WALSH

ENGINEERING ASSOCIATES, INC.

January 14, 2025

Maine Coastal Program
32 Blossom Lane
21 State House Station
Augusta, Maine 04330

RE: CZMA Federal Consistency Review Submission
Arundel Yacht Club
Kennebunkport, Maine 04046

To Whom it May Concern,

On behalf of the Arundel Yacht Club (AYC, Applicant), Walsh Engineering Associates, Inc. (WEA), is pleased to submit the enclosed Coastal Zone Management Act (CZMA) Federal Consistency Review submission for the proposed dredging project to take place in the Kennebunk River, at the AYC's marina. A Federal Consistency Review is required because two federal permits from the U.S. Army Corps of Engineers (USACE) are necessary to conduct the dredging/disposal work. This project also requires a state permit from the Maine Department of Environmental Protection (DEP) and local permits from the Town of Kennebunkport. A list of all permits required for the project, the associated regulatory entities, and the status of permit application submissions are shown in the table below:

Required Permit/Approval	Regulatory Entity	Status
Section 408	USACE	Submitted 9/6/2024
Individual Standard Permit	USACE	Submitted 10/3/2024
Natural Resources Protection Act Individual Permit	Maine DEP	Submitted 10/3/2024
Kennebunk River Committee Approval	Town of Kennebunkport/Kennebunk	To be submitted February/ March 2025
Kennebunk River Harbor Master Approval	Town of Kennebunkport/Kennebunk	To be submitted February/ March 2025
Activities and Land Use Permit	Town of Kennebunkport	To be submitted following River Committee/Harbor Master approval
Site Plan Review	Town of Kennebunkport	To be submitted following River Committee/Harbor Master approval
Flood Hazard Development Permit	Town of Kennebunkport	To be submitted following River Committee/Harbor Master approval

A Federal Consistency Submission Form is included with this letter, as well as copies of the USACE Section 408 and Individual Standard Permit applications that were submitted on September 6, and October 3, 2024, respectively, and the Maine DEP Natural Resources Protection Act (NRPA) Individual Permit application that was submitted on October 3, 2024.

On behalf of the applicant, thank you in advance for your review of this submission. We look forward to working with you and the Maine Coastal Program to make this project successful.

Respectfully,

Leyna L. Tobey

Leyna Tobey, PE – Project Manager
Walsh Engineering Associates, Inc.

cc. AYC – Costas Balomenos
USACE – Heather Stukas
Maine DEP – Alison Sirois

Enc. Federal Consistency Submission Form
AYC USACE Section 408 Permit Application (Submitted on September 6, 2024)
AYC USACE Individual Standard Permit Application (Submitted on October 3, 2024)
AYC Maine DEP NRPA Individual Permit Application (Submitted on October 3, 2024)

Federal Consistency Submission Form

Maine Coastal Program
Coastal Zone Management Act
Federal Consistency Submission Form

The Maine Coastal Program (MCP) is the lead agency for Coastal Zone Management in Maine. MCP strongly suggests that applicants for a federal consistency determination or certification use this form for activities regulated under the Coastal Zone Management Act (CZMA) of 1972, as amended, and the National Oceanic and Atmospheric Administration (NOAA) Federal Consistency Regulations under 15 CFR Part 930. Although use of this form is not required, it is provided to applicants to facilitate the submission and timely review of a consistency determination or certification. Federal agencies and applicants are only required to provide the information listed in NOAA's Federal Consistency Regulations unless otherwise described in the Maine Guide to Federal Consistency Review, as approved by NOAA.

I. Applicant Information:

Project/Activity Name: Arundel Yacht Club Dredging	
Contact Name: Costas Balomenos (on behalf of the Arundel Yacht Club, Applicant)	Authorized Agent (if applicable): Walsh Engineering Associates, Inc. (c/o - Leyna Tobey)
Federal Agency: N/A	
Address: 51 Ocean Avenue	
City: Kennebunkport	State: Maine — Zip Code: 04046
Email: leyna@walsh-eng.com (Authorized Agent)	Phone Number: 207-553-9898 (Authorized Agent)

II. Federal Consistency Category:

☐	Federal Agency Activity (15 CFR Part 930, subpart C)
☒	Federal License or Permit Activity (15 CFR Part 930, subpart D)
☐	Outer Continental Shelf Activity (15 CFR Part 930, subpart E)
☐	Federal Financial Assistance Activity to State/Local Government (15 CFR Part 930, subpart F)

III. Summary Description:

The project includes dredging of the Kennebunk River at the Arundel Yacht Club's marina to provide adequate depth for navigation.

IV. Select enforceable policies relevant to project or activity:

☒	Natural Resources Protection Act (38 M.R.S. §§480-A to 480-S; and 480-U to 480-HH)
☐	Site Location of Development Law (38 M.R.S. §§481 to 485-A; 486-A, -B; 487-A to 490-FF)
☐	Maine Metallic Mineral Mining Act (38 M.R.S. §§490-LL to 490-TT)
☐	MaineDOT Traffic Movement Permit Law (23 M.R.S. §704-A)
☐	Erosion Control and Sedimentation Law (38 M.R.S. §420-C)
☐	Expedited Permitting of Grid-scale Wind Energy Development (35-A M.R.S. §§3451-3459)
☐	Solar Energy Development Decommissioning Law (35-A M.R.S. chapter 34-D)
☐	Storm Water Management Law (38 M.R.S. §420-D)
☐	Maine Waterway Development and Conservation Act (38 M.R.S. §§630 to 636-A; 640)
☐	Protection and Improvement of Air Law (38 M.R.S. §§581 to 610-A, -B)
☐	Protection and Improvement of Waters Act (38 M.R.S. §§361-A, 362, 362-A, 363-D, 372; 410-N; 411 to 424; 451, 451-A, 452; 464 to 470)
☐	Nutrient Management Act (7 M.R.S. §§4201 to 4214)
☐	Land Use Regulation Law (12 M.R.S. §§681 to 689)
☐	Maine Hazardous Waste, Septage and Solid Waste Management Act (38 M.R.S. §§1301 to 1310-BB; 1316 to 1316-L; 1317 to 1319-Y)
☐	Uncontrolled Hazardous Substance Sites Law (38 M.R.S. §§1362, 1367, 1367-B)
☐	Asbestos Law (38 M.R.S. §§1273 and 1281)
☐	Lead Abatement Law (38 M.R.S. §§1296 and 1298(3))
☐	Sale of Consumer Products Affecting the Environmental Law (38 M.R.S. §§1608 and 1609-10)
☐	Mercury-Added Products and Services Law (38 M.R.S. §§1661 to 1661-C; 1665-A, -B; 1672
☐	Solid Waste Management and Recycling Law (38 M.R.S. §§2101; 2133, sub-§2(A); 2165
☐	Priority Toxic Chemical Use Reduction Law (38 M.R.S. §§2321 to 2330)
☐	Wellhead Protection Law (38 M.R.S. §§1391 to 1399)
☐	Nuclear Facility Decommissioning Laws (PL 1999 c. 739; PL 1999 c. 741)
☐	Oil Discharge Prevention & Pollution Control Law (38 M.R.S. §§541 to 560)
☐	Oil Storage Facilities and Ground Water Protection Law (38 M.R.S. §§561; 562-A; 563, sub-§1(A) and 2; 563-A to -B; 564; 565-A; 566-A; 568; 568-A to -B; 569-C; 570; 570-C to -G, I to M
☒	Maine Endangered Species Act (12 M.R.S. §12801 to 12810; 12 M.R.S. §6971 to 6976; 12 M.R.S. §10001, sub-§§19 and 62)
☐	General Licensing and Enforcement Authorities; Fees (38 M.R.S. §§341-D; 344 to 349; 352 to 353; 353-A, -B)
☐	Maine Rivers Act (12 M.R.S. §§403; 407)
☐	Marine Resources Law (12 M.R.S. §§6171 to 6192; 6432-A)
☐	Importing of Certain Marine Organisms (12 M.R.S. §6071)
☐	Aquaculture Leasing Laws (12 M.R.S. §6071-A; 12 M.R.S. §6072; 12 M.R.S. §6072-A; 12 M.R.S. §6073)
☐	Subdivision Law (30-A M.R.S. §§4401 to 4408)
☐	Mandatory Shoreland Zoning Law (38 M.R.S. §§435 to 448)
☐	Coastal Management Policies Act (38 M.R.S. §§1801 to 1802)
☐	Coastal Barrier Resources System Act (38 M.R.S. §§1901 to 1905)

V. Supporting Documentation. Please list all maps, diagrams, reports, and other materials below:

Copies of the U.S. Army Corps of Engineers Section 408 Permit and Individual Standard Permit applications and the Maine Department of Environmental Protection Natural Resources Protection Act (NRPA) Individual Permit application are attached to this Federal Consistency Submission Form. These applications include a project description, dredging plans, an alternatives analysis, and more.

VI. Other Coordination. Please list all agencies and contacts required to review this project below:

U.S. Army Corps of Engineers: Section 408 Permit, Individual Standard Permit
Maine DEP: NRPA Individual Permit Application
Town of Kennebunkport: Kennebunk River Committee Approval, Harbor Master Approval, Activities and Land Use Permit, Site Plan Review, Flood Hazard Development Permit Review

VII. Statement of Determination/Certification and Signature. Check one and sign below:

☐	FEDERAL AGENCY CONSISTENCY DETERMINATION. Based upon the information, data, and analysis included herein, the federal agency or its authorized agent finds the proposed activity is consistent to the maximum extent practicable with the enforceable policies of the Maine Coastal Program.
☐	FEDERAL AGENCY NEGATIVE DETERMINATION. Based upon the information, data, and analysis included herein, the federal agency or its authorized agent finds the proposed activity will not have any reasonably foreseeable effects on Maine's coastal uses or resources.
▣	NON-FEDERAL APPLICANT CONSISTENCY CERTIFICATION. Based upon the information, data, and analysis included herein, the non-federal applicant certifies that the proposed activity complies with the enforceable policies of Maine Coastal Program and will be conducted in a manner consistent with such program.

Signature: Leyna L Tobey	Digitally signed by Leyna Tobey, PE Date: 2025.01.14 13:29:58-05'00'
Printed Name: Leyna Tobey	Date: 1/14/2025

AYC USACE Section 408 Permit Application
(Submitted on September 6, 2024)

Army Corp of Engineers
Section 408

For

Arundel Yacht Club
51 Ocean Ave
Kennebunkport, ME 04046

September 6, 2024

Applicant
Arundel Yacht Club
P.O. Box 328
Kennebunkport, ME 04046

Prepared By:

WALSH
ENGINEERING ASSOCIATES, INC.

One Karen Drive, Suite 2A
Westbrook, Maine
207.553.9898

September 6, 2024

U.S. Army Corps of Engineers – Maine Project Office
Heather S. Stukas – Project Manager
442 Civic Center Drive, Suite 350
Augusta, ME 04330

**RE: Section 408 Permit
Arundel Yacht Club Dredging
51 Ocean Avenue
Kennebunkport, Maine**

Dear Ms. Stukas:

Walsh Engineering Associates, Inc. (WEA) is requesting permission for a single-phased review for a private entity (the Arundel Yacht Club, Applicant) to make alterations adjacent to, and to temporarily occupy, a U.S. Army Corps of Engineers (USACE) Federally Authorized Civil Work Project under 33 USC 408 (Section 408). The applicant is proposing to mechanically dredge a portion of the Kennebunk River adjacent to, but not within, the Kennebunk River Federal Navigation Project (FNP). The proposed dredging actions are not anticipated to be injurious to the public interest or impair the usefulness of the USACE project.

The Arundel Yacht Club (AYC) is located at 51 Ocean Avenue in Kennebunkport, Maine with 161 feet of frontage on the Kennebunk River. The Town of Kennebunkport Assessor's Office identifies the parcel as Map 10, Lot 1, Block 5. The facility is an 0.42-acre parcel of land with an 18,100 square foot 1.5-story shingled historical building known as the "Thomas Goodwin Rope Walk," which is now used as the yacht club. The property maintains associated parking areas and 50 boat slips (see Figure 1 – Section 408 Plan attached to this letter).

The shoaling that is occurring in the AYC's marina area makes vessels more susceptible to groundings and exposes them to hazardous conditions when tides and weather create rough seas. Bathymetric surveys of the FNP have identified sufficient shoaling that presents a navigational hazard.

Proposed Action
The Applicant is proposing to mechanically dredge the following:

- Proposed dredged volume = 8,031 cubic yards of silt and sand
- Area of dredge = 180-foot x 290-foot area (48,620 square feet)
- Proposed dredge depth = elevation -6.0 feet mean low water, with about 1 foot of over-dig

The purpose of this project is to dredge the shoaled areas of the FNP to restore safe vessel navigation at the AYC, and to dispose of dredged material in the most appropriate location. The dredged material will be transported by barge to an open water placement disposal site yet to be approved. Please refer to Figure 2 – Plan View and Figure 3 – Section Views, attached to this letter, for detailed dredging information.

Alteration, Occupation, and Use of the FNP
Federal Navigation Projects are authorized, constructed, and maintained on the premise that they will be accessible and available to all on equal terms. These Projects include a wide array of channels and harbors that provide for the needs of fishing vessels, commercial shippers, recreational boaters, and national defense.

Given the anticipated timing for receiving USACE General Permit Approval, Maine Department of Environmental Protection (DEP) Natural Resources Protection Act (NRPA) Approval, and a Disposal Authorization, WEA anticipates that the dredging equipment would temporarily occupy the area during the winter 2025-2026 dredge window. WEA will be working closely with the AYC and the designated dredging company to ensure the alteration of the FNP by dredging will be in the manner and amount that has been designated and approved. The dredge will only temporarily occupy the FNP for the amount of time needed to dredge the area (anticipated to be two days).

A 1976 USACE map showing the original limits of the Kennebunk River FNP is attached to this letter, as well as an updated map from 2020 showing revised coordinates for the upstream limits of the FNP.

Operation, Maintenance, and Repair
Sand shoals accumulate rapidly in this area of the Kennebunk River, creating the need for regular maintenance dredging. The AYC site has an extensive history of dredging dating back to the 1970s, with the most recent USACE permit issued for a maintenance dredge in August 2015 (Permit #NAE-2006-26), and the most recent Maine DEP Permit by Rule (PBR) issued in January 2017 (Permit #L-22701-4E-A-N). Any dredging that takes place is only a temporary measure until the AYC identifies the need for additional dredging in the future.

Potential Impacts to Usefulness of the FNP
No potential impacts to the usefulness of the FNP are anticipated. The project is not anticipated to be injurious to the public interest.

Statement of No Objection
Please see the Statement of No Objection Letter from the project's Non-Federal Sponsor, the Town of Kennebunkport, attached to this letter.

Endangered Species
The National Marine Fisheries Service and the U.S. Fish and Wildlife Service have been consulted to ensure that the proposed activity will not significantly affect any species or critical habitat designated as endangered or threatened pursuant to the Endangered Species Act (ESA) of 1973. It is our determination that the project is not likely to adversely affect threatened or endangered species.

Cultural Resources
The Maine Historic Preservation Commission (MHPC) has been consulted and determined that there will be no historic properties affected by the proposed undertaking as defined by Section 106 of the National Historic Preservation Act. The Passamaquoddy Tribe and the Mi'kmaq Nation Tribal Historic Preservation Office (THPO) have both determined that the project will have no impact on cultural and historical concern. Project correspondence regarding cultural resources is attached to this letter.

Essential Fish Habitat Assessment
The project may have a temporary adverse effect on Essential Fish Habitat (EFH). The project site is located within areas designated as EFH for Atlantic Salmon Rearing Habitat. The project is likely to have short-term and localized impacts to EFH, with no significant impacts to these habitats anticipated.

Additional Requirements – Water Quality Certification
The Maine DEP "*has combined the decision concerning water quality certification with the review of an application for a state permit that already requires compliance with state water quality standards…the issuance of the order approving the project constitutes both the state permit and the water quality certification.*" The project team is planning to file a Maine DEP NRPA Permit Application following the approval of this Section 408 Application. In accordance with the statement quoted above, the NRPA Permit Approval will constitute both the state permit and the Water Quality Certification and can be provided to the USACE upon receipt.

If you have any questions or concerns with this project, please feel free to contact me at (207) 553-9898 or by e-mail at leyna@walsh-eng.com. We look forward to working with you on this project.

Respectfully,

Leyna L Tobey

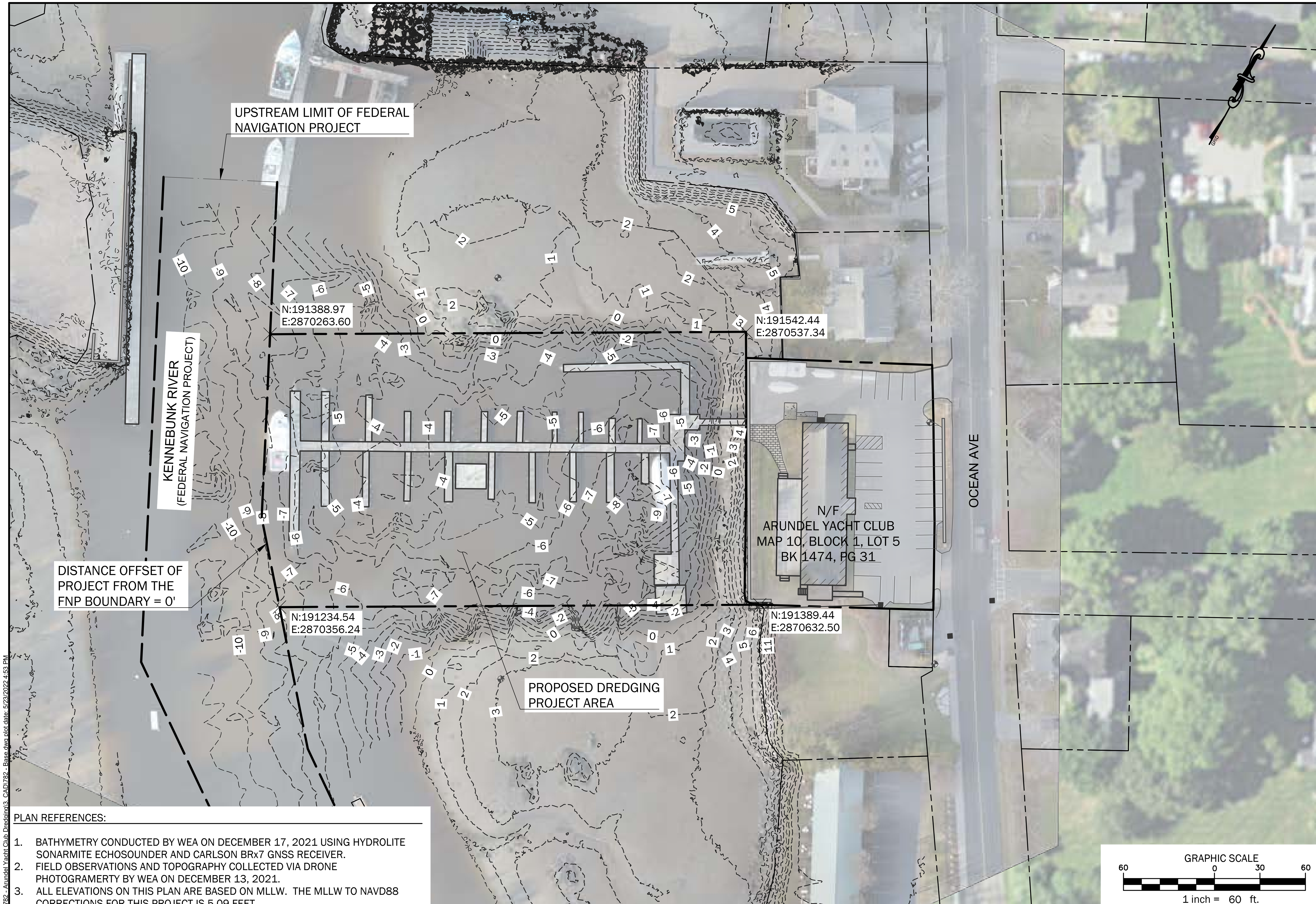
Leyna Tobey, PE – Project Manager
Walsh Engineering Associates, Inc.

cc. AYC
Enc. Section 408 Project Plans
- Figure 1 – Section 408 Plan, Figure 2 – Dredging Plan View, Figure 3 – Dredging Section View

Kennebunk River FNP Maps
- USACE 1976 Kennebunk River FNP Map, USACE 202 Kennebunk River FNP Map

Statement of No Objection Letter from Non-Federal Sponsor
- Town of Kennebunkport Letter dated August 30, 2024

Cultural Resources Correspondence
- MHPC Conclusion Statement dated March 9, 2022
- THPO Notification dated February 24, 2022
- THPO Responses dated March 2, 2022, March 3, 2022, and June 15, 2022



PLAN REFERENCES:

1. BATHYMETRY CONDUCTED BY WEA ON DECEMBER 17, 2021 USING HYDROLITE SONARMITE ECHOSOUNDER AND CARLSON BRx7 GNSS RECEIVER.
2. FIELD OBSERVATIONS AND TOPOGRAPHY COLLECTED VIA DRONE PHOTOGRAMERTY BY WEA ON DECEMBER 13, 2021.
3. ALL ELEVATIONS ON THIS PLAN ARE BASED ON MLLW. THE MLLW TO NAVD88 CORRECTIONS FOR THIS PROJECT IS 5.09 FEET.

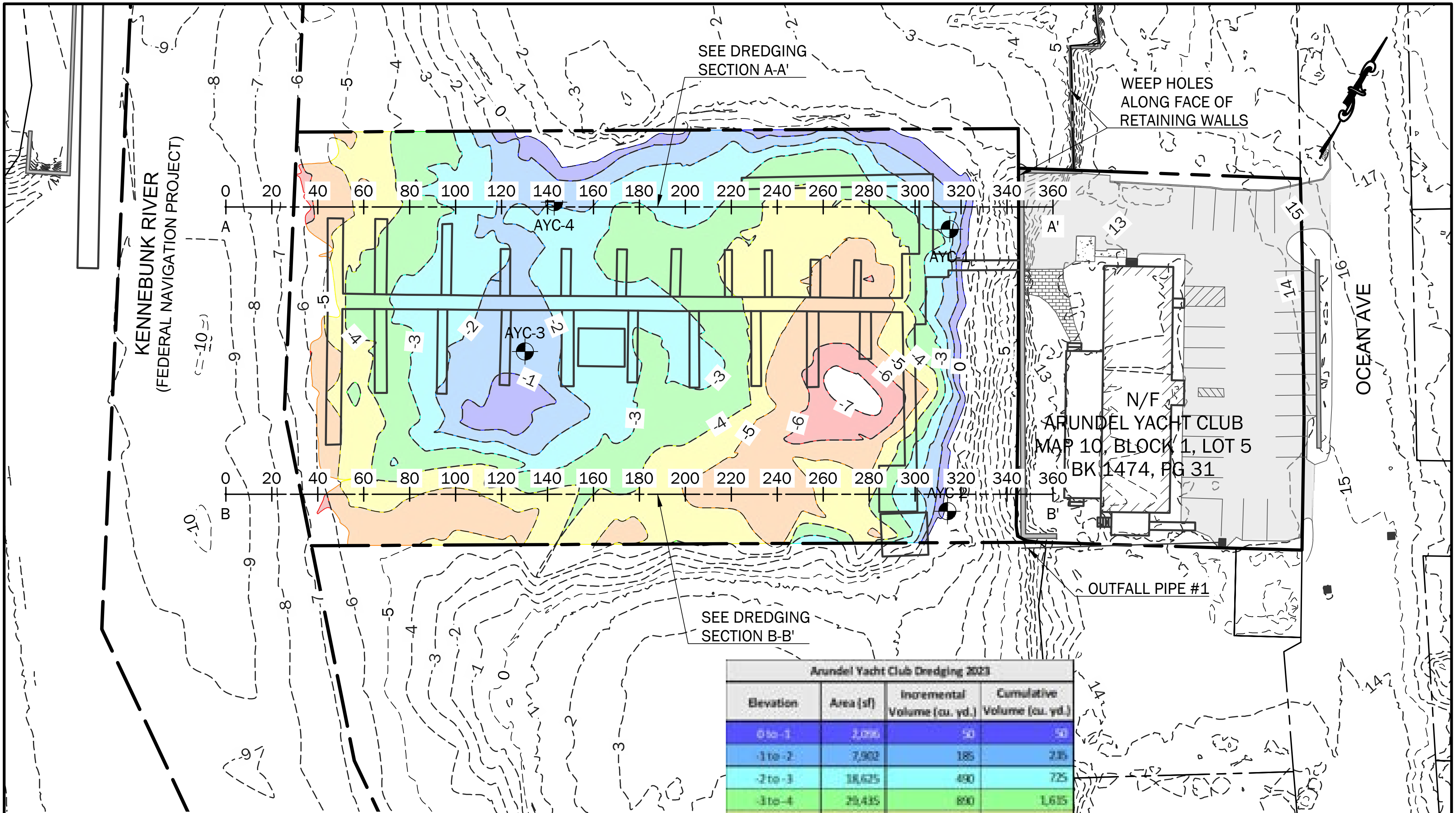
Sheet Number: 1

Sheet Title: Section 408 Plan

Job No.:	782
Date:	November 2021
Scale:	1" = 60'
Drawn:	CAR
Checked:	WRW

Arundel Yacht Club
51 Ocean Avenue
Kennebunkport, Maine 04046

WALSH ENGINEERING ASSOCIATES, INC.
One Karen Dr., Suite 2A | Westbrook, Maine 04092
ph: 207.553.9898 | www.walsh-eng.com



Arundel Yacht Club Dredging 2023			
Elevation	Area (sf)	Incremental Volume (cu. yd.)	Cumulative Volume (cu. yd.)
0 to -1	2,096	50	50
-1 to -2	7,902	185	235
-2 to -3	18,625	490	725
-3 to -4	29,435	890	1,615
-4 to -5	39,853	1,285	2,900
-5 to -6	47,368	1,635	4,535
-6 to -7	48,620	1,890	6,425
Total Dredge Volume w/ 25% Bulking Factor			8,031 cu. yd.

PLAN REFERENCES:

1. BATHYMETRY CONDUCTED BY WEA ON NOVEMBER 17, 2023 USING A HYDROLITE SONARMITE ECHOSOUNDER AND CARLSON BRx7 GNSS RECEIVER.
2. TOPOGRAPHIC DATA COLLECTED BY WEA VIA A DJI M300 DRONE EQUIPPED WITH A ZENMUSE L1 LIDAR CAMERA ON NOVEMBER 21, 2023.
3. ALL ELEVATIONS ON THIS PLAN ARE BASED ON THE MLLW VERTICAL DATUM. ELEVATIONS IN NAVD88 HAVE BEEN RAISED BY 5.14 FEET TO THE MLLW DATUM.

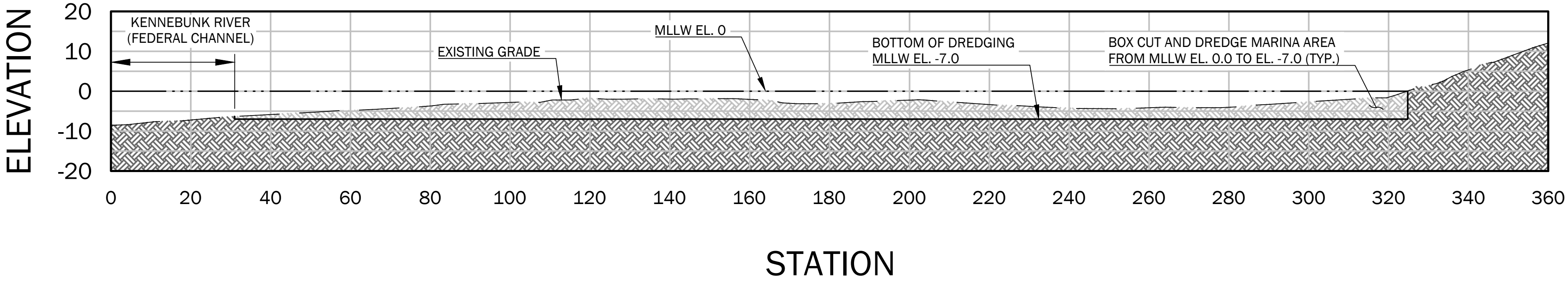
WALSH
ENGINEERING ASSOCIATES, INC.
One Karen Dr., Suite 2A | Westbrook, Maine 04092
ph: 207.553.9898 | www.walsh-eng.com

Arundel Yacht Club Dredging: 2023 Bathymetry

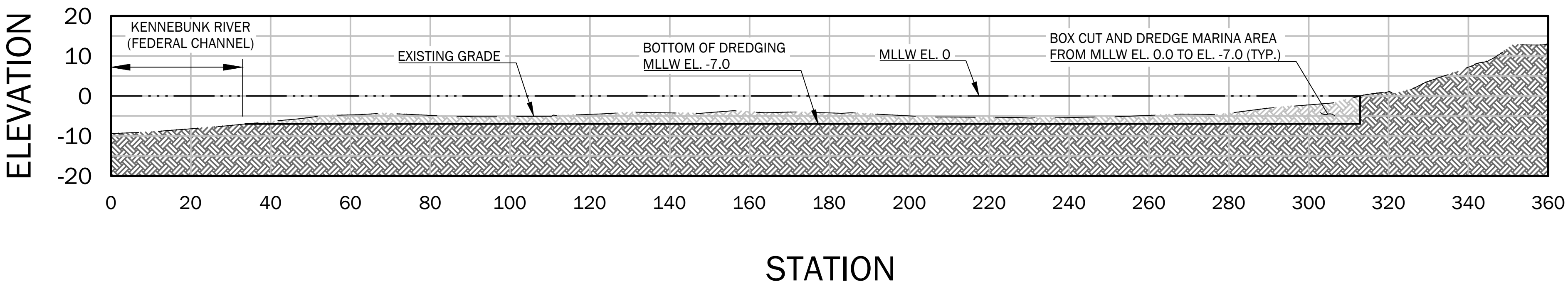
Arundel Yacht Club
51 Ocean Ave
Kennebunkport, Maine 04046

Sheet Title:
Figure 2: Plan View

Job No.:	782
Date:	December 2023
Scale:	1" = 60'
Drawn:	CAR
Checked:	WRW

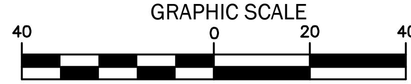


Dredging Section A-A'



Dredging Section B-B'

GRAPHIC SCALE



1 inch = 40 ft.

WALSH
ENGINEERING ASSOCIATES, INC.
One Karen Dr., Suite 2A | Westbrook, Maine 04092
ph: 207.553.9898 | www.walsh-eng.com

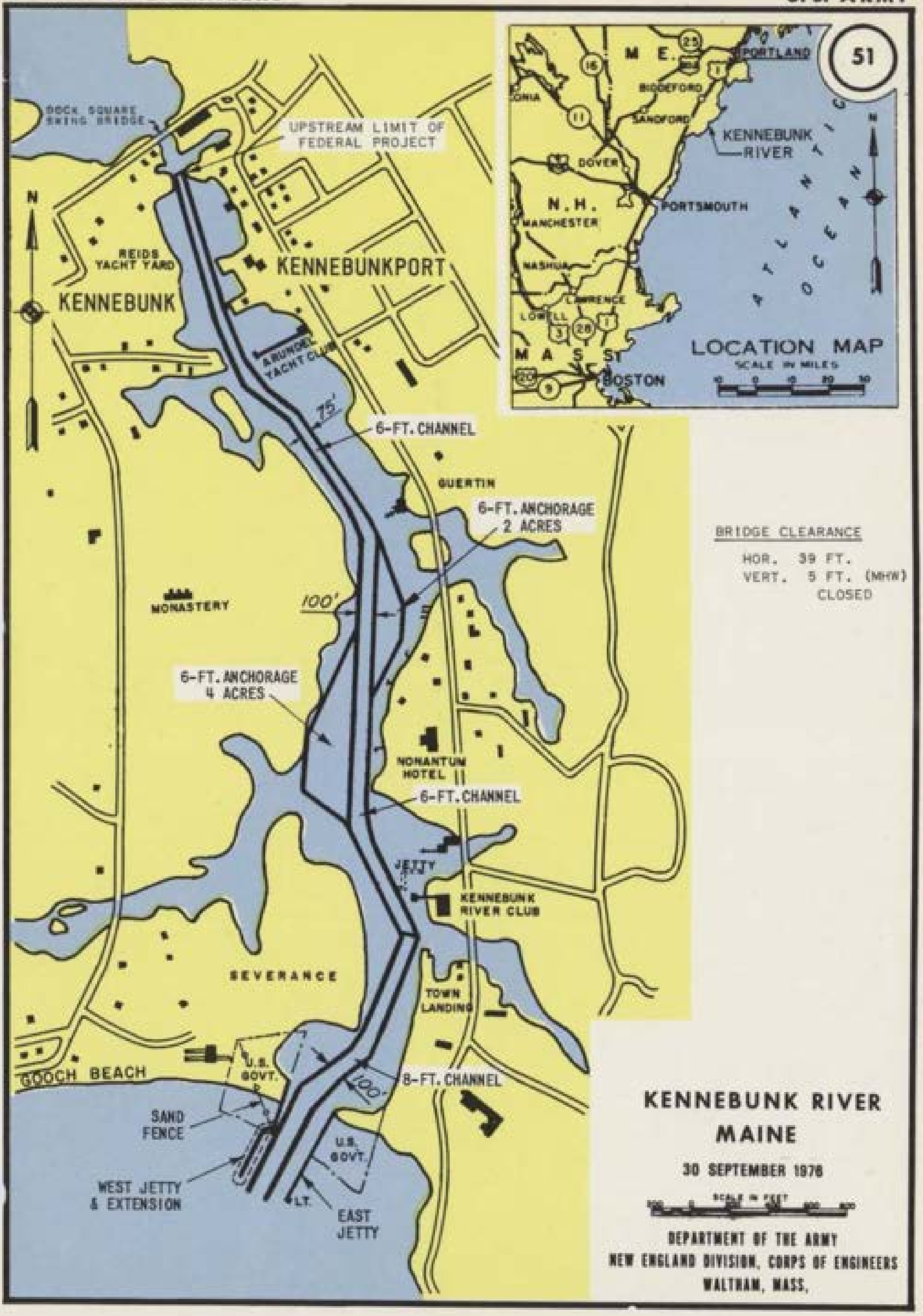
Arundel Yacht Club Dredging: 2023 Bathymetry

Arundel Yacht Club
51 Ocean Ave
Kennebunkport, Maine 04046

Sheet Title:
Figure 3: Section Views

Job No.:	782
Date:	December 2023
Scale:	1" = 40'
Drawn:	CAR
Checked:	WRW

P:\782 - Arundel Yacht Club Dredging\3. CAD\782 - Base.dwg plot date: 12/20/2023 2:35 PM



KENNEBUNK RIVER
MAINE

30 SEPTEMBER 1976

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

KENNEBUNK RIVER
MAINE
6 AND 8-FOOT CHANNELS
6-FOOT ANCHORAGE
STATE PLANE COORDINATES NAD 83
MAINE WEST ZONE (1802)

#	EASTING	NORTHING
1	2870190.46	186839.76
2	2870613.60	187634.56
3	2870822.49	187767.06
4	2870900.74	187871.89
5	2871053.72	188410.19
6	2871149.91	188382.86
7	2870991.89	187826.84
8	2870891.61	187692.48
9	2870752.79	187604.42
10	2870654.23	187498.07
11	2870278.73	186792.77
12	2871021.73	188297.62
13	2871010.07	188447.20
14	2870782.53	188940.19
15	2870818.94	189593.56
16	2870881.55	189933.12
17	2870870.45	190521.09
18	2870841.68	190609.23
19	2870581.42	190929.12
20	2870480.44	191024.34

#	EASTING	NORTHING
21	2870294.03	191158.63
22	2870151.82	191445.64
23	2870219.02	191478.94
24	2870317.45	191280.29
25	2870417.87	191161.85
26	2870589.15	191038.46
27	2870935.01	190613.36
28	2870970.80	190503.71
29	2870971.94	190443.03
30	2870981.72	189924.92
31	2870918.43	189581.67
32	2870889.33	189059.31
33	2870925.66	188868.73
34	2870615.35	189085.40
35	2870645.97	189634.89
36	2870738.62	189838.12
37	2870801.55	189838.12
38	2871085.67	190066.77
39	2871078.16	189932.05

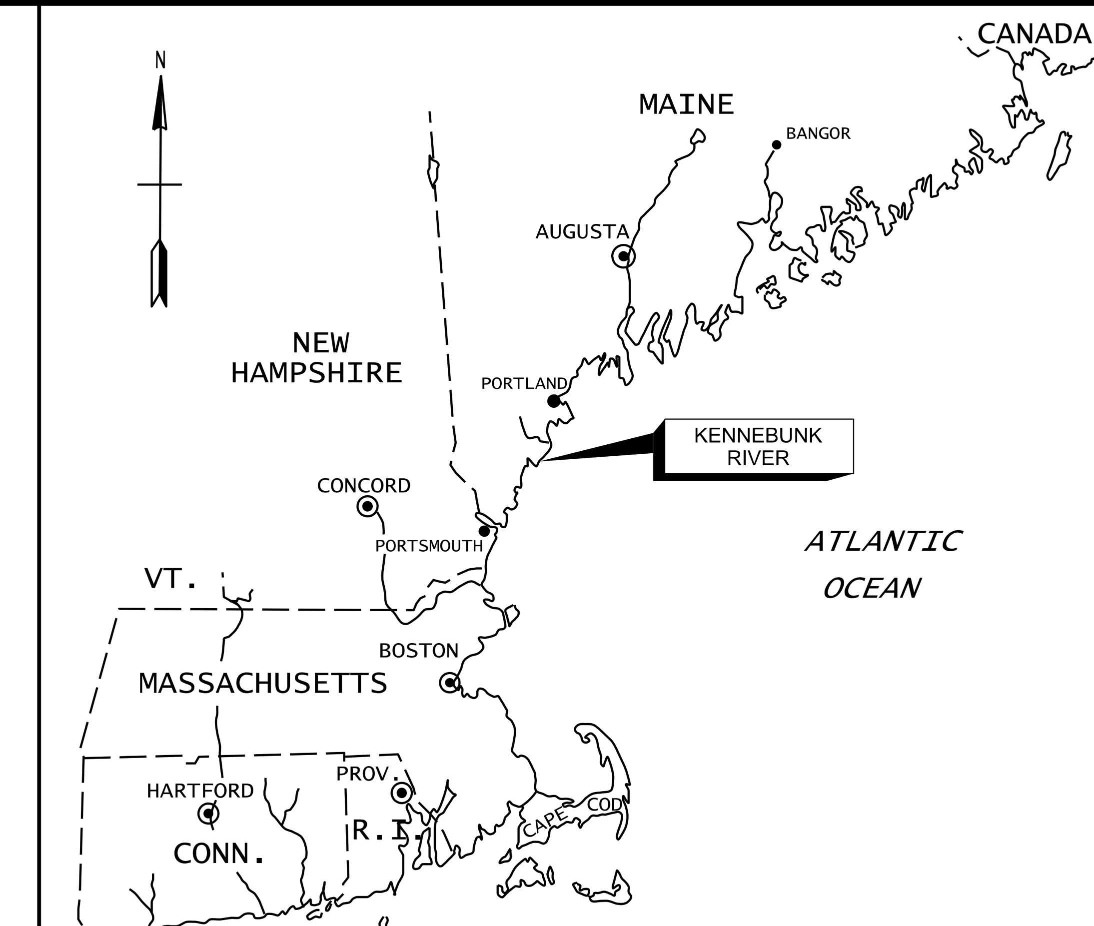
GENERAL NOTES:

1. KENNEBUNK RIVER (CENAE_ME_63_KNR) SEE SHEET V-001.
   REACH NAMES: 8-FOOT CHANNEL, 6-FOOT CHANNEL REACH 1, 6-FOOT CHANNEL REACH 2, 6-FOOT EAST ANCHORAGE, AND 6-FOOT WEST ANCHORAGE.

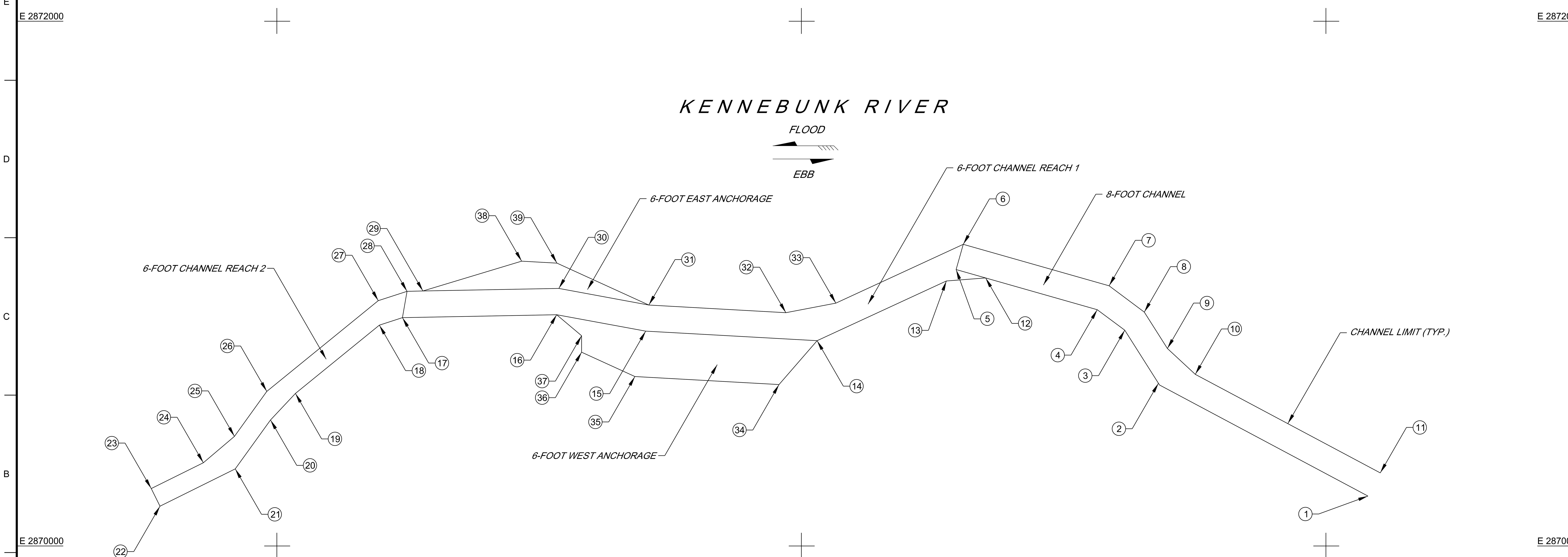
2. FOR HYDROGRAPHIC SURVEY INFORMATION SEE USACE HYRDROGRAPHIC SURVEYS (EHYDRO) WEB SITE:

USACE DISTRICT	USACE CHANNEL	CHANNEL ID
NAE	KENNEBUNK RIVER	CENAE_ME_63_KNR

3. COORDINATES SHOWN ARE BASED ON THE LAMBERT GRID SYSTEM FOR THE STATE OF MAINE WEST ZONE (1802), NAD 1983 AND ARE BASED ON U.S. SURVEY FEET.



LOCATION MAP
NOT TO SCALE



A1 GENERAL PLAN
SCALE: 1" = 200'

U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD, MA 01742-2751

DWN BY: EMA	CHK BY:	ISSUE DATE:
REVIEWED BY: ZSM Asst. Chief, Survey Sec.		SOLICITATION NO.:
APPROVED BY: Chief, Survey Section		CONTRACT NO.:
SIZE: ANSI D	SCALE: 1:1	DRAWING CODE: ME_63_KNR_NP_2020 SHEET 1 OF 1

KENNERBUNK RIVER
KENNEBUNKC AND KENNEBUNKPORT, MAINE
FEDERAL NAVIGATION PROJECT

6 AND 8-FOOT CHANNELS
6-FOOT ANCHORAGE

SHEET ID
V-001

TOWN OF KENNEBUNKPORT, MAINE

– INCORPORATED 1653 –

August 30, 2024

U.S. Army Corps of Engineers – Maine Project Office
Heather S. Stukas – Project Manager
442 Civic Center Drive, Suite 350
Augusta, ME 04330

RE: Statement of No Objection from the Non-Federal Sponsor

Dear Ms. Stukas:

Walsh Engineering Associates, Inc. (WEA) is requesting permission for a private entity (the Arundel Yacht Club, Applicant) to make alterations adjacent to, and temporarily occupy, a U.S. Army Corps of Engineers (USACE) Federally Authorized Civil Work Project under 33 USC 408 (Section 408).

As I understand, the Arundel Yacht Club (AYC) is seeking to mechanically dredge the shoaled areas of the Kennebunk River within the AYC marina, which is adjacent to the USACE's Federal Navigation Project, in order to restore safe vessel navigation at the marina. The shoaling that is occurring in the AYC's marina area makes vessels more susceptible to groundings and exposes them to hazardous conditions when tides and weather create rough seas. Bathymetric surveys of the Federal Navigation Project have identified sufficient shoaling that presents a navigational hazard.

The proposed dredging actions are not anticipated to be injurious to the public interest or impair the usefulness of the USACE Federal Navigation Project. This Statement of No Objection does not grant the project permission to move forward with construction. Once the AYC receives USACE Section 408 Approval, they will proceed with filing the following project permits: USACE General Permit Pre-Construction Notification; Maine DEP Natural Resources Protection Act (NRPA) Permit; and Town of Kennebunkport Activities and Land Use, Site Plan Review, Flood Hazard Development, River Committee Approval, and Harbor Master Approval applications.

Sincerely,

Laurie A. Smith
Town Manager

Cc: Jamie Houtz, Kennebunk River Harbormaster

6 Elm Street, P.O. Box 566, Kennebunkport, Maine 04046
Tel: (207) 967-4243 Fax: (207) 967-8470

WALSH
ENGINEERING ASSOCIATES, INC.

RECEIVED
FEB 28 2022
By 0331-22

February 24, 2022

Mr. Kirk F. Mohney, Director
Maine Historic Preservation Commission
55 Capitol Street
65 State House Station
Augusta, Maine 04333-0065

RE: Arundel Yacht Club Historic Review
51 Ocean Ave, Kennebunkport ME
Map 10, Lot 1, Block 5

Dear Mr. Mohney,

Please take note that the Arundel Yacht Club intends to file permit applications with the Maine DEP for dredging activities located in the Kennebunk River offshore of 51 Ocean Ave in Kennebunkport, Maine. Walsh Engineering Associates is requesting that the MHPC review the area for any known historic and/or archaeological resources. A site plan location map is attached for your review.

If you have any questions or concerns with this project, please feel free to contact me at (207) 553-9898 or by e-mail at randee@walsh-eng.com. Thank you in advance for your timely comments.

Respectfully,

RMcDonald

Randee McDonald
Project Coordinator
Walsh Engineering Associates

Enc: Location Plan

Based on the information submitted, I have concluded that there will be no historic properties affected by the proposed undertaking, as defined by Section 106 of the National Historic Preservation Act. Consequently, pursuant to 36 CFR 800.4(d)(1), no further Section 106 consultation is required unless additional resources are discovered during project implementation pursuant to 36 CFR 800.13.

Kirk F. Mohney

Kirk F. Mohney,
State Historic Preservation Officer
Maine Historic Preservation Commission

3/9/22
Date

February 24, 2022

THPO
Houlton Band of Maliseet Indians
88 Bell Road Littleton, Maine 04730
istjohn@maliseets.com

THPO
Passamaquoddy Tribe of Indians
Pleasant Point Reservation
PO Box 343 Perry, Maine 04667
soctomah@gmail.com

THPO
Passamaquoddy Tribe of Indians
Indian Township Reservation
P.O. Box 301 Princeton, Maine 04668
soctomah@gmail.com

THPO
Mi'kmaq Nation
7 Northern Road Presque Isle, Maine 04769
kreis@micmac-nsn.gov

THPO
Cultural and Historic Preservation Dept.12
Wabanaki Way Indian Island, Maine 04468
chris.sockalexis@penobscotnation.org

VIA email as noted above

RE: Arundel Yacht Club Historic Review
51 Ocean Ave, Kennebunkport ME
Map 10, Lot 1, Block 5

Please take note that the Arundel Yacht Club intends to file permit applications with the Maine DEP for dredging activities located in the Kennebunk River offshore of 51 Ocean Ave in Kennebunkport, Maine. Walsh Engineering Associates is requesting that the THPO review the area for any known historic and/or archaeological resources. A site plan location map is attached for your review.

If you have any questions or concerns with this project, please feel free to contact me at (207) 553-9898 or by e-mail at randee@walsh-eng.com. Thank you in advance for your timely comments.

Respectfully,

RMcDonald

Randee McDonald
Project Coordinator
Walsh Engineering Associates

Enc: Location Plan

Tribal Historic Preservation Office
Passamaquoddy Tribe
PO Box 159 Princeton, Me. 04668
207-214-4051

March 2, 2022

Randee McDonald
Project Coordinator
One Karen Drive, Suite 2A
Westbrook, ME 04092

- Re: Kennebunkport – 51 Ocean Ave

Dear Randee;

The Passamaquoddy THPO has reviewed the following applications regarding the historic properties and significant religious and cultural properties in accordance with NHPA, NEPA, AIRFA, NAGPRA, ARPA, Executive Order 13007 Indian Sacred Sites, Executive Order 13175 Consultation and Coordination with Indian Tribal Governments, and Executive Order 12898 Environmental Justice.

The Projects listed above will not have any impact on cultural and historical concerns of the Passamaquoddy Tribe. Should buried artifacts, human remains, cultural sites or ground features be unexpectedly unearthed during ground disturbing activities, all construction should immediately cease and the resources be examined by a professional archaeologist. Additionally, all appropriate authorities-including all pertinent tribal entities should be notified.

Sincerely;

Donald Soctomah
Soctomah@gmail.com
THPO
Passamaquoddy Tribe

Tribal Historic Preservation Office
Mi'kmaq Nation (Formerly known as the Aroostook Band of Micmac)
Kendyl Reis
Tribal Historic Preservation Officer
7 Northern Road
Presque Isle, ME 04769
Phone: (207)764-1972 ext. 161
Fax: (207)764-7667
Email: kreis@micmac-nsn.gov
Arundel Yacht Club Project

51 Ocean Ave, Kennebunkport, Maine
March 3rd, 2022

Thank you for the opportunity to review the above-referenced project for compliance with National Environmental Policy Act (NEPA) and National Historic Preservation Act (NHPA), or other, requirements.

Based on the project description, we do not have knowledge of any specific sites or cultural features that exist at the proposed project location.

However, this geographic area does constitute traditional areas that were historically utilized by members of the Mi'kmaq Nation and the other Wabanaki Tribes. Therefore, we respectfully request that if during the course of excavation/construction activities, human remains, artifacts, or any other evidence of Native American presence is discovered, that site activities in the vicinity of the discovery immediately cease, pending notification to us.

In addition, if this project results in wetland disturbances requiring mitigation, we are requesting that you utilize the black ash (Fraginus nigra) as the principal wetland species for wetland restoration activities. The black ash tree has special significance in the culture of the northeastern Tribes and is used extensively for weaving baskets and other Native American crafts. The black ash tree also provides valuable food and habitat for migratory waterfowl and other wildlife. Unfortunately, however, this species has been selected against by foresters and landowners who favor other tree species. As a result of this, and other environmental factors, the black ash tree is in serious decline in Maine. The Mi'kmaq Nation has completed several black ash wetland restoration projects and have a dependable source for highly-quality seedlings, and the experience and expertise to assist you with black ash wetland restoration projects.

On the subject of human remains, artifacts, or any other evidence of Native American presence is discovered. The human remains will be reburied with the appropriate respect for the remains that is required at a distinctive and respectable site. The artifacts and other evidence of Native American discovery will be documented with appropriate detail. The items will be analyzed for the precise period of the items' distinctive period and will be documented by the Tribal Historic Preservation Officer for the Mi'kmaq Nation.

If you have any questions or comments, please feel free to contact me.

Sincerely,

Kendyl Reis
Tribal Historic Preservation Officer

PENOBSCOT NATION
CULTURAL & HISTORIC PRESERVATION
12 WABANAKI WAY, INDIAN ISLAND, ME 04468

CHRIS SOCKALEXIS – TRIBAL HISTORIC PRESERVATION OFFICER
E-MAIL: chris.sockalexis@penobscotnation.org

NAME	Randee McDonald
ADDRESS	Walsh Engineering Associates One Karen Drive, Suite 2A Westbrook, ME 04092
OWNER'S NAME	Arundel Yacht Club
TELEPHONE	(207) 553-9898
EMAIL	Randee@Walsh-eng.com
PROJECT NAME	Maintenance Dredging
PROJECT SITE	Kennebunkport, ME
DATE OF REQUEST	February 24, 2022
DATE REVIEWED	June 15, 2022

Thank you for the opportunity to comment on the above referenced project. This project appears to have no impact on a structure or site of historic, architectural or archaeological significance to the Penobscot Nation as defined by the National Historic Preservation Act of 1966, as amended.

If there is an inadvertent discovery of Native American cultural materials during the course of the project, please contact my office at (207) 817-7471. Thank you for consulting with the Penobscot Nation Tribal Historic Preservation Office with this project.

Chris Sockalexis, THPO
Penobscot Nation

AYC USACE Individual Standard Permit Application
(Submitted on October 3, 2024)

New England District of the U.S. Army Corps of Engineers General Permit Application/Pre-Construction Notification

For

Arundel Yacht Club
51 Ocean Ave
Kennebunkport, Maine

October 3, 2024

Applicant
Arundel Yacht Club
51 Ocean Ave
Kennebunkport, Maine

Prepared By:

WALSH
ENGINEERING ASSOCIATES, INC.

One Karen Drive, Suite 2A
Westbrook, Maine
207.553.9898

WALSH
ENGINEERING ASSOCIATES, INC.

October 3, 2024

U.S. Army Corps of Engineers – New England District
c/o Ms. Heather S. Stukas
442 Civic Center Drive, Suite 350
Augusta, ME 04330

RE: New England District of USACE General Permit Application
Pre-Construction Notification
Arundel Yacht Club
Kennebunkport, Maine 04046

Dear Heather,

On behalf of the Arundel Yacht Club (AYC, Applicant), Walsh Engineering Associates, Inc. (WEA), is pleased to submit the enclosed General Permit Application/Pre-Construction Notification to the New England District of the United States Army Corps of Engineers (USACE) for the proposed dredging activities to take place in the Kennebunk River located adjacent to the AYC.

The AYC is located at 51 Ocean Ave in Kennebunkport, Maine, with 161 feet of frontage along the Kennebunk River. The Town of Kennebunkport Assessor's Office identifies the parcel as Map 10, Block 5, Lot 1. The facility is a 0.42-acre parcel of land with an 18,100 square foot 1.5-story shingled historical building known as the "Thomas Goodwin Rope Walk," which is now used as the AYC. The property maintains associated parking areas and fifty boat slips. The proposed dredge area is coincidental with the area that was previously permitted under Maine Department of Environmental Protection (DEP) Permit #L-22701-4E-A-N in 2006. Since that time, it has been dredged in August 2015 under Maine DEP's Permit by Rule (PBR) process and USACE Permit #NAE-2006-26, and once more in January 2017 under another PBR.

As described in this application, a USACE Section 408 Permit is required to conduct the dredging work, as the project is located adjacent to the Kennebunk River Federal Navigation Project; a Section 408 Permit application for the project was submitted to the USACE on September 6, 2024. In addition, this Pre-Construction Notification is being submitted concurrently with a Maine DEP Natural Resources Protection Act (NRPA) Application.

On behalf of the applicant, thank you in advance for your review of this application. We look forward to working with you and the department to make this project successful.

Respectfully,

Leyna L Tobey

Leyna Tobey, PE – Project Manager
Walsh Engineering Associates, Inc.

cc. AYC
Enc. Pre-Construction Notification & Supporting Documents

Table of Contents
USACE – Pre-Construction Notification
Arundel Yacht Club
Kennebunkport, ME 04046

Pre-Construction Notification Checklist
Application for Department of the Army Permit (ENG Form 4345)
Agent Authorization

Activities Description.. Attachment 1
Dredging Figures .... Attachment 2
Alternatives Analysis.. Attachment 3
Site Conditions Report .... Attachment 4
Historic Sites .... Attachment 5
Abutters List... Attachment 6
Construction and Erosion Control Plan .... Attachment 7
Sampling & Analysis Plan.. Attachment 8
List of Authorizations Required for Project .... Attachment 9

Pre-Construction Notification Checklist

US Army Corps of Engineers®
New England District

Section VII: Content of a Pre-Construction Notification

In addition to the following required information, the applicant must provide additional information as the Corps deems essential to make a public interest determination including, where applicable, a determination of compliance with the Section 404(b)(1) guidelines or ocean dumping criteria. Such additional information may include environmental data and information on alternate methods and sites as may be necessary for the preparation of the required environmental documentation. For a more comprehensive checklist, go to *www.nae.usace.army.mil/missions/regulatory* >> Forms >> Application and Plan Guideline Checklist. Please check with the Corps for project-specific requirements.

Information required for all projects:

- ☑ DIGITAL SUBMISSIONS ARE ENCOURAGED (email PCN to **cenae-r-me@usace.army.mil**)
- ☑ Completed Corps application form (ENG Form 4345 attached below or found electronically at *www.usace.army.mil/Missions/Civil-Works/Regulatory-Program-and-Permits/Obtain-a-Permit*) or appropriate state application form. Forms may need to be supplemented to include the information noted below.
- ☑ Proof of notification to MHPC and all five federally-recognized tribes (see Section VIII for contact info).
- ☑ Official Species List for any federally-listed endangered or threatened species and email address of the person who generated the list.
- ☑ Drawings, sketches, or plans (detailed engineering plans and specifications are not required) that are legible, reproducible (color is encouraged, but features must be distinguishable in black and white), no larger than 8.5"x11", with bar scale (plans overlaid on aerial photos are discouraged). Wetland area impact sheets shall have the highest resolution possible to show work within Corps jurisdiction (do not just reduce project overview or cut large-scale plan into quadrant sheets). Provide locus map and a plan overview of the entire property with a key index to the individual impact sheets. A locus map be on a section of color USGS topographic map.
- ☑ Include:
  - ☑ All direct, secondary, permanent and temporary effects the project would cause, including the anticipated amount of impacts to waters of the U.S. expected to result from the activity, in acres, linear feet, or other appropriate unit of measure.
  - ☐ Any historic permanent fill associated with each single and complete project. N/A
  - ☐ Cross-section views of all wetland and waterway fill areas and wetland replication areas. N/A
  - ☐ Document on project plans wetlands, other special aquatic sites (SAS) including vegetated shallows (or submerged aquatic vegetation, SAV) and mudflats, natural rocky habitat, shellfish areas, vernal pools, and other waters, such as lakes and ponds, and perennial, and intermittent streams on the project site (GC1). N/A
  - ☑ MLW line, MHW mark, and HTL elevations in tidal waters. Show OHWM elevation in lakes and non-tidal streams.
  - ☑ **Existing and proposed conditions.**
- ☑ Volume, type, and source of fill material to be discharged into waters and wetlands, including the area(s) (in square feet or acres) of fill in wetlands, below OHWM in inland waters and below the HTL in coastal waters.
- ☐ If applicable, a restoration plan showing how all temporary fills and structures will be removed and the area restored to pre-project conditions (see GC 21). N/A

Information that may be required:

☑ Photographs of wetland/waterway to be impacted. Photos at low tide are preferred for work in tidal waters.
☑ For drawings, sketches, or plans:
  ☑ The vertical datum for all coastal projects and projects in towns bordering coastal waters shall be in U.S. survey feet and referenced to MLLW and include current tidal epoch, with a reference chart showing conversion factor to the North American Vertical Datum of 1988. Do not use local datum. See *www.nae.usace.army.mil/missions/regulatory* >> Forms and Publications >>Vertical Datum - FEMA (Jul 2007);
  ☑ The horizontal state plane coordinates shall be shown on plan and elevation views and shall be in the North American Datum of 1983 (NAD83) State Plane Coordinate System in U.S. survey feet.
□ For the construction of a filled area or pile or float-supported platform, the use of, and specific structures to be erected on, the fill or platform. N/A
☑ For the discharge of dredged or fill material into waters of the U.S. or the transportation of dredged material for the purpose of disposing of it in ocean waters, the source of the material; the purpose of the discharge, a description of the type, composition and quantity of the material; the method of transportation and disposal of the material; and the location of the disposal site.
☑ For the discharge of dredged or fill material into waters of the U.S., include a statement describing how impacts to waters of the U.S. are to be avoided and minimized. Include either a statement describing how impacts to waters of the U.S. are to be compensated for or a statement explaining why compensatory mitigation should not be required for the proposed impacts.
☑ Purpose and need for the proposed activity;
☑ Limits and coordinates of any Federal Navigation Project in the vicinity of the project area.
□ Limits and coordinates of any proposed mooring field, reconfiguration zone or aquaculture activity. Provide coordinates for all corners; N/A
☑ Schedule of construction/activity;
☑ Names and addresses of adjoining property owners;
□ Location and dimensions of adjacent structures; N/A
☑ Alternatives analysis;
□ Wetland delineation data sheets; N/A
☑ List of authorizations required by other federal, interstate, state, or local agencies for the work, including all approvals received or denials already made.
☑ Identification and description of potential impacts to Essential Fish Habitat (see GC 17).
☑ Identification of potential discharges of pollutants to waters, including potential impacts to impaired waters, in the project area.
□ Invasive Species Control Plan (see GC 22). For sample control plans, see *www.nae.usace.army.mil/Missions/Regulatory/Invasive-Species* N/A
□ Wildlife Action Plan (WAP) maps. Contact the Maine Department of Inland Fisheries & Wildlife (Section VIII) or online at *www.maine.gov/ifw/wildlife/conservation/action_plan.html* N/A

Information for dredging projects that may be required:

☑ Sediment testing, including physical (e.g., grain-size analysis), chemical and biological testing. For projects proposing open water disposal, applicants must contact the Corps as early as possible regarding sampling and testing protocols. Sampling and testing of sediments without such contact should not occur and if done, would be at the applicant's risk.
☑ The area in square feet and volume of material to be dredged below mean high water.
□ Existing and proposed water depths. N/A
☑ Type of dredging equipment to be used.
☑ Nature of material (e.g., silty sand).
☑ Any existing sediment grain size and bulk sediment chemistry data for the proposed or any nearby projects.
□ Information on the location and nature of municipal or industrial discharges and occurrence of any contaminant spills in or near the project area. N/A
□ Shellfish survey. N/A
☑ Location of the disposal site (include locus sheet).
☑ Identification and description of any potential impacts to Essential Fish Habitat.
□ Delineation of submerged aquatic vegetation (e.g., eelgrass beds). N/A

<u>Information for tidal crossing projects that may be required</u>: N/A

- □ A graphic longitudinal elevation profile plot of the tidal stream channel thalweg, both up and downstream of the proposed project site. Thalweg elevations shall extend from the crossing to beyond the zone of scour, channel widening, or other channel alteration resulting from the present or pre-existing crossings. The profile plot should include labeled elevations for the:
  - □ crossing invert and top of the inlet and outlet
  - □ roadbed crown
  - □ lowest and highest recorded tides at the site
  - □ reference datums, such as MLLW, MHHW, and astronomical high tide
  - □ hydraulic controls and nearest crossings that could influence or be influenced by the proposed crossing
- □ A graphic plot of continuous tidal water levels recorded up and downstream, simultaneously, of the proposed crossing for an entire lunar cycle. The water level plot should include labeled elevations for the:
  - □ crossing invert and crossing top at the inlet and outlet
  - □ roadbed crown
  - □ reference datums, such as MLLW, MHHW, and astronomical high tide
- □ A map showing projected extents of maximum flooding within the area influenced by the crossing under current conditions and as a result of sea level rise. The present minimum sea level rise scenario suggested for planning purposes by the Maine Climate Council Scientific and Technical Subcommittee is the Intermediate Scenario, which projects an increase of 3.0-4.6 feet by 2100.

<u>Information for aquaculture projects that may be required</u>: N/A

- □ Maine Aquaculture guidelines and joint Corps/Maine DMR applications may be found at: *www.maine.gov/dmr/aquaculture/index.htm*
- □ In addition to the information required above, applications should also include:
  - □ Results of coordination with Harbor Master and U.S. Coast Guard
  - □ Whether canopy predator nets are being used.

Application for Department of the Army Permit (ENG Form 4345)

U.S. Army Corps of Engineers (USACE)

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT

For use of this form, see 33 CFR 325. The proponent agency is CECW-CO-R.

Form Approved - OMB No. 0710-0003 Expires: 08-31-2023

The public reporting burden for this collection of information, OMB Control Number 0710-0003, is estimated to average 11 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or burden reduction suggestions to the Department of Defense, Washington Headquarters Services, at whs.mc-alex.esd.mbx.dd-dod-information-collections@mail.mil. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR APPLICATION TO THE ABOVE EMAIL.

PRIVACY ACT STATEMENT

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public and may be made available as part of a public notice as required by Federal law. Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued. One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and/or instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned. System of Record Notice (SORN). The information received is entered into our permit tracking database and a SORN has been completed (SORN #A1145b) and may be accessed at the following website: http://dpcld.defense.gov/Privacy/SORNsIndex/DOD-wide-SORN-Article-View/Article/570115/a1145b-ce.aspx

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME First - Matthew Middle - Last - Tuller Company - Arundel Yacht Club E-mail Address - matt@atlanticcomfort.com	8. AUTHORIZED AGENT'S NAME AND TITLE (agent is not required) First - Leyna Middle - L. Last - Tobey Company - Walsh Engineering Associates, Inc. E-mail Address - leyna@walsh-eng.com
6. APPLICANT'S ADDRESS: Address- P.O. Box 328 City - Kennebunkport State - Maine Zip - 04046 Country - USA	9. AGENT'S ADDRESS: Address- 1 Karen Drive, Suite 2A City - Westbrook State - Maine Zip - 04092 Country - USA
7. APPLICANT'S PHONE NOs. w/AREA CODE a. Residence b. Business c. Fax	10. AGENTS PHONE NOs. w/AREA CODE a. Residence 207-553-9898 b. Business c. Fax

STATEMENT OF AUTHORIZATION

11. I hereby authorize, Walsh Engineering Associates, Inc. to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

*See Attached Agent Authorization

SIGNATURE OF APPLICANT DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)
Arundel Yacht Club Dredging

13. NAME OF WATERBODY, IF KNOWN (if applicable) Kennebunk River	14. PROJECT STREET ADDRESS (if applicable) Address 51 Ocean Ave City - Kennebunkport State- Maine Zip- 04046
15. LOCATION OF PROJECT Latitude: ◦N 43°21'29.77" Longitude: ◦W 70°28'31.64"	

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)

State Tax Parcel ID 3428 Municipality Kennebunkport

Section - Township - Range -

17. DIRECTIONS TO THE SITE

From Portland, take I-95 South; Exit 32, Route ME-111, then onto Precourt Street; turn right onto US-1 South, then left onto Log Cabin Road; left onto Maine Street; right onto ME-9; then 2nd left onto Ocean Ave.

18. Nature of Activity (Description of project, include all features)

The Applicant is proposing to mechanically dredge the following:

•Proposed dredged volume = 8,031± cubic yards of silt and sand

•Area of dredge = 180 foot x 250 foot area (45,356 square feet)

•Proposed dredge depth = elevation -6.0 plus a one foot overdig

The dredged material would be transported by barge to the Isle of Shoals North (IOSN) open water disposal site. Please refer to Figure 1 - Plan View and Figure 2 - Section Views for detailed information.

19. Project Purpose (Describe the reason or purpose of the project, see instructions)

The applicant is proposing to mechanically dredge approximately 8,031± cubic yards of sediment from the area in front of the AYC, including in and around the boat slips, to provide adequate depth for navigation and berthing. Silt, sand, and other natural deposits have impacted the marina of the AYC and have limited boat navigation and berthing depths, especially during periods of low tide.

USE BLOCKS 20-23 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge

An alternatives analysis is attached to this application, describing how onshore disposal and beneficial use of dredged materials are infeasible for this project. As a result, the dredged material is proposed to be transported by barge to the Isle of Shoals North (IOSN) open water disposal site.

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards:

Type Amount in Cubic Yards	Type Amount in Cubic Yards	Type Amount in Cubic Yards
8,031 CY - silt and sand		

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

Acres 45,356 SF; 1.04 acres

or

Linear Feet

23. Description of Avoidance, Minimization, and Compensation (see instructions)

Walsh Engineering Associates will be working closely with the Arundel Yacht Club and the selected dredging contractor to ensure the dredging will be conducted in the manner and amount that has been designated and approved.

24. Is Any Portion of the Work Already Complete? ☐ Yes ☒ No IF YES, DESCRIBE THE COMPLETED WORK

25. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (if more than can be entered here, please attach a supplemental list).

a. Address- See attached 150-foot abutters list

City - State - Zip -

b. Address-

City - State - Zip -

c. Address-

City - State - Zip -

d. Address-

City - State - Zip -

e. Address-

City - State - Zip -

26. List of Other Certificates or Approvals/Denials received from other Federal, State, or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED
Maine DEP	NRPA	*See Attached List of Authorizations Required for Project			
Town of Kennebunkpor	Site Plan Review				
Town of Kennebunkpor	Flood Hazard Developmen				
Town of Kennebunkpor	Activities and Land Use				

* Would include but is not restricted to zoning, building, and flood plain permits

27. Application is hereby made for permit or permits to authorize the work described in this application. I certify that this information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

Leyna L Tobey
Digitally signed by Leyna Tobey, PE
Contact Info: leyna@walsh-eng.com
Date: 2024.10.03 11:51:15-04'00'

SIGNATURE OF APPLICANT DATE SIGNATURE OF AGENT DATE

The Application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

Agent Authorization

To Whom It May Concern,

By this letter, the undersigned, a representative of the Arundel Yacht Club authorizes Walsh Engineering Associates, Inc. to act as the agent for the undersigned in the preparation and submission of all Federal, State, and Local City permit applications and relevant documents and correspondence for all necessary permits for the dredging of the AYC Marina located at 51 Ocean Ave, Kennebunkport, Maine; to attend meetings and site visits; to appear before all boards, commissions, and committees, and to provide such other services as are necessary and appropriate in furtherance of the aforementioned project.

Sincerely,

Signature

Anita O. Carroll AYC Vice Commodore
Printed Name and Title

1/27/2022
Date

Attachment 1 – Activities Description

1.1 – Site Location Plan

1.2 – Photo Log

1.3 – Disposal Site Locus (Isle of Shoals North)

1.4 – Kennebunk River FNP Map (1976)

1.5 – Updated Kennebunk River FNP Map (2020)

1.0 Activities Description

The Arundel Yacht Club (AYC) is located at 51 Ocean Avenue in Kennebunkport, Maine, with 161 feet of frontage along the Kennebunk River. The Town of Kennebunkport's Assessor's Office identifies the parcel as Map 10, Block 5 Lot 1. The facility is a 0.42-acre parcel of land with an 18,100 square foot 1.5-story shingled historical building known as the "Thomas Goodwin Rope Walk," which is now used as the yacht club. The property maintains associated parking areas and 50 boat slips.

Existing Conditions

The AYC is located approximately 0.75-mile from the mouth of the Kennebunk River. The Kennebunk River flows generally southeast, past the towns of Lyman, Arundel, Kennebunk, and Kennebunkport. It enters the Atlantic Ocean in Kennebunkport, approximately 0.5-mile downstream from the town center. The surrounding area, with its high density of marinas and other waterfront uses, has an extensive history of dredging. The AYC's dredging activities date back to the 1970s, with the most recent permits issued for maintenance dredging in 2017. Silt, sand, and other natural deposits have impacted the marina of the AYC and have limited boat navigation and berthing depths, especially during periods of low tide.

Proposed Project

The applicant is proposing to mechanically dredge approximately 8,031± cubic yards of sediment from the area in front of the AYC, including in and around the boat slips, to provide adequate depth for navigation and berthing.

The area of the dredge will be an approximately 180-foot by 250-foot area (~45,356 square feet). The proposed dredge depth will be to elevation -6.0 feet mean low water, with about one foot of over-dig. It is anticipated that dredging will coincide with neighboring marinas performing dredging at the same approximate time (see "Adjacent Dredging Projects" section below). The material will be transported by barge to the Isle of Shoals North Disposal Site (IOSN). The IOSN is located approximately 15 nautical miles east of Portsmouth, New Hampshire, in the Gulf of Maine. A site location plan of the dredge location, a photo log of the existing site, and a locus map of the IOSN disposal site are attached to this Activities Description.

The proposed AYC dredge area is coincidental with the area that was previously permitted under Maine Department of Environmental Protection (DEP) Permit #L-22701-4E-A-N in 2006. Since that time, it has been dredged in August 2015 under Maine DEP's Permit by Rule (PBR) and U.S. Army Corps of Engineers (USACE) Permit #NAE-2006-26, and in January 2017 under Maine DEP's PBR.

Given the timing for receiving permit approvals from Maine DEP and USACE, WEA anticipates that the work will occur during the winter 2025-2026 dredge window.

Work Adjacent to a Federal Navigation Project

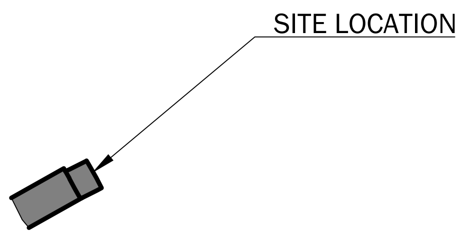
The applicant is proposing to mechanically dredge a portion of the Kennebunk River adjacent to, but not within, the Kennebunk River Federal Navigation Project (FNP), a USACE Federally Authorized Civil Work Project under 33 USC 408 (Section 408). A Section 408 Permit Application was submitted to the USACE for this project on September 6, 2024.

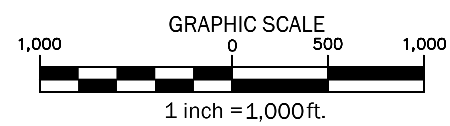
WEA will be working closely with the AYC and the designated dredging company to ensure the alteration of the FNP by dredging will be in the manner and amount that has been designated and approved. The dredge will only temporarily occupy the FNP for the amount of time needed to dredge the area (anticipated to be two days). The proposed dredging actions are not anticipated to be injurious to the public interest or impair the usefulness of the USACE project.

A 1976 USACE map showing the original limits of the Kennebunk River FNP is attached to this Activities Description, as well as an updated map from 2020 showing revised coordinates for the upstream limits of the FNP.

Adjacent Dredging Projects

The dredging of the AYC will coincide with similar dredging work at three adjacent marinas on the Kennebunk River, including the Yachtsman Marina, the Kennebunkport Marina, and the Kennebunk River Club.





WALSH
ENGINEERING ASSOCIATES, INC.

One Karen Dr., Suite 2A | Westbrook, Maine 04092
ph: 207.553.9898 | www.walsh-eng.com

Arundel Yacht Club Dredging

Arundel Yacht Club
51 Ocean Avenue
Kennebunkport, Maine 04046

Sheet Title:
Figure 1: Overview Plan

Job No.:	782
Date:	November 2021
Scale:	1" = 1,000'
Drawn:	CAR
Checked:	WRW

WALSH
ENGINEERING ASSOCIATES, INC.

PHOTO LOG

Arundel Yacht Club Dredge

Kennebunkport, ME

Photo No. 1

Date: 1/28/2022

Site Location:
Arundel Yacht Club

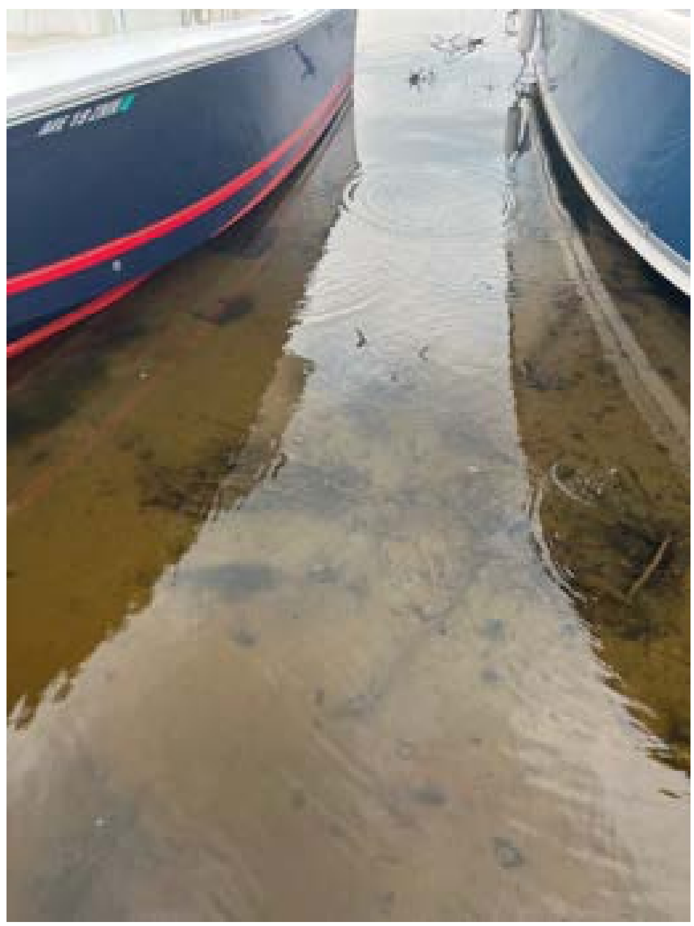
Description:
View of the Arundel Yacht Club.

Photo No. 2

Date: 11/15/2021

Site Location:
Arundel Yacht Club

Description:
View of the adjacent Kennebunk River and approximate dredge location.

Photo No. 3 **Date:** 11/15/2021 **Site Location:** Arundel Yacht Club **Description:** Additional view of approximate dredge location.	
Photo No. 4 **Date:** 8/4/2023 **Site Location:** Arundel Yacht Club **Description:** Boat slips in the marina.	

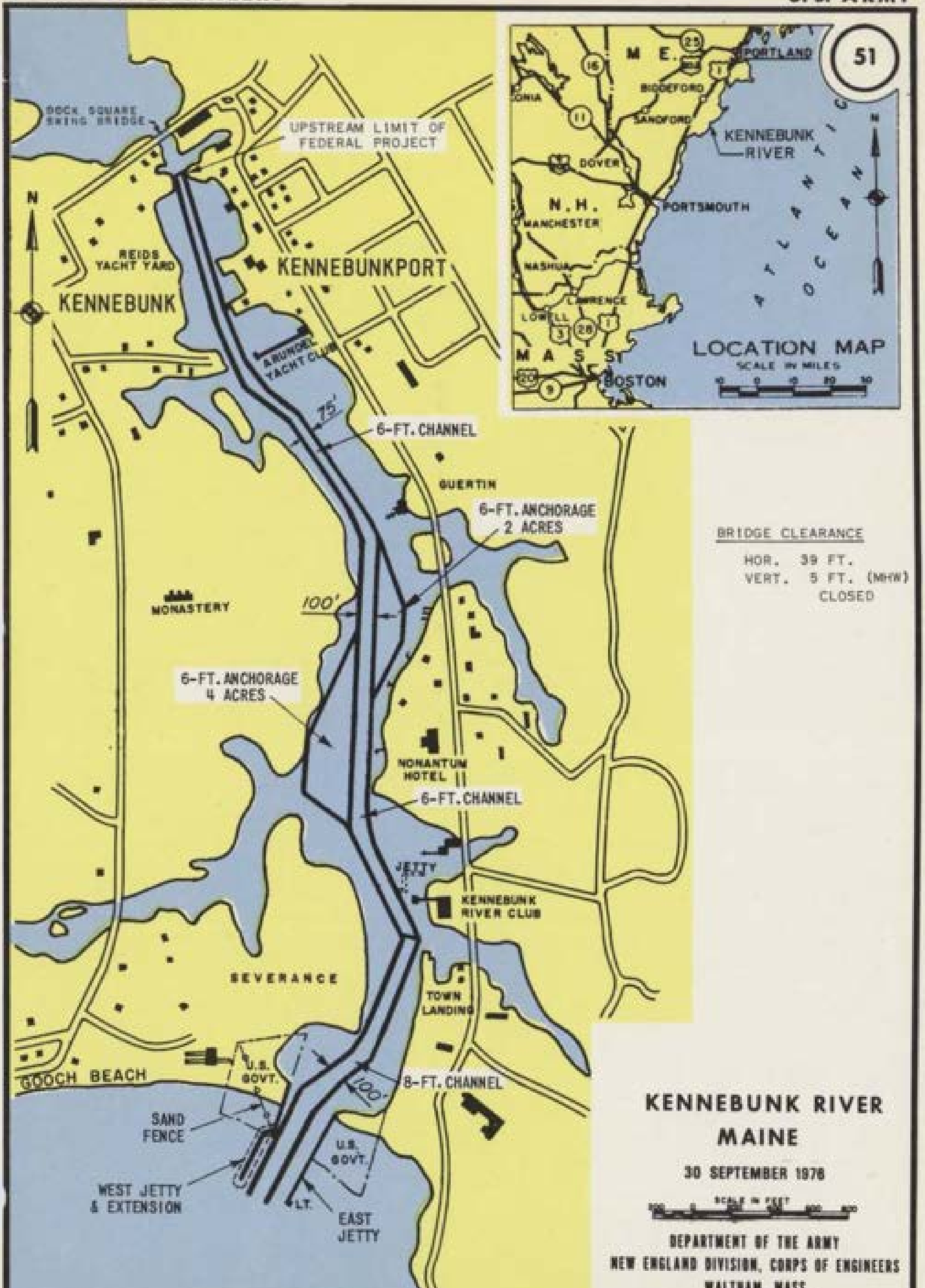
WALSH
ENGINEERING ASSOCIATES, INC.

One Karen Dr., Suite 2A | Westbrook, Maine 04092
ph: 207.553.9898 | www.walsh-eng.com

Arundel Yacht Club Dredging

Arundel Yacht Club
51 Ocean Avenue
Kennebunkport, Maine 04046

Sheet Title: **Dredge Disposal Site Location**	
Job No.:	782
Date:	January 2022
Scale:	1" = 24,000'
Drawn:	KEW
Checked:	WRW


51
DOCK SQUARE SWING BRIDGE
UPSTREAM LIMIT OF FEDERAL PROJECT
REIDS YACHT YARD
KENNEBUNK
KENNEBUNKPORT
ARUNDEL YACHT CLUB
75'
6-FT. CHANNEL
GUERTIN
6-FT. ANCHORAGE 2 ACRES
MONASTERY
100'
6-FT. ANCHORAGE 4 ACRES
NONANTUM HOTEL
6-FT. CHANNEL
JETTY
KENNEBUNK RIVER CLUB
SEVERANCE
TOWN LANDING
GOOCH BEACH
U.S. GOVT.
100'
8-FT. CHANNEL
SAND FENCE
U.S. GOVT.
WEST JETTY & EXTENSION
LT.
EAST JETTY
M E.
PORTLAND
BIDDEFORD
SANFORD
KENNEBUNK RIVER
DOVER
N.H.
MANCHESTER
PORTSMOUTH
NASHUA
LAWRENCE
LOWELL
M A S S.
BOSTON
ATLANTIC OCEAN
LOCATION MAP
SCALE IN MILES
BRIDGE CLEARANCE
HOR. 39 FT.
VERT. 5 FT. (MHW)
CLOSED
KENNEBUNK RIVER
MAINE
30 SEPTEMBER 1976
SCALE IN FEET
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

KENNEBUNK RIVER
MAINE
6 AND 8-FOOT CHANNELS
6-FOOT ANCHORAGE
STATE PLANE COORDINATES NAD 83
MAINE WEST ZONE (1802)

#	EASTING	NORTHING
1	2870190.46	186839.76
2	2870613.60	187634.56
3	2870822.49	187767.06
4	2870900.74	187871.89
5	2871053.72	188410.19
6	2871149.91	188382.86
7	2870991.89	187826.84
8	2870891.61	187692.48
9	2870752.79	187604.42
10	2870654.23	187498.07
11	2870278.73	186792.77
12	2871021.73	188297.62
13	2871010.07	188447.20
14	2870782.53	188940.19
15	2870818.94	189593.56
16	2870881.55	189933.12
17	2870870.45	190521.09
18	2870841.68	190609.23
19	2870581.42	190929.12
20	2870480.44	191024.34

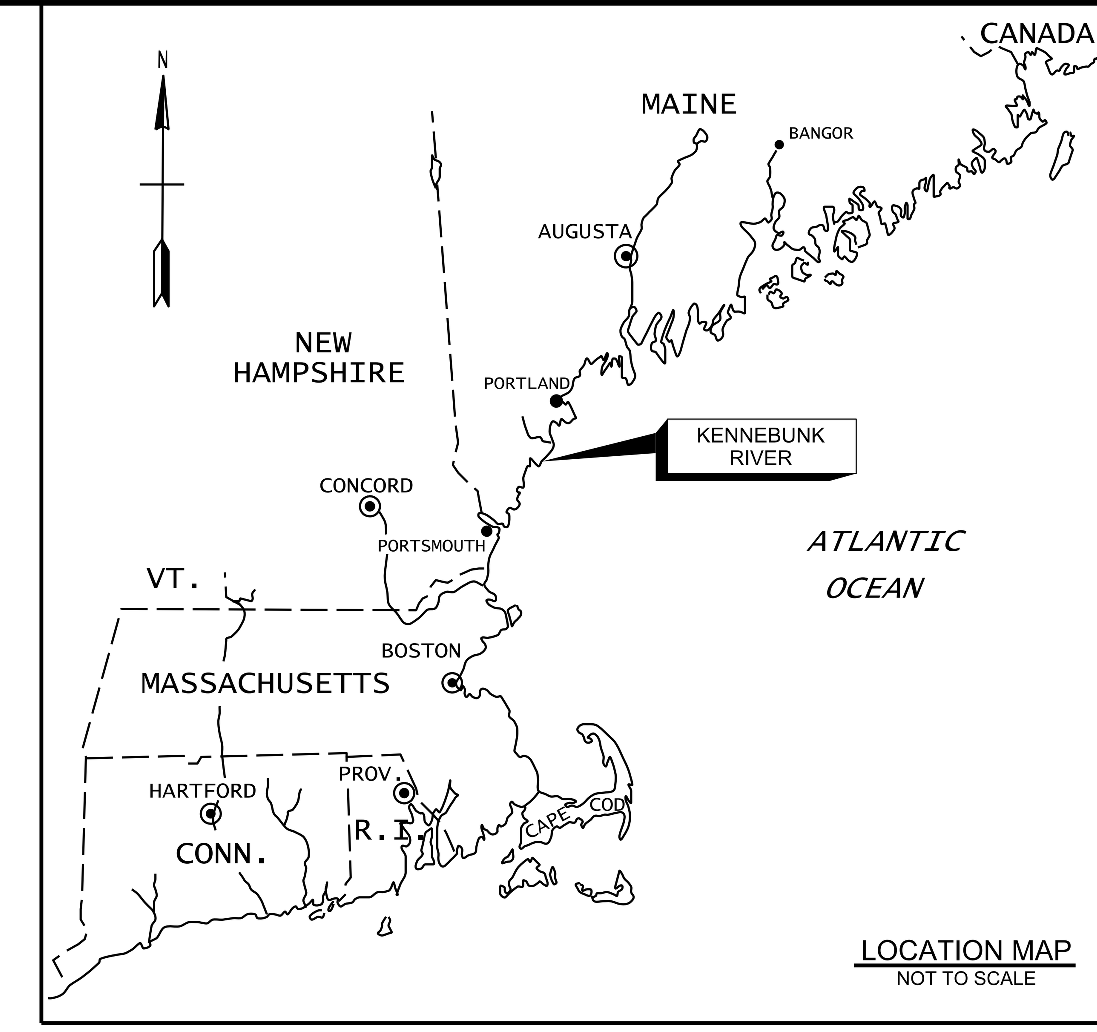
#	EASTING	NORTHING
21	2870294.03	191158.63
22	2870151.82	191445.64
23	2870219.02	191478.94
24	2870317.45	191280.29
25	2870417.87	191161.85
26	2870589.15	191038.46
27	2870935.01	190613.36
28	2870970.80	190503.71
29	2870971.94	190443.03
30	2870981.72	189924.92
31	2870918.43	189581.67
32	2870889.33	189059.31
33	2870925.66	188868.73
34	2870615.35	189085.40
35	2870645.97	189634.89
36	2870738.62	189838.12
37	2870801.55	189838.12
38	2871085.67	190066.77
39	2871078.16	189932.05

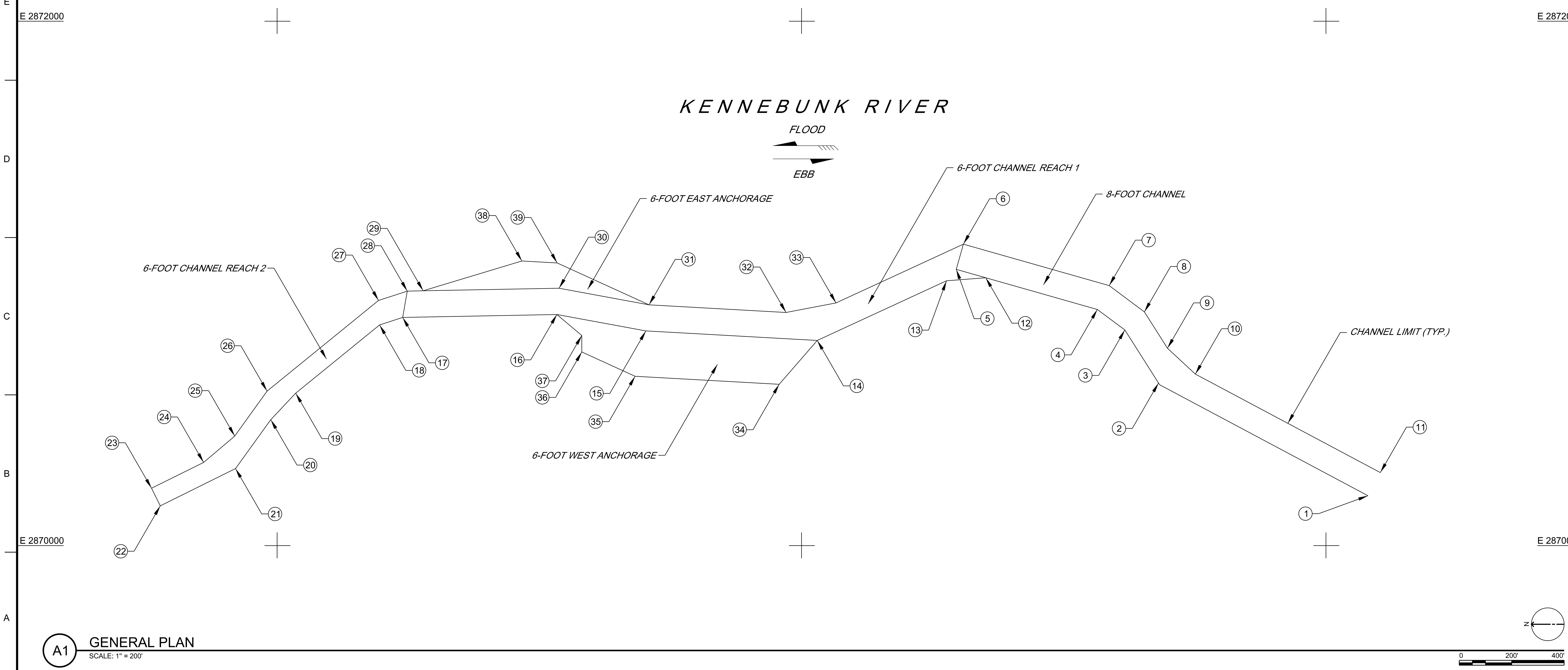
GENERAL NOTES:

1. KENNEBUNK RIVER (CENAE_ME_63_KNR) SEE SHEET V-001.
   REACH NAMES: 8-FOOT CHANNEL, 6-FOOT CHANNEL REACH 1, 6-FOOT CHANNEL REACH 2, 6-FOOT EAST ANCHORAGE, AND 6-FOOT WEST ANCHORAGE.
2. FOR HYDROGRAPHIC SURVEY INFORMATION SEE USACE HYRDROGRAPHIC SURVEYS (EHYDRO) WEB SITE:

USACE DISTRICT	USACE CHANNEL	CHANNEL ID
NAE	KENNEBUNK RIVER	CENAE_ME_63_KNR

3. COORDINATES SHOWN ARE BASED ON THE LAMBERT GRID SYSTEM FOR THE STATE OF MAINE WEST ZONE (1802), NAD 1983 AND ARE BASED ON U.S. SURVEY FEET.





A1 GENERAL PLAN
SCALE: 1" = 200'

US Army Corps of Engineers®

MARK	DESCRIPTION	DATE

U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
696 VIRGINIA ROAD
CONCORD, MA 01742-2751

DWN BY: EMA
CHK BY:
ISSUE DATE:
REVIEWED BY: ZSM
Asst. Chief, Survey Sec.
SOLICITATION NO.:
APPROVED BY:
Chief, Survey Section
CONTRACT NO.:
SIZE: ANSI D
SCALE: 1:1
DRAWING CODE: ME_63_KNR_NP_2020
SHEET 1 OF 1

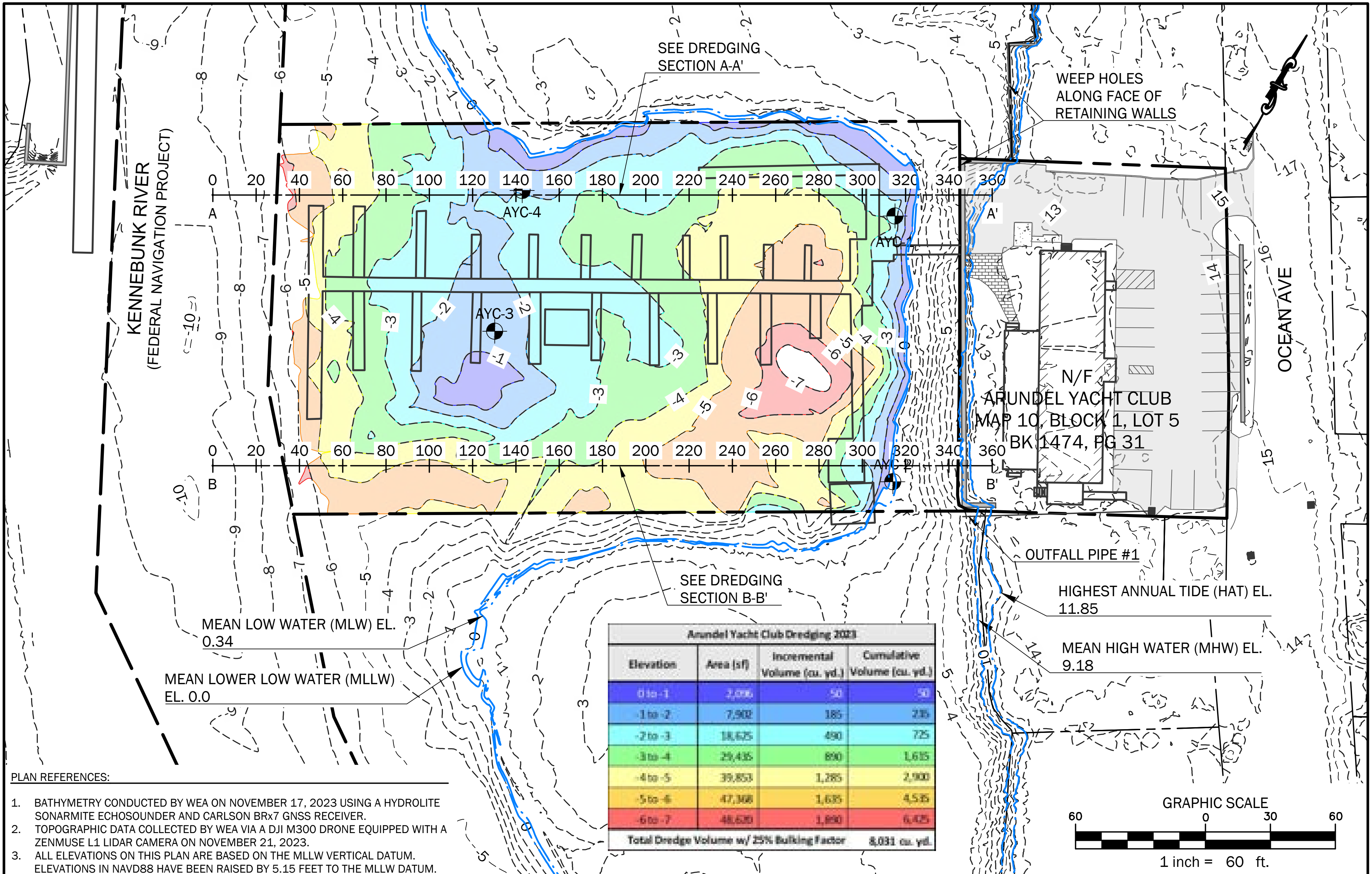
KENNERBUNK RIVER
KENNEBUNKC AND KENNEBUNKPORT, MAINE
FEDERAL NAVIGATION PROJECT

6 AND 8-FOOT CHANNELS
6-FOOT ANCHORAGE

SHEET ID
V-001

pw://COE-NAEPWP01CON.nae.ds.usace.army.mil:coe-naepwp01con.nae.ds.usace.army.mil/Documents/Civil Works/Navigation/ME/Kennebunk River/_2020 Federal Navigation Project (ME_63_KNR_NP_2020)/ProjectData/CAD_BIM/_Sheets/ME_63_KNR_NP_2020_V-001.dgn
10:31:39 AM 3/9/2020 PD: AEC_pdf.pltcfg DS: AEC_Screen.dscript.dscript

Attachment 2 – Dredging Figures



Arundel Yacht Club Dredging 2023			
Elevation	Area (sf)	Incremental Volume (cu. yd.)	Cumulative Volume (cu. yd.)
0 to -1	2,096	50	50
-1 to -2	7,902	185	235
-2 to -3	18,625	490	725
-3 to -4	29,435	890	1,615
-4 to -5	39,853	1,285	2,900
-5 to -6	47,368	1,635	4,535
-6 to -7	48,620	1,890	6,425
Total Dredge Volume w/ 25% Bulking Factor			8,031 cu. yd.

PLAN REFERENCES:

1. BATHYMETRY CONDUCTED BY WEA ON NOVEMBER 17, 2023 USING A HYDROLITE SONARMITE ECHOSOUNDER AND CARLSON BRx7 GNSS RECEIVER.
2. TOPOGRAPHIC DATA COLLECTED BY WEA VIA A DJI M300 DRONE EQUIPPED WITH A ZENMUSE L1 LIDAR CAMERA ON NOVEMBER 21, 2023.
3. ALL ELEVATIONS ON THIS PLAN ARE BASED ON THE MLLW VERTICAL DATUM. ELEVATIONS IN NAVD88 HAVE BEEN RAISED BY 5.15 FEET TO THE MLLW DATUM.

WALSH
ENGINEERING ASSOCIATES, INC.
One Karen Dr., Suite 2A | Westbrook, Maine 04092
ph: 207.553.9898 | www.walsh-eng.com

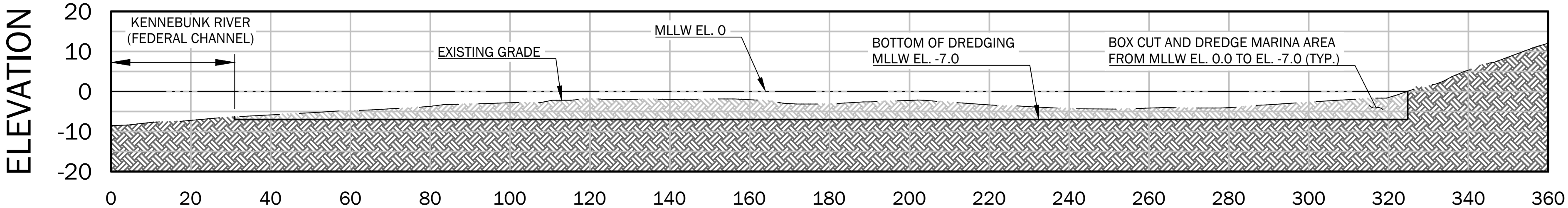
ARUNDEL YACHT CLUB DREDGING

ARUNDEL YACHT CLUB
51 OCEAN AVE
KENNEBUNKPORT, ME 04046

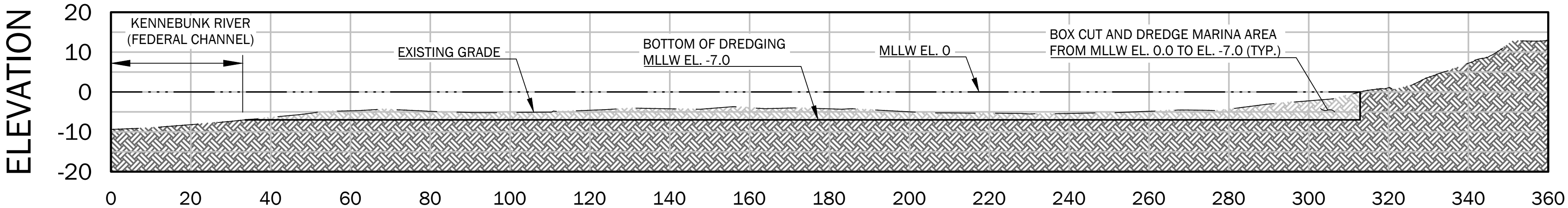
Sheet Title:

FIG. 1: PLAN VIEW

Job No.:	782
Date:	OCT. 23, 2024
Scale:	AS SHOWN
Drawn:	CAR/MNW
Checked:	WRW

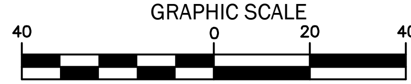


Dredging Section A-A'



Dredging Section B-B'

GRAPHIC SCALE



1 inch = 40 ft.

WALSH
ENGINEERING ASSOCIATES, INC.
One Karen Dr., Suite 2A | Westbrook, Maine 04092
ph: 207.553.9898 | www.walsh-eng.com

ARUNDEL YACHT CLUB DREDGING

ARUNDEL YACHT CLUB
51 OCEAN AVE
KENNEBUNKPORT, ME 04046

Sheet Title:
FIG 2: SECTION VIEWS

Job No.:	782
Date:	OCT. 23, 2024
Scale:	AS SHOWN
Drawn:	CAR/MNW
Checked:	WRW

Attachment 3 – Alternatives Analysis

Alternatives Analysis

Revision 1A – October 25, 2024

**Note: Sections of this Alternatives Analysis that have been updated/added in Revision 1A are in red text.*

Dredging Alternatives Analysis

WEA studied several alternatives for the Arundel Yacht Club (AYC) dredging project, all evaluated against its purpose and need. The project's purpose is to dredge and dispose of dredged material from the site in an efficient, environmentally cautious, and effective manner; the project's need is to provide the AYC with safe navigation and anchoring conditions for watercraft.

The existing conditions and dredging alternatives analysis are described in the following narrative:

Existing Conditions

The AYC (site) encompasses approximately 0.42 acres of land. The Arundel Wharf, Ocean Avenue and a residence border the site to the north; residences and Ocean Avenue border the site to the east; the Yachtsman Hotel & Marina Club are located south of the property; and the Kennebunk River borders the property to the west.

Alternative 1 – No Action

WEA investigated the possibility of not dredging, however, the project's purpose is to provide effective navigation for watercraft and boat slips at the AYC. If Alternative 1 is utilized, the club members and guest mariners will not be able to safely navigate to the boat slips. The area would continue to fill in with sediment and eventually the mooring and docking space would become unusable. Alternative 1 is not practicable as it would eventually force the AYC to close due to unsafe navigation and does not satisfy the project need.

Alternative 2 – Reduced Dredge

WEA investigated the option of dredging 50% less than the proposed amount of 8,031 cubic yards. Though there may be a slight environmental benefit to dredging less (a smaller area would be disturbed and the length of dredging activities would be reduced), the dredged area would quickly fill in again within a few years, requiring the area to be dredged again sooner than if the area was dredged to elevation -6.0 feet. Again, this would not allow the club members and others to navigate or use the docks in a safe manner. Alternative 2 would not advance the project's need.

Alternative 3 – Full Dredge

WEA investigated the option of fully dredging the marina to the proposed elevation of -6.0 feet mean low water, totaling 8,031 cubic yards of dredge material. The dredging will provide adequate sediment removal for boat owners to navigate safely for 6-8 years at the current rate of sedimentation, and therefore has been selected as the most appropriate alternative for this project to meet the project's purpose and need.

Selection
Given the information above, Alternative 3 was selected as the most appropriate alternative for the project. This alternative will provide the maximum efficiency of dredging and will optimize the time between necessary dredging events.

Dredge Material Disposal Alternatives Analysis

The USACE approved a Sampling and Analysis Plan (SAP) for the project on May 24, 2022, which provided proposed sediment sampling locations, methods, and testing criteria to determine disposal suitability. The sampling results were submitted to the USACE for the AYC and the nearby Yachtsman Marina, Kennebunkport Marina, and Kennebunk River Club. The USACE issued a Suitability Determination for all 4 sites on June 10, 2024, which documents the suitability of the dredged material for disposal at the Isle of Shoals North (IOSN) open water disposal site.

It is WEA's understanding that the USACE requires General Permit applicants to conduct an alternatives analysis to evaluate options for disposal of dredged material. In order of disposal method preference, the USACE favors onshore disposal, followed by beneficial use, and then open water placement.

The dredge material disposal alternatives analysis is described in the following narrative:

Alternative A – Onshore Disposal

Onshore Disposal – Storage of Material at the AYC
WEA investigated the option of onshore disposal of the 8,031 cubic yards of dredged materials from the AYC. The AYC encompasses approximately 0.42 acres of land, as shown in the aerial site map attached to this Alternatives Analysis as Figure 1. Due to the small size of the AYC lot, there is minimal space available to conduct onshore disposal operations at the site.

Logistically, to conduct onshore disposal of the dredged material, the following steps would need to be taken:

- Use barge-mounted dredging equipment to dredge sediment.
- Place the dredged material onshore into a stockpile or a large container from the dredge barge.
    - As shown in the attached aerial site map, the largest area available for a stockpile of dredged materials is located within a 23-foot by 23-foot grassed area east of the AYC building. If a 4-foot walkway is kept clear around the stockpile, the allowable diameter of the stockpile would be 15 feet (therefore the allowable radius would be 7.5 feet). Using the following standard soil stockpile volume equation, the required height of a 8,031 cubic yard (216,837 cubic feet) stockpile would need to be 3,681 feet tall, which is infeasible.
        - $Volume = \frac{1}{3} \times \pi \times Radius^2 \times Height \rightarrow$
        - $Height = Volume \times 3 \times \frac{1}{\pi} \times \frac{1}{Radius^2} \rightarrow$
        - $Height = 216{,}837 ft^3 \times 3 \times \frac{1}{\pi} \times \frac{1}{(7.5ft)^2} = 3{,}681\ ft$

    - In addition, this step is infeasible due to the layout of the AYC's dock/boat slips; the closest a dredge barge could get to the "open space" located to the east of the AYC building is at least 90 feet away, requiring the dredging equipment to have a very large reach.
- Give the dredged sediment appropriate time to dewater.
- Load dried dredged sediment into dump trucks or roll-off containers and haul offsite to a final disposal location.
    - Dump trucks have an approximately 20 cubic yard capacity and roll-off containers have a maximum capacity of 40 cubic yards. With these capacities, the hauling and disposal of the dried dredged sediment would require approximately 402 or 201 truckloads, respectively. The hauling of sediment would be infeasible due to major increases in project duration and costs.
    - In addition, because the proposed and allowable dredging window occurs during winter, local roadways will be posted for heavy truck traffic, which would likely require hauling vehicles to reduce the quantity of sediment they can transport at once.

As documented above, onshore disposal of dredged sediment using the AYC site is infeasible due to site constraints and sediment hauling duration/costs. As mentioned, an aerial map of the site is included as Figure 1 to this Alternatives Analysis for reference.

Onshore Disposal – Storage of Material at Alternative Locations on the Kennebunk River

The proposed dredge volume for the Arundel Yacht Club is 8,031 cubic yards, or 216,837 cubic feet. Area estimates for storing the dredged material in a stockpile or in roll-off dumpsters for dewatering are described below. Dewatering the dredged sediment could take anywhere from a couple days to a couple weeks.

<u>Storage via Stockpile</u>

It is assumed that acceptable side slopes for a stockpile of wet, silty sediment would be between 4:1 and 5:1 (horizontal to vertical), and an acceptable stockpile height would be between 20 and 25 feet. Using these criteria and the estimated dredge volume of 216,837 cubic feet, the diameter of the stockpile needed to store the dredged material would be approximately 200 feet. It is assumed that around 20 feet of additional space would be required around the perimeter of the stockpile for erosion and sedimentation controls, dewatering materials, and equipment access, increasing the diameter of the storage area to 240 feet. Figure 2, included with this Alternatives Analysis, shows what a 240-foot diameter stockpile would look like on nearby facilities with open space along the Kennebunk River; there are no facilities with adequate space to accommodate the stockpile storage area. In addition, the AYC does not have control or interest in any of the nearby facilities along the Kennebunk River shown in Figure 2.

<u>Storage via Roll-Off Dumpster</u>

The largest readily available roll-off dumpster size is 40 cubic yards. It is assumed that wet sediment dumped into a roll-off dumpster to dewater would contain about 20-percent water, which would reduce the soil capacity in the dumpster to 32 cubic yards. With this assumption, it would require 251 dumpsters to store 8,031 cubic yards of sediment. Each roll-off dumpster is 22 feet long by 7.5 feet wide; adding a 5-foot walking area around the roll-off would increase the footprint of each roll-off to 27 feet by 12.5 feet, or 337.5 square feet. The total space required for 251 roll-off dumpsters would be approximately 84,715 square feet. Figure 3, included with this Alternatives Analysis, shows what an 84,715 square foot roll-off dumpster storage area would look like on nearby facilities with open space along the Kennebunk River; there are no facilities with adequate space to accommodate the roll-off storage area. In addition, the AYC does not have control or interest in any of the nearby facilities along the Kennebunk River shown in Figure 3.

Onshore Disposal – Disposal Location Alternatives

As stated above, it is infeasible to get the dredged material onshore for dewatering and subsequent hauling to a disposal location at the AYC and other nearby facilities along the Kennebunk River. As a result, the following onshore disposal location alternatives are also considered infeasible:

- Landfill
  - This alternative is also infeasible due to the estimated cost to dispose of the material at a landfill. Tipping and hauling fees for material disposal would likely be between $75 and $100 per cubic yard, totaling around $600,000 to $800,000 for disposal of 8,031 cubic yards of material.
  - The Juniper Ridge Landfill in Alton/Old Town, Maine and the Waste Management Crossroads Landfill in Norridgewock, Maine currently do not have sufficient capacity to accommodate the dredge materials and the increase in daily traffic to dispose of the dredge materials. The Waste Management Turnkey Landfill in Rochester, NH could accommodate the materials, however, as documented above, this option is both infeasible due to inability to get the dredge material upland, and cost prohibitive.
- Well injection
  - The Environmental Protection Agency's "General Information About Injection Wells" webpage states that injected fluids may include "water, wastewater, brine (salt water), or water mixed with chemicals." The dredged materials will consist of silty sediment and therefore well injection is not a feasible disposal alternative.
  - In addition, the Maine Department of Environmental Protection's Underground Injection Control (UIC) Program webpage states that Class I, II, III, and IV injections wells are prohibited in Maine.
- Incineration
  - This alternative is also infeasible due to the estimated cost to incinerate soils. Hauling and incineration fees would likely be around $700 per cubic yard, totaling around $5.6M for the incineration of 8,031 cubic yards of material. (Source: Federal Remediation Technologies Roundtable Screening Matrix and Reference Guide, Version 4.0, Section 4.22 Incineration.) In addition, it appears that the closest soil incineration facilities to the AYC are in Illinois or Arkansas.
- Spread of material over open ground
  - This alternative is also infeasible because the AYC does not have access to a land area appropriate for spreading the material over open ground. Spreading 216,837 cubic feet of soil across a land area would consist of: 1 foot of sediment spread across a 216,837 square foot (~5 acre) land area; or 6 inches of sediment spread across a 433,674 square foot (~10 acre) land area.
- Additional biological, chemical, or physical treatment of intermediate or final waste streams

- Additional treatment of the dredged sediment would not increase the feasibility of onshore disposal.

Alternative B – Beneficial Use

WEA used the USACE's New England District Beneficial Use Planning Tool (Tool) to identify potential beneficial use dredge material disposal sites within a 30-mile radius of the project site, which is the distance from the AYC to the IOSN open water disposal site. The Tool identified 17 potential beneficial use sites; an analysis of the suitability of each of these sites is as follows:

- Beach Nourishment (4 sites – Wells Beach, Drakes Island Beach, Camp Ellis, Western Beach)
  - A representative from the USACE confirmed that all beach nourishment projects require sand, whereas the dredged material from the Kennebunk River will be primarily silt. Therefore, beneficial use of dredged material at the beach nourishment sites is infeasible.
- Construction and Industrial or Commercial Uses (2 sites – Cobble Berm in Ogunquit, ME and Dune Erosion/Stormwater Improvements in Wells, ME)
  - The two construction projects require cobble and sand materials, respectively, whereas the material dredged from the Kennebunk River will be primarily silt. Therefore, beneficial use of dredged material at the construction sites is infeasible.
- Nearshore Berm (6 sites – Wallis Sands, Wells, Goochs Beach, Kennebunk River, Saco, and Little River Rock Disposal Sites)
  - A representative from the USACE confirmed that all nearshore berm projects require sand, whereas the dredged material from the Kennebunk River will be primarily silt. Therefore, beneficial use of dredged material at nearshore berm sites is infeasible.
- Salt Marshes (5 sites – Piscataqua, Ogunquit/Rachel Carson National Wildlife Refuge, Webhannet, and Little River Salt Marsh Priority Areas Accepting Sediment; and Goosefare Salt Marsh)
  - Piscataqua Salt Marsh Priority Area: A representative from the New Hampshire Division of Environmental Services (NHDES) stated that the Piscataqua Salt Marsh is not a potential dredge disposal site.
  - Ogunquit/Rachel Carson National Wildlife Refuge, Webhannet, and Little River Salt Marsh Priority Areas Accepting Sediment and Goosefare Salt Marsh: A representative from the U.S. Fish and Wildlife Service (USFWS) stated that the State of Maine's current regulations and permitting processes do not allow the use of dredged materials on salt marshes.
  - Beneficial use of dredged material at salt marsh sites is infeasible.

A summary of the 17 potential beneficial use sites is included as Table 1, attached to this Alternatives Analysis along with a list of references and copies of relevant email communications.

Alternative C – Open Water Placement

Open Water Placement – Saco Bay Open Water Disposal Site

In order to get Maine DEP's approval for disposal at the Saco Bay Open Water Disposal Site, additional benthic environment testing of the river sediment is required. The time it will take to conduct the additional sediment testing and analysis, to receive an updated Suitability Determination for Saco Bay from the USACE, and to receive permit approvals for dredging from the USACE and Maine DEP would push the dredging activities to the Winter 2026-2027 dredge window. The AYC has a critical need to conduct their maintenance dredging in the Winter 2025-2026 dredge window, as boats at their marina are already experiencing navigation challenges due to river sediment accumulation at the marina. As a result, consideration of the Saco Bay Disposal Site is not a feasible alternative for this round of maintenance dredging.

Open Water Placement – Isle of Shoals North Open Water Disposal Site

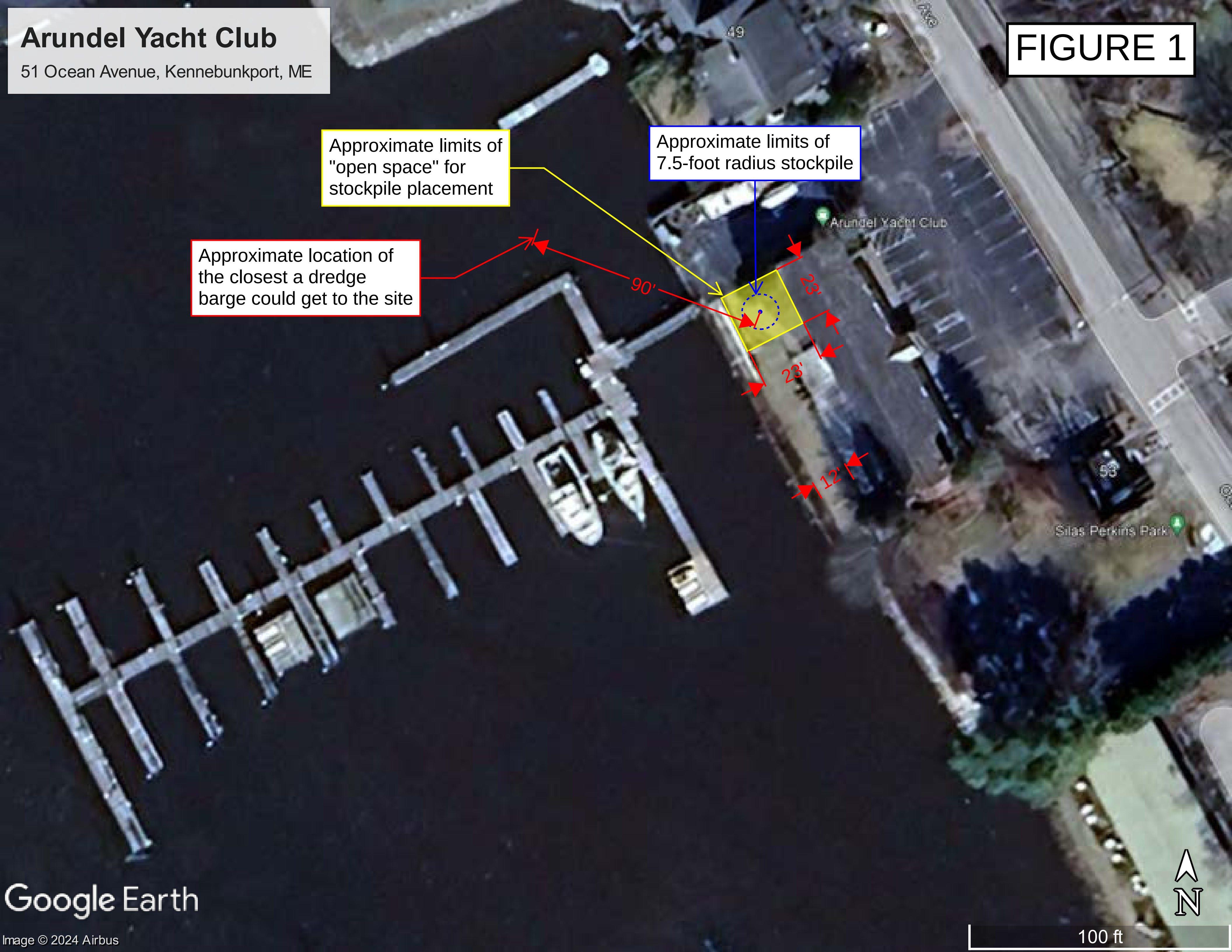
As stated above, the USACE issued a Suitability Determination for the AYC and the nearby Yachtsman Marina, Kennebunkport Marina, and Kennebunk River Club on June 10, 2024, which documents the suitability of the dredged material for disposal at the IOSN open water disposal site.

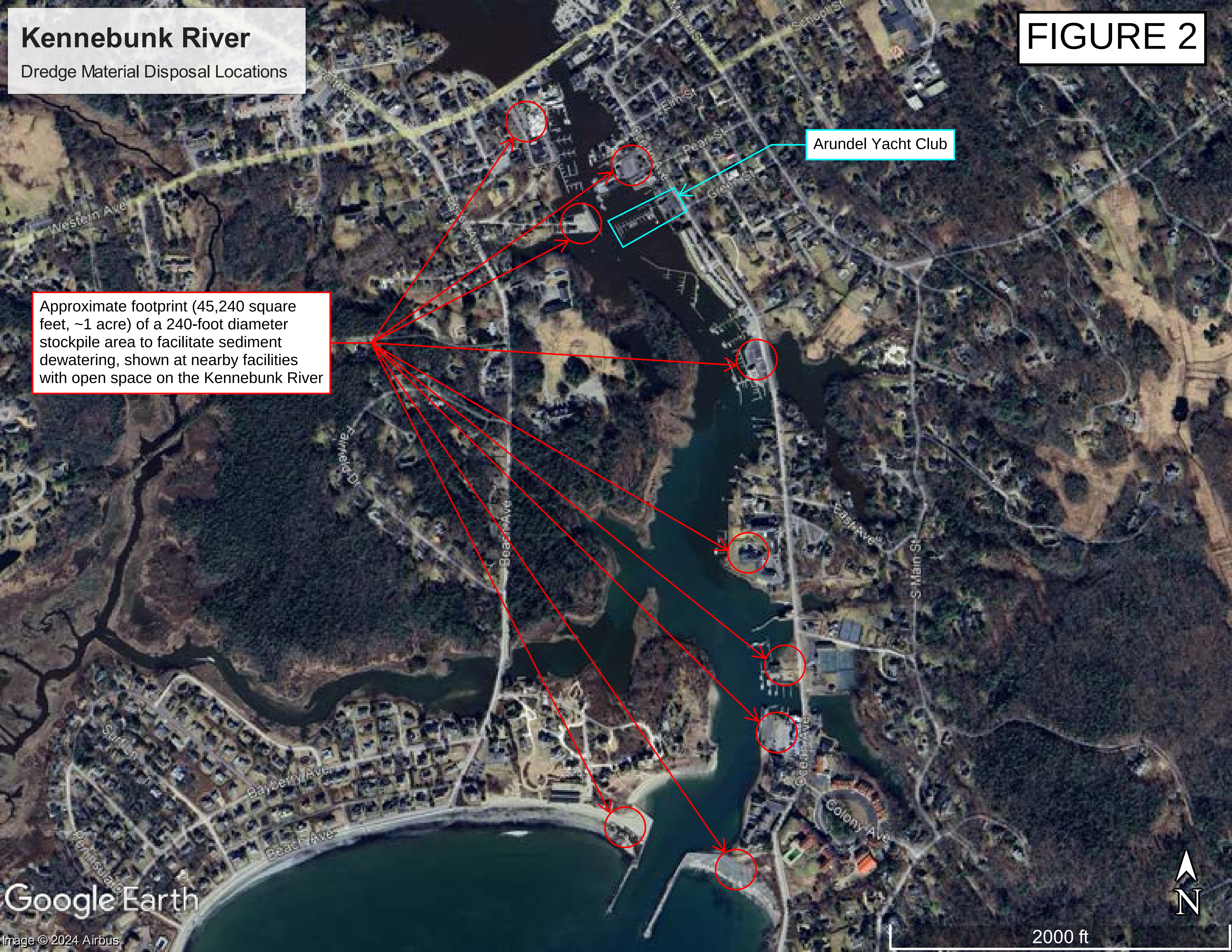
Selection

Due to the infeasibility of disposing of dredged material onshore and there being no beneficial use sites suitable for disposal, Alternative C, open water placement at IOSN, was selected as the most appropriate alternative for the project.

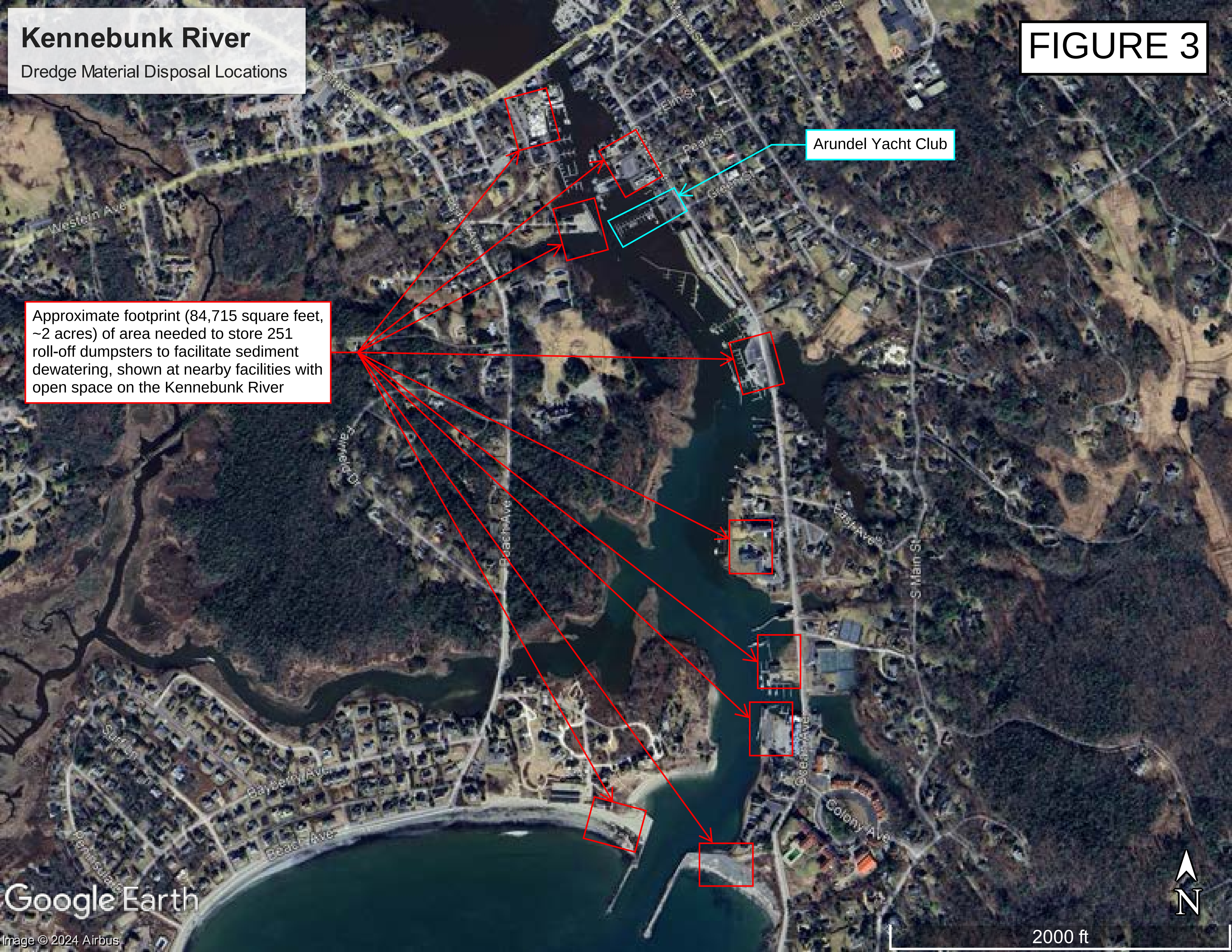
Figures

Figure 1: AYC Site Aerial Map
Figure 2: Kennebunk River – Stockpile Locations
Figure 3: Kennebunk River – Roll-Off Dumpster Locations


Arundel Yacht Club
51 Ocean Avenue, Kennebunkport, ME
FIGURE 1
Approximate limits of "open space" for stockpile placement
Approximate limits of 7.5-foot radius stockpile
Approximate location of the closest a dredge barge could get to the site
90'
23'
23'
12'
Arundel Yacht Club
Silas Perkins Park
49
53
Google Earth
Image © 2024 Airbus
N
100 ft



Kennebunk River
Dredge Material Disposal Locations
FIGURE 2
Arundel Yacht Club
Approximate footprint (45,240 square feet, ~1 acre) of a 240-foot diameter stockpile area to facilitate sediment dewatering, shown at nearby facilities with open space on the Kennebunk River
Western Ave
Beach Ave
S Main St
Colony Ave
Bayberry Ave
N
2000 ft
Google Earth
Image © 2024 Airbus


Kennebunk River
Dredge Material Disposal Locations
FIGURE 3
Arundel Yacht Club
Approximate footprint (84,715 square feet, ~2 acres) of area needed to store 251 roll-off dumpsters to facilitate sediment dewatering, shown at nearby facilities with open space on the Kennebunk River
Western Ave
Beach Ave
S Main St
Colony Ave
Bayberry Ave
Google Earth
Image © 2024 Airbus
N
2000 ft

Tables

Table 1: Dredge Material Disposal Beneficial Use Alternatives – Arundel Yacht Club

Table 1
Dredge Material Disposal Beneficial Use Alternatives - Arundel Yacht Club
Summary Table & References

Project Name[1]	Project Category	Location	Coordinates	Contact	Feasible Disposal Location?	Reasoning
Wells Beach	Beach Nourishment	Wells, ME	43.311208N -70.561063W	USACE	No	Beach nourishment projects require sand; dredged material from the Kennebunk River will be primarily silt.[4,5]
Drakes Island Beach	Beach Nourishment	Wells, ME	43.321900N -70.552082W	USACE	No	Beach nourishment projects require sand; dredged material from the Kennebunk River will be primarily silt.[4,5]
Camp Ellis	Beach Nourishment	Saco, ME	43.466204N -70.381264W	USACE	No	This beach nourishment project requires "sandy shoal material," and dredged material from the Kennebunk River will be primarily silt.[4,5,6]
Western Beach	Beach Nourishment	Scarborough, ME	43.539528N -70.321888W	USACE	No	Beach nourishment projects require sand; dredged material from the Kennebunk River will be primarily silt.[4,5]
Cobble Berm	Construction and Industrial or Commercial Uses	Ogunquit, ME	43.236523N -70.589087W	USACE	No	Project requires cobble, and dredged material from the Kennebunk River will be primarily silt.
Dune Erosion and Stormwater Improvements	Construction and Industrial or Commercial Uses	Wells, ME	43.248998N -70.595158W	USACE	No	Dune requires sand, and dredged material from the Kennebunk River will be primarily silt.
Wallis Sands Disposal Site	Nearshore Berm	Rye, NH	43.020324N -70.726276W	USACE	No	Nearshore berm projects require sand, and dredged material from the Kennebunk River will be primarily silt.[4,5]
Wells Nearshore Disposal Site	Nearshore Berm	Wells, ME	43.307605N -70.560229W	USACE	No	20,000 CY of dredged "sandy" material from the 2020 Wells Harbor federal navigation project was placed here; however, nearshore berm projects require sand, and dredged material from the Kennebunk River will be primarily silt.[4,5,6]
Goochs Beach Nearshore Site	Nearshore Berm	Kennebunkport, ME	43.345503N -70.481053W	USACE	No	20,000 CY of dredged material from the 2020 Kennebunk/Kennebunkport federal navigation project was placed here; however, nearshore berm projects require sand, and dredged material from the Kennebunk River will be primarily silt.[4,5,6]
Kennebunk River Disposal Site	Nearshore Berm	Kennebunkport, ME	43.345134N -70.479100W	USACE	No	Nearshore berm projects require sand, and dredged material from the Kennebunk River will be primarily silt.[4,5]
Saco Nearshore Disposal Site	Nearshore Berm	Saco, ME	43.467543N -70.366173W	USACE	No	Nearshore berm projects require sand, and dredged material from the Kennebunk River will be primarily silt.[4,5]
Little River Rock Nearshore	Nearshore Berm	Saco, ME	43.518925N -70.364468W	USACE	No	Nearshore berm projects require sand, and dredged material from the Kennebunk River will be primarily silt.[4,5]
Piscataqua Salt Marsh Priority Area[2]	Salt Marsh Priority Area	Rye, NH	--	USFWS	No	Piscataqua Salt Marsh is not a potential dredge disposal site.[7]
Ogunquit Salt Marsh Priority Area/Rachel Carson National Wildlife Refuge[3]	Salt Marsh Priority Area	Ogunquit/Wells, ME	--	USFWS	No	Maine state permitting does not allow the use of dredged materials on salt marshes.[8]

Table 1
Dredge Material Disposal Beneficial Use Alternatives - Arundel Yacht Club
Summary Table & References

Project Name[1]	Project Category	Location	Coordinates	Contact	Feasible Disposal Location?	Reasoning
Webhannet Salt Marsh Priority Area[3]	Salt Marsh Priority Area	Wells, ME	--	USFWS	No	Maine state permitting does not allow the use of dredged materials on salt marshes.[8]
Little River Salt Marsh Priority Area[3]	Salt Marsh Priority Area	Wells, ME	--	USFWS	No	Maine state permitting does not allow the use of dredged materials on salt marshes.[8]
Goosefare Salt Marsh	Wetland Habitats/Salt Marsh	Saco, ME	43.493752N -70.392875W	USFWS	No	Maine state permitting does not allow the use of dredged materials on salt marshes.[8]

References:

1. USACE New England District Beneficial Use Planning Tool: https://www.arcgis.com/apps/dashboards/4f1c828081684605af2972cb6297dacf
2. New Hampshire Saltmarsh Restoration Priorities for the Saltmarsh Sparrow: https://acjv.org/documents/NH_SALS_comp_guidance_doc.pdf
3. Maine Saltmarsh Restoration Priorities for the Saltmarsh Sparrow: https://acjv.org/documents/ME_SALS_comp_guidance_doc.pdf
4. Email Correspondence Between WEA and USACE, dated August 13, 2024 (attached).
5. Email Correspondence Between WEA and USEPA, dated August 14, 2024 (attached).
6. USACE Update Report - Maine, dated January 31, 2024: https://www.nae.usace.army.mil/Portals/74/ME-UpdateReport_31Jan2024.pdf
7. Email Correspondence Between WEA and NHDES, dated August 19, 2024 (attached).
8. Email Correspondence Between WEA and USFWS, dated August 14, 2024 (attached).

References

1. Email Correspondence Between WEA and USACE, dated August 13, 2024.
2. Email Correspondence Between WEA and USEPA, dated August 14, 2024.
3. Email Correspondence Between WEA and NHDES, dated August 19, 2024.
4. Email Correspondence Between WEA and USFWS, dated August 14, 2024.

Leyna Tobey

From:	Hopkins, Aaron D CIV USARMY CENAE (USA) <Aaron.D.Hopkins@usace.army.mil>
Sent:	Tuesday, August 13, 2024 12:44 PM
To:	Leyna Tobey; Saloio, Gabriella J CIV USARMY CEHQ (USA)
Subject:	RE: Beneficial Use Sites for Dredging

Hi Leyna,

I got your voicemail the other day and I apologize for not returning your call yet.

Great to see that you used the Beneficial Use of Dredged Material Planning Tool as a screening step for your project. You are correct about the beach nourishment sites needing sandy material – and the same can be said for the nearshore berm sites you identified in the Planning Map as those are intended to be feeder berms for the adjacent beaches. The openwater sites in your list are included in the Planning Map to compare openwater disposal alternatives and are not considered beneficial use themselves. That leaves the five salt marsh sites on your list which are all potential restoration sites from the USFWS. I would suggest you reach out to the contacts in the Atlantic Coast Joint Venture reference at USFWS or Maine Dept of Inland Fisheries and Wildlife to see if there are any potential beneficial uses for your project at those sites. We were able to provide some dredged material recently to the Rachel Carson National Wildlife Refuge in Wells, ME for a small beneficial use project.

Aaron

Aaron Hopkins
DAMOS Program Manager
US Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742
978.318.8973

From: Leyna Tobey <leyna@Walsh-eng.com>
Sent: Tuesday, August 13, 2024 10:54 AM
To: Saloio, Gabriella J CIV USARMY CEHQ (USA) <Gabriella.J.Saloio@usace.army.mil>; Hopkins, Aaron D CIV USARMY CENAE (USA) <Aaron.D.Hopkins@usace.army.mil>
Subject: [Non-DoD Source] Beneficial Use Sites for Dredging

Good morning Gabriella and Aaron,

I am working on permitting a dredging project for several marinas on the lower Kennebunk River in Kennebunk, ME, and am currently conducting an alternatives analysis on where to dispose of the 25,000 CY of silty dredge material. I used the Army Corp's Beneficial Use of Dredged Material Planning Tool and found the potential disposal locations in the attached spreadsheet within a 30-mile radius of the project site.

As Gabriella is listed as the ACOE contact for several of the disposal locations and Aaron is listed at the contact for the DAMOS Beneficial Use Planning Map, I was hoping either of you would be able to provide me with some details for the disposal sites listed in the attached spreadsheet (e.g. if they are accepting materials, what types of materials they are accepting, timeline for acceptance, etc.) or could point me in the right direction to another contact to reach out to. (Note that the attached spreadsheet does not include any beach nourishment projects, as those projects are assumed to need sand and the material we will be dredging is primarily silt.)

Please give me a call to discuss if that would be easier. Thanks in advance!

Leyna

Leyna Tobey, PE*
Project Manager | Civil Engineer
Licensed in MA

WALSH
ENGINEERING ASSOCIATES, INC.

One Karen Drive, Suite 2A
Westbrook, ME 04092
P: (207) 553-9898, Ext 105
www.walsh-eng.com

Leyna Tobey

From:	Wolf, Steven <Wolf.Steven@epa.gov>
Sent:	Wednesday, August 14, 2024 10:18 AM
To:	Leyna Tobey
Cc:	Sterling, Alexa
Subject:	FW: Dredged Material Disposal Inquiry
Attachments:	2024-08-12 Dredge Disposal Alternatives Analysis_to EPA.xlsx

Hi Leyna, EPA co-manages the ocean dredged material disposal sites with the Army Corps – the goal of the alternatives analysis is to evaluate other uses of the dredged material rather than just straight disposal. The nearshore sites are considered "beneficial" in that material placed at those sites is integrated into coastal sediment transport and can actually nourish beaches with material under the right hydrodynamic conditions. Unfortunately, as I recall, the material from the projects you referenced contains too high a percentage of fine-grained material to be placed at the nearshore sites. For evaluating the feasibility of using the material as part of salt marsh restoration, I'd direct you back to the Corps and to ME and NH state agencies. I'd suggest starting with Todd Randall at the New England District Corps (todd.a.randall@usace.army.mil) who could provide information on any federal marsh restoration projects as well as the contact information for the states folks involved in marsh restoration. Feel free to reach back it you need additional information - Steve

Steven Wolf | US Environmental Protection Agency, Region 1 (New England)
5 Post Office Square, Suite 100, Mail Code OEP06-1 Boston, MA 02109-3912
Office: 617-918-1617   Mobile: 978-201-1928   wolf.steven@epa.gov

---

From: Leyna Tobey <leyna@Walsh-eng.com>
Sent: Tuesday, August 13, 2024 12:12 PM
To: Sterling, Alexa <Sterling.Alexa@epa.gov>; Wolf, Steven <Wolf.Steven@epa.gov>
Subject: Dredged Material Disposal Inquiry

Good afternoon Alexa and Steven,

I am working on permitting a dredging project for several marinas on the lower Kennebunk River in Kennebunk, ME, and am currently conducting an alternatives analysis on where to dispose of the 25,000 CY of silty dredge material. I used the Army Corp's Beneficial Use of Dredged Material Planning Tool and found the potential disposal locations in the attached spreadsheet within a 30-mile radius of the project site.

As you are both listed on the EPA's website for dredged material disposal, I was hoping either of you would be able to provide me with some details for the disposal sites listed in the attached spreadsheet (e.g. if they are accepting materials, what types of materials they are accepting, timeline for acceptance, etc.) or could point me in the right direction to another contact to reach out to. (Note that the attached spreadsheet does not include any beach nourishment projects, as those projects are assumed to need sand and the material we will be dredging is primarily silt.)

Please give me a call to discuss if that would be easier. Thanks in advance!

Leyna

Leyna Tobey, PE*
Project Manager | Civil Engineer
Licensed in MA

WALSH
ENGINEERING ASSOCIATES, INC.

One Karen Drive, Suite 2A
Westbrook, ME 04092
P: (207) 553-9898, Ext 105
www.walsh-eng.com

Leyna Tobey

From: Lucey, Kevin <kevin.p.lucey@des.nh.gov>
Sent: Monday, August 19, 2024 11:59 AM
To: Leyna Tobey; tracy@rockinghamccd.org
Subject: RE: Piscataqua Saltmarsh Restoration Inquiry

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Leyna,
There are only 3 NH sites listed as Beneficial Use Sites (Seabrook Beach, Hampton Beach, and Wallis Sands Offshore Berm). The "Piscataqua Salt Marsh" is not a potential dredge disposal site. Its included on the USACE mapper because it is a USFWS Priority for Salt Marsh. NH has not yet undertaken any sediment placement projects on tidal wetlands.

I don't know much about it, but I understand that there is a dredge sediment reuse project at the Webhannet Salt Marsh in Wells.

Good luck,
Kevin Lucey, Habitat Coordinator
Coastal Program | Watershed Management Bureau | Water Division
New Hampshire Department of Environmental Services
222 International Drive, Suite 175
Portsmouth, NH 03801
603-559-0026
kevin.p.lucey@des.nh.gov

From: Leyna Tobey <leyna@Walsh-eng.com>
Sent: Tuesday, August 13, 2024 1:53 PM
To: Lucey, Kevin <kevin.p.lucey@des.nh.gov>; tracy@rockinghamccd.org
Subject: Piscataqua Saltmarsh Restoration Inquiry

Good afternoon Tracy and Kevin,

I am working on permitting a dredging project for several marinas on the lower Kennebunk River in Kennebunk, ME, and am currently conducting an alternatives analysis on where to dispose of the 25,000 CY of silty dredge material. I used the Army Corp's Beneficial Use of Dredged Material Planning Tool (here) and found that the Piscataqua Saltmarsh is listed as a potential dredge material disposal location.

I saw that you were both listed as contacts for the project on the New Hampshire Saltmarsh Restoration Priorities for the Saltmarsh Sparrow document, and I was hoping either of you would be able to provide me with some details regarding whether you are accepting materials for the Saltmarsh, what types of materials are being accepted, timeline for material acceptance, etc. Or, if you are not the right contacts to be reaching out to, could you please point me in the right direction of who I should be contacting?

Please give me a call to discuss if that would be easier. Thanks in advance!

Leyna

Leyna Tobey, PE*
Project Manager | Civil Engineer
**Licensed in MA*

WALSH
ENGINEERING ASSOCIATES, INC.

One Karen Drive, Suite 2A
Westbrook, ME 04092
P: (207) 553-9898, Ext 101
www.walsh-eng.com

Leyna Tobey

From:	Sanders, Nicole A <nicole_sanders@fws.gov>
Sent:	Wednesday, August 14, 2024 9:50 AM
To:	Leyna Tobey; danielle.dauria@maine.gov
Cc:	Adamowicz, Susan; Stromayer, Karl
Subject:	RE: [EXTERNAL] Webhannet Saltmarsh Restoration Inquiry

Hi Leyna,

Thank you for reaching out! Right now, in Maine, state permitting does now allow the use of dredged materials on salt marshes. We are going to pilot the first thin-layer placement on Refuge land in Maine but the reason we are able to do this is because ours is a true pilot study permitted under an innovate pilot program with the Maine DEP. This permitting pathway operates under a pilot solid waste permit. We initiated conversations with the Army Corps and regulators years prior to getting our small (~1,000 cy) amount of clean, sandy sediment. Though it's certainly not out of the question to apply for another thin-layer placement project, it will not be a fast process, and DEP may not permit it at all based on the current regulatory processes. Usually for a pilot, there is only a small amount of sediment used 1-2,000 cubic yards over a ~2 acre area. Still, they may consider scaling up, which is an important part of learning and attempting new restoration techniques in Maine. And, there are salt marsh areas that we have conceptually considered for future thin-layer projects. All comes down to the permitting process! Once our refuge manager, Karl, has returned from annual leave myself, Sue, and Karl can discuss viable options and get back to you. Thanks again for reaching out and thinking of us.

Best,
Nicole

From: Leyna Tobey <leyna@Walsh-eng.com>
Sent: Tuesday, August 13, 2024 2:00 PM
To: Sanders, Nicole A <nicole_sanders@fws.gov>; danielle.dauria@maine.gov
Subject: [EXTERNAL] Webhannet Saltmarsh Restoration Inquiry

Good afternoon Nicole and Danielle,

I am working on permitting a dredging project for several marinas on the lower Kennebunk River in Kennebunk, ME, and am currently conducting an alternatives analysis on where to dispose of the 25,000 CY of silty dredge material. I used the Army Corp's Beneficial Use of Dredged Material Planning Tool (here) and found that the Webhannet River Complex Saltmarsh is listed as a potential dredge material disposal location.

I saw that you were both listed as contacts for the project on the Maine Saltmarsh Restoration Priorities for the Saltmarsh Sparrow document, and I was hoping either of you would be able to provide me with some details regarding whether you are accepting materials for the project(s), what types of materials are being accepted, timeline for material acceptance, etc. Or, if you are not the right contacts to be reaching out to, could you please point me in the right direction of who I should be contacting?

Please give me a call to discuss if that would be easier. Thanks in advance!

Leyna

Leyna Tobey, PE*
Project Manager | Civil Engineer
*Licensed in MA

WALSH
ENGINEERING ASSOCIATES, INC.

One Karen Drive, Suite 2A
Westbrook, ME 04092
P: (207) 553-9898, Ext 105
www.walsh-eng.com

Attachment 4 – Site Conditions Report

4.1 – Maine IF&W Beginning with Habitat Map

4.2 – USFWS IPaC Official Species List

4.3 – NOAA Fisheries EFH Mapper Report

4.4 – NOAA Fisheries Greater Atlantic Region ESA Section 7 Map

4.0 Site Conditions Report

The dredging activity will occur at the AYC within the Kennebunk River, which is located approximately 0.75 miles from the mouth of the Kennebunk River.

The shoreline area southeast of the AYC consists of large riprap placed to prevent bank erosion. The yacht club and its neighbor to the northeast have vertical concrete retaining walls. The sandy area in front of those walls is completely covered at high tide and is partially exposed at low tide. Minimal rockweed was observed in this area, but no other plant or marine species were noted.

According to the Maine Department of Inland Fisheries & Wildlife (IF&W) Beginning with Habitat website (https://www.maine.gov/ifw/fish-wildlife/wildlife/beginning-with-habitat/maps/index.html), the dredging location is bordered to the northwest and southeast by wetlands identified by the National Wetland Inventory (NWI). The area of the dredging is located in a relatively small area of the Kennebunk River's shellfish growing area.

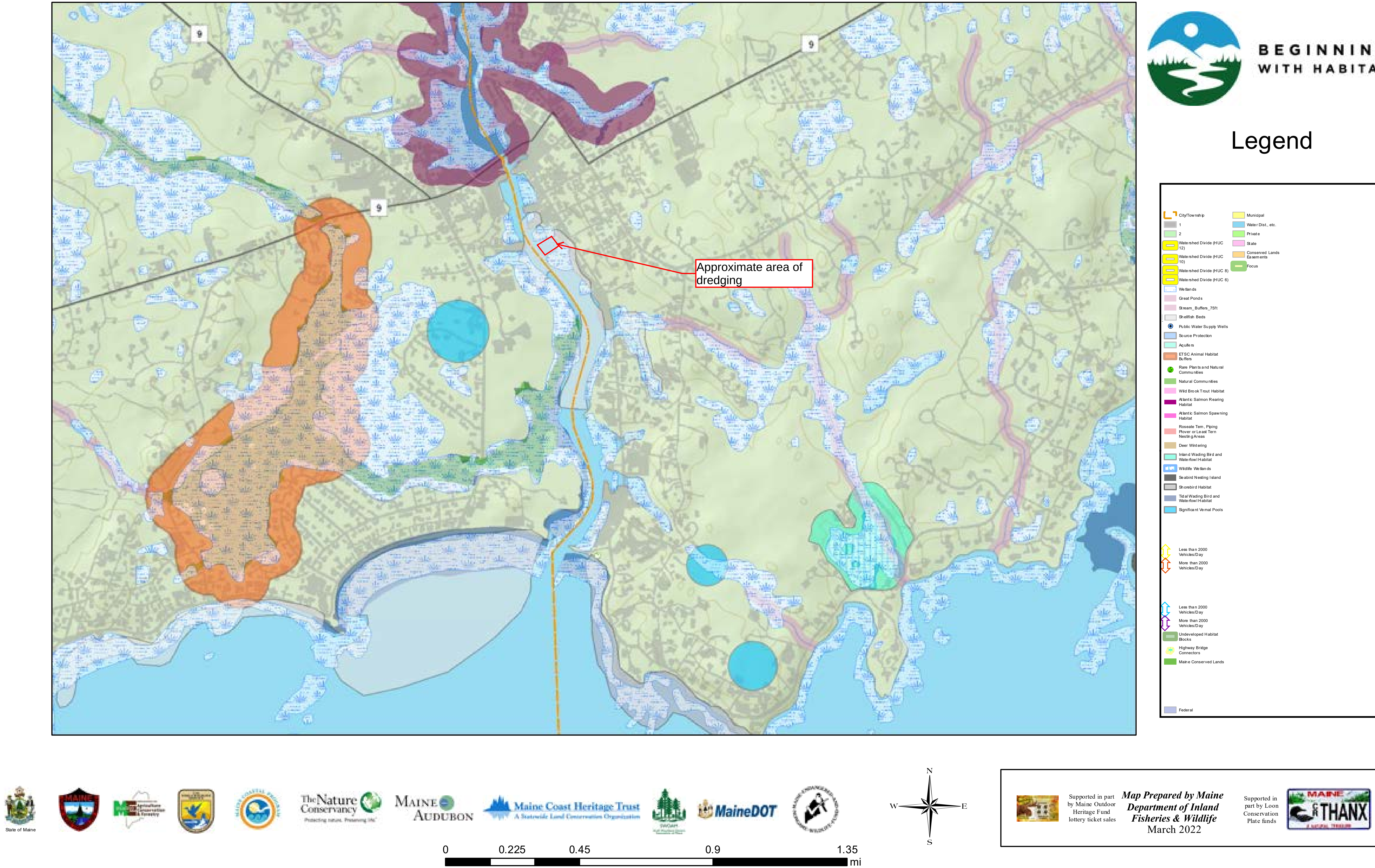
According to the U.S. Department of Fish & Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) website (https://ipac.ecosphere.fws.gov/), the following are listed species that may occur in the area of the property: the Northern Long-eared Bat and the Monarch Butterfly. It is our determination that the project is not likely to adversely affect threatened or endangered species.

According to the National Oceanic and Atmospheric Administration (NOAA) Fisheries Essential Fish Habitat (EFH) Mapper, the project location is mapped within a New England/Mid-Atlantic EFH for the following species: Acadian redfish (larvae); haddock (juvenile); little skate (adult); monkfish (eggs, larvae, juvenile, adult); silver hake (eggs, larvae, adult); and winter flounder (eggs). The project is likely to have short-term and localized impacts to EFH, with no significant impacts to these habitats anticipated.

According to the NOAA Fisheries Greater Atlantic Region Endangered Species Act (ESA) Section 7 Mapper (Section 7 Mapper), adult and subadult Atlantic sturgeon (threatened/endangered) and adult shortnose sturgeon (endangered) migrate and forage in the Kennebunk River within the limits of the project boundary. The migrating and foraging time of year for the Atlantic sturgeon is identified as all year, however, the Section 7 Mapper notes that the Atlantic sturgeon exhibit seasonal coastal movements in the spring and fall; the migrating and foraging time of year for the shortnose sturgeon is identified as April 1 to November 30.

The AYC dredging work is proposed to take place in winter 2025-2026 and to avoid disturbances to EFH and sturgeon populations to the maximum extent possible.

The Kennebunk River (Assessment Unit ID ME0106000301_622 R01) is listed on the Maine Department of Environmental Protection's (DEP's) Final 2018/2020/2022 Integrated Water Quality Report as a Delisted Category 5 Waterbody, as a Total Maximum Daily Load (TMDL) for E. coli was approved for the river in 2009. The proposed dredging activities will not discharge any bacteria into the river.


9
9
9
Approximate area of dredging
BEGINNING WITH HABITAT
Legend
City/Township
1
2
Watershed Divide (HUC 12)
Watershed Divide (HUC 10)
Watershed Divide (HUC 8)
Watershed Divide (HUC 6)
Wetlands
Great Ponds
Stream_Buffers_75ft
Shellfish Beds
Public Water Supply Wells
Source Protection
Aquifers
ETSC Animal Habitat Buffers
Rare Plants and Natural Communities
Natural Communities
Wild Brook Trout Habitat
Atlantic Salmon Rearing Habitat
Atlantic Salmon Spawning Habitat
Roseate Tern, Piping Plover or Least Tern Nesting Areas
Deer Wintering
Inland Wading Bird and Waterfowl Habitat
Wildlife Wetlands
Seabird Nesting Island
Shorebird Habitat
Tidal Wading Bird and Waterfowl Habitat
Significant Vernal Pools
Less than 2000 Vehicles/Day
More than 2000 Vehicles/Day
Less than 2000 Vehicles/Day
More than 2000 Vehicles/Day
Undeveloped Habitat Blocks
Highway Bridge Connectors
Maine Conserved Lands
Federal
Municipal
Water Dist., etc.
Private
State
Conserved Lands Easements
Focus
State of Maine
The Nature Conservancy
Maine Audubon
Maine Coast Heritage Trust
A Statewide Land Conservation Organization
MaineDOT
N
W
E
S
0
0.225
0.45
0.9
1.35
mi
Supported in part by Maine Outdoor Heritage Fund lottery ticket sales
Map Prepared by Maine Department of Inland Fisheries & Wildlife
March 2022
Supported in part by Loon Conservation Plate funds

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Maine Ecological Services Field Office
P. O. Box A
East Orland, ME 04431
Phone: (207) 469-7300 Fax: (207) 902-1588

In Reply Refer To: June 15, 2022
Project Code: 2022-0013708
Project Name: AYC

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see https://www.fws.gov/birds/policies-and-regulations.php.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/birds/policies-and-regulations/executive-orders/e0-13186.php.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Maine Ecological Services Field Office
P. O. Box A
East Orland, ME 04431
(207) 469-7300

Project Summary

Project Code: 2022-0013708
Event Code: None
Project Name: AYC
Project Type: Disposal Dredge Material
Project Description: This project consists of dredging an area in front of the Arundel Yacht Club.
Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@43.358029450000004,-70.47593825153226,14z

Counties: York County, Maine

Endangered Species Act Species

There is a total of 2 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

IPaC User Contact Information

Agency: Walsh Engineering Associates, Inc.
Name: Randee McDonald
Address: One Karen Drive, Suite 2A
City: Westbrook
State: ME
Zip: 04092
Email randee@walsh-eng.com
Phone: 2075539898

EFH Mapper Report

EFH Data Notice

Essential Fish Habitat (EFH) is defined by textual descriptions contained in the fishery management plans developed by the regional fishery management councils. In most cases mapping data can not fully represent the complexity of the habitats that make up EFH. This report should be used for general interest queries only and should not be interpreted as a definitive evaluation of EFH at this location. A location-specific evaluation of EFH for any official purposes must be performed by a regional expert. Please refer to the following links for the appropriate regional resources.

Greater Atlantic Regional Office
Atlantic Highly Migratory Species Management Division

Query Results

Degrees, Minutes, Seconds: Latitude = 43º 21' 30" N, Longitude = 71º 31' 27" W
Decimal Degrees: Latitude = 43.358, Longitude = -70.476

The query location intersects with spatial data representing EFH and/or HAPCs for the following species/management units.

***** W A R N I N G *****

Please note under "Life Stage(s) Found at Location" the category "ALL" indicates that all life stages of that species share the same map and are designated at the queried location.

EFH

Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
		Acadian Redfish	Larvae	New England	Amendment 14 to the Northeast Multispecies FMP
		Haddock	Juvenile	New England	Amendment 14 to the Northeast Multispecies FMP
		Little Skate	Adult	New England	Amendment 2 to the Northeast Skate Complex FMP
		Monkfish	Adult, Eggs/Larvae, Juvenile	New England	Amendment 4 to the Monkfish FMP
		Silver Hake	Adult, Eggs/Larvae	New England	Amendment 14 to the Northeast Multispecies FMP
		Winter Flounder	Eggs	New England	Amendment 14 to the Northeast Multispecies FMP

Pacific Salmon EFH

No Pacific Salmon Essential Fish Habitat (EFH) were identified at the report location.

Atlantic Salmon

No Atlantic Salmon were identified at the report location.

HAPCs

No Habitat Areas of Particular Concern (HAPC) were identified at the report location.

EFH Areas Protected from Fishing

No EFH Areas Protected from Fishing (EFHA) were identified at the report location.

Spatial data does not currently exist for all the managed species in this area. The following is a list of species or management units for which there is no spatial data. ****For links to all EFH text descriptions see the complete data inventory: open data inventory -->**
All EFH species have been mapped for the Greater Atlantic region, **Atlantic Highly Migratory Species EFH**, Bigeye Sand Tiger Shark, Bigeye Sixgill Shark, Caribbean Sharpnose Shark, Galapagos Shark, Narrowtooth Shark, Sevengill Shark, Sixgill Shark, Smooth Hammerhead Shark, Smalltail Shark

Drawn Action Area & Overlapping S7 Consultation Areas

Area of Interest (AOI) Information

Area : 2.79 acres

Aug 27 2024 14:26:21 Eastern Daylight Time

Summary

Name	Count	Area(acres)	Length(mi)
Atlantic Sturgeon	2	5.59	N/A
Shortnose Sturgeon	1	2.79	N/A
Atlantic Salmon	0	0	N/A
Sea Turtles	0	0	N/A
Atlantic Large Whales	0	0	N/A
In or Near Critical Habitat	0	0	N/A

Atlantic Sturgeon

#	Feature ID	Species	Lifestage	Behavior	Zone
1	ANS_C50_ADU_MAF	Atlantic sturgeon	Adult	Migrating & Foraging	N/A
2	ANS_C50_SUB_MAF	Atlantic sturgeon	Subadult	Migrating & Foraging	N/A

#	From	Until	From (2)	Until (2)	Area(acres)
1	01/01	12/31	N/A	N/A	2.79
2	01/01	12/31	N/A	N/A	2.79

Shortnose Sturgeon

#	Feature ID	Species	Life Stage	Behavior	Zone
1	SNS_C50_ADU_MAF	Shortnose sturgeon	Adult	Migrating & Foraging	N/A

#	From	Until	From (2)	Until (2)	Area(acres)
1	04/01	11/30	N/A	N/A	2.79

Attachment 5 – Historic Sites

5.1 – MHPC Response

5.2 – THPO Notification

5.3 – THPO Responses

5.0 Historic Sites

As required by the Army Corps of Engineers (ACOE), the Maine Historic Preservation Commission (MHPC) and the Tribal Historic Preservation Officers (THPO) of Maine have been consulted regarding this project. A copy of these communications are included with this section.

WALSH
ENGINEERING ASSOCIATES, INC.

RECEIVED
FEB 28 2022
By 0331-22

February 24, 2022

Mr. Kirk F. Mohney, Director
Maine Historic Preservation Commission
55 Capitol Street
65 State House Station
Augusta, Maine 04333-0065

RE: Arundel Yacht Club Historic Review
51 Ocean Ave, Kennebunkport ME
Map 10, Lot 1, Block 5

Dear Mr. Mohney,

Please take note that the Arundel Yacht Club intends to file permit applications with the Maine DEP for dredging activities located in the Kennebunk River offshore of 51 Ocean Ave in Kennebunkport, Maine. Walsh Engineering Associates is requesting that the MHPC review the area for any known historic and/or archaeological resources. A site plan location map is attached for your review.

If you have any questions or concerns with this project, please feel free to contact me at (207) 553-9898 or by e-mail at randee@walsh-eng.com. Thank you in advance for your timely comments.

Respectfully,

RMcDonald

Randee McDonald
Project Coordinator
Walsh Engineering Associates

Enc: Location Plan

Based on the information submitted, I have concluded that there will be no historic properties affected by the proposed undertaking, as defined by Section 106 of the National Historic Preservation Act. Consequently, pursuant to 36 CFR 800.4(d)(1), no further Section 106 consultation is required unless additional resources are discovered during project implementation pursuant to 36 CFR 800.13.

Kirk F. Mohney 3/9/22

Kirk F. Mohney,
State Historic Preservation Officer
Maine Historic Preservation Commission

Date

WALSH
ENGINEERING ASSOCIATES, INC.

February 24, 2022

THPO
Houlton Band of Maliseet Indians
88 Bell Road Littleton, Maine 04730
istjohn@maliseets.com

THPO
Passamaquoddy Tribe of Indians
Pleasant Point Reservation
PO Box 343 Perry, Maine 04667
soctomah@gmail.com

THPO
Passamaquoddy Tribe of Indians
Indian Township Reservation
P.O. Box 301 Princeton, Maine 04668
soctomah@gmail.com

THPO
Mi'kmaq Nation
7 Northern Road Presque Isle, Maine 04769
kreis@micmac-nsn.gov

THPO
Cultural and Historic Preservation Dept.12
Wabanaki Way Indian Island, Maine 04468
chris.sockalexis@penobscotnation.org

VIA email as noted above

RE: Arundel Yacht Club Historic Review
51 Ocean Ave, Kennebunkport ME
Map 10, Lot 1, Block 5

Please take note that the Arundel Yacht Club intends to file permit applications with the Maine DEP for dredging activities located in the Kennebunk River offshore of 51 Ocean Ave in Kennebunkport, Maine. Walsh Engineering Associates is requesting that the THPO review the area for any known historic and/or archaeological resources. A site plan location map is attached for your review.

If you have any questions or concerns with this project, please feel free to contact me at (207) 553-9898 or by e-mail at randee@walsh-eng.com. Thank you in advance for your timely comments.

Respectfully,

Randee McDonald
Project Coordinator
Walsh Engineering Associates

Enc: Location Plan

Tribal Historic Preservation Office
Passamaquoddy Tribe
PO Box 159 Princeton, Me. 04668
207-214-4051

March 2, 2022

Randee McDonald
Project Coordinator
One Karen Drive, Suite 2A
Westbrook, ME 04092

- Re: Kennebunkport – 51 Ocean Ave

Dear Randee;

The Passamaquoddy THPO has reviewed the following applications regarding the historic properties and significant religious and cultural properties in accordance with NHPA, NEPA, AIRFA, NAGPRA, ARPA, Executive Order 13007 Indian Sacred Sites, Executive Order 13175 Consultation and Coordination with Indian Tribal Governments, and Executive Order 12898 Environmental Justice.

The Projects listed above will not have any impact on cultural and historical concerns of the Passamaquoddy Tribe. Should buried artifacts, human remains, cultural sites or ground features be unexpectedly unearthed during ground disturbing activities, all construction should immediately cease and the resources be examined by a professional archaeologist. Additionally, all appropriate authorities-including all pertinent tribal entities should be notified.

Sincerely;

Donald Soctomah
Soctomah@gmail.com
THPO
Passamaquoddy Tribe

Tribal Historic Preservation Office
Mi’kmaq Nation (Formerly known as the Aroostook Band of Micmac)
Kendyl Reis
Tribal Historic Preservation Officer
7 Northern Road
Presque Isle, ME 04769
Phone: (207)764-1972 ext. 161
Fax: (207)764-7667
Email: kreis@micmac-nsn.gov
Arundel Yacht Club Project

51 Ocean Ave, Kennebunkport, Maine
March 3rd, 2022

Thank you for the opportunity to review the above-referenced project for compliance with National Environmental Policy Act (NEPA) and National Historic Preservation Act (NHPA), or other, requirements.

Based on the project description, we do not have knowledge of any specific sites or cultural features that exist at the proposed project location.

However, this geographic area does constitute traditional areas that were historically utilized by members of the Mi’kmaq Nation and the other Wabanaki Tribes. Therefore, we respectfully request that if during the course of excavation/construction activities, human remains, artifacts, or any other evidence of Native American presence is discovered, that site activities in the vicinity of the discovery immediately cease, pending notification to us.

In addition, if this project results in wetland disturbances requiring mitigation, we are requesting that you utilize the black ash (Fraginus nigra) as the principal wetland species for wetland restoration activities. The black ash tree has special significance in the culture of the northeastern Tribes and is used extensively for weaving baskets and other Native American crafts. The black ash tree also provides valuable food and habitat for migratory waterfowl and other wildlife. Unfortunately, however, this species has been selected against by foresters and landowners who favor other tree species. As a result of this, and other environmental factors, the black ash tree is in serious decline in Maine. The Mi’kmaq Nation has completed several black ash wetland restoration projects and have a dependable source for highly-quality seedlings, and the experience and expertise to assist you with black ash wetland restoration projects.

On the subject of human remains, artifacts, or any other evidence of Native American presence is discovered. The human remains will be reburied with the appropriate respect for the remains that is required at a distinctive and respectable site. The artifacts and other evidence of Native American discovery will be documented with appropriate detail. The items will be analyzed for the precise period of the items’ distinctive period and will be documented by the Tribal Historic Preservation Officer for the Mi’kmaq Nation.

If you have any questions or comments, please feel free to contact me.

Sincerely,

Kendyl Reis
Tribal Historic Preservation Officer

PENOBSCOT NATION
CULTURAL & HISTORIC PRESERVATION
12 WABANAKI WAY, INDIAN ISLAND, ME 04468

CHRIS SOCKALEXIS – TRIBAL HISTORIC PRESERVATION OFFICER
E-MAIL: chris.sockalexis@penobscotnation.org

NAME	Randee McDonald
ADDRESS	Walsh Engineering Associates One Karen Drive, Suite 2A Westbrook, ME 04092
OWNER'S NAME	Arundel Yacht Club
TELEPHONE	(207) 553-9898
EMAIL	Randee@Walsh-eng.com
PROJECT NAME	Maintenance Dredging
PROJECT SITE	Kennebunkport, ME
DATE OF REQUEST	February 24, 2022
DATE REVIEWED	June 15, 2022

Thank you for the opportunity to comment on the above referenced project. This project appears to have no impact on a structure or site of historic, architectural or archaeological significance to the Penobscot Nation as defined by the National Historic Preservation Act of 1966, as amended.

If there is an inadvertent discovery of Native American cultural materials during the course of the project, please contact my office at (207) 817-7471. Thank you for consulting with the Penobscot Nation Tribal Historic Preservation Office with this project.

Chris Sockalexis, THPO
Penobscot Nation

Attachment 6 – Abutters List

150 feet Abutters List Report

Kennebunkport, ME
October 01, 2024

Subject Property:

Parcel Number:	10-1-5	Mailing Address:	ARUNDEL YACHT CLUB PO BOX 328 KENNEBUNKPORT, ME 04046-0328
CAMA Number:	10-1-5		
Vision ID:	3428		
Property Address:	51 OCEAN AVENUE		

Abutters:

Parcel Number:	10-1-15	Mailing Address:	KENNEBUNKPORT, TOWN OF PO BOX 566 KENNEBUNKPORT, ME 04046
CAMA Number:	10-1-15		
Vision ID:	3441		
Property Address:	53 OCEAN AVENUE		
Parcel Number:	10-1-3	Mailing Address:	YACHTSMAN HOSPITALITY, LLC 2 LIVEWELL DRIVE, #203 KENNEBUNK, ME 04043
CAMA Number:	10-1-3		
Vision ID:	3427		
Property Address:	57 OCEAN AVENUE		
Parcel Number:	10-1-4	Mailing Address:	KENNEBUNKPORT, TOWN OF PO BOX 566 KENNEBUNKPORT, ME 04046
CAMA Number:	10-1-4		
Vision ID:	525		
Property Address:	OCEAN AVENUE		
Parcel Number:	10-1-6	Mailing Address:	EDITH HG MCCONNELL REVOCABLE TRUST PO BOX 1813 KENNEBUNKPORT, ME 04046
CAMA Number:	10-1-6		
Vision ID:	527		
Property Address:	49 OCEAN AVENUE		
Parcel Number:	10-1-7	Mailing Address:	BARTLETT, HUGH J & JUDITH PO BOX 293 KENNEBUNKPORT, ME 04046
CAMA Number:	10-1-7		
Vision ID:	105722		
Property Address:	47 OCEAN AVENUE #5		
Parcel Number:	10-1-7	Mailing Address:	FANTON, ROMA F 39 MEETINGHOUSE LANE FAIRFIELD, CT 06430
CAMA Number:	10-1-7A		
Vision ID:	105722		
Property Address:	47 OCEAN AVENUE #7		
Parcel Number:	10-1-7	Mailing Address:	NOWAK, LORI 4940 N HACIENDA DEL SOL ROAD TUCSON, AZ 85718
CAMA Number:	10-1-7B		
Vision ID:	105722		
Property Address:	47 OCEAN AVENUE #8		
Parcel Number:	10-1-7	Mailing Address:	NOWAK, LORI 4940 N HACIENDA DEL SOL ROAD TUCSON, AZ 85718
CAMA Number:	10-1-7C		
Vision ID:	105722		
Property Address:	47 OCEAN AVENUE #6		

150 feet Abutters List Report

Kennebunkport, ME
October 01, 2024

Parcel Number:	10-1-7	Mailing Address:	MCFB, LLC
CAMA Number:	10-1-7D		PO BOX 2675
Vision ID:	105722		KENNEBUNKPORT, ME 04046
Property Address:	47 OCEAN AVENUE #4		
Parcel Number:	10-1-7	Mailing Address:	MULBERGER, VIRGINIA A
CAMA Number:	10-1-7E		804 HALL PLACE
Vision ID:	105722		ALEXANDRIA, VA 22302
Property Address:	47 OCEAN AVENUE #2		
Parcel Number:	10-1-7	Mailing Address:	REDDEN, MICHAELA A & OLSHAN, ARTHUR
CAMA Number:	10-1-7F		8 FRAESCO LANE
Vision ID:	105722		NORWOOD, NJ 07648
Property Address:	47 OCEAN AVENUE #3		
Parcel Number:	10-1-7	Mailing Address:	PELLETIER, THOMAS J & CYNTHIA L
CAMA Number:	10-1-7G		182 LOWELL STREET
Vision ID:	105722		PEABODY, MA 01960
Property Address:	47 OCEAN AVENUE #1		
Parcel Number:	10-1-7	Mailing Address:	RIVERBANK CONDO
CAMA Number:	10-1-7Z		
Vision ID:	105722		,
Property Address:	47 OCEAN AVENUE #MAIN		
Parcel Number:	10-2-1	Mailing Address:	BYERLY, WILLIAM F & MARY C
CAMA Number:	10-2-1		PO BOX 2675
Vision ID:	3442		KENNEBUNKPORT, ME 04046
Property Address:	46 OCEAN AVENUE		
Parcel Number:	10-2-2	Mailing Address:	KENNEBUNKPORT CONSERVATION TRUST
CAMA Number:	10-2-2		PO BOX 7004
Vision ID:	546		CAPE PORPOISE, ME 04014-07004
Property Address:	OCEAN AVENUE		
Parcel Number:	10-5-10	Mailing Address:	MAHONEY FAMILY REVOCABLE TRUST
CAMA Number:	10-5-10		52 OCEAN AVENUE
Vision ID:	587		KENNEBUNKPORT, ME 04046
Property Address:	52 OCEAN AVENUE		
Parcel Number:	10-5-11	Mailing Address:	STOHLMAN, SUZANNE
CAMA Number:	10-5-11		PO BOX 127
Vision ID:	588		KENNEBUNKPORT, ME 04046
Property Address:	5 GREENE STREET		

Attachment 7 – Construction and Erosion Control Plan

7.0 Construction & Erosion Control Plan

Construction

The dredging will be conducted utilizing a floating barge and dredging crane with a clamshell bucket. The barge will access the project area from traveling upriver from the Kennebunk River Breakwater. The area of the dredge will be an approximately 180-foot by 250-foot area (~45,356 square feet). The proposed dredge depth will be to elevation -6.0 feet mean low water, with about one foot of over-dig. It is anticipated that dredging will coincide with neighboring marinas performing dredging at the same approximate time, including the Yachtsman Marina, the Kennebunkport Marina, and the Kennebunk River Club. The material will be transported by barge to the Isle of Shoals North Disposal Site (IOSN). The IOSN is located approximately 15 nautical miles east of Portsmouth, New Hampshire, in the Gulf of Maine.

Erosion & Sedimentation Control

The dredging will be conducted from a floating barge using a dredging crane with a clamshell bucket. The dredged material will be placed on the barge and brought to the IOSN open water placement site for disposal. There will be no storage of the dredged material on land which negates the need for erosion and sedimentation control measures in this regard. No formal erosion control measures are proposed for the project. However, turbidity curtains will be implemented, if deemed necessary, around the proposed dredging area to mitigate the travel of sediment during the in-water disturbance.

Attachment 8 – Sampling and Analysis Plan

8.1 – Final Sampling and Analysis Plan

8.2 – Suitability Determination for IOSN

8.0 Sampling and Analysis Plan

The U.S. Army Corps of Engineers (USACE) approved a Sampling and Analysis Plan (SAP) for the project on May 24, 2022, which provided proposed sediment sampling locations, methods, and testing criteria to determine disposal suitability. The sampling results were submitted to the USACE for the AYC and the nearby Yachtsman Marina, Kennebunkport Marina, and Kennebunk River Club. The USACE issued a Suitability Determination for all 4 sites on June 10, 2024, which documents the suitability of the dredged material for disposal at the Isle of Shoals North (IOSN) open water disposal site.

The SAP and USACE's Suitability Determination are included as an attachment to this permit section for reference.

CENAE–PDE 24 May 2022

FINAL Sampling and Analysis Plan for Arundel Yacht Club, Kennebunkport, ME, File Number NAE-2022-00288

1. **Project Description:** The applicant is proposing to mechanically dredge approximately 3,775 cubic yards (CY) of material from shoaled areas totaling just over one acre within the property's marina basin located in the town of Kennebunkport, ME (Figures 1 and 2). This area will be dredged to the proposed depth of -6 feet at mean lower low water (MLLW) plus one foot of allowable overdepth. The applicant proposes to dispose of this material at the Isles of Shoals North Disposal Site (IOSN).

This sampling and analysis plan (SAP) has been developed by the New England District (NAE) U.S. Army Corps of Engineers (USACE) to gather information to support a dredged material suitability determination for the open water disposal alternative associated with this project. This sampling and analysis effort will be divided into two phases. The first phase will include sampling and testing of dredge site sediment for grain size and bulk chemistry in order to identify contaminants of concern. The second phase will include sampling of dredge site sediment and water for elutriate and biological testing in order to evaluate the material for placement at IOSN. The results of biological testing will be evaluated against the most recent NAE dataset for the IOSN reference area. All sampling and analysis activities described in this plan shall follow the requirements set forth in the "*Regional Implementation Manual for the Evaluation of Dredged Material Proposed for Disposal in New England Waters*" (RIM) dated May 6, 2004. A copy of the RIM may be downloaded from the NAE website: http://www.nae.usace.army.mil/Missions/Regulatory/DredgedMaterialProgram/RegionalImplementationManual.aspx

2. **Conceptual Site Model:** NAE reviewed historic testing data, water quality data, spill records, and adjacent land use information to develop a conceptual site model (CSM) for the proposed project. The CSM was used to characterize the system and identify potential sources of contamination, site-specific contaminants of concern, exposure pathways, and biological receptors in order to inform this sampling and analysis plan.

Project Setting: The property is associated with the Arundel Yacht Club located along the Kennebunk River in Kennebunkport, ME. The yacht club building was originally constructed in 1806 and was used as a rope making business until 1816. Sanborn maps from 1911 show that the property was used for a boat house, carriage house, and wagon shed. It has served as the Arundel Yacht Club since 1957 and provides dockage for up to fifty recreational boats and the launching of small sailboats. There is no boat or engine repair that takes place at the property. Land use in the surrounding area includes a mix of residential properties, many with docks, and marina facilities. The Yachtsman Hotel and

Marina Club, which provides dockage for recreational watercraft, is directly adjacent to the south of the property. The nearby Kennebunkport Marina is approximately 800 feet south of the project area and offers boat slips, full mechanical services, and repairs as well as a boat ramp. Chicks Marina, which has a fuel dock, is adjacent to the southern property boundary of the Kennebunkport Marina, approximately 1,200 feet south of the project area. Downtown Kennebunkport, an area with several restaurants, retail shops, and marine services, is approximately 1,000 feet north of the property. The Kennebunkport River Federal Navigation Project (FNP) -6 foot MLLW channel is located directly adjacent to the western boundary of the project area.

<u>Water Quality</u>: Water Quality in the project area is dictated by tidal exchange with the Gulf of Maine with freshwater input from the Kennebunk River to the north and a series of stormwater discharge pipes within the Arundel Yacht Club and the other marina properties along the river (Figure 3). The 2014 Environmental Assessment for dredging of the Kennebunk River FNP noted that there have been reported increases of bacterial counts in the water, attributed to faulty septic systems, agriculture, and overboard discharges. Tidal waters of the Kennebunk River are classified as SB by the Maine Department of Environmental Protection (MEDEP). Class SB waters must be of such quality that they are suitable for the designated uses of recreation in and on the water, fishing, aquaculture, propagation and harvesting of shellfish, industrial process and cooling water supply, hydroelectric power generation, navigation and as habitat for fish and other estuarine and marine life (38 M.R.S. § 465(B)(2) https://www.mainelegislature.org/legis/statutes/38/title38sec465-B.html).

<u>Dredge History and Existing Testing Data</u>: The project area was last dredged in 2017 when approximately 1,800 CY of material were removed to a depth of -6 feet Mean Low Water (MLW) and placed at the Cape Arundel Disposal Site (CADS). Sampling and testing of this material in 2003 documented sediments to be predominately fine grained. Chemistry data, also from 2003, revealed elevated levels of metals (cadmium, copper, and mercury) at the project site. A review of biological testing data from 2014 found sediment from the project area not likely to be acutely toxic to benthic organisms. A suitability determination from 2015 concluded that project sediments were suitable for open water placement at CADS.

The adjacent Yachtsman Marina was last dredged in 2015 when approximately 3,914 CY of material were removed to a depth of -5 feet MLW and placed at the CADS. Sampling and testing of this material in 2014 documented sediments from two samples along the shoreline in the middle of the basin to be predominately fine grained (passing the No. 200 sieve) while the remaining four samples, located away from the shoreline, were predominately sand with some silt. A review of the associated chemistry data found elevated levels of pesticides (total DDX [4,4'-DDD + 4,4'-DDE + 4,4'-DDT]) and total high molecular weight polyaromatic hydrocarbons (HPAHs). A review of the associated biological testing data found sediment from the project area not likely to be acutely toxic to benthic organisms. A suitability determination from 2014 for the project area found sediments suitable for open water disposal at CADS. A residual dredging event of 100 CY was authorized by USACE in 2020 and the material was placed upland.

Spill Data: Based on information provided by the applicant and a review of the Maine Department of Environmental Protection (MEDEP) Oil and Hazardous Waste Spill Database (https://www.maine.gov/dep/spills/index.html), NAE determined that there have been several small diesel, gasoline, and oil spills within the surrounding area of the project site since 2011.

Risk Ranking: Following the tier one review of the site characteristics, location, and the available historical data, the proposed project was given a **low-moderate** risk ranking according to the following matrix.

Table 1: Project Risk Ranking

Rank	Guidelines
Low	Few or no sources of contamination. Data available to verify no significant potential for adverse biological effects.
Low-Moderate	Few or no sources of contamination but existing data is insufficient to confirm ranking.
Moderate	Contamination sources exist within the vicinity of the project with the potential to produce chemical concentrations that may cause adverse biological effects.
High	Known sources of contamination within the project area and historical data exists that has previously failed biological testing.

3. **Sample Collection:** In the first phase of testing the applicant shall collect sediment cores from four locations within the proposed dredge areas as specified in Table 2 (also see Figure 3). These locations were selected based on information from the CSM described above, the low to moderate risk ranking for the project, and shoaled areas identified in the project conditions survey submitted by the applicant. All core samples shall be collected to the proposed dredge depth plus overdredge amount using inert core liners. Estimated core lengths based on the bathymetry provided by the applicant are provided in Table 2, but the actual required core lengths shall be determined at the time of the sampling effort using measured water depths at each location corrected to MLLW. In order to ensure that the core samples adequately represent the dredge interval at each location, all cores to be used for this project shall have a recovered length that is within 75% of the core penetration depth. In addition, any cores that display significant disturbance such as compaction or wash out shall be disregarded. If the cores from any location do not meet the acceptability criteria after six attempts, then the applicant should retain the best core from that location and contact NAE for

further guidance. The penetration and recovery for the core used for the chemistry and grain size samples should be recorded on the sample log.

Upon collection, all cores shall be measured and maintained in an upright position for a minimum of 15 minutes to allow any fine-grained material to settle. After a core has settled, it shall be re-measured before any overlying water is drained, taking care to not include overlying water with sediment flocculant in the measurement. All cores shall be split lengthwise, photographed with a stadia rod for scale, and described in accordance with ASTM D 2488 (Standard Practice for Description and Identification of Soils). Samples shall be collected from the dredge interval (dredge depth + overdepth) within each core for grain size and bulk chemical analysis as described in the sections below. If the dredge interval within a core is homogenous then the entire length may be composited as a single sample with the chemistry/grain size sample interval noted on the sampling log. If any core shows significant stratification or obvious signs of contamination, then subsamples shall be collected from each layer and noted on the sampling log and the applicant shall consult NAE for guidance prior to the start of analysis. The term "significant stratification" includes any distinct change in sediment composition that could represent a change in depositional history or waterway usage such as a change in color or lithology. Compositing of dissimilar sediment layers without prior approval from NAE will result in the rejection of any resulting data products. In addition, a field duplicate sample should be collected for bulk chemistry and grain size analysis and an equipment blank should be collected for chemical analysis off any non-dedicated equipment used in the sampling process.

All sediments held for testing shall be stored in accordance with the requirements in Table 3 (from Table 8-9 in *Evaluation of Dredged Material Proposed for Ocean Disposal, Testing Manual, 1991).* Sample chain of custody forms shall be maintained by the applicant and submitted to NAE with the data package described in section 5 of this SAP.

Based on the results of the grain size and bulk chemistry sediment testing, NAE will provide the applicant with a biological testing compositing plan. In the second phase of testing, dredge area sediment shall be collected from the same sample locations described in Table 2 and composited according to NAE's biological testing compositing plan. Sufficient amounts of sediment and water shall be collected for elutriate preparation and analysis, water column toxicity testing, 10-day whole sediment toxicity testing, and 28-day bioaccumulation testing according to the sections below. Sediment cores from each station shall be collected using inert core liners and may be transferred directly into food grade polyethylene pails after core recovery has been measured. In addition, the applicant shall collect dredge site water from a central location within the proposed project area. All water samples shall be collected from the middle of the water column using either a non-contaminating pump or a discrete water sampler.

Please note that the applicant is not required to collect sediment or water samples from the IOSN reference site as the results of the biological testing will be compared to recent reference site data collected by NAE.

Again, all sediment and water samples held for testing shall be stored in accordance with the requirements in Table 3 (from Table 8-2 in Evaluation of Dredged Material Proposed for Ocean Disposal, Testing Manual, 1991). Sample chain of custody forms shall be maintained by the applicant and submitted to NAE with the data package described in section 5 of this SAP.

Vessel positioning shall be achieved using a Global Positioning System (GPS) that has been calibrated on site using a known reference point. The required horizontal accuracy at each sample location shall be 10 feet or less. All coordinate data shall be reported in geographic NAD 83 decimal degree format. All depth data shall be reported in tenths of feet. Water depths at each location are to be determined with an accuracy of ±0.1 feet (relative to MLLW). All depth data shall be reported in tenths of feet.

For phase one sampling, sample data including date, time, latitude, longitude, GPS accuracy at each sample station, measured water depth, tidal correction, core penetration, recovery, and chemistry sample intervals(s) shall be recorded in a sampling log (Figure 4 or equivalent) and provided to NAE with the applicant's core descriptions and photographs.

For phase two sampling, all sample data including date, time, latitude, longitude, GPS accuracy at each sample station, measured water depth, tidal correction, number of cores collected at each station, core lengths, and a general description of the sediment shall be recorded in a sampling log and provided to NAE. Note that if any of the phase two cores are significantly different from the material that was sampled during phase one, a representative core should be photographed and described and NAE should be consulted for guidance.

4. **Sample Analysis:** Sediment and water samples from the dredge area shall undergo physical, chemical, and biological analysis as described in the sections below. All laboratories used for this project shall have an approved Laboratory Quality Assurance Plan (LQAP) on file with NAE. Any data produced by a lab without an approved LQAP will not be accepted. The RIM, a list of laboratories with approved LQAPs, and the reporting format and requirements for electronic submission of data are available for download through the NAE website: http://www.nae.usace.army.mil/Missions/Regulatory/Dredged-Material-Program/.

Grain Size and Bulk Sediment Chemistry: All samples from the proposed dredge footprint shall be individually analyzed for grain size and bulk sediment chemistry. Testing parameters, analytical methods, and reporting limits to be used are outlined in Table 4. The listed analytical methods are recommended but can be replaced by other methods that will provide the required reporting limits. Additional guidance on the physical and chemical analysis of sediments can be found in chapter 5 of the RIM. NAE will provide the applicant with a compositing plan for biological testing based on sample proximity, physical characteristics recorded during the core description process, and the results of grain size and bulk chemistry analysis.

<u>Elutriate Chemistry:</u> Elutriate samples shall be prepared from the dredge area water and sediments according to the project compositing plan. The elutriate samples and clean seawater (provided by the applicant's testing facility) used for dilutions in the suspended phase particulate bioassays shall undergo chemical analysis according to the testing parameters, analytical methods, and reporting limits outlined in Table 5. The listed analytical methods are recommended but can be replaced by other methods that will give the required reporting limits. Additional guidance can be found in Section 6.1 of the RIM and Section 9.4 of the Green Book.

<u>Water Column Toxicity Testing:</u> Suspended phase particulate bioassays shall be performed on each composite sample in accordance with the requirements specified in Section 6.2 of the RIM, and Section 11.1 of the Green Book. Refer to the RIM for guidance in selecting the test species. Clean seawater provided by the applicant's testing facility shall be used as both control and dilution water.

Please note that excessive ammonia concentrations in the elutriate samples may cause a toxic response that is not of interest to the SPP bioassay, which focuses on persistent contaminants. To account for this scenario, the US Environmental Protection Agency (EPA) and NAE have devised a protocol to determine if ammonia is the driver of toxicity in situations where unionized ammonia is present at concentrations above the applicable water quality criteria (WQC). In order to facilitate this protocol, the applicant may choose to have their laboratory measure total ammonia in the undiluted elutriate samples prior to SPP bioassay initiation and calculate the unionized ammonia concentrations based on measurements of pH, temperature, and salinity. If the calculated unionized ammonia concentrations are greater than the applicable WQC, the testing facility shall immediately notify the applicant, who may wish to seek guidance from NAE on project-specific procedures for preparation of additional elutriate samples requiring ammonia reduction and the need for additional SPP testing. This protocol is not a requirement, but NAE recommends it to prevent a 'false positive' toxicity result that would limit the applicant's disposal alternatives.

<u>10-Day Whole Sediment Toxicity Testing:</u> 10-day whole sediment toxicity testing shall be performed on each composite sample in accordance with the

requirements specified in Chapter 7.1 of the RIM, Section 11.2 of the Green Book, and Methods for Assessing the Toxicity of Sediment-Associated Contaminants with Estuarine and Marine Amphipods, 1994. The bioassay test shall use two species of test animals, the amphipod *Leptocheirus plumulosus* and the mysid shrimp *Americamysis bahia*. If the applicant wishes to use alternate species listed in the RIM, then NAE must be contacted prior to sampling to coordinate the need for reference area sample collection and analysis.

28-Day Bioaccumulation Testing: 28-day bioaccumulation testing shall be performed on each composite sample in accordance with the requirements specified in Chapter 7.2 of the RIM and Section 12.1 of the Green Book. The bioaccumulation test shall use a bivalve, *Macoma nasuta*, and the polychaete *Nereis virens* as test animals. If alternate species are selected from the RIM then contact NAE prior to sampling to coordinate necessary reference data collection. At the end of the 28–day test, the tissues of the survivors shall be tested for the project contaminants of concern according to Tables 8 and 9 of the RIM. The contaminants of concern will be determined from the bulk sediment chemistry testing described above.

5. **Reporting requirements:** All sediment testing data is required to be submitted electronically in the electronic data deliverable (EDD) format available on the NAE website (http://www.nae.usace.army.mil/Missions/Disposal-Area-Monitoring-System-DAMOS/Electronic-Data-Deliverables.aspx). Hard copy data submission is also required but may be substituted with a printer friendly, easy-to-read format (e.g., PDF, MS Word). Any analytes not detected shall be reported as half the method detection limit (MDL) and qualified with a "U". RIM quality control summary tables are required to be submitted with each project dataset. These tables are found in Appendix II of the RIM.

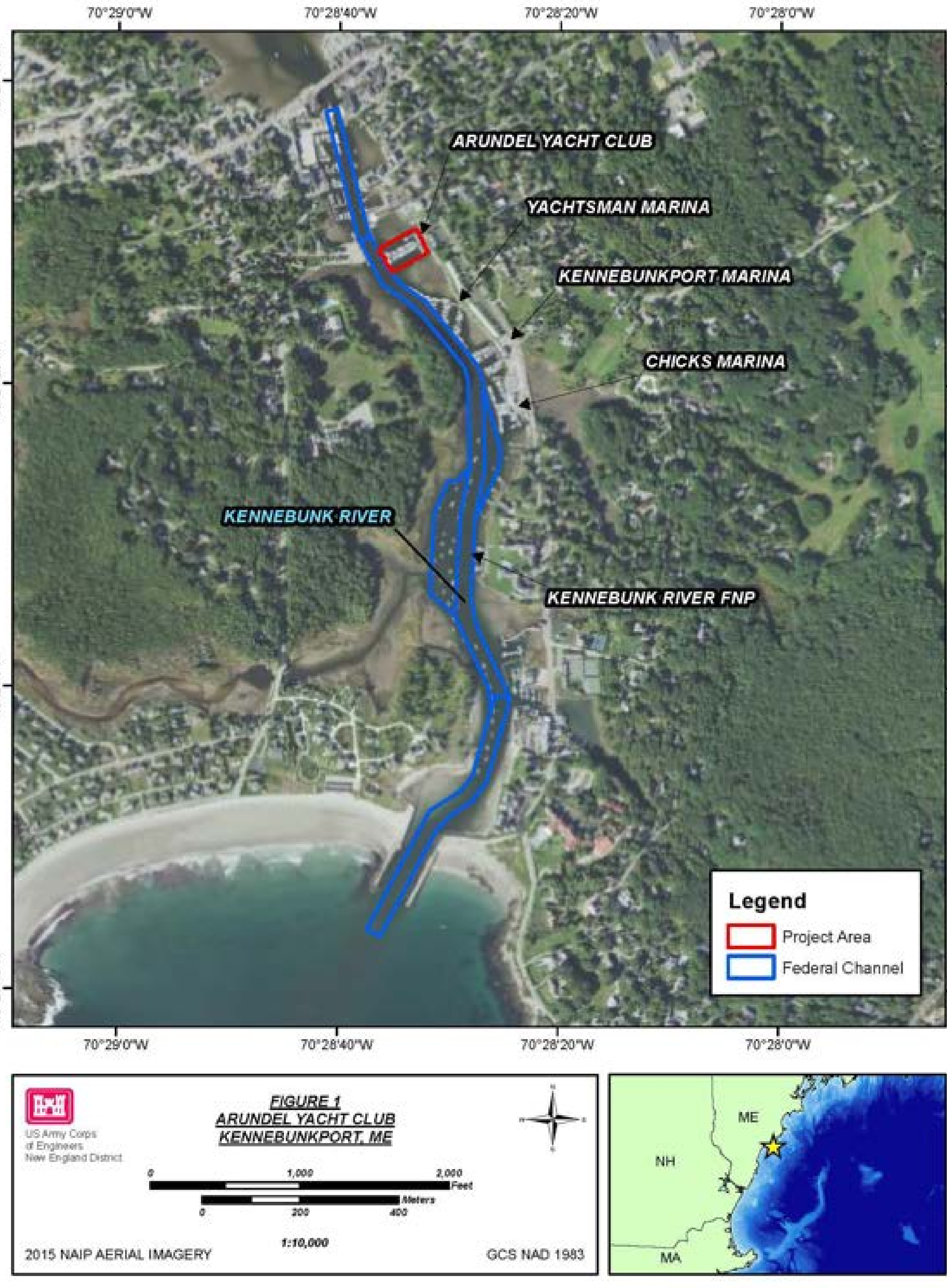
6. **Contact Information:** Questions about this plan should be directed to Gabriella Saloio (phone: 978-318-8138 e-mail: Gabriella.J.Saloio@usace.army.mil)

Gabriella Saloio

Gabriella Saloio
Biologist
New England District
U.S. Army Corps of Engineers

Table 2: Arundel Yacht Club Sample Locations

Station	Latitude (NAD 83)	Longitude (NAD 83)	Survey Depth (Feet MLLW)	Project Depth (Feet MLLW)	Overdepth (Feet)	Estimated Core length (Feet)
AYC-1	-70.475810	43.358305	-3.9	-6.0	1.0	3.1
AYC-2	-70.475589	43.358010	-1.7	-6.0	1.0	5.3
AYC-3	-70.476321	43.357931	-3.0	-6.0	1.0	4.0
AYC-4	-70.476397	43.358105	-3.0	-6.0	1.0	4.0



70°29'0"W
70°28'40"W
70°28'20"W
70°28'0"W
43°21'40"N
43°21'20"N
43°21'0"N
43°20'40"N
ARUNDEL YACHT CLUB
YACHTSMAN MARINA
KENNEBUNKPORT MARINA
CHICKS MARINA
KENNEBUNK RIVER
KENNEBUNK RIVER FNP
Legend
Project Area
Federal Channel
US Army Corps of Engineers New England District
FIGURE 1
ARUNDEL YACHT CLUB
KENNEBUNKPORT, ME
0
1,000
2,000
Feet
Meters
0
200
400
1:10,000
2015 NAIP AERIAL IMAGERY
GCS NAD 1983
ME
NH
MA

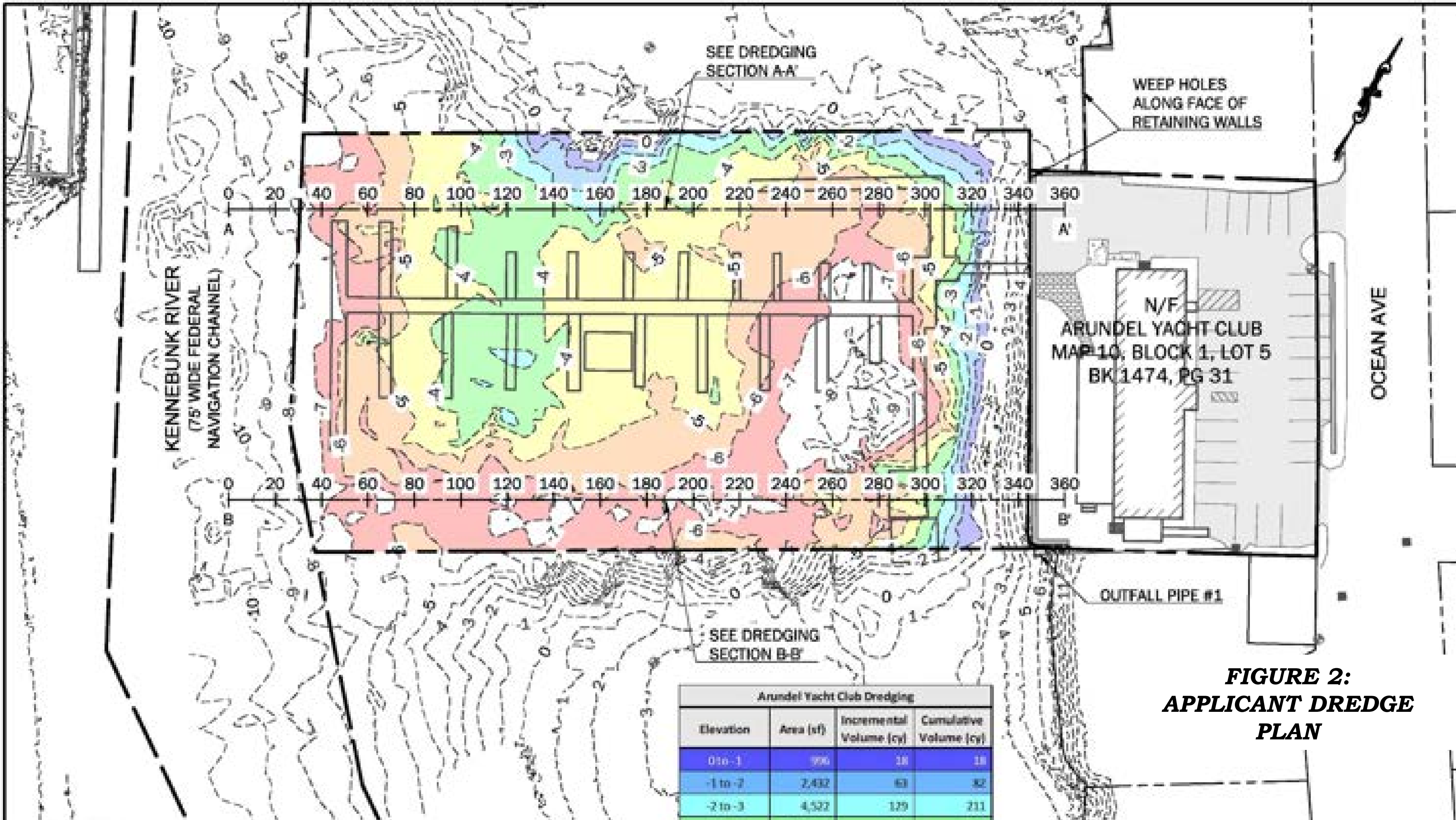


FIGURE 2: APPLICANT DREDGE PLAN

PLAN REFERENCES:

1. BATHYMETRY CONDUCTED BY WEA ON DECEMBER 17, 2021 USING HYDROLITE SONARMITE ECHOSOUNDER AND CARLSON BRx7 GNSS RECEIVER.
2. FIELD OBSERVATIONS AND TOPOGRAPHY COLLECTED VIA DRONE PHOTOGRAMERTY BY WEA ON DECEMBER 13, 2021.
3. ALL ELEVATIONS ON THIS PLAN ARE BASED ON MLLW. THE MLLW TO NAVD88 CORRECTIONS FOR THIS PROJECT IS 5.09 FEET.

Arundel Yacht Club Dredging			
Elevation	Area (sf)	Incremental Volume (cy)	Cumulative Volume (cy)
0 to -1	996	18	18
-1 to -2	2,432	63	82
-2 to -3	4,522	129	211
-3 to -4	11,832	303	514
-4 to -5	24,323	670	1,183
-5 to -6	35,131	1,101	2,284
-6 to -7	45,356	1,491	3,775
Including 25% Bulking Factor			4,718

WALSH
ENGINEERING ASSOCIATES, INC.
One Karen Dr., Suite 2A | Westbrook, Maine 04092
ph: 207.553.9898 | www.walsh-eng.com

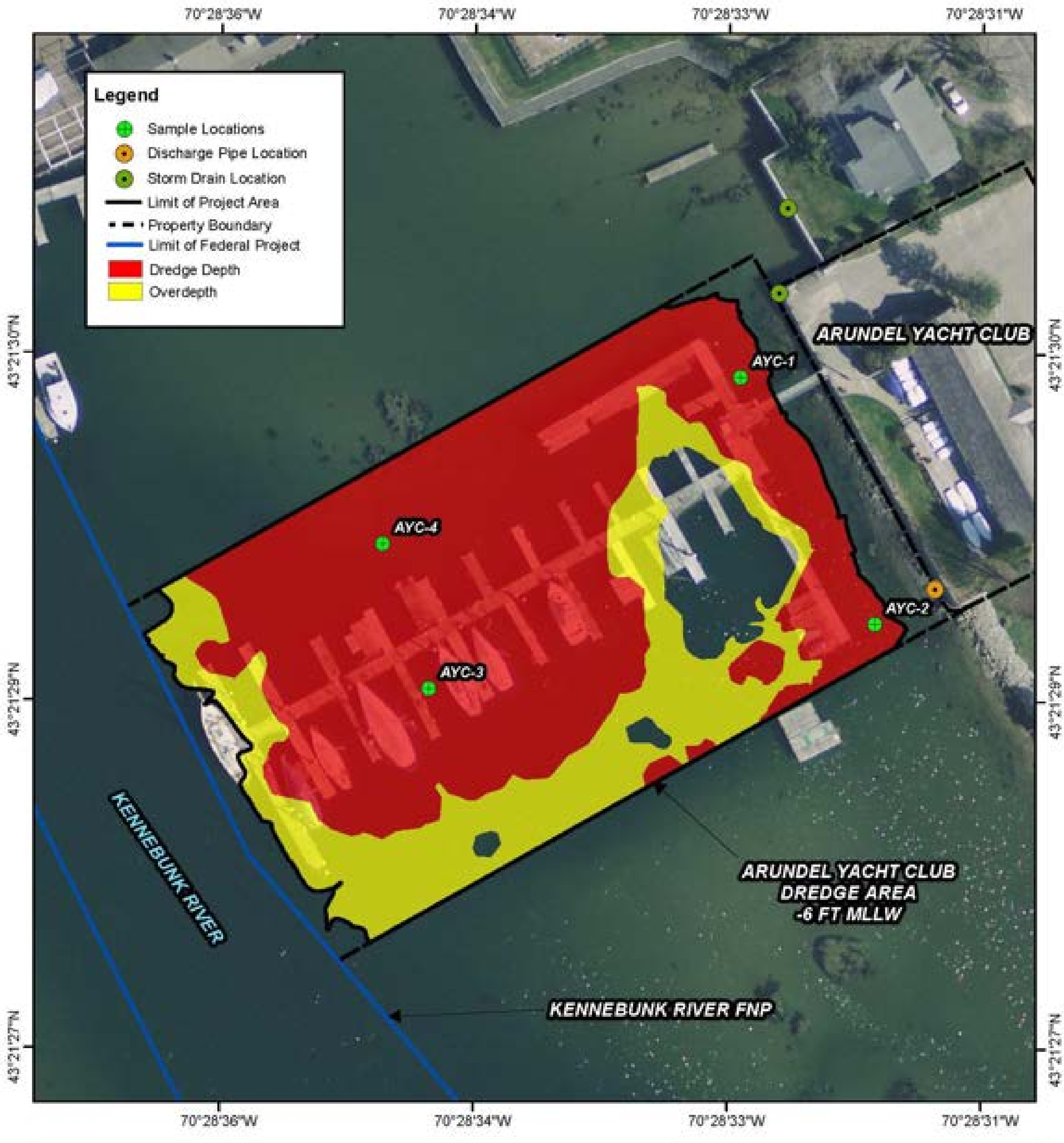
Arundel Yacht Club Dredging

Arundel Yacht Club
51 Ocean Ave
Kennebunkport, Maine 04046

Sheet Title:
Figure 2A: Plan View

Job No.:	782
Date:	January 2022
Scale:	1" = 60'
Drawn:	CAR
Checked:	WRW

P:\782 - Arundel Yacht Club Dredging\3. CAD\782 - Base.dwg plot date: 1/28/2022 3:50 PM



US Army Corps of Engineers New England District

FIGURE 3
ARUNDEL YACHT CLUB
2022 SAMPLE LOCATIONS

0 70 140 Feet
0 20 40 Meters

1:700

2022 ESRI WORLD IMAGERY

GCS NAD 1983

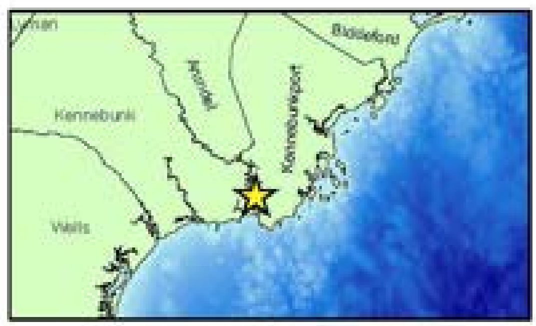


TABLE 3: RECOMMENDED PROCEDURES FOR SAMPLE COLLECTION, PRESERVATION, AND STORAGE

Analyses	Collection Method	Sample Volume	Container	Preservation Technique	Storage Conditions	Holding Time[b]
Sediment						
Chemical/Physical Analyses						
Metals	Grab/corer	200 mL	Precleaned polyethylene jar[c]	Refrigerate. Dry ice[b] or freezer storage is recommended for extended holding times.	≤ 4° C[c]	Hg - 28 days Others - 6 Months[d]
Organic Compounds	Grab/corer	475 mL	Solvent-rinsed glass jar with Teflon lid[c]	Refrigerate. Dry ice[b] or freezer storage is recommended for extended holding times.	≤ 4° C/dark[d]	14 days[e]
Particle Size	Grab/corer	75 mL	Whirl-pac bag[b]	Refrigerate	≤ 4° C	Undetermined
Total Organic Carbon	Grab/corer	3 L	Heat treated glass vial with Teflon lined lid[c]	Refrigerate. Dry ice[c] or freezer storage is recommended for extended holding times.	≤ 4° C[c]	14 days
Sediment from Which Elutriate is Prepared	Grab/corer	Dependent on tests performed	Glass with Teflon lined lid	Completely fill and Refrigerate	≤ 4° C/dark/airtight	Undetermined
Biological Tests						
Dredged Material	Grab/corer	12-15 L per sample	Plastic bag or container[e]	Completely fill and Refrigerate; sieve	≤ 4° C/dark/airtight	14 days[i ƒ]
Reference Sediment	Grab/corer	45-50 L per test	Plastic bag or container[e]	Completely fill and Refrigerate; sieve	≤ 4° C/dark/airtight	14 days[i ƒ]
Control Sediment	Grab/corer	21-25 L per test	Plastic bag or container[e]	Completely fill and Refrigerate; sieve	≤ 4° C/dark/airtight	14 days[i ƒ]
Water and Elutriate						
Chemical/Physical Analyses						
Metals		Discrete sampler or pump	1 L	Acid-rinsed polyethylene or glass jar	pH <2 with HNO_3[d]	4° C ± 2° C[d]

TABLE 3: RECOMMENDED PROCEDURES FOR SAMPLE COLLECTION, PRESERVATION, AND STORAGE (CONTINUED)

Organics	Discrete sampler or pump	4 L	Amber glass bottle[d]	Airtight seal; refrigerate	4° C ± 2° C[d]	5 days[d]
Tissue						
Metals	Trawl/ Teflon coated grab	30 g	Double Ziploc[c]	Handle with non-metallic forceps; plastic gloves; dry ice[c]	≤ -20° C[C]	Hg - 14 days Others - 6 months[i]
PCBs and Chlorinated Pesticides	Trawl/ Teflon coated grab	100 g	Hexane-rinsed double aluminum foil and double Ziploc[c]	Handle with hexane-rinsed stainless steel forceps; dry ice[c]	≤ -20° C[C]	10 days[i e]
Volatile Organic Compounds	Trawl/ Teflon coated grab	50 g	Heat cleaned aluminum foil and watertight plastic bag[i]	Covered ice chest[d]	≤ -20° C[i]	10 days[i e]
PAHs	Trawl/ Teflon coated grab	50 g	Hexane-rinsed double aluminum foil and double Ziploc[c]	Handle with hexane-rinsed stainless steel forceps; dry ice[c]	≤ -20° C[i]	10 days[i e]
Lipids	Trawl/ Teflon coated grab	50 g	Hexane-rinsed aluminum foil	Handle with hexane-rinsed stainless steel forceps; quick freeze	20° C	Undetermined

[a] *This table contains only a summary of collection, preservation, and storage procedures for samples. The cited references should be consulted for a more detailed description of these procedures.*

[b] *These holding times are for sediment, water, and tissue based on guidance that is sometimes administrative rather than technical in nature. There are no promulgated, scientifically based holding time criteria for sediments, tissues, or elutriates. References should be consulted if holding times for sample extracts are desired. Holding times are from the time of sample collection.*

[c] *NOAA (1989).*

[d] *Tetra Tech (1986a)*

[e] *Sample may be held for up to one year if maintained ≤ -20° C*

[f] *Two weeks is recommended; sediments must not be held for longer than 8 weeks prior to biological testing.*

[g] *NOAA (1989).*

[h] *Plumb (1981).*

[i] *Tetra Tech (1986b)*

TABLE 4: BULK SEDIMENT TESTING PARAMETERS

Parameter	Analytical Method		Reporting Limit (ppm)
Metals			
Arsenic	6010B, 6020, 7060, 7061		0.4
Cadmium	6010B, 6020, 7130, 7131		0.07
Chromium	6010B, 6020, 7190, 7191		0.5
Copper	6010B, 6020, 7210		0.5
Lead	6010B, 6020, 7420, 7421		0.5
Mercury	7471		0.02
Nickel	6010B, 6020, 7520		0.5
Zinc	6010B, 6020, 7950		1.0
PCBs (total by NOAA summation of congeners)			
See next page	8082A		0.001
Pesticides	NOAA (1993), 8081B		0.001
Aldrin	Heptachlor epoxide		
cis- & trans-Chlordane	Hexachlorobenzene		
4,4'-DDT, DDD, DDE	Lindane		
Dieldrin	Methoxychlor		
α & β Endosulfan	cis- & trans-Nonachlor		
Endrin	Oxychlordane		
Heptachlor	Toxaphene		0.025
Polycyclic Aromatic Hydrocarbons (PAHs)	8270C-SIM		0.01
Acenaphthene	Chrysene		
Acenaphthylene	Dibenzo(a,h)anthracene		
Anthracene	Fluoranthene		
Benzo(a)anthracene	Fluorene		
Benzo(a)pyrene	Indeno(1, 2, 3-cd)pyrene		
Benzo(b)fluoranthene	Naphthalene		
Benzo(k)fluoranthene	Phenanthrene		
Benzo(g, h, i)perylene	Pyrene		
Total Organic Carbon	Plumb (1981), APHA (1995)		0.1%
Percent Moisture	Plumb (1981), EPA (1992), PSEP (1986)		1.0%
Grain Size	Wet Sieve (#4, 10, 40, 200)		

TABLE 4: BULK SEDIMENT TESTING PARAMETERS (CONTINUED)

PCB CONGENERS

Analytical Method: NOAA (1993), 8082A

Reporting Limit: 1 ppb

Congeners:

8*	2,4' diCB
18*	2,2',5 triCB
28*	2,4,4' triCB
44*	2,2',3,5' tetraCB
49	2,2',4',5 tetraCB
52*	2,2',5,5' tetraCB
66*	2,3',4,4' tetraCB
87	2,2',3,4,5' pentaCB
101*	2,2',4,5,5' pentaCB
105*	2,3,3',4,4' pentaCB
118*	2,3',4,4',5 pentaCB
128*	2,3,3',4,4' hexaCB
138*	2,2',3,4,4',5' hexaCB
153*	2,2',4,4',5,5' hexaCB
170*	2,2',3,3',4,4',5 heptaCB
180*	2,2',3,4,4',5,5' heptaCB
183	2,2',3,4,4',5',6 heptaCB
184	2,2',3,4,4',6,6' heptaCB
187*	2,2',3,4',5,5',6 heptaCB
195*	2,2',3,3',4,4',5,6 octaCB
206*	2,2',3,3',4,4',5,5',6 nonaCB
209*	2,2',3,3',4,4',5,5',6,6' decaCB

* denotes a congener to be used in estimating Total PCB. To calculate Total PCB, sum the concentrations of all eighteen congeners marked with a "*" and multiply by 2.

The specified methods are recommendations only. Other acceptable methodologies capable of meeting the Reporting Limits can be used. Sample preparation methodologies (e.g. extraction and cleanup) and sample size may need to be modified to achieve the required Reporting Limits.

TABLE 5: ELUTRIATE TESTING PARAMETERS

Parameter	Recommended Analytical Method	Reporting Limit (µg/L)
Metals		
Arsenic	200.9, 1632	1.0
Cadmium	200.9, 1637	1.0
Chromium (VI)	218.6, 1636	1.0
Copper	200.9, 1639, 1640	0.6
Lead	200.9, 1639, 1640	1.0
Mercury	245.7, 1631	0.4
Nickel	200.9, 1639, 1640	1.0
Selenium	200.9, 1639	1.0
Silver	200.9	0.5
Zinc	200.9, 1639	1.0
PCBs (total, by either of these methods)		
	3510B, 8080A, NYSDEC	0.006
Pentachlorophenol	3501B, 8270C	2.60
Pesticides	3510B, 8080A	
Aldrin		0.26
Chlordane		0.02
Chloropyrifos		0.002
Dieldrin		0.14
4, 4'-DDT		0.03
α & β Endosulfan		0.007
Endrin		0.007
Heptachlor		0.01
Heptachlor epoxide		0.01
Lindane		0.26
Toxaphene		0.04

Reference:

NYSDEC. 1991. Analytical Method for the Determination of PCB Congeners by Fused Silica Capillary Column Gas Chromatography with Electron Capture Detector. NYSDEC #91-11.

FIGURE 4: EXAMPLE CORE LOG DATA SHEET

PROJECT NAME: ______________________________ DATE: __________

PROJECT LOCATION: ______________ SEA STATE: ____________________

VESSEL: ______________ POSITIONING EQUIPMENT: ____________________

SAMPLING EQUIPMENT: ______________________________________

SAMPLING PERSONNEL: ____________________ LOGGED BY: ______________

CORE ID: ______________________________ TIME: __________

LATITUDE: ______________ LONGITUDE: ______________ POSITION ACCURACY: ________

MEASURED WATER DEPTH: ______________ CORRECTED WATER DEPTH: ______________

TARGET PENETRATION: __________ ACTUAL PENETRATION: ________ RECOVERY: ________

COMMENTS: ____

SAMPLE INTERVAL(S): ______________________________________

CORE PHOTO:	CORE DESCRIPTION:
Insert core photograph with scale	*Insert field notes and ASTM description of core*

CENAE-PDE **10 June 2024**

FINAL Suitability Determination for Maintenance Dredging of the Kennebunk River Projects, Kennebunkport, Maine

Summary:
This determination addresses the suitability of shoaled sediments within four project areas along the Kennebunk River, in Kennebunkport, Maine (ME): Arundel Yacht Club (AYC), Yachtsman Marina, Kennebunkport Marina, and Kennebunk River Club (KBRC) for unconfined open water disposal at the Isle of Shoals North Disposal Site (IOSN) (Figure 1). The New England District (NAE) of the US Army Corps of Engineers (USACE) finds that sufficient data have been provided to satisfy the evaluation and testing requirements of Section 103 of the Marine Protection Research and Sanctuaries Act (MPRSA). Based on an evaluation of the project sites and the material proposed to be dredged, NAE finds these sediments suitable for unconfined open water disposal at IOSN as proposed.

1. Project Description:
The applicants are proposing to mechanically dredge shoaled areas from four project areas along the Kennebunk River in Kennebunkport, ME.

- The Arundel Yacht Club is proposing to dredge approximately 8,031 cubic yards (cy) from shoaled areas totaling just over 1 acre within the property's marina basin (Figures 1, 2, and 6).
- The Yachtsman Marina is proposing to dredge approximately 6,400 cy of shoaled material from areas totaling 1.4 acres within the property's marina basin (Figures 1, 3, and 7).
- The Kennebunkport Marina is proposing to dredge approximately 3,675 cy of shoaled material from 0.8 acres within the property's marina basin (Figures 1, 4, and 8).
- The Kennebunk River Club is proposing to dredge a total of approximately 8,935 cy of shoaled material: 3,026 cy of material will be removed from the 0.4 acre north marina basin, and 5,909 cy will be removed from the 0.8 acre south marina basin (Figures 1, 5, and 9).

All areas will be dredged to the authorized project depth of -6 feet at mean lower low water (MLLW) plus 1 foot of allowable overdepth. The applicant requested that disposal of the proposed dredge material be evaluated for IOSN as a potential alternative for this project.

Table 1: Project Area Summary

Project Area	File Number	Project Depth (ft MLLW) plus 1 ft OD	Dredge Volume (cy)	Acreage
Arundel Yacht Club	NAE-2022-00288	-6.0	8,031	1.0
Yachtsman Marina	NAE-2004-00319	-6.0	6,400	1.4
Kennebunkport Marina	NAE-2005-00280	-6.0	3,675	0.8
Kennebunk River Club – North Marina Basin	NAE-2007-2704	-6.0	3,026	0.4
Kennebunk River Club – South Marina Basin		-6.0	5,909	0.8

2. Conceptual Site Model:

USACE reviewed historic testing data, previous environmental assessments, water quality data, and adjacent land use information to develop a conceptual site model (CSM) for the Kennebunk River projects (Figure 10). NAE used this CSM to characterize the system and to identify potential sources of contamination, site-specific contaminants of concern, exposure pathways, and biological receptors to inform this suitability determination.

Project Setting: All four projects are located along the eastern shoreline of the Kennebunk River in Kennebunkport, ME. The Arundel Yacht Club is located farthest upriver (approximately 0.8 miles from the river's mouth), the Yachtsman Marina and Kennebunkport Marina are adjacent to each other just to the south of Arundel Yacht Club, and the Kennebunk River Club is located farther down river, about 0.25 miles from the mouth of the river (Figure 1).

The Arundel Yacht Club building was constructed in 1806 and served as a rope making facility until 1816. Sanborn maps from 1911 show that the property was used as a boat house, carriage house, and wagon shed prior to the establishment of the yacht club in 1957. The yacht club provides dockage for up to fifty recreational boats and has a launch for small sailboats. There are no repair or fuel facilities on the property. The Yachtsman Marina offers boat dockage to the Yachtsman Hotel guests. The Marina is now leased to and managed by the adjacent Kennebunkport Marina, located directly to the south. The applicant is proposing to dredge the leased area to connect the two marinas. The Kennebunkport Marina is a year-round facility offering slips, full mechanical services, a ship store, engine sales, power boat and canoe rentals, as well as a boat ramp. The Kennebunk River Club provides seasonal dockage for recreational vessels, as well as shoreside facilities for social and recreational functions.

Land use in the surrounding area is largely a mix of residential property, many with private docks, and other marina facilities. Chicks Marina, which has a fuel dock, is adjacent to Kennebunkport Marina. Downtown Kennebunkport, which has several restaurants, retail shops, and marine services, is approximately 1,000 feet north of Arundel Yacht Club. The Kennebunkport River Federal Navigation Project (FNP) -6 foot MLLW channel is located directly adjacent to the western boundary of the project areas.

Water Quality: Water Quality in the project area is dictated by tidal exchange with the Gulf of Maine with freshwater input from the Kennebunk River to the north and a series of stormwater discharge pipes within the marina properties along the river (Figures 6-9). Tidal waters of the Kennebunk River are classified as SB by the Maine Department of Environmental Protection (MEDEP). Class SB waters must be of such quality that they are suitable for the designated uses of recreation in and on the water, fishing, aquaculture, propagation and harvesting of shellfish, industrial process and cooling water supply, hydroelectric power generation, navigation and as habitat for fish and other estuarine and marine life (38 M.R.S. § 465(B)(2) https://www.mainelegislature.org/legis/statutes/38/title38sec465-B.html).

Dredge History and Existing Testing Data: The Arundel Yacht Club was last dredged in 2017 when approximately 1,800 cy of material were removed to a depth of -6 feet at Mean Low Water (MLW) and placed at the Cape Arundel Disposal Site (CADS). Sampling and testing of this material in 2003 documented sediments to be predominately fine grained. A review of the associated chemistry data found cadmium, copper, and mercury detected at concentrations with the potential to cause toxicity based on current sediment screening guidelines. Based on the results of elutriate, toxicity, and bioaccumulation studies, NAE found the material from the Arundel Yacht Club suitable for placement at CADS in a 2015 suitability determination.

The Yachtsman Marina was last dredged in 2015 when approximately 3,914 cy of material were removed to a depth of -5 feet MLW and placed at CADS. Sampling and testing of this material in 2014 documented sediments from two samples along the shoreline in the middle of the basin to be predominately fine grained while the remaining four samples, located away from the shoreline, were predominately sand with some silt. A review of the associated chemistry data found levels of total DDX (sum of 4,4'-DDD + 4,4'-DDE +4,4'-DDT) and total high molecular weight polyaromatic hydrocarbons (HPAHs) detected at concentrations with the potential to cause toxicity based on current sediment screening guidelines. Based on the results of elutriate, toxicity, and bioaccumulation studies, NAE found the material from the Yachtsman Marina suitable for placement at CADS in a 2014 suitability determination. In addition, a residual dredging event of 100 cy was authorized by USACE in 2020 and this material was placed upland.

The Kennebunkport Marina was last dredged in 2015 when approximately 1,500 cy of material were removed to a depth of -5 feet MLW and placed at CADS. Sampling and testing of this material in 2014 documented predominately fine grained sediments with little sand. A review of the associated chemistry data found total DDX and total HPAHs detected at concentrations with the potential to cause toxicity based on current sediment screening guidelines. Based on the results of elutriate, toxicity, and bioaccumulation studies, NAE found the material from the Kennebunkport Marina suitable for placement at CADS in a 2014 suitability determination.

The Kennebunk River Club was last dredged in 2009 when 7,609 cy of fine grained material were mechanically removed and placed at CADS. A review of the associated chemistry data found cadmium, total HPAHs, total DDX, and total chlordane detected at concentrations with the potential to cause toxicity based on current sediment screening guidelines. Based on the results of elutriate, toxicity, and bioaccumulation studies, NAE found the material from the Kennebunk River Club suitable for placement at CADS in a 2009 suitability determination.

<u>Spill Data:</u> Based on information provided by the applicant and a review of the MEDEP Oil and Hazardous Waste Spill Database (https://www.maine.gov/dep/spills/index.html) and the U.S. Coast Guard's National Response Center website, NAE determined that there have been several small sheens, diesel, gasoline, and oil spills within the vicinity of the project sites since 2009.

<u>Disposal Site:</u> IOSN is located approximately 23 miles south of the project locations. IOSN is regularly monitored by the NAE Disposal Area Monitoring System (DAMOS) Program. The most recent DAMOS report on IOSN was based on a 2022 survey of the site (USACE, 2023).

<u>Risk Ranking:</u> Based on the site characteristics and the available testing data outlined above, all four projects were given a **low-moderate** risk ranking according to the following matrix in Table 2.

Table 2: Project Risk Ranking

Rank	Guidelines
Low	Few or no sources of contamination. Data available to verify no significant potential for adverse biological effects.
Low-Moderate	Few or no sources of contamination but existing data is insufficient to confirm ranking.
Moderate	Contamination sources exist within the vicinity of the project with the potential to produce chemical concentrations that may cause adverse biological effects.
High	Known sources of contamination within the project area and historical data exists that has previously failed biological testing.

3. Sampling, Testing, and Analysis:

NAE prepared sampling and analysis plans (SAPs) in January of 2022 for the Kennebunkport (three samples) and Yachtsman Marinas (five samples) and in May 2022 for the Arundel Yacht Club (four samples) that called for the collection of samples for bulk sediment chemistry and grain size, as well as full biological testing, including elutriate preparation and analysis, water column toxicity testing, 10-day whole sediment toxicity testing, and 28-day bioaccumulation testing. The applicants collected sediment cores from these three marina basins in July of 2022 (Table 3, Figures 6 through 8) for chemistry and grain size analysis. In addition, NAE prepared a biological testing SAP in June of 2020 for the Kennebunk River Club using bulk sediment chemistry and grain size data collected in December of 2018 which was also used in this evaluation (Table 3, Figure 9).

Table 3: Core Locations

Sample Location	Latitude	Longitude	Project Depth with Overdepth (ft MLLW)	Water Depth (ft MLLW)	Required Core Length (ft)	Recovery/ Penetration (ft)	Sample Interval (ft)
Arundel Yacht Club							
AYC-1	43.35831	-70.47582	-7.0	-3.9	3.1	3.2/3.2	0-3.2
AYC-2	43.35800	-70.47561	-7.0	-2.1	4.9	2.4/2.4	0-2.4
AYC-3	43.35793	-70.47634	-7.0	-3.2	3.8	0.75/1.0	0-0.75
AYC-4	43.35811	-70.47638	-7.0	-3.0	4.0	4.0/4.1	0-4.0
Yachtsman Marina							
Y-1	43.35735	-70.47578	-7.0	-1.5	5.5	3.5/3.5	0-3.5
Y-2	43.35724	-70.47533	-7.0	-1.2	5.8	2.5/2.5	0-2.5
Y-3	43.35701	-70.47488	-7.0	-4.2	2.8	2.7/2.7	0-2.7
Y-4	43.35673	-70.47467	-7.0	-4.4	2.6	3.4/3.4	0-2.6
Y-5	43.35629	-70.47437	-7.0	-1.0	6.0	6.1/6.1	0-6.0
Kennebunkport Marina							
K-1	43.35587	-70.47367	-7.0	-1.8	5.2	4.2/4.2	0-4.2
K-2	43.35607	-70.47394	-7.0	-4.8	2.2	3.1/3.1	0-2.2
K-3	43.35634	-70.47400	-7.0	-1.7	5.3	4.2/4.3	0-4.2
Kennebunk River Club							
KBRC-A	43.34975	-70.47269	-7.0	-2.5	5.0	4.5/4.5	0-4.5
KBRC-B	43.34982	-70.47327	-7.0	-4.0	3.0	3.0/3.0	0-3.0
KBRC-C	43.35007	-70.47322	-7.0	-2.0	4.0	5.0/5.0	0-5.0
KBRC-D	43.35008	-70.47340	-7.0	-5.0	1.0	2.0/2.0	0-2.0
KBRC-E	43.35046	-70.47323	-7.0	-2.5	6.0	4.5/4.5	0-4.5
KBRC-F	43.35039	-70.47352	-7.0	-2.0	4.0	5.0/5.0	0-5.0
KBRC-G	43.35063	-70.47326	-7.0	-1.0	2.0	6.0/6.0	0-6.0
KBRC-H	43.35055	-70.47354	-7.0	-4.0	3.0	3.0/3.0	0-3.0
KBRC-I	43.35082	-70.47331	-7.0	-1.5	6.0	5.5/5.5	0-5.5

Physical and Chemical Analysis of Sediments

Samples were largely composed of fines with little to some fine sand though several stations from the Yachtsman Marina and Kennebunk River Club were composed of fine sand with little to some fines. Grain size data are presented in Table 4 and core logs are provided in Appendix A.

Table 4: Grain Size Results

Sample ID	%Gravel	%Sand			%Fines
		Coarse	*Medium*	*Fine*	
Arundel Yacht Club					
AYC-1	0.1	1.7	6.4	13.1	78.7
AYC-2	3.1	2.2	12.5	31.4	50.8
AYC-3	0.4	0.9	5.2	14.4	79.1
AYC-4	3.6	0.8	4.5	10.7	80.4
Yachtsman Marina					
Y-1	4.9	0.8	6.0	64.7	23.6
Y-2	0.3	1.5	9.8	60.6	27.8
Y-3	2.3	1.7	5.7	20.6	69.7
Y-4	0.0	0.8	5.4	26.5	67.3
Y-5	1.0	1.2	4.4	80.6	12.8
Kennebunkport Marina					
K-1	0.1	0.6	4.4	43.9	51.0
K-2	0.0	1.2	7.9	28.9	62.0
K-3	2.4	1.5	8.0	19.7	68.4
Kennebunk River Club					
KBRC-A	0.0	1.0	4.0	32.0	62.7
KBRC-B	0.1	1.0	7.0	40.0	51.6
KBRC-C	0.0	1.0	2.0	61.0	35.6
KBRC-D	0.0	1.0	4.0	56.0	38.6
KBRC-E	0.0	0.0	3.0	71.0	25.9
KBRC-F	0.2	1.0	1.0	81.0	16.6
KBRC-G	0.2	1.0	4.0	61.0	33.8
KBRC-H	0.6	2.0	4.0	64.0	29.7
KBRC-I	0.7	2.0	10.0	45.0	43.4

As no project specific contaminants of concern were identified in the CSM, samples were analyzed for the standard suite of contaminants specified in the Regional Implementation Manual for the Evaluation of Dredged Material Proposed for Disposal in New England Waters (RIM) (EPA/USACE, 2004).

To examine the sediment concentrations in an ecologically meaningful context, NAE used Sediment Quality Guidelines (SQGs) to screen the chemical concentrations found in the sediment samples from the Kennebunk River project areas samples. Applicable SQG screening values for marine and estuarine sediments are the National Oceanic and Atmospheric Administration (NOAA) effects-range low (ERL) and effects-range median (ERM). It is important to understand that these values were not derived as toxicity pass-fail thresholds. Rather, ERL and ERM values are empirically derived guidelines based on a large number of studies nationwide that identify contaminant levels that indicate probability of toxic effects to inform decision making (Long et al., 1998). Effects are considered unlikely at concentrations below the ERL with an increased probability of toxic effects as concentrations increase. At concentrations above the ERM toxic effects are considered likely. For samples with sediment concentrations that fall between the ERL and ERM levels, consideration is given to both the number of contaminants that exceed ERL values and where the concentrations fall in the range between ERL and ERM values in assessing the probability of toxic effects and the potential need for additional testing.

Metals concentrations were largely below the ERL with many concentrations also less than the IOSN reference concentrations in all four project areas. Arsenic was detected at concentrations just above the ERL and reference value at stations AYC-1 and AYC-4, though both stations were below the established natural background level, 16 mg/kg, in Maine sediments (MEDEP, 2018). Nickel concentrations at Arundel Yacht Club stations AYC-1 and AYC-4 and Yachtsman Marina station Y-3 were also slightly greater than the ERL and IOSN reference value. The lead concentration in the Kennebunkport Marina station K-1 was greater than both the ERL and reference value. All metal concentrations in the Kennebunk River Club samples were below the ERL.

A few individual low molecular weight polyaromatic hydrocarbons (LPAHs) were found at concentrations above their respective ERLs, including acenaphthene and fluorene at station K-2 in the Kennebunkport Marina, acenaphthene, anthracene, and fluorene at stations KBRC-A and B in the Kennebunk River Club, and all individual LPAHs except for naphthalene at the Arundel Yacht Club station AYC-2. Additionally, the total LPAH concentration at AYC-2 was greater than the ERL and IOSN reference value. Individual HPAHs benzo(a)anthracene and fluoranthene were found at concentrations greater than their respective ERLs at stations AYC-2, KBRC-A, and KBRC-B. Pyrene and chrysene were also found above the ERL at KBRC-B and pyrene was found above the ERL in station KBRC-C. Total HPAH concentrations were found above the ERL at stations AYC-2 at the Arundel Yacht Club and stations KBRC-A, B, and C in the Kennebunk River Club. All PAH concentrations were below ERL values in all samples from the Yachtsman Marina.

The pesticides 4,4’-DDD, 4,4’-DDE, and 4,4’-DDT as well as total DDX concentrations were found at concentrations greater than the ERL at stations K-1 and 2 at the Kennebunkport Marina and stations AYC-1 and 2 at the Arundel Yacht Club, where station AYC-4 also had 4,4’-DDE, 4,4’-DDT, and total DDX at concentrations over the ERL. Stations Y-1 and 2 at the Yachtsman Marina contained concentrations of 4,4’-DDE and total DDX that were greater than the ERL and the concentration of 4,4’-DDD was also above the ERL at station Y-2. Total DDX was found in concentrations above the ERL in all the Kennebunk River Club stations except for KBRC-F. 4,4`-DDT concentrations were also greater than the ERL in stations KBRC-B, KBRC-C, and KBRC-I and 4,4`-DDD exceeded the ERL in station KBRC-C. Dieldrin was found at concentrations greater than the ERL at Kennebunk River Club stations KBRC-A, B, D, E, and I and total chlordane was found at concentrations greater than the ERL at all stations in the Kennebunk River Club project area except for KBRC-E and KBRC-G.

Individual polychlorinated biphenyls (PCBs) were generally not detected. Where detected, total PCBs were found at concentrations well below the ERL at all stations sampled.

A summary of the bulk sediment chemistry data is presented in Table 5 with comparison to the ERL/ERM values and reference concentrations for IOSN. The full bulk chemistry results are presented in Appendix B.

Table 5. Summary of Bulk Sediment Chemistry Results

							Kennebunkport Marina						*Yachtsman Marina*									
					IOSN		K-1		K-2		K-3		Y-1		Y-2		Y-3		Y-4		Y-5	
Parameter	CAS Number	Units	ERL	ERM	Value	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Physical																						
Total organic carbon	14762744	%			1.28		0.37		3.04		2.32		0.93		0.72		1.90		1.19		0.20	
Metals																						
Arsenic	7440382	mg/kg	8.2	70	9.66		2.85		6.68		6.34		6.65		3.20		7.96		4.54		0.984	
Cadmium	7440439	mg/kg	1.2	9.6	0.072		0.295		0.410		0.344		0.225		0.235		0.388		0.430		0.093	
Chromium	7440473	mg/kg	81	370	31.5		21.9		27.1		26.4		17.7		14.7		33.6		23.1		6.71	
Copper	7440508	mg/kg	34	270	10.9		14.2		16.7		15.4		12.5		8.64		18.3		9.82		1.59	
Lead	7439921	mg/kg	46.7	218	18.1		134		21.9		17.1		12.4		12.9		20.2		7.79		1.81	
Mercury	7439976	mg/kg	0.150	0.710	0.032		0.051		0.063		0.047		0.045		0.051		0.052		0.011	J	0.005	J
Nickel	7440020	mg/kg	20.9	51.6	20.8		9.17		15.6		15.4		11.3		8.37		21.4		15.1		3.81	
Zinc	7440666	mg/kg	150	410	60.6		56.6		67.4		57.2		42.2		37.6		71.2		45.2		10.2	
PAHs																						
Total LPAH	*SUMLPAH*	ug/kg	552	3,160	48.2		185		225		225		188		191		118		7.87		8.67	
Total HPAH	*SUMHPAH*	ug/kg	1,700	9,600	260		1238		1697		1664		1336		1338		863		33.3		48.3	
Pesticides																						
4,4`-DDD	72548	ug/kg	2	20	0.020	U	4.98	J	4.66	J	0.112	UJ	1.16	J	2.86	J	0.093	UJ	0.016	UJ	0.013	UJ
4,4`-DDE	72559	ug/kg	2.2	27	0.066		2.23		4.53	J	0.068	U	2.50	J	2.78		0.057	U	0.010	U	0.008	U
4,4`-DDT	50293	ug/kg	1	7	0.026	U	1.44		1.44		0.148	U	0.960		0.808		0.123	U	0.020	U	0.017	U
Total DDX	SUMDDX	ug/kg	1.58	46.1	0.112		8.65		10.6		0.328	U	4.62		6.45		0.272	U	0.045	U	0.038	U
Dieldrin	60571	ug/kg	0.02	8	0.040	U	0.031	U	0.038	U	0.226	U	0.038	U	0.031	U	0.187	U	0.031	U	0.026	U
Total Chlordane	*SUMCHLOR*	ug/kg	0.5	6	0.300	U	0.233	U	0.289	U	1.710	U	0.285	U	0.234	U	1.42	U	0.233	U	0.198	U
PCBs																						
Total PCBs	*SumNOAA18*	ug/kg	22.7	180	4.02	U	8.34		3.98		2.77		1.92		2.33		3.56		1.56	U	1.33	U

Table 5. Summary of Bulk Sediment Chemistry Results, cont.

							Arundel Yacht Club							
					IOSN		AYC-1		AYC-2		AYC-3		AYC-4	
Parameter	CAS Number	Units	ERL	ERM	Value	Q	Result	Q	Result	Q	Result	Q	Result	Q
Physical														
Total organic carbon	14762744	%			1.28		1.14		1.15		8.46		2.64	
Metals														
Arsenic	7440382	mg/kg	8.2	70	9.66		9.75		6.72		7.78		10.3	
Cadmium	7440439	mg/kg	1.2	9.6	0.072		0.335		0.330		0.453		0.613	
Chromium	7440473	mg/kg	81	370	31.5		41.6		26.2		25.6		38.1	
Copper	7440508	mg/kg	34	270	10.9		29.4		15.7		25.6		24.3	
Lead	7439921	mg/kg	46.7	218	18.1		30.9		26.1		21.4		33.7	
Mercury	7439976	mg/kg	0.150	0.710	0.032		0.064		0.086		0.059	J	0.108	
Nickel	7440020	mg/kg	20.9	51.6	20.8		25.4		13.0		15.0		22.7	
Zinc	7440666	mg/kg	150	410	60.6		101		58.1		68.6		98.0	
PAHs														
Total LPAH	*SUMLPAH*	ug/kg	552	3,160	48.2		189		654		90.9		104	
Total HPAH	*SUMHPAH*	ug/kg	1,700	9,600	260		1482		3341		411		986	
Pesticides														
4,4`-DDD	72548	ug/kg	2	20	0.020	U	3.87	J	4.34	J	0.274	UJ	1.99	J
4,4`-DDE	72559	ug/kg	2.2	27	0.066		7.51	J	5.74		0.167	U	4.37	J
4,4`-DDT	50293	ug/kg	1	7	0.026	U	1.62	J	2.60		0.360	U	1.51	J
Total DDX	SUMDDX	ug/kg	1.58	46.1	0.112		13.0		12.7		0.801	U	7.87	
Dieldrin	60571	ug/kg	0.02	8	0.040	U	0.23	U	0.15	U	0.550	U	0.225	U
Total Chlordane	*SUMCHLOR*	ug/kg	0.5	6	0.300	U	1.72	U	1.11	U	4.2	U	1.7	U
PCBs														
Total PCBs	*SumNOAA18*	ug/kg	22.7	180	4.02	U	3.95		8.87		5.59	U	2.29	U

Table 5. Summary of Bulk Sediment Chemistry Results, cont.

							Kennebunk River Club																	
					IOSN		KBRC-A		KBRC-B		KBRC-C		KBRC-D		KBRC-E		KBRC-G		KBRC-H		KBRC-I		KBRC-F	
Parameter	CAS Number	Units	ERL	ERM	Value	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Physical																								
Total organic carbon	14762744	%			1.28		-		-		-		-		-		-		-		-		-	
Metals																								
Arsenic	7440382	mg/kg	8.2	70	9.66		5.34		4.98		3.52		3.30		2.47		3.34		2.82		5.12		1.58	
Cadmium	7440439	mg/kg	1.2	9.6	0.072		0.463		0.433		0.300		0.350		0.229		0.277		0.237		0.451		0.119	
Chromium	7440473	mg/kg	81	370	31.5		27.5		26.0		20.0		20.5		15.6		18.0		16.5		24.8		11.0	
Copper	7440508	mg/kg	34	270	10.9		13.7		13.8		9.34		9.52		18.6		8.28		7.16		13.6		5.32	
Lead	7439921	mg/kg	46.7	218	18.1		18.8		17.8		12.2		13.3		8.67		11.5		9.29		17.7		4.81	
Mercury	7439976	mg/kg	0.150	0.710	0.032		0.062		0.054		0.052		0.053		0.032		0.067		0.046		0.056		0.023	
Nickel	7440020	mg/kg	20.9	51.6	20.8		15.9		14.5		11.4		11.3		8.57		9.92		8.67		13.4		6.12	
Zinc	7440666	mg/kg	150	410	60.6		68.9		67.7		48.3		50.9		37.2		50.5		39.9		78.2		28.9	J
PAHs																								
Total LPAH	*SUMLPAH*	ug/kg	552	3,160	48.2		316		321		208		106		114		101		127		217		104	
Total HPAH	*SUMHPAH*	ug/kg	1,700	9,600	260		2644		4212		2028		866		838		756		653		1301		567	
Pesticides																								
4,4`-DDD	72548	ug/kg	2	20	0.020	U	1.30		1.90		2.10		1.30		1.00		1.20		0.880		1.70		0.680	
4,4`-DDE	72559	ug/kg	2.2	27	0.066		1.90		1.30		1.40		1.30		0.790		1.40		1.30		2.00		0.400	
4,4`-DDT	50293	ug/kg	1	7	0.026	U	0.850		1.50		4.00		0.750		0.620		0.900		0.530		2.20		0.028	U
Total DDX	SUMDDX	ug/kg	1.58	46.1	0.112		4.05		4.70		7.50		3.35		2.41		3.50		2.71		5.90		1.11	
Dieldrin	60571	ug/kg	0.02	8	0.040	U	0.460		0.850		0.026	U	1.00		1.20		0.026	U	0.026	U	0.610		0.026	U
Total Chlordane	*SUMCHLOR*	ug/kg	0.5	6	0.300	U	1.4		0.95		1.8		1.8		0.044	U	0.265		1.54		1.04		1.25	
PCBs																								
Total PCBs	*SumNOAA18*	ug/kg	22.7	180	4.02	U	1.4		2.1		1.2		0.751		0.326	U	0.326	U	0.831		1.3		0.706	

Notes:
Yellow indicates an exceedance of the ERL
Red indicates an exceedance of the ERM
U= Compound was analyzed for but was not detected (non-detect)
J= Indicates an estimated value
Non-detects reported as half the MDL
Reference site data from DAMOS monitoring surveys (2019 IOSN)
Total PCBs were calculated using the NOAA 18 method
Total Chlordane is a sum of alpha and gamma chlordane, cis and trans nonachlor, and oxychlordane; IOSN value is a sum of only alpha and gamma chlordane

Elutriate Chemistry and Biological Analysis of Sediments

Based on the lithology, chemistry results, and location of sample stations, NAE provided the applicant with a compositing plan for biological testing following the tiered testing protocol outlined in the Evaluation of Dredged Material Proposed for Ocean Disposal – Testing Manual (Green Book, EPA/USACE, 1991). Sediment and water for biological testing were collected by the applicant in February of 2023 to characterize the potential risk associated with open water placement of the dredged material from the four Kennebunk River projects. Sediment was collected from ten representative sample locations across all four project areas to create one composite sample (Table 2 and Figures 6 through 9). The composite sample for biological testing was comprised of sediment from stations AYC-1, 2, and 4 from the Arundel Yacht Club, Y-2 and 3 from the Yachtsman Marina, K-1 and 2 from the Kennebunkport Marina, and KBRC-B, C, and E from the Kennebunk River Club. Site water was also collected from a central location within each proposed project area and composited. The biological testing samples were collected according to the compositing plan to determine the potential for the dredged sediment to cause adverse effects to the biological receptors identified in the CSM. Compliance with water quality criteria was determined through elutriate testing, sediment toxicity was measured through a 10-day whole sediment acute toxicity test, human health risk was determined through a 28-day bioaccumulation test, and water column toxicity was determined through a suspended particulate phase test as described in the Green Book (USEPA/USACE, 1991).

Evaluating Potential Effects to Benthic Organisms

The CSM identified the uptake of contaminants from placed dredged material at IOSN as a primary exposure pathway for project sediments and the potential for acute toxicity was determined through a 10-day whole sediment acute toxicity test as described in the Green Book (EPA/USACE, 1991).

Mean mortality in the control samples of the 10-day whole sediment acute toxicity tests was less than 10% for the amphipod (*Leptocheirus plumulosus*) and the mysid (*Americamysis bahia*); therefore, the tests were valid based on criteria established in the testing protocol.

Mean survivability for *A. bahia* and *L. plumulosus* was 97% and 95%, respectively. Results were not statistically different when compared to survivability in the IOSN reference sediment. The material proposed to be dredged is not considered acutely toxic to the mysids or amphipods used in this assessment.

Results from the 10-day whole sediment toxicity test are summarized in Table 6.

Table 6: Mean Survivability in the 10-day Whole Sediment Toxicity Test

Organism	Lab Control	IOSN Reference	Comp 1
A. bahia	98%	98%	97%
L. plumulosus	98%	93%	95%

Evaluating Potential Effects to Human Health

In order to assess the potential risk to human health through the exposure pathways identified in the CSM, a 28-day bioaccumulation test was performed with the clam, *Macoma nasuta,* and marine polychaete worm, *Nereis virens,* using sediments from the composite sample.

Results showed statistically significant increases of certain contaminants of concern (COCs) in tissue samples from clams exposed to project sediments when compared to tissue samples from clams exposed to reference area sediments including three metals (copper, lead, and nickel), several individual PAHs, three PCB congeners, and two pesticides (4,4'-DDD and 4,4'-DDE). Generally, COC concentrations were only slightly higher in the composite tissue sample than in the pre-test or IOSN reference tissue. Anthracene, benzo(a)anthracene, benzo(b)fluoranthene, and chrysene concentrations were 5 times higher in the composite tissue sample than in the IOSN reference site tissue concentrations. Fluoranthene, pyrene and 4,4'-DDD concentrations were more than 10 times higher in the composite tissue sample than in the IOSN reference site tissue concentrations. Copper, nickel, fluorene, naphthalene, and PCB 52 were detected at concentrations less than were detected in the pre-test tissue, which reflects the initial contaminant load in the wild caught specimens prior to the test initiation, suggesting that these contaminants may not be attributable to site conditions. However, these analytes were conservatively included in subsequent risk modeling.

Significant increases in worm tissue samples as compared to reference area tissue samples included five metals (cadmium, chromium, lead, nickel, and zinc), several individual PAHs, two PCB congeners, and one pesticide (4,4'-DDD). Generally, COC concentrations were only slightly higher in the composite tissue sample than in the pre-test or IOSN reference tissue. Pyrene was 5 times higher in the composite tissue sample than the IOSN reference site tissue concentrations. Benzo(k)fluoranthene, fluoranthene, and PCB 105 were more than 10 times higher in the composite tissue sample than the IOSN reference site tissue concentrations. Chromium, lead, nickel, anthracene, naphthalene, and 4,4'-DDD were detected at concentrations less than were detected in the pre-test tissue, which reflects the initial contaminant load in the wild caught specimens prior to the test initiation, suggesting that these contaminants may not be attributable to site conditions, however these analytes were conservatively included in the subsequent risk modeling.

Based on these results, the tissue burden data were analyzed with the EPA Bioaccumulation Evaluation Screening Tool (BEST) model to determine the toxicological significance of bioaccumulation from exposure to the dredged sediment. The BEST model includes an evaluation of the non-carcinogenic risk, carcinogenic risk, and any observed exceedances of Food and Drug Administration (FDA) thresholds to determine potential adverse impacts to human health from the consumption of lobster, fish, or shellfish exposed to project sediments. Consideration was also given to the number of contaminants that were statistically elevated in comparison to the reference tissue concentrations and to the magnitude of those concentrations in comparison to the reference tissue concentrations and comparable organisms living in the vicinity of the disposal site according to the factors outlined in the Ocean Testing Manual (USEPA/USACE, 1991).

For both *Macoma nasuta* and *Alitta virens*, modeling based on the tissue contaminant loads measured in the composite sample found that all contaminants were below the EPA Hazard Quotient for non-carcinogenic risk of 1.0, below the EPA carcinogenic risk threshold (1×10^{-4}), and were also less than established FDA action levels. Statistically elevated concentrations of contaminants in the tissue samples that could not be evaluated using the BEST model were compared to background invertebrate concentrations in the NOAA Mussel Watch dataset (NCCOS, 2023) and all concentrations were found to be less than the dataset concentrations.

Based on this analysis, there is no unacceptable risk to the receptors identified in the CSM from the bioaccumulation of contaminants through exposure to the dredged material from the projects. BEST model outputs and tissue data are provided in Appendix C.

<u>Evaluating Potential Effects to Fish and Marine Invertebrates</u>

The CSM identified the uptake of contaminants from the water column during the placement of dredged material at IOSN as a primary exposure pathway for project sediments. Elutriate samples were prepared from the site composite sediment sample and site water and the potential for water column toxicity was determined through a suspended particulate phase (SPP) toxicity test as described in the Green Book (USEPA/USACE, 1991).

The results from the SPP toxicity test were used to determine the median lethal concentration (LC_{50}) for the three target species exposed to the sediment elutriates. All three species, the mysid, *A. bahia*, the minnow, *Menidia beryllina*, and the mussel, *Mytilus edulis,* showed no adverse effects on survival after exposure to the elutriate from the composite sample (Table 7).

Table 7: LC_{50} Values in Suspended Phase Toxicity Test

Composite	*A. bahia* LC_{50} (%)	*M. beryllina* LC_{50} (%)	*M. edulis* LC_{50} (%)
Composite 1	>100%	>100%	>100%

To determine if the discharge of dredged material would meet the limiting permissible concentration (LPC), NAE utilized the Short-Term Fate (STFATE) numerical model to analyze the disposal cloud as it descends through the water column after release from a scow. Results of the STFATE evaluation using the lowest LPC (LC_{50} of 100% and an application factor of 0.01) predicted that the water column would attain the LPC within four hours of disposal at IOSN. Additionally, all contaminants of concern in the elutriate samples were below the federal and Maine water quality criteria. Elutriate chemistry concentrations are presented in Appendix D.

4. Suitability Determination:

Based on the weight of evidence, including the CSM, sediment chemistry results, biological testing results, and the subsequent risk modeling, no significant adverse impacts through the exposure pathways identified in the conceptual site model were found for the Arundel Yacht Club, Kennebunkport Marina, Yachtsman Marina, and Kennebunk River Club. Based on the testing and evaluation requirements set forth in Section 103 of the MPRSA, the sediments to be dredged are considered suitable for unconfined open water disposal at IOSN.

This suitability determination was coordinated with EPA Region 1 and MEDEP. MEDEP concurred with the determination and EPA Region 1 conducted an individual evaluation of the project and documented their findings in a separate memo.

Briley K. Barra
Digitally signed by BARRA.BRILEY.KATHERINE.1617990837
Date: 2024.06.10 12:19:48 -04'00'

Briley K. Barra
Technical Specialist
Dredged Material Management Team
USACE-New England District

Digitally signed by LOYD.RICHARD.B.1274669540
Date: 2024.06.12 15:46:38 -04'00'

Richard B. Loyd
Chief
Environmental Resources and Marine Programs Section
USACE-New England District

5. References:

Long E.R & MacDonald D.D. 1998. Recommended Uses of Empirically Derived, Sediment Quality Guidelines for Marine and Estuarine Ecosystems, Human and Ecological Risk Assessment: An International Journal, 4:5, 1019-1039.

MEDEP 2018. Maine Remedial Action Guidelines (RAGS) for Sites Contaminated with Hazardous Substances. Maine Department of Environmental Protection, Bureau of Remediation and Waste Management. 19 October 2018.

National Centers for Coastal Ocean Science, 2023: National Status and Trends: Mussel Watch Program, https://www.fisheries.noaa.gov/inport/item/39400.

USACE 2022. Monitoring Survey at the Isles of Shoals North Disposal Site, October 2021. DAMOS Contribution No. 214. Prepared by INSPIRE Environmental, Newport, RI for the U.S. Army Corps of Engineers, New England District, Concord, MA. 46 pp plus Figures and Appendices.

USEPA/USACE 2004. Regional Implementation Manual for the Evaluation of Dredged Material Proposed for Disposal in New England Waters. U.S. EPA Region 1, Boston, MA/U.S. Army Corps of Engineers, New England District, Concord, MA.

USEPA/USACE 1991. Evaluation of Dredged Material Proposed for Ocean Disposal Testing Manual. Environmental Protection Agency, Office of Water and Department of the Army, United States Army Corps of Engineers. Washington, D.C.

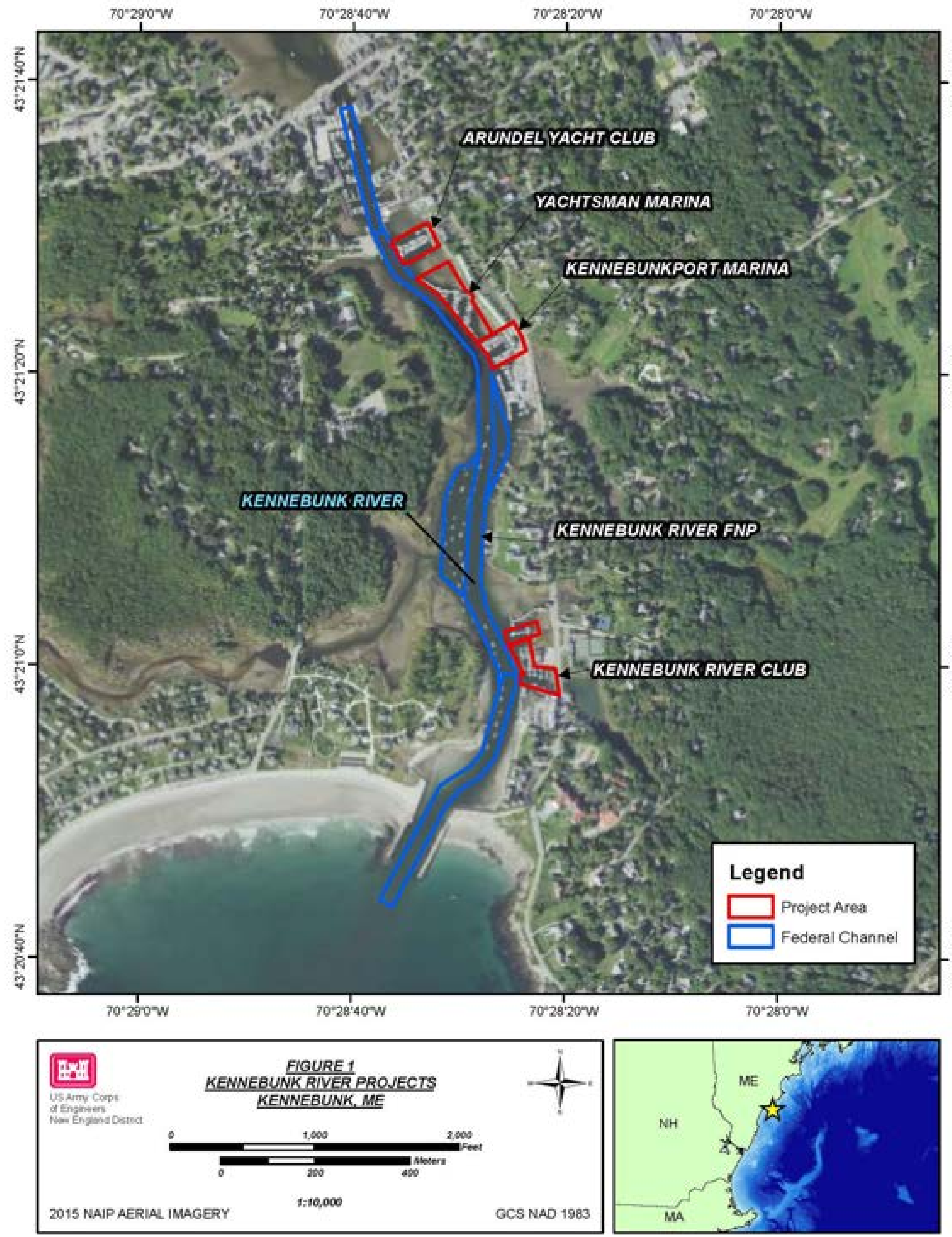
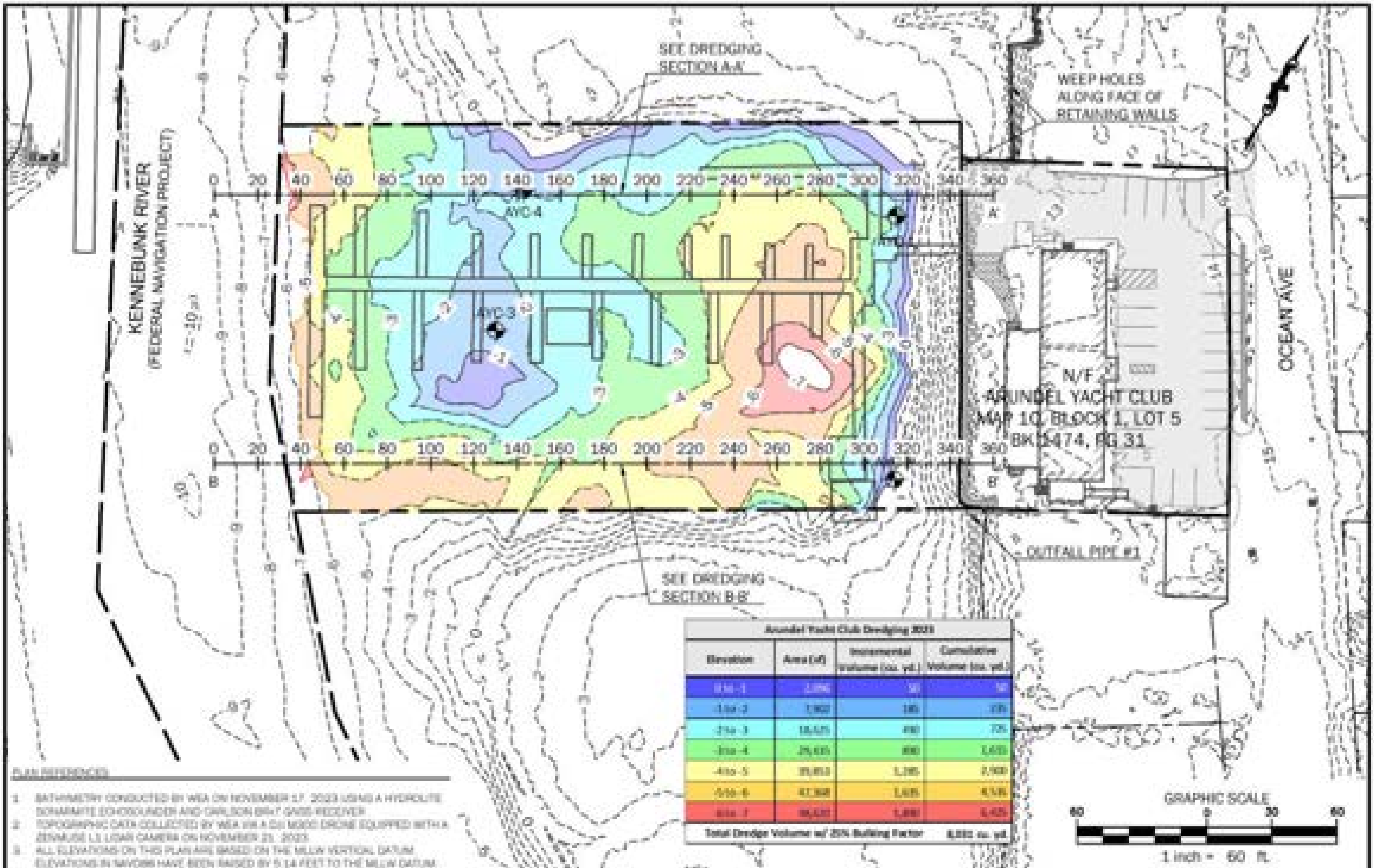


FIGURE 1
KENNEBUNK RIVER PROJECTS
KENNEBUNK, ME



Arundel Yacht Club Dredging 2023

Elevation	Area (sf)	Incremental Volume (cu. yd.)	Cumulative Volume (cu. yd.)
0 to -1	2,090	50	50
-1 to -2	7,902	185	235
-2 to -3	18,625	490	725
-3 to -4	29,635	890	1,615
-4 to -5	39,853	1,285	2,900
-5 to -6	47,368	1,635	4,535
-6 to -7	66,620	1,890	6,425
Total Dredge Volume w/ 25% Bulking Factor			8,031 cu. yd.

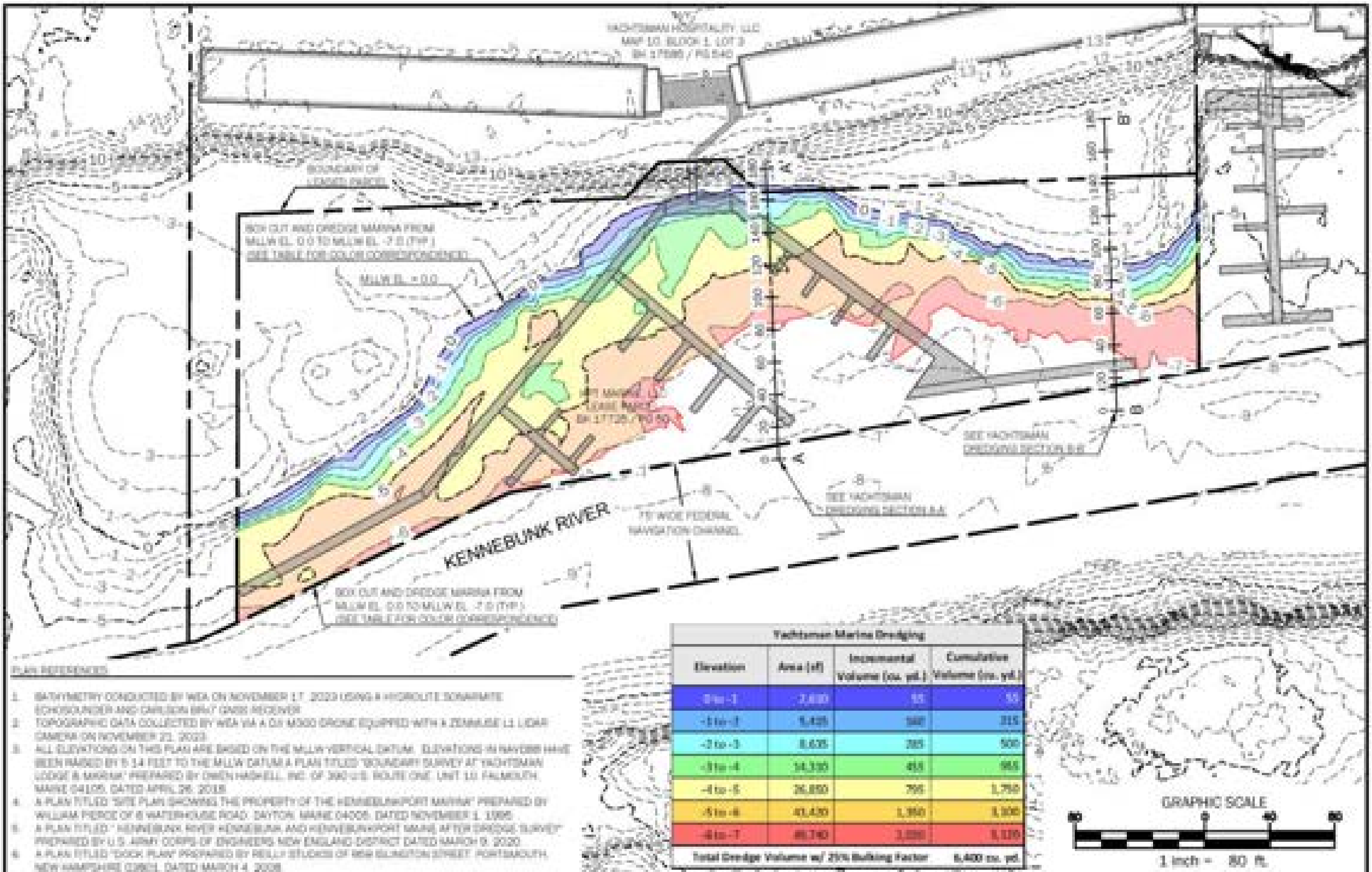
WALSH ENGINEERING ASSOCIATES, INC.

One Karen Dr., Suite 2A | Westbrook, Maine 04092
ph: 207.553.9898 | www.walsh-eng.com

Arundel Yacht Club Dredging: 2023 Bathymetry

Arundel Yacht Club
51 Ocean Ave
Kennebunkport, Maine 04046

Figure 2: Arundel Yacht Club Applicant Dredge Plan



Yachtsman Marina Dredging			
Elevation	Area (sf)	Incremental Volume (cu. yd.)	Cumulative Volume (cu. yd.)
0 to -1	2,610	55	55
-1 to -2	5,435	160	215
-2 to -3	8,635	285	500
-3 to -4	14,330	455	955
-4 to -5	26,850	795	1,750
-5 to -6	43,430	1,350	3,100
-6 to -7	49,740	2,020	5,120
Total Dredge Volume w/ 25% Bulking Factor			6,400 cu. yd.

WALSH ENGINEERING ASSOCIATES, INC.

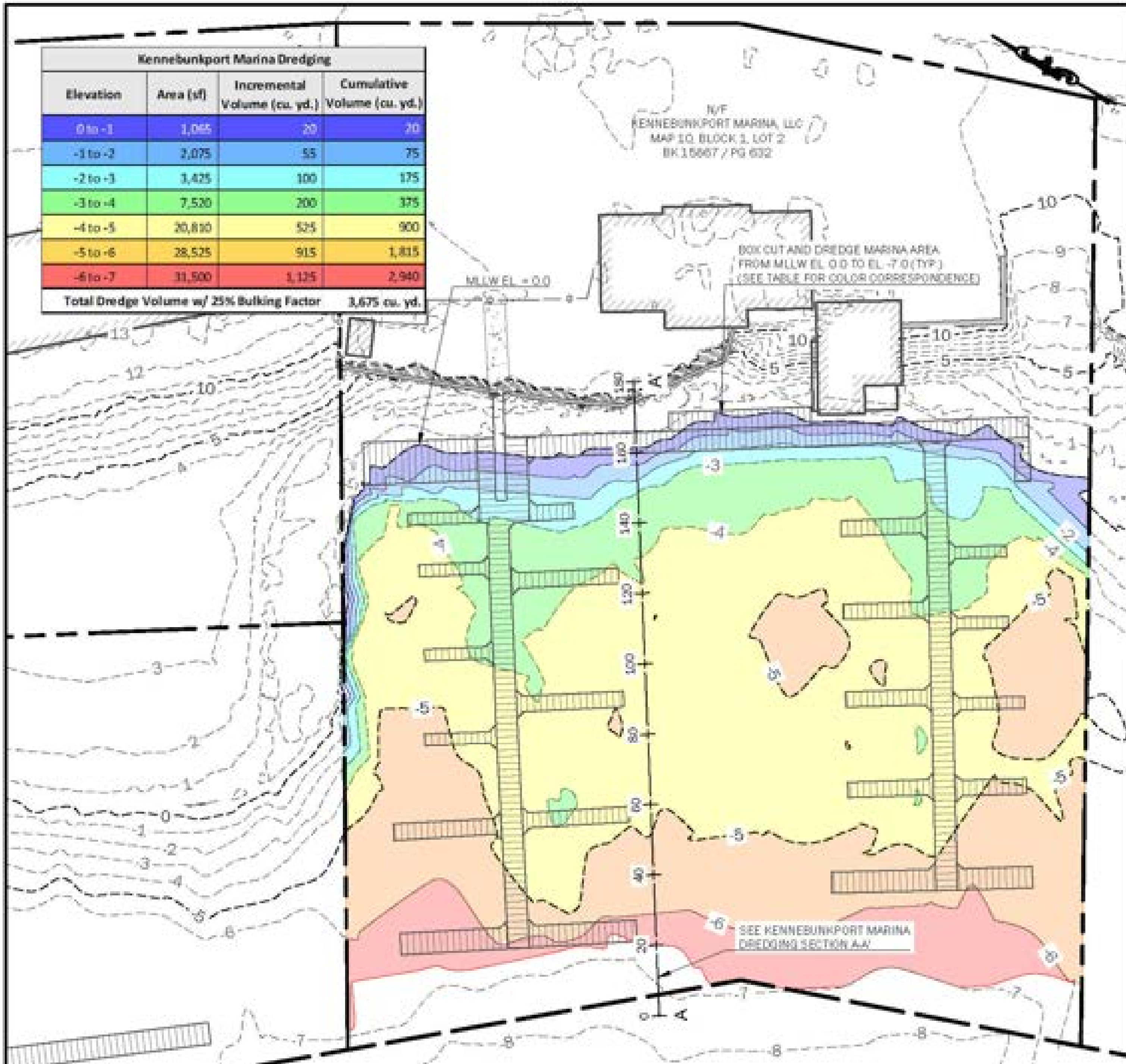
One Aaron Dr., Suite 2A | Westbrook, Maine 04092
ph. 207.553.9898 | www.walsh-eng.com

Yachtsman Marina Dredging: 2023 Bathymetry

Kennebunkport Marina
59 Ocean Ave
Kennebunkport, Maine 04046

Figure 3: Yachtsman Marina Applicant Dredge Plan

Kennebunkport Marina Dredging			
Elevation	Area (sf)	Incremental Volume (cu. yd.)	Cumulative Volume (cu. yd.)
0 to -1	1,065	20	20
-1 to -2	2,075	55	75
-2 to -3	3,425	100	175
-3 to -4	7,520	200	375
-4 to -5	20,810	525	900
-5 to -6	28,525	915	1,815
-6 to -7	31,500	1,125	2,940
Total Dredge Volume w/ 25% Bulking Factor			3,675 cu. yd.



PLAN REFERENCES

1. BATHYMETRY CONDUCTED BY WEA ON NOVEMBER 17, 2023 USING A HYDROLITE SONARMITE ECHOSOUNDER AND CARLSON BRx7 GNSS RECEIVER.
2. TOPOGRAPHIC DATA COLLECTED BY WEA VIA A DJI M300 DRONE EQUIPPED WITH A ZENMUSE L1 LIDAR CAMERA ON NOVEMBER 21, 2023.
3. ALL ELEVATIONS ON THIS PLAN ARE BASED ON THE MLLW VERTICAL DATUM. ELEVATIONS IN NAVD88 HAVE BEEN RAISED BY 5.14 FEET TO THE MLLW DATUM.
4. A PLAN TITLED "BOUNDARY SURVEY AT YACHTSMAN LODGE & MARINA" PREPARED BY OWEN HASKELL, INC OF 390 U.S. ROUTE ONE, UNIT 10, FALMOUTH, MAINE 04105, DATED APRIL 26, 2016.
5. A PLAN TITLED "SITE PLAN SHOWING THE PROPERTY OF THE KENNEBUNKPORT MARINA" PREPARED BY WILLIAM PIERCE OF 6 WATERHOUSE ROAD, DAYTON, MAINE 04005, DATED NOVEMBER 1, 1995.
6. A PLAN TITLED " KENNEBUNK RIVER KENNEBUNK AND KENNEBUNKPORT MAINE AFTER DREDGE SURVEY" PREPARED BY U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT DATED MARCH 9, 2020.
7. A PLAN TITLED "DOCK PLAN" PREPARED BY REILLY STUDIOS OF 959 ISLINGTON STREET, PORTSMOUTH, NEW HAMPSHIRE 03801, DATED MARCH 4, 2008.

WALSH
ENGINEERING ASSOCIATES, INC.
One Harbor Dr., Suite 3A | Westbrook, Maine 04092
ph. 207.553.9898 | www.walsh-eng.com

Kennebunkport Marina Dredging: 2023 Bathymetry

Kennebunkport Marina
67 Ocean Ave
Kennebunkport, Maine 04046

Figure 4: Kennebunkport Marina Applicant Dredge Plan

ECO-ANALYSTS, INC. ENVIRONMENTAL CONSULTANTS P.O. BOX 224 BATH, MAINE 04530 (207) 837-2442 raptor@gwi.net	Date: 12/9/2019 Project: KRC Drafted By: TF/SS	**Plan View of the Existing Condition and the proposed dredge window for the Kennebunk River Club, 116 Ocean Ave in Kennebunkport, Maine**	**Figure 5: Kennebunk River Club Applicant Dredge Plan**

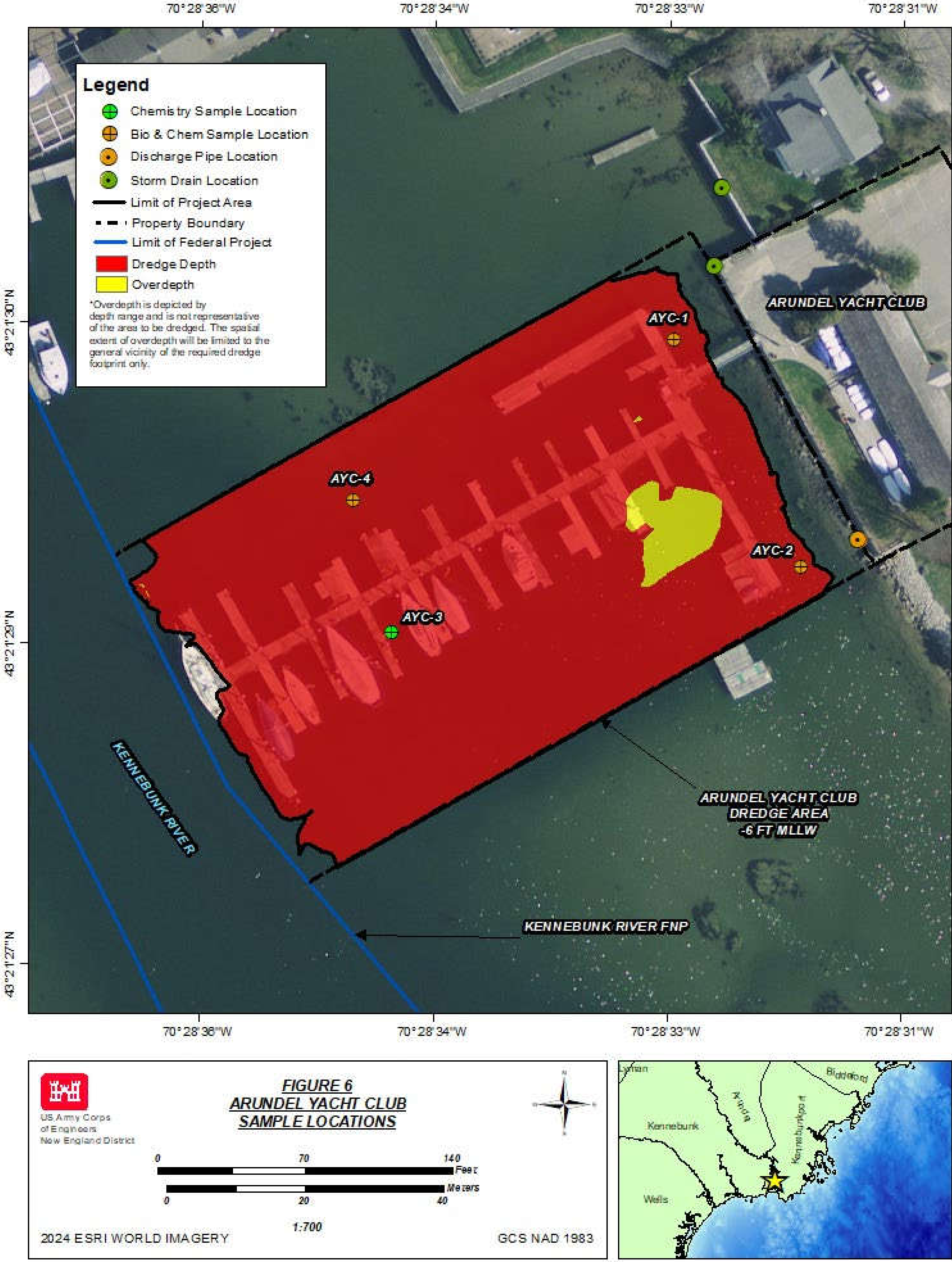
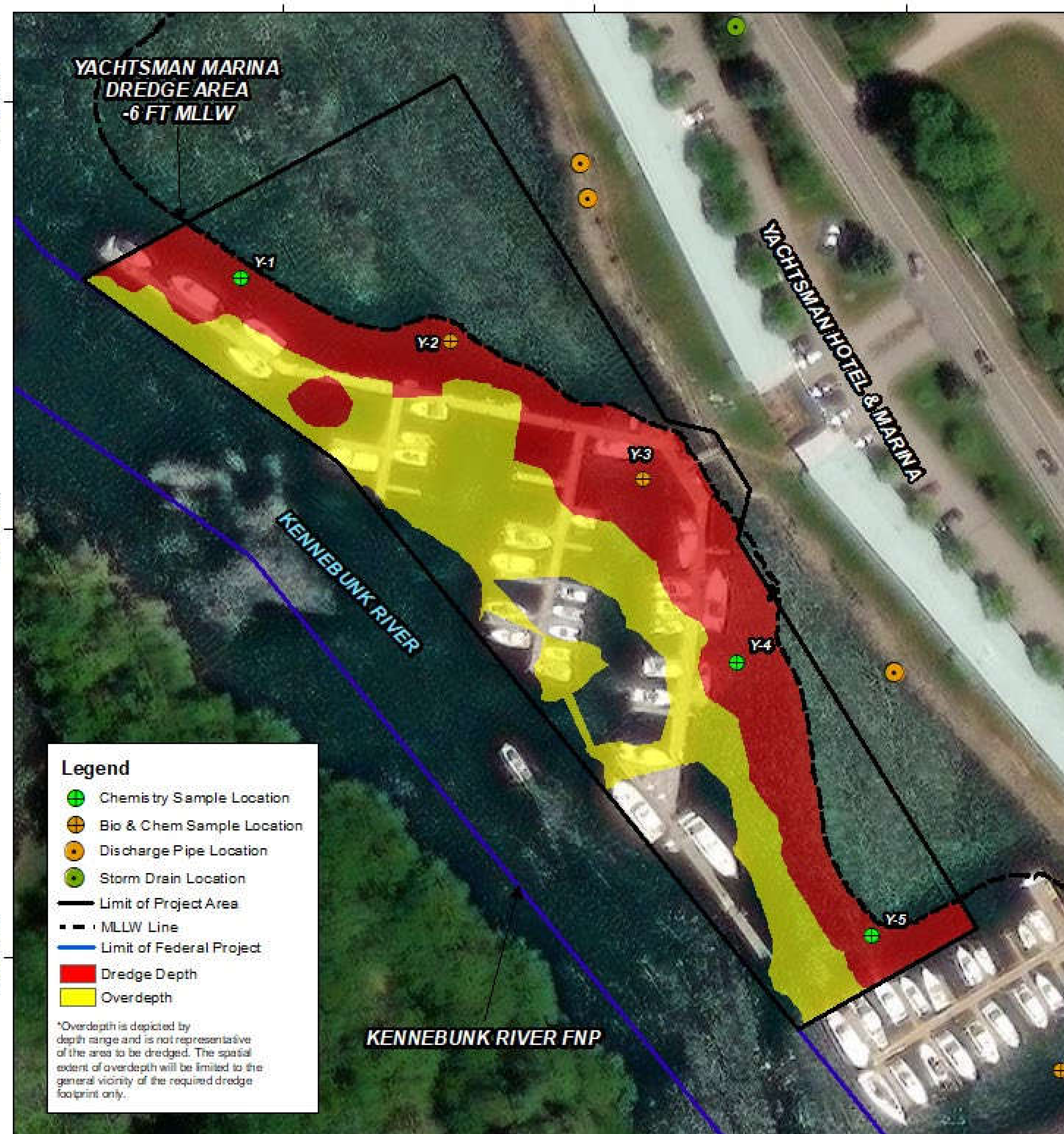


FIGURE 6
ARUNDEL YACHT CLUB
SAMPLE LOCATIONS



US Army Corps of Engineers New England District

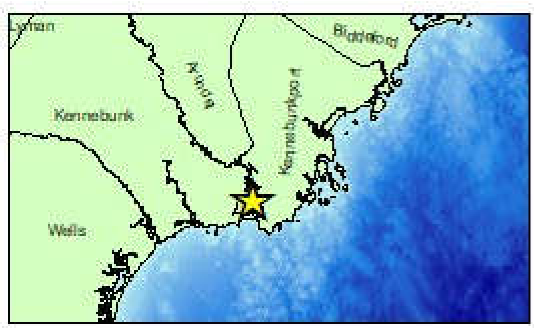
FIGURE 7
YACHTSMAN MARINA
SAMPLE LOCATIONS

0 100 200 Feet
0 30 60 Meters

1:1,000

2024 ESRI WORLD IMAGERY

GCS NAD 1983



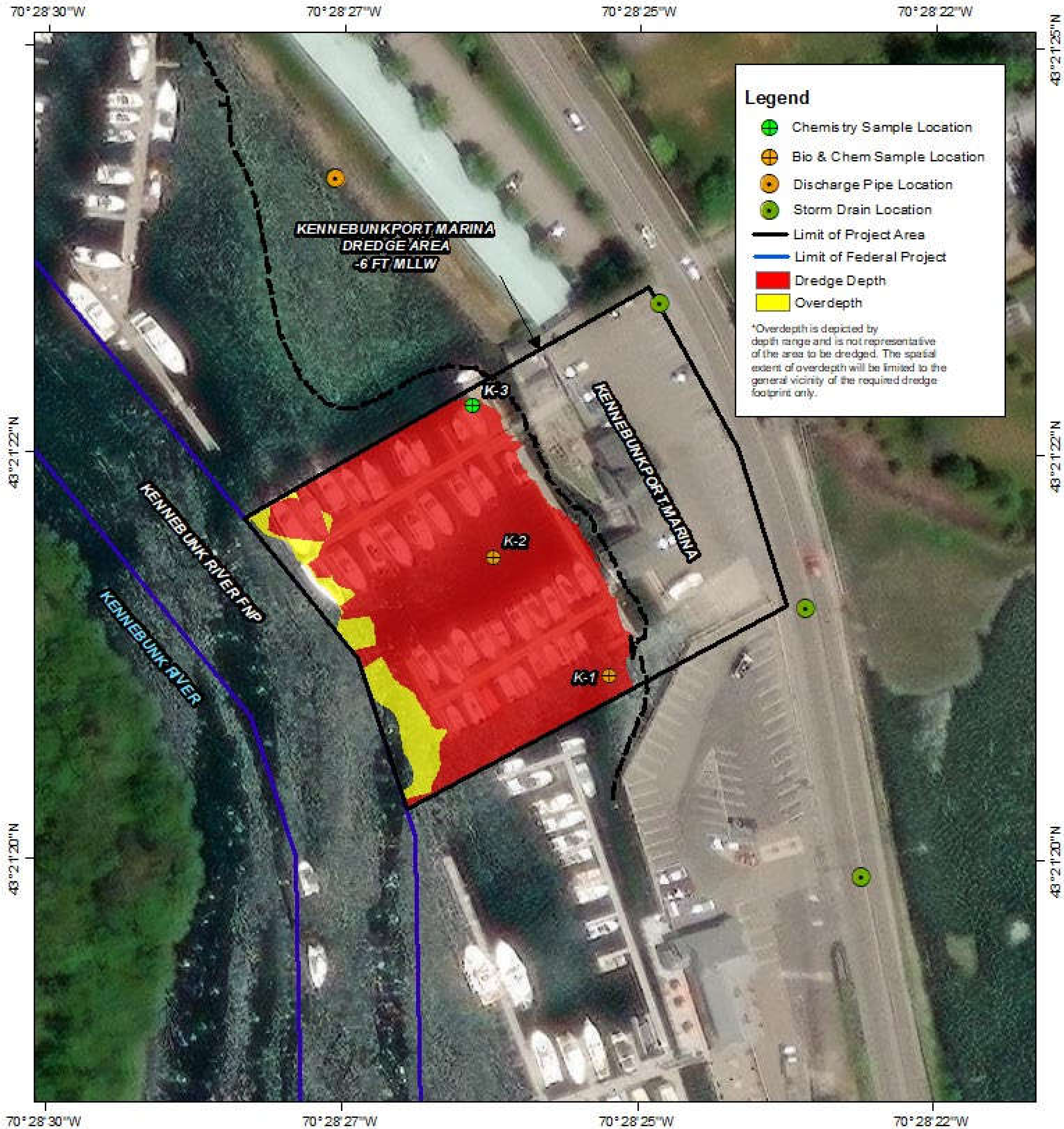


FIGURE 8
KENNEBUNKPORT MARINA
SAMPLE LOCATIONS

US Army Corps of Engineers New England District

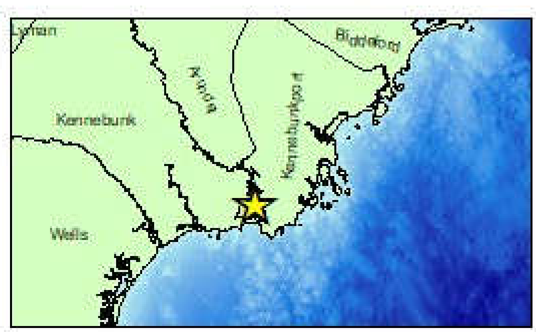
0 100 200 Feet

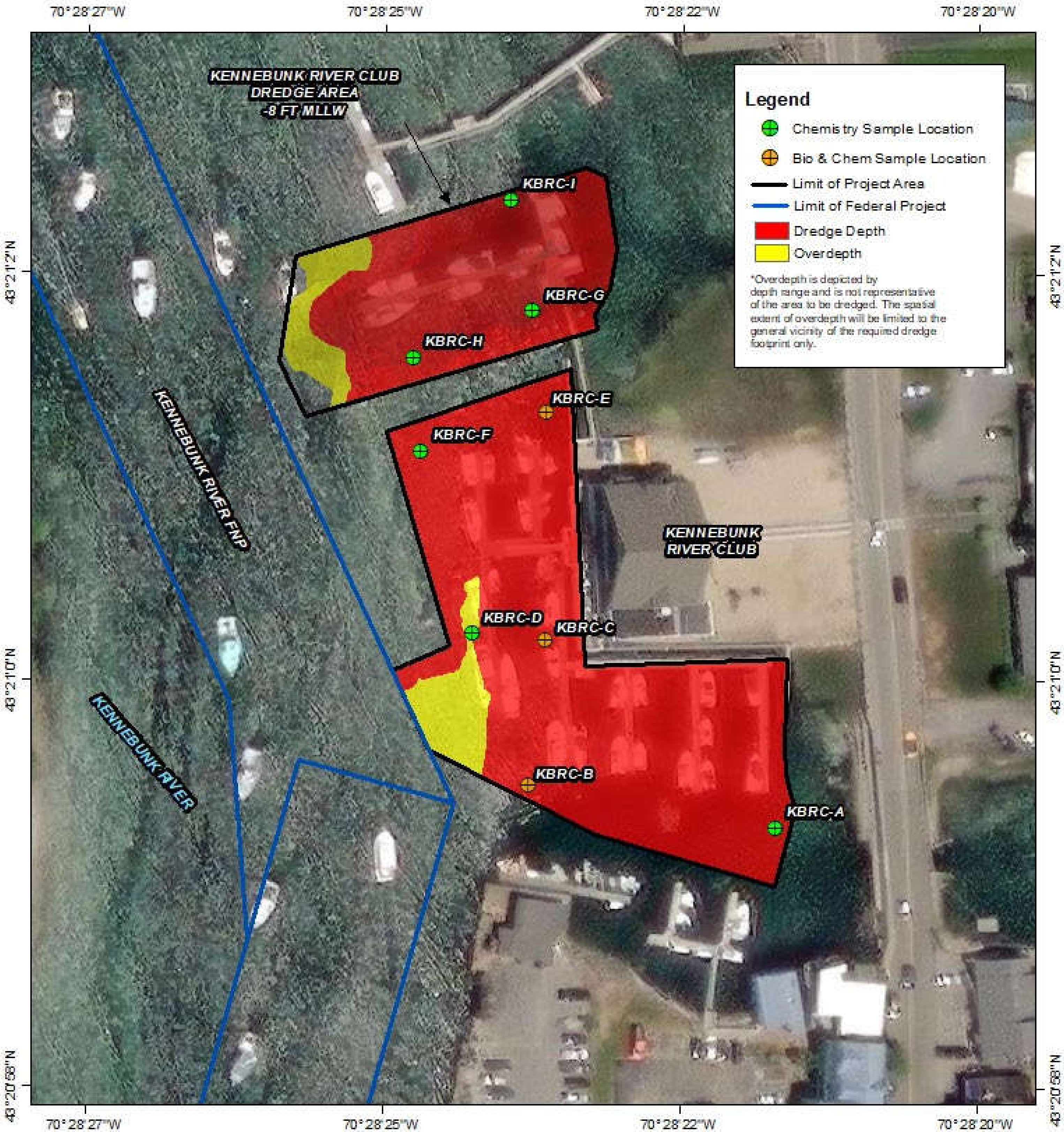
0 20 40 60 Meters

1:1,000

2024 ESRI WORLD IMAGERY

GCS NAD 1983





US Army Corps
of Engineers
New England District

FIGURE 9
KENNEBUNK RIVER CLUB
SAMPLE LOCATIONS

0 100 200 Feet
0 20 40 60 Meters
1:1,000

2024 ESRI WORLD IMAGERY

GCS NAD 1983

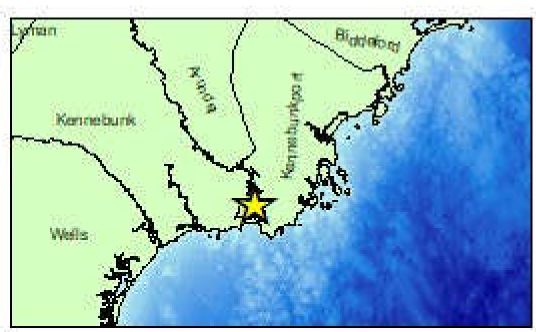
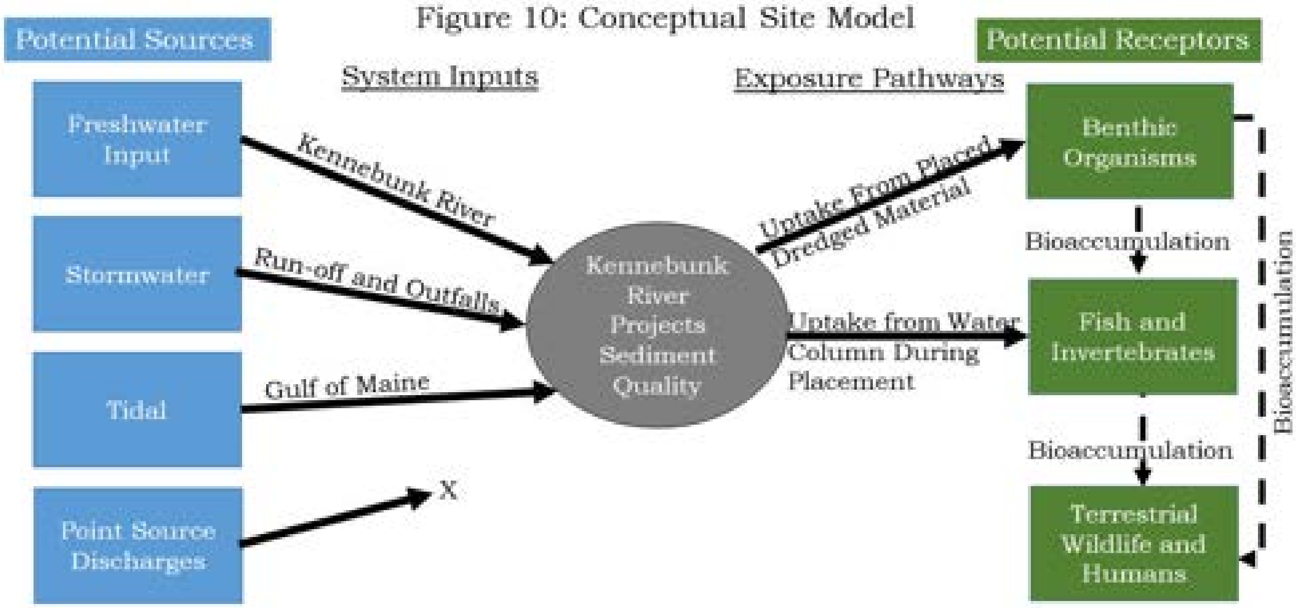


Figure 10: Conceptual Site Model



Appendix A
Core Logs and Photographs

Coastline Consulting & Development Core Log

Project: Arundel Yacht Club

Date: 7/26/2022

Sampling Personnel: Dustin J Kach

Weather: Light Winds, Clear Skies

Location Method: DGPS: 1 meter accuracy

Sample ID: AYC-1

Time: 1:06 pm

Sampler Type: VibraCore Sampler

Depth: -3.9' MLLW

Coordinates: **Latitude:** 43.35831 **Longitude:** -70.47582

Penetration: 3.2' **Recovery:** 3.2' **No. Attempts:** 3

Material Description: 0-3.1, composited. Dark silt/mud with shell debris.

Core Photo

Coastline Consulting & Development Core Log

Project: Arundel Yacht Club **Date**: 7/26/2022

Sampling Personnel: Dustin J Kach

Weather: Light Winds, Clear Skies

Location Method: DGPS: 1 meter accuracy

Sample ID: AYC-2 **Time:** 12:20 pm

Sampler Type: VibraCore Sampler

Depth: -2.1’ MLLW

Coordinates: **Latitude:** 43.35800 **Longitude:** -70.47561

Penetration: 2.4’ **Recovery:** 2.4’ **No. Attempts:** 9

Material Description: 0-2.4’ composited. Hard packed sand with shell debris. Multiple attempts were made refusal was reached after 2.4’ penetration.

Core Photo

Coastline Consulting & Development Core Log

Project: Arundel Yacht Club **Date**: 7/26/2022

Sampling Personnel: Dustin J Kach

Weather: Light Winds, Clear Skies

Location Method: DGPS: 1 meter accuracy

Sample ID: AYC-3 **Time:** 12:55 pm

Sampler Type: VibraCore Sampler

Depth: -3.2' MLLW

Coordinates: **Latitude:** 43.35793 **Longitude:** -70.47634

Penetration: 1' **Recovery:** 9" **No. Attempts:** 16

Material Description: 0-9" composited. Hard substrate encountered a lot of wood debris and shell material. We attempted to call ACOE contacts during sampling, messages were left but no one returned the calls that day. We kept the largest core and did not cut it because we did not want to lose any material. Sample was extruded directly into bucket for compositing. We attempted multiple cores within a 10' radius of the location and saved the best one. Multiple attempts were made refusal was reached after 1' penetration.

Core Photo

Coastline Consulting & Development Core Log

Project: Arundel Yacht Club **Date**: 7/26/2022

Sampling Personnel: Dustin J Kach

Weather: Light Winds, Clear Skies

Location Method: DGPS: 1 meter accuracy

Sample ID: AYC-4 **Time:** 12:35 pm

Sampler Type: VibraCore Sampler

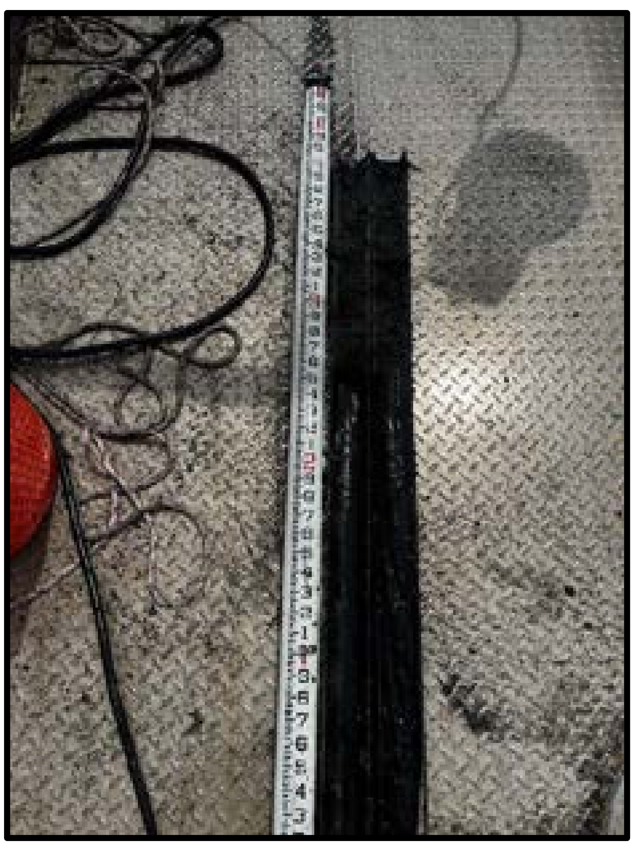
Depth: -3.0’ MLLW

Coordinates: **Latitude:** 43.35811 **Longitude:** -70.47638

Penetration: 4.1’ **Recovery:** 4.0’ **No. Attempts:** 5

Material Description: 0-4.0 composited. Dark silt with hard packed sand at bottom of core.

Core Photo



Coastline Consulting & Development Core Log

Project: Kennebunkport Marina **Date**: 7/26/2022

Sampling Personnel: Dustin J Kach

Weather: Light Winds, Clear Skies

Location Method: DGPS: 1 meter accuracy

Sample ID: K-1 **Time:** 9:38 am

Sampler Type: VibraCore Sampler

Depth: -1.8' MLLW

Coordinates: **Latitude:** 43.35587 **Longitude:** -70.47367

Penetration: 4.2' **Recovery:** 4.2' **No. Attempts:** 6

Material Description: 0-4.2' composited. Dark silt with hard packed sand at bottom of core. Multiple attempts were made refusal was reached after 4.2' penetration.

Core Photo

Coastline Consulting & Development Core Log

Project: Kennebunkport Marina **Date**: 7/26/2022

Sampling Personnel: Dustin J Kach

Weather: Light Winds, Clear Skies

Location Method: DGPS: 1 meter accuracy

Sample ID: K-2 **Time:** 9:47 am

Sampler Type: VibraCore Sampler

Depth: -4.8’ MLLW

Coordinates: **Latitude:** 43.35607 **Longitude:** -70.47394

Penetration: 3.1’ **Recovery:** 3.1’ **No. Attempts:** 3

Material Description: 0-2.2’ composited. Dark silt with hard packed sand towards bottom of core.

Core Photo

Coastline Consulting & Development Core Log

Project: Kennebunkport Marina **Date**: 7/26/2022

Sampling Personnel: Dustin J Kach

Weather: Light Winds, Clear Skies

Location Method: DGPS: 1 meter accuracy

Sample ID: K-3 **Time:** 10:05 am

Sampler Type: VibraCore Sampler

Depth: -1.7' MLLW

Coordinates: **Latitude:** 43.35634 **Longitude:** -70.474

Penetration: 4.3' **Recovery:** 4.2' **No. Attempts:** 7

Material Description: 0-4.2' composited. Dark silt with hard packed sand at bottom of core. Multiple attempts were made refusal was reached after 4.3' penetration.

Core Photo

Coastline Consulting & Development Core Log

Project: Yachtsman Marina

Date: 7/26/2022

Sampling Personnel: Dustin J Kach

Weather: Light Winds, Clear Skies

Location Method: DGPS: 1 meter accuracy

Sample ID: Y-1

Time: 11:29 am

Sampler Type: VibraCore Sampler

Depth: -1.5' MLLW

Coordinates: **Latitude:** 43.35735 **Longitude:** -70.47578

Penetration: 3.5'

Recovery: 3.5'

No. Attempts: 8

Material Description: 0-3.5' composited. Compact sand with shell debris. Multiple attempts were made refusal was reached after 3.5' penetration.

Core Photo

Coastline Consulting & Development Core Log

Project: Yachtsman Marina **Date**: 7/26/2022

Sampling Personnel: Dustin J Kach

Weather: Light Winds, Clear Skies

Location Method: DGPS: 1 meter accuracy

Sample ID: Y-2 **Time:** 11:15 am

Sampler Type: VibraCore Sampler

Depth: -1.2' MLLW

Coordinates: **Latitude:** 43.35724 **Longitude:** -70.47533

Penetration: 2.5' **Recovery:** 2.5' **No. Attempts:** 8

Material Description: 0-2.5' composited. Hard packed sand. Multiple attempts were made refusal was reached after 2.5' penetration.

Core Photo

Coastline Consulting & Development Core Log

Project: Yachtsman Marina

Date: 7/26/2022

Sampling Personnel: Dustin J Kach

Weather: Light Winds, Clear Skies

Location Method: DGPS: 1 meter accuracy

Sample ID: Y-3

Time: 11:02 am

Sampler Type: VibraCore Sampler

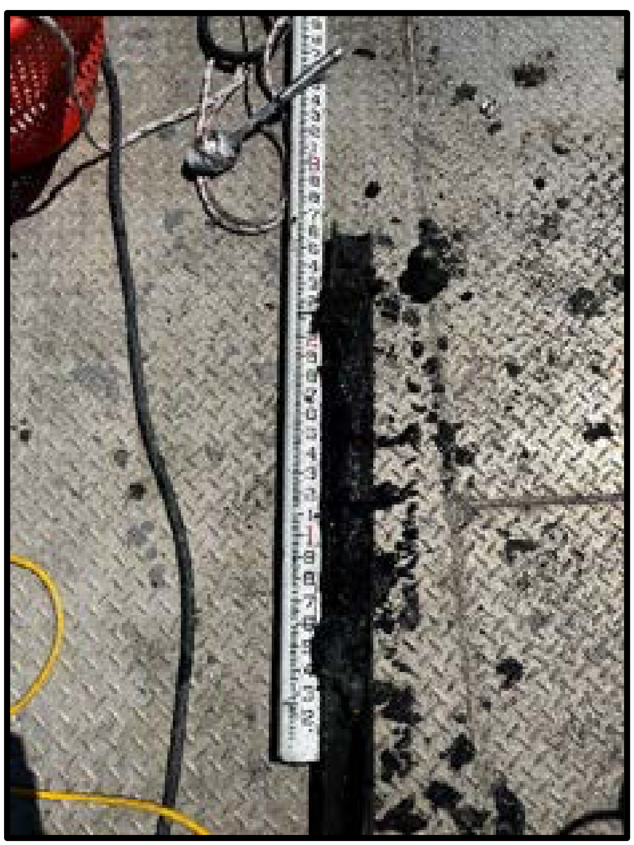
Depth: -4.2’ MLLW

Coordinates: **Latitude:** 43.35701 **Longitude:** -70.47488

Penetration: 2.7’ **Recovery:** 2.7’ **No. Attempts:** 5

Material Description: 0-2.7’ composited. Dark silt with hard packed sand at bottom of core.

Core Photo



Coastline Consulting & Development Core Log

Project: Yachtsman Marina **Date**: 7/26/2022

Sampling Personnel: Dustin J Kach

Weather: Light Winds, Clear Skies

Location Method: DGPS: 1 meter accuracy

Sample ID: Y-4 **Time:** 10:54 am

Sampler Type: VibraCore Sampler

Depth: -4.4' MLLW

Coordinates: **Latitude:** 43.35673 **Longitude:** -70.47467

Penetration: 3.4' **Recovery:** 3.4' **No. Attempts:** 4

Material Description: 0-2.6' composited. Dark silt with hard packed sand at bottom of core.

Core Photo

Coastline Consulting & Development Core Log

Project: Yachtsman Marina **Date**: 7/26/2022

Sampling Personnel: Dustin J Kach

Weather: Light Winds, Clear Skies

Location Method: DGPS: 1 meter accuracy

Sample ID: Y-5 **Time:** 10:40 am

Sampler Type: VibraCore Sampler

Depth: -1.0' MLLW

Coordinates: **Latitude:** 43.35629 **Longitude:** -70.47437

Penetration: 6.1' **Recovery:** 6.1' **No. Attempts:** 3

Material Description: 0-6.0' composited. Dark silt with hard packed sand at bottom of core.

Core Photo

Appendix B
Bulk Sediment Chemistry Results

					IOSN		Kennebunkport Marina (NAE-2005-00280)					
							K-1		K-2		K-3	
Parameter	CAS Number	Units	ERL	ERM	Value	Q	Result	Q	Result	Q	Result	Q
Physical												
Total organic carbon	14762744	%			1.28		0.37		3.04		2.32	
Metals												
Arsenic	7440382	mg/kg	8.2	70	9.66		2.85		6.68		6.34	
Cadmium	7440439	mg/kg	1.2	9.6	0.072		0.295		0.410		0.344	
Chromium	7440473	mg/kg	81	370	31.5		21.9		27.1		26.4	
Copper	7440508	mg/kg	34	270	10.9		14.2		16.7		15.4	
Lead	7439921	mg/kg	46.7	218	18.1		134		21.9		17.1	
Mercury	7439976	mg/kg	0.150	0.710	0.032		0.051		0.063		0.047	
Nickel	7440020	mg/kg	20.9	51.6	20.8		9.17		15.6		15.4	
Zinc	7440666	mg/kg	150	410	60.6		56.6		67.4		57.2	
PAHs												
Acenaphthene	83329	ug/kg	16	500	1.48		3.96	J	20.4		15.1	
Acenaphthylene	208968	ug/kg	44	640	7.06		30.1		20.6		12.6	
Anthracene	120127	ug/kg	85.3	1,100	4.14		32.5		34.5		40.4	
Fluorene	86737	ug/kg	19	540	2.40		8.08		25.5		17.1	
Naphthalene	91203	ug/kg	160	2,100	6.25		8.30		10.2		11.6	
Phenanthrene	85018	ug/kg	240	1500	26.9		102		114		128	
Total LPAH	*SUMLPAH*	ug/kg	552	3,160	48.2		185		225		225	
Benzo(a)anthracene	56553	ug/kg	261	1,600	21.3		115		157		133	
Benzo(a)pyrene	50328	ug/kg	430	1,600	23.4		129		160		130	
Benzo(b)fluoranthene	205992	ug/kg			36.4		126		180		137	
Benzo(g,h,i)perylene	191242	ug/kg			23.1		88.0		112		90.4	
Benzo(k)fluoranthene	207089	ug/kg			18.5		91		131		117	
Chrysene	218019	ug/kg	384	2,800	21.7		132		164		138	
Dibenz(a,h)anthracene	53703	ug/kg	63.4	260	4.41		19.6		24.4		20.4	
Fluoranthene	206440	ug/kg	600	5,100	42.1		239		364		474	
Indeno(1,2,3-cd)pyrene	193395	ug/kg			23.6		83.5		108		94.6	
Pyrene	129000	ug/kg	665	2,600	45.2		215		297		330	
Total HPAH	*SUMHPAH*	ug/kg	1,700	9,600	260		1238		1697		1664	
Pesticides												
4,4`-DDD	72548	ug/kg	2	20	0.020	U	4.98	J	4.66	J	0.112	UJ
4,4`-DDE	72559	ug/kg	2.2	27	0.066		2.23		4.53	J	0.068	U
4,4`-DDT	50293	ug/kg	1	7	0.026	U	1.44		1.44		0.148	U
Total DDX	SUMDDX	ug/kg	1.58	46.1	0.112		8.65		10.6		0.328	U
Aldrin	309002	ug/kg			0.066	U	0.051	U	0.063	U	0.374	U
Alpha-Chlordane (cis)	5103719	ug/kg			0.142	U	0.110	U	0.137	U	0.810	U
cis-Nonachlor	5103731	ug/kg			0.019	U	0.015	U	0.019	U	0.109	U
Dieldrin	60571	ug/kg	0.02	8	0.040	U	0.031	U	0.038	U	0.226	U
Endosulfan I	959988	ug/kg			0.036	U	0.028	U	0.035	U	0.206	U
Endosulfan II	33213659	ug/kg			0.019	U	0.015	U	0.018	U	0.106	U
Endrin	72208	ug/kg			0.022	U	0.017	U	0.021	U	0.123	U
Gamma-Chlordane (trans)	5103742	ug/kg			0.040	U	0.031	U	0.039	U	0.228	U
Heptachlor	76448	ug/kg			0.041	U	0.032	U	0.040	U	0.235	U
Heptachlor epoxide	1024573	ug/kg			0.085	U	0.066	U	0.082	U	0.482	U
Hexachlorobenzene	118741	ug/kg			0.354	U	0.274	U	0.341	U	2.015	U
Lindane	58899	ug/kg			0.059	U	0.046	U	0.057	U	0.338	U
Methoxychlor	72435	ug/kg			0.913	U	0.073	U	0.090	U	0.530	U
Oxychlordane	27304138	ug/kg			0.082	U	0.063	U	0.079	U	0.464	U
Toxaphene	8001352	ug/kg			1.71	U	1.33	U	1.65	U	9.70	U
trans-Nonachlor	39765805	ug/kg			0.018	U	0.014	U	0.017	U	0.100	U
Total Chlordane	*SUMCHLOR*	ug/kg	0.5	6	0.300	U	0.233	U	0.289	U	1.710	U
PCBs												
PCB 008	34883437	ug/kg			0.104	U	0.041	U	0.050	U	0.059	U
PCB 018	37680652	ug/kg			0.076	U	0.030	U	0.037	U	0.043	U
PCB 028	7012375	ug/kg			0.129	U	0.050	U	0.062	U	0.074	U
PCB 044	41464395	ug/kg			0.144	U	0.056	U	0.069	U	0.082	U
(PCB 049)	41464408	ug/kg			0.140	U	0.055	U	0.068	U	0.080	U
PCB 052	35693993	ug/kg			0.080	U	0.308	J	0.248	J	0.046	U
PCB 066	32598100	ug/kg			0.075	U	0.029	U	0.036	U	0.043	U
(PCB 087)	38380028	ug/kg			0.061	U	0.302	J	0.030	U	0.035	U
PCB 101	37680732	ug/kg			0.123	U	0.819		0.059	U	0.070	U
PCB 105	32598144	ug/kg			0.110	U	0.043	U	0.053	U	0.063	U
PCB 118	31508006	ug/kg			0.116	U	0.571		0.056	U	0.066	U
PCB 128	38380073	ug/kg			0.137	U	0.053	U	0.066	U	0.078	U
PCB 138	35065282	ug/kg			0.088	U	0.922		0.625		0.290	J
PCB 153	35065271	ug/kg			0.183	U	0.597		0.316	J	0.104	U
PCB 170	35065306	ug/kg			0.067	U	0.026	U	0.033	U	0.039	U
PCB 180	35065293	ug/kg			0.069	U	0.256	J	0.033	U	0.039	U
(PCB 183)	52663691	ug/kg			0.037	U	0.015	U	0.018	U	0.021	U
(PCB 184)	74472483	ug/kg			0.076	U	0.030	U	0.037	U	0.043	U
PCB 187	52663680	ug/kg			0.099	U	0.213	J	0.048	U	0.056	U
PCB 195	52663782	ug/kg			0.129	U	0.050	U	0.062	U	0.074	U
PCB 206	40186729	ug/kg			0.132	U	0.051	U	0.064	U	0.075	U
PCB 209	2051243	ug/kg			0.151	U	0.059	U	0.073	U	0.086	U
Total PCBs	*SumNOAA18*	ug/kg	22.7	180	4.02	U	8.34		3.98		2.77	

	Yachtsman Marina (NAE-2004-00319)										Arundel Yacht Club (NAE-2022-00288)							
	Y-1		Y-2		Y-3		Y-4		Y-5		AYC-1		AYC-2		AYC-3		AYC-4	
Parameter	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Physical																		
Total organic carbon	0.93		0.72		1.90		1.19		0.20		1.14		1.15		8.46		2.64	
Metals																		
Arsenic	6.65		3.20		7.96		4.54		0.984		9.75		6.72		7.78		10.3	
Cadmium	0.225		0.235		0.388		0.430		0.093		0.335		0.330		0.453		0.613	
Chromium	17.7		14.7		33.6		23.1		6.71		41.6		26.2		25.6		38.1	
Copper	12.5		8.64		18.3		9.82		1.59		29.4		15.7		25.6		24.3	
Lead	12.4		12.9		20.2		7.79		1.81		30.9		26.1		21.4		33.7	
Mercury	0.045		0.051		0.052		0.011	J	0.005	J	0.064		0.086		0.059	J	0.108	
Nickel	11.3		8.37		21.4		15.1		3.81		25.4		13.0		15.0		22.7	
Zinc	42.2		37.6		71.2		45.2		10.2		101		58.1		68.6		98.0	
PAHs																		
Acenaphthene	5.30		3.46	J	2.97	J	1.75	J	1.32	J	11.3		23.4		1.40	U	4.94	J
Acenaphthylene	9.97		17.0		12.6		0.241	U	0.884	J	23.8		71.1		7.60	J	15.3	
Anthracene	26.3		32.5		18.1		0.692	J	0.640	J	25.0		119		7.96	J	18.6	
Fluorene	6.97		9.01		5.98		0.218	U	0.186	U	12.9		37.4		3.53	J	4.86	J
Naphthalene	5.13		8.99		9.39		2.35	UJ	2.26	UJ	14.5		21.8		29.7		7.95	
Phenanthrene	134	J	120		69.4		2.62	J	3.38	J	101		381		40.7		52.2	
Total LPAH	188		191		118		7.87		8.67		189		654		90.9		104	
Benzo(a)anthracene	127		128		74.0		2.98	J	3.97		136		326		31.0		77.3	
Benzo(a)pyrene	132	J	130		85.3		3.12	J	4.60		140		328		35.7		90.0	
Benzo(b)fluoranthene	116	J	141		95.8		3.61	J	5.28		163		320		42.7		93.5	
Benzo(g,h,i)perylene	87.6	J	83.3		63.9		2.36	J	3.32	J	101		206		28.2		61.9	
Benzo(k)fluoranthene	106	J	94.6		61.4		2.23	J	3.38	J	120		231		31.1		75.7	
Chrysene	136	J	140		88.9		3.32	J	4.68		148		362		42.9		94.7	
Dibenz(a,h)anthracene	19.6		21.2		15.2		0.253	U	0.723	J	25.3		56.6		8.33	J	14.7	
Fluoranthene	297	J	269		167		7.05		6.58		291		702		92.7		233	
Indeno(1,2,3-cd)pyrene	90.1	J	86.5		67.2		2.39	J	3.20	J	102		215		27.4		64.2	
Pyrene	225		244		144		5.99		12.6		256		594		71.2		181	
Total HPAH	1336		1338		863		33.3		48.3		1482		3341		411		986	
Pesticides																		
4,4`-DDD	1.16	J	2.86	J	0.093	UJ	0.016	UJ	0.013	UJ	3.87	J	4.34	J	0.274	UJ	1.99	J
4,4`-DDE	2.50	J	2.78		0.057	U	0.010	U	0.008	U	7.51	J	5.74		0.167	U	4.37	J
4,4`-DDT	0.960		0.808		0.123	U	0.020	U	0.017	U	1.62	J	2.60		0.360	U	1.51	J
Total DDX	4.62		6.45		0.272	U	0.045	U	0.038	U	13.0		12.7		0.801	U	7.87	
Aldrin	0.063	U	0.051	U	0.311	U	0.051	U	0.044	U	0.378	U	0.243	U	0.915	U	0.374	U
Alpha-Chlordane (cis)	0.135	U	0.111	U	0.670	U	0.110	U	0.094	U	0.815	U	0.525	U	1.97	U	0.810	U
cis-Nonachlor	0.018	U	0.015	U	0.090	U	0.015	U	0.013	U	0.110	U	0.071	U	0.265	U	0.109	U
Dieldrin	0.038	U	0.031	U	0.187	U	0.031	U	0.026	U	0.23	U	0.15	U	0.550	U	0.225	U
Endosulfan I	0.035	U	0.029	U	0.171	U	0.028	U	0.024	U	0.208	U	0.134	U	0.500	U	0.206	U
Endosulfan II	0.018	U	0.015	U	0.088	U	0.015	U	0.013	U	0.107	U	0.069	U	0.260	U	0.106	U
Endrin	0.021	U	0.017	U	0.102	U	0.017	U	0.014	U	0.124	U	0.080	U	0.300	U	0.123	U
Gamma-Chlordane (trans)	0.038	U	0.031	U	0.189	U	0.031	U	0.027	U	0.23	U	0.15	U	0.555	U	0.228	U
Heptachlor	0.039	U	0.032	U	0.195	U	0.032	U	0.027	U	0.237	U	0.152	U	0.570	U	0.234	U
Heptachlor epoxide	0.081	U	0.066	U	0.400	U	0.066	U	0.056	U	0.487	U	0.312	U	1.18	U	0.482	U
Hexachlorobenzene	0.337	UJ	0.276	U	1.670	U	0.274	U	0.234	U	2.035	U	1.305	U	4.92	U	2.02	U
Lindane	0.057	UJ	0.047	U	0.281	U	0.046	U	0.039	U	0.342	U	0.219	U	0.825	U	0.338	U
Methoxychlor	0.089	U	0.073	U	0.442	U	0.073	U	0.062	U	0.540	U	0.345	U	1.30	U	0.530	U
Oxychlordane	0.078	U	0.064	U	0.385	U	0.063	U	0.054	U	0.469	U	0.301	U	1.13	U	0.464	U
Toxaphene	1.63	U	1.34	U	8.10	U	1.33	U	1.13	U	9.80	U	6.30	U	23.8	U	9.70	U
trans-Nonachlor	0.017	U	0.014	U	0.083	U	0.014	U	0.012	U	0.101	U	0.065	U	0.244	U	0.100	U
Total Chlordane	0.285	U	0.234	U	1.42	U	0.233	U	0.198	U	1.72	U	1.11	U	4.2	U	1.7	U
PCBs																		
PCB 008	0.050	U	0.041	U	0.049	U	0.041	U	0.035	U	0.060	U	0.039	U	0.145	U	0.06	U
PCB 018	0.036	U	0.030	U	0.036	U	0.030	U	0.025	U	0.044	U	0.028	U	0.105	U	0.043	U
PCB 028	0.062	U	0.050	U	0.061	U	0.050	U	0.043	U	0.074	U	0.048	U	0.179	U	0.073	U
PCB 044	0.069	U	0.056	U	0.068	U	0.056	U	0.048	U	0.083	U	0.393		0.200	U	0.082	U
(PCB 049)	0.067	U	0.055	U	0.067	U	0.055	U	0.047	U	0.081	U	0.052	U	0.195	U	0.080	U
PCB 052	0.038	U	0.031	U	0.038	U	0.031	U	0.027	U	0.046	U	0.506		0.111	U	0.046	U
PCB 066	0.036	U	0.030	U	0.036	U	0.029	U	0.025	U	0.043	U	0.028	U	0.105	U	0.043	U
(PCB 087)	0.029	U	0.024	U	0.029	U	0.024	U	0.020	U	0.035	U	0.023	U	0.085	U	0.035	U
PCB 101	0.059	U	0.048	U	0.270	J	0.048	U	0.041	U	0.357	J	0.747		0.170	U	0.070	U
PCB 105	0.053	U	0.043	U	0.052	U	0.043	U	0.037	U	0.063	U	0.041	U	0.153	U	0.063	U
PCB 118	0.056	U	0.046	U	0.055	U	0.045	U	0.039	U	0.067	U	0.590		0.162	U	0.066	U
PCB 128	0.066	U	0.054	U	0.065	U	0.053	U	0.046	U	0.079	U	0.051	U	0.191	U	0.078	U
PCB 138	0.042	U	0.278	J	0.453	J	0.034	U	0.029	U	0.389	J	1.07		0.122	U	0.050	U
PCB 153	0.087	U	0.206	J	0.292	J	0.071	U	0.061	U	0.300	J	0.657		0.254	U	0.104	U
PCB 170	0.032	U	0.027	U	0.032	U	0.026	U	0.022	U	0.039	U	0.025	U	0.094	U	0.039	U
PCB 180	0.033	U	0.027	U	0.033	U	0.027	U	0.023	U	0.040	U	0.026	U	0.096	U	0.039	U
(PCB 183)	0.018	U	0.015	U	0.018	U	0.015	U	0.012	U	0.022	U	0.014	U	0.052	U	0.021	U
(PCB 184)	0.036	U	0.030	U	0.036	U	0.030	U	0.025	U	0.044	U	0.028	U	0.105	U	0.043	U
PCB 187	0.047	U	0.039	U	0.047	U	0.039	U	0.033	U	0.057	U	0.037	U	0.138	U	0.056	U
PCB 195	0.062	U	0.051	U	0.061	U	0.050	U	0.043	U	0.075	U	0.048	U	0.180	U	0.074	U
PCB 206	0.063	U	0.052	U	0.063	U	0.051	U	0.044	U	0.076	U	0.049	U	0.184	U	0.075	U
PCB 209	0.072	U	0.059	U	0.072	U	0.059	U	0.050	U	0.087	U	0.056	U	0.211	U	0.086	U
Total PCBs	1.92		2.33		3.56		1.56	U	1.33	U	3.95		8.87		5.59	U	2.29	U

	Kennebunk River Club (NAE-2007-2704)																	
	KBRC-A		KBRC-B		KBRC-C		KBRC-D		KBRC-E		KBRC-G		KBRC-H		KBRC-I		KBRC-F	
Parameter	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Physical																		
Total organic carbon	-		-		-		-		-		-		-		-		-	
Metals																		
Arsenic	5.34		4.98		3.52		3.30		2.47		3.34		2.82		5.12		1.58	
Cadmium	0.463		0.433		0.300		0.350		0.229		0.277		0.237		0.451		0.119	
Chromium	27.5		26.0		20.0		20.5		15.6		18.0		16.5		24.8		11.0	
Copper	13.7		13.8		9.34		9.52		18.6		8.28		7.16		13.6		5.32	
Lead	18.8		17.8		12.2		13.3		8.67		11.5		9.29		17.7		4.81	
Mercury	0.062		0.054		0.052		0.053		0.032		0.067		0.046		0.056		0.023	
Nickel	15.9		14.5		11.4		11.3		8.57		9.92		8.67		13.4		6.12	
Zinc	68.9		67.7		48.3		50.9		37.2		50.5		39.9		78.2		28.9	J
PAHs																		
Acenaphthene	21.7		18.2		1.35	U	1.35	U	1.35	U	1.35	U	1.35	U	1.35	U	1.35	U
Acenaphthylene	10.0		1.25	U	1.25	U	1.25	U	1.25	U	1.25	U	1.25	U	11.9		1.25	
Anthracene	90.3		143.0		46.3		19.6		26.2		18.9		25.2		29.1		15.4	U
Fluorene	37.8		30.6		15.9		1.45	U	1.45	U	1.45	U	10.9		14.2		1.45	
Naphthalene	1.15	U	1.15	U	1.15	U	1.15	U	1.15	U	1.15	U	1.15	U	1.15	U	1.15	U
Phenanthrene	155		127		142		81.5		82.9	J	76.5		87.1		159		82.9	
Total LPAH	316		321		208		106		114		101		127		217		104	
Benzo(a)anthracene	311		522		257		92		97.2		78.7		67.0		136		55.8	
Benzo(a)pyrene	171	J	226	J	146	J	80	J	76.8		71.4	J	58	J	129	J	51.8	J
Benzo(b)fluoranthene	282	J	303	J	210	J	109	J	87.2		86.6	J	86.2	J	201	J	63.6	J
Benzo(g,h,i)perylene	73.1	J	82.4	J	60.7	J	38.2	J	39.7		31.0	J	23.7	J	50	J	26.8	J
Benzo(k)fluoranthene	174	J	251	J	139	J	77.7	J	67.3		78.9	J	52.5	J	110	J	40.5	J
Chrysene	321		455		216		102		95.7		86.1		79.0		169		58.6	
Dibenz(a,h)anthracene	11.6	J	15.5	J	10.0	UJ	9.9	UJ	10.2		10.1	UJ	10.2	UJ	10.1	UJ	9.90	UJ
Fluoranthene	618		1130		264		152		162	J	136		127		209		123	
Indeno(1,2,3-cd)pyrene	71.2	J	87.5	J	60.5	J	39.5	J	43.8		33.4	J	27.2	J	51.0	J	28.1	J
Pyrene	611		1140		665		166		158		144		122		236		109	
Total HPAH	2644		4212		2028		866		838		756		653		1301		567	
Pesticides																		
4,4`-DDD	1.30		1.90		2.10		1.30		1.00		1.20		0.880		1.70		0.680	
4,4`-DDE	1.90		1.30		1.40		1.30		0.790		1.40		1.30		2.00		0.400	
4,4`-DDT	0.850		1.50		4.00		0.750		0.620		0.900		0.530		2.20		0.028	U
Total DDX	4.05		4.70		7.50		3.35		2.41		3.50		2.71		5.90		1.11	
Aldrin	0.008	U	0.008	U	0.008	U	0.008	U	0.008	U	0.008	U	0.008	U	0.008	U	0.200	UJ
Alpha-Chlordane (cis)	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
cis-Nonachlor	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U
Dieldrin	0.460		0.850		0.026	U	1.00		1.20		0.026	U	0.026	U	0.610		0.026	U
Endosulfan I	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U
Endosulfan II	0.019	U	0.019	U	0.019	U	1.20		0.019	U	0.019	U	0.019	U	0.740		0.019	U
Endrin	0.027	U	0.027	U	0.430		0.760		0.027	U	0.027	U	0.770		1.90		0.027	U
Gamma-Chlordane (trans)	0.710		0.910		0.220		1.8		0.009	U	0.009	U	1.50		0.720		0.830	J
Heptachlor	0.470		0.300		0.310		0.230		0.220		0.009	U	0.009	U	0.820		0.009	U
Heptachlor epoxide	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.200	UJ
Hexachlorobenzene	0.009	U	0.450		0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.009	U
Lindane	0.013	U	0.670		0.540		0.013	U	0.013	U	0.013	U	0.013	U	0.013	U	0.400	J
Methoxychlor	0.125	U	0.125	U	0.125	U	0.125	U	0.125	U	0.125	U	0.125	U	0.125	U	0.125	U
Oxychlordane	0.710		0.010	U	1.60		0.010	U	0.010	U	0.230		0.010	U	0.290		0.200	UJ
Toxaphene	0.019	U	0.019	U	0.019	U	0.019	U	0.019	U	0.019	U	0.019	U	0.019	U	0.019	U
trans-Nonachlor	0.009	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.200	UJ
Total Chlordane	1.4		0.95		1.8		1.8		0.044	U	0.265		1.54		1.04		1.25	
PCBs																		
PCB 008	0.015	U	0.015	U	0.015	U	0.015	U	0.015	U	0.015	U	0.015	U	0.015	U	0.015	U
PCB 018	0.017	U	0.017	U	0.017	U	0.017	U	0.017	U	0.017	U	0.017	U	0.017	U	0.017	U
PCB 028	0.015	U	0.015	U	0.015	U	0.015	U	0.015	U	0.015	U	0.015	U	0.015	U	0.015	U
PCB 044	0.008	U	0.008	U	0.008	U	0.008	U	0.008	U	0.008	U	0.008	U	0.008	U	0.008	U
(PCB 049)	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U
PCB 052	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
PCB 066	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U
(PCB 087)	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U
PCB 101	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
PCB 105	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.200	
PCB 118	0.011	U	0.250		0.011	U	0.011	U	0.011	U	0.011	U	0.011	U	0.011	U	0.011	U
PCB 128	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
PCB 138	0.280		0.360		0.230		0.220		0.008	U	0.008	U	0.260		0.290		0.008	U
PCB 153	0.260		0.310		0.220		0.006	U	0.006	U	0.006	U	0.006	U	0.220		0.006	U
PCB 170	0.011	U	0.011	U	0.011	U	0.011	U	0.011	U	0.011	U	0.011	U	0.011	U	0.011	U
PCB 180	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U
(PCB 183)	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
(PCB 184)	0.012	U	0.012	U	0.012	U	0.012	U	0.012	U	0.012	U	0.012	U	0.012	U	0.012	U
PCB 187	0.008	U	0.008	U	0.008	U	0.008	U	0.008	U	0.008	U	0.008	U	0.008	U	0.008	U
PCB 195	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U
PCB 206	0.011	U	0.011	U	0.011	U	0.011	U	0.011	U	0.011	U	0.011	U	0.011	U	0.011	U
PCB 209	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
Total PCBs	1.4		2.1		1.2		0.751		0.326	U	0.326	U	0.831		1.3		0.706	

Notes:

Yellow indicates an exceedance of the ERL

Red indicates an exceedance of the ERM

U= Compound was analyzed for but was not detected (non-detect)

J= Indicates an estimated value

J+= Indicates an estimated value biased high

Non-detects reported as half the MDL

Reference site data from DAMOS monitoring surveys (2019 IOSN)

Total PCBs were calculated using the NOAA 18 method

Total Chlordane is a sum of alpha and gamma chlordane, cis and trans nonachlor, and oxychlordane; IOSN value is a sum of only alpha and gamma chlordane

Appendix C
Tissue Concentrations and
BEST Model Output

TABLE C-1 STATISTICAL COMPARISONS OF *N. virens* BODY BURDENS VS. IOSN 2019 REFERENCE DATA

Compound	Units	Pre-Test [d] Mean	Pre-Test [d] Qual	IOSN 2019 Mean	IOSN 2019 Qual	Composite Mean	Composite Qual
Trace Metals							
Arsenic, total	mg/Kg	2.00		2.25		2.02	NS
Cadmium, total	mg/Kg	0.0300	b	0.0252	b	0.0338	bS
Chromium, total	mg/Kg	0.620	b	0.0686	b	0.551	bS
Copper, total	mg/Kg	1.49		1.20		1.12	NS
Lead, total	mg/Kg	0.195		0.0744		0.191	S
Mercury, total	mg/Kg	0.0110	b	0.0156	b	0.00662	abNS
Nickel, total	mg/Kg	0.476		0.168		0.232	S
Zinc, total	mg/Kg	13.1		18.6		14.1	NS/S e
PAH Compounds							
Acenaphthene	µg/Kg	0.620	a	0.563	ab	0.883	abNS
Acenaphthylene	µg/Kg	0.381	a	0.286	a	4.22	aNS
Anthracene	µg/Kg	0.903	ab	0.310	a	0.610	abS
Benzo(a)anthracene	µg/Kg	0.775	a	0.581	a	0.766	ac
Benzo(a)pyrene	µg/Kg	0.813	a	0.610	a	0.805	ac
Benzo(b)fluoranthene	µg/Kg	1.08	a	0.807	a	2.43	aS
Benzo(k)fluoranthene	µg/Kg	0.493	a	0.371	a	6.45	aS
Benzo(g,h,i)perylene	µg/Kg	0.345	a	0.259	a	0.427	abS
Chrysene	µg/Kg	0.752	a	0.564	a	1.14	abS
Dibenz(a,h)anthracene	µg/Kg	0.400	a	0.300	a	0.396	ac
Fluoranthene	µg/Kg	0.610	a	0.569	ab	6.71	bS
Fluorene	µg/Kg	1.07	b	0.431	ab	2.05	bS
Indeno(1,2,3-cd)pyrene	µg/Kg	0.810	a	0.608	a	0.802	ac
Naphthalene	µg/Kg	1.64	b	0.651	ab	1.60	abS
Phenanthrene	µg/Kg	0.677	a	2.04	b	0.861	abNS
Pyrene	µg/Kg	0.898	a	0.674	a	6.23	bS
Total PAHs	µg/Kg	12.3		9.63		36.4	
PCB Congeners							
PCB 008	µg/Kg	0.0638	a	0.0480	a	0.0632	ac
PCB 018	µg/Kg	0.0465	a	0.0349	a	0.0460	ac
PCB 028	µg/Kg	0.0790	a	0.0593	a	0.0784	ac
PCB 044	µg/Kg	0.0880	a	0.0661	a	0.0873	ac
PCB 052	µg/Kg	0.0491	a	0.0369	a	0.136	abS
PCB 066	µg/Kg	0.0462	a	0.0347	a	0.0457	ac
PCB 101	µg/Kg	0.0752	a	0.0564	a	0.0745	ac
PCB 105	µg/Kg	0.0675	a	0.0506	a	0.810	aS
PCB 118	µg/Kg	0.0713	a	0.0534	a	0.0706	ac
PCB 128	µg/Kg	0.0842	a	0.0632	a	0.0834	ac
PCB 138	µg/Kg	0.305	ab	0.331	ab	0.462	aNS
PCB 153	µg/Kg	0.628	b	0.763		0.857	aNS
PCB 170	µg/Kg	0.0413	a	0.0310	a	0.0409	ac
PCB 180	µg/Kg	0.0423	a	0.0318	a	0.0419	ac
PCB 187	µg/Kg	0.256	a	0.0456	a	0.0601	ac
PCB 195	µg/Kg	0.0795	a	0.0596	a	0.0786	ac
PCB 206	µg/Kg	0.0810	a	0.0608	a	0.0802	ac
PCB 209	µg/Kg	0.0928	a	0.0697	a	0.0920	ac
Total PCBs	µg/Kg	4.39		3.79		6.42	
Pesticides							
Aldrin	µg/Kg	0.0404	a	0.0605	a	0.0400	ac
cis-Chlordane	µg/Kg	0.0870	a	0.131	a	0.0863	ac
trans-Chlordane	µg/Kg	0.0245	a	0.0369	a	0.0243	ac
cis-Nonachlor	µg/Kg	0.0117	a	0.0176	a	0.0116	ac
trans-Nonachlor	µg/Kg	0.0108	a	0.0161	a	0.0106	ac
Oxychlordane	µg/Kg	0.0501	a	0.0752	a	0.0495	ac
Total Chlordanes	µg/Kg	0.184		0.277		0.182	
4,4'-DDT	µg/Kg	0.0159	a	0.0238	a	0.0158	ac
4,4'-DDD	µg/Kg	3.29	ab	0.0182	a	0.665	S
4,4'-DDE	µg/Kg	0.00737	a	0.0111	a	0.00728	ac
Total DDT	µg/Kg	3.32		0.0531		0.688	
Dieldrin	µg/Kg	0.0243	a	0.0365	a	0.0241	ac
alpha-Endosulfan	µg/Kg	0.0222	a	0.0334	a	0.0220	ac
beta-Endosulfan	µg/Kg	0.0115	a	0.0173	a	0.0113	ac
Total Endosulfans	µg/Kg	0.0337		0.0507		0.0333	
Endrin	µg/Kg	0.0132	a	0.0199	a	0.0131	ac
Heptachlor	µg/Kg	0.0253	a	0.0379	a	0.0250	ac
Heptachlor epoxide	µg/Kg	0.0520	a	0.0780	a	0.0515	ac
Hexachlorobenzene	µg/Kg	0.217	a	0.326	a	0.215	ac
Lindane (gamma-BHC)	µg/Kg	0.0365	a	0.0548	a	0.0361	ac
Methoxychlor	µg/Kg	0.0575	a	0.843	a	0.0568	ac
Toxaphene	µg/Kg	1.05	a	1.58	a	1.04	ac

Notes:

Mean concentrations are reported to 3 significant figures.

a = COC not detected (below MDL) in at least one replicate; mean value was calculated using one-half of the project specific MDL for non-detected values.
b = COC concentration estimated (detected below RL but above MDL) in at least one replicate; mean value calculated using estimated value.
c = COC was not detected in either the dredge tissue replicates or in the historic reference tissue, therefore was eliminated from further evaluation.
[d] Pre-test tissue represents the mean of three replicates, whereas the reference and site composites represent a mean of 5 replicates.
[e] Analysis conducted after removal of a statistical outlier.

NS = Not Significant - mean tissue body burden was not statistically different from the associated reference site mean body burden. Statistical significance accepted at α=0.05.
S = Significant - mean tissue body burden was statistically different, greater than the associated reference site mean body burden. Statistical significance accepted at α=0.05.

TABLE C-2 STATISTICAL COMPARISONS OF *M. nasuta* BODY BURDENS VS. IOSN 2019 REFERENCE DATA

Compound	Units	Pre-Test [d] Mean	Pre-Test [d] Qual	IOSN 2019 Mean	IOSN 2019 Qual	Composite Mean	Composite Qual
Trace Metals							
Arsenic, total	mg/Kg	2.59		3.49		2.54	NS
Cadmium, total	mg/Kg	0.0297	b	0.0290	b	0.0266	bNS
Chromium, total	mg/Kg	0.465		0.334	b	0.434	bNS
Copper, total	mg/Kg	3.10		1.77		2.71	S
Lead, total	mg/Kg	0.129		0.349		0.452	S
Mercury, total	mg/Kg	0.00185	a	0.00170	a	0.00208	ac
Nickel, total	mg/Kg	0.713		0.521		0.570	NS/S [e]
Zinc, total	mg/Kg	11.6		11.8		12.8	NS
PAH Compounds							
Acenaphthene	µg/Kg	1.07	ab	0.453	a	1.56	abNS
Acenaphthylene	µg/Kg	0.378	a	0.279	a	0.381	ac
Anthracene	µg/Kg	0.853	ab	0.302	a	2.69	bS
Benzo(a)anthracene	µg/Kg	1.32	ab	0.565	a	5.40	bS
Benzo(a)pyrene	µg/Kg	0.805	a	0.594	a	1.74	abS
Benzo(b)fluoranthene	µg/Kg	1.07	a	0.786	a	4.41	bS
Benzo(k)fluoranthene	µg/Kg	0.490	a	0.455	ab	1.25	abS
Benzo(g,h,i)perylene	µg/Kg	0.342	a	0.518	ab	0.820	abNS
Chrysene	µg/Kg	2.01	b	0.550	a	2.92	bS
Dibenz(a,h)anthracene	µg/Kg	0.559	ab	2.97	b	0.400	aNS
Fluoranthene	µg/Kg	2.57	b	2.12	b	26.6	S
Fluorene	µg/Kg	2.11	b	0.253	a	1.74	bS
Indeno(1,2,3-cd)pyrene	µg/Kg	0.803	a	3.54	b	0.985	abNS
Naphthalene	µg/Kg	3.78	b	0.390	a	1.77	bS
Phenanthrene	µg/Kg	4.09	b	1.97	b	6.92	bS
Pyrene	µg/Kg	2.86	b	1.63	b	20.8	S
Total PAHs	µg/Kg	25.1		17.4		80.4	
PCB Congeners							
PCB 008	µg/Kg	0.0633	a	0.0467	a	0.0639	ac
PCB 018	µg/Kg	0.0461	a	0.0340	a	0.0465	ac
PCB 028	µg/Kg	0.0783	a	0.0578	a	0.0791	ac
PCB 044	µg/Kg	0.0873	a	0.0644	a	0.0883	ac
PCB 052	µg/Kg	2.09		0.0359	a	0.172	aS
PCB 066	µg/Kg	0.0457	a	0.0338	a	0.0462	ac
PCB 101	µg/Kg	0.0745	a	0.0550	a	0.0754	ac
PCB 105	µg/Kg	0.0668	a	0.0493	a	0.0675	ac
PCB 118	µg/Kg	0.0708	a	0.0522	a	0.142	abS
PCB 128	µg/Kg	0.0835	a	0.0616	a	0.0843	ac
PCB 138	µg/Kg	0.392	a	0.0394	a	0.0539	ac
PCB 153	µg/Kg	0.111	a	0.0820	a	0.142	abS
PCB 170	µg/Kg	0.0410	a	0.0303	a	0.0414	ac
PCB 180	µg/Kg	0.0419	a	0.0309	a	0.0423	ac
PCB 187	µg/Kg	0.0603	a	0.0445	a	0.0607	ac
PCB 195	µg/Kg	0.0787	a	0.0580	a	0.0794	ac
PCB 206	µg/Kg	0.0803	a	0.0594	a	0.0810	ac
PCB 209	µg/Kg	0.0920	a	0.0680	a	0.0929	ac
Total PCBs	µg/Kg	7.22		1.81		2.92	
Pesticides							
Aldrin	µg/Kg	0.0200	a	0.0296	a	0.0202	ac
cis-Chlordane	µg/Kg	0.0432	a	0.0638	a	0.0436	ac
trans-Chlordane	µg/Kg	0.0122	a	0.0180	a	0.0123	ac
cis-Nonachlor	µg/Kg	0.00582	a	0.00870	a	0.00587	ac
trans-Nonachlor	µg/Kg	0.00533	a	0.00780	a	0.00538	ac
Oxychlordane	µg/Kg	0.0248	a	0.0366	a	0.0250	ac
Total Chlordanes	µg/Kg	0.0913		0.135		0.0922	
4,4'-DDT	µg/Kg	0.00788	a	0.0117	a	0.00796	ac
4,4'-DDD	µg/Kg	0.00598	a	0.00880	a	0.391	S
4,4'-DDE	µg/Kg	0.00365	a	0.219	b	0.499	S
Total DDT	µg/Kg	0.0175		0.240		0.898	
Dieldrin	µg/Kg	0.0121	a	0.0178	a	0.0122	ac
alpha-Endosulfan	µg/Kg	0.0110	a	0.0163	a	0.0111	ac
beta-Endosulfan	µg/Kg	0.00568	a	0.00840	a	0.00573	ac
Total Endosulfans	µg/Kg	0.0167		0.0247		0.0168	
Endrin	µg/Kg	0.00653	a	0.00970	a	0.00662	ac
Heptachlor	µg/Kg	0.0125	a	0.0186	a	0.0127	ac
Heptachlor epoxide	µg/Kg	0.0257	a	0.0381	a	0.0260	ac
Hexachlorobenzene	µg/Kg	0.108	a	0.159	a	0.109	ac
Lindane (gamma-BHC)	µg/Kg	0.0181	a	0.0267	a	0.0183	ac
Methoxychlor	µg/Kg	0.0285	a	0.411	a	0.0287	ac
Toxaphene	µg/Kg	0.518	a	0.767	a	0.524	ac

Notes:
Mean concentrations are reported to 3 significant figures.

a = COC not detected (below MDL) in at least one replicate; mean value was calculated using one-half of the project specific MDL for non-detected values.
b = COC concentration estimated (detected below RL but above MDL) in at least one replicate; mean value calculated using estimated value.
c = COC was not detected in either the dredge tissue replicates or in the historic reference tissue, therefore was eliminated from further evaluation.
[d] Pre-test tissue represents the mean of three replicates, whereas the reference and site composites represent a mean of 5 replicates.
[e] Analysis conducted after removal of a statistical outlier.

NS = Not Significant - mean tissue body burden was not statistically different from the associated reference site mean body burden. Statistical significance accepted at α=0.05.
S = Significant - mean tissue body burden was statistically different, greater than the associated reference site mean body burden. Statistical significance accepted at α=0.05.

BRAMS

BEST EPA Report

Project name: Yachtsman Marina, Kennebunkport, ME

Project number:

Model filename: EPA Reg 1 Template wChemical List.best

Chemical filename: Chemical_List_for_EPA_Reg1_template (in progress).xlsx

Table Of Contents

Adult Angler 1

Total Estimated Risks 1

Seafood Non-Cancer Risk 4

FDA Action Limit/Tolerance 6

Ecological Effect Level 8

FDA Level of Concern 10

Selected Chemicals 11

Macoma nasuta 11

Nereis virens 12

Human Subreport

Human: Adult Angler

Total Estimated Risks From Organics(see EPA Table Xa)

Receptor: Adult Angler

Organism: Macoma nasuta

		Cancer Risk	Non-Cancer Risk
Composite (10 Stations at		Fish Fillet	
	Test	6.01E-6	3.72E-2
	Reference	1.66E-6	1.74E-2
		Nereis virens	
	Test	0	0
	Reference	0	0
		Macoma nasuta	
	Test	6.23E-6	3.84E-2
	Reference	1.72E-6	1.8E-2
		Total Lobster	
	Test	3.1E-5	1.92E-1
	Reference	8.57E-6	9E-2

		Cancer Risk	Non-Cancer Risk
		Lobster Hepatopancreas	
	Test	2.14E-5	1.33E-1
	Reference	5.91E-6	6.21E-2
		Lobster Muscle	
	Test	9.62E-6	5.96E-2
	Reference	2.66E-6	2.79E-2

Total Estimated Risks From Organics(see EPA Table Xa)

Receptor: Adult Angler

Organism: Nereis virens

		Cancer Risk	Non-Cancer Risk
Composite (10 Stations at		Fish Fillet	
	Test	5.09E-6	8.9E-2
	Reference	1.63E-6	3.72E-2
		Nereis virens	
	Test	6.12E-6	1.08E-1
	Reference	1.97E-6	4.51E-2
		Macoma nasuta	
	Test	0	0
	Reference	0	0
		Total Lobster	
	Test	2.63E-5	4.59E-1
	Reference	8.39E-6	1.92E-1
		Lobster Hepatopancreas	
	Test	1.81E-5	3.17E-1
	Reference	5.79E-6	1.32E-1
		Lobster Muscle	
	Test	8.14E-6	1.42E-1
	Reference	2.6E-6	5.95E-2

Seafood Non-Cancer Risks (see EPA Table 6a, Columns F & G)

Receptor: Adult Angler

Organism: Macoma nasuta

			Non-Cancer Risk
Composite (10 Stations at 4 Marinas Mud)	Copper	**Test**	0
		Reference	0
	Lead	**Test**	0
		Reference	0
	Nickel	**Test**	0
		Reference	0

Seafood Non-Cancer Risks (see EPA Table 6a, Columns F & G)

Receptor: Adult Angler

Organism: Nereis virens

			Non-Cancer Risk
Composite (10 Stations at 4 Marinas Mud)	Cadmium	**Test**	2.9E-3
		Reference	2.16E-3
	Chromium	**Test**	1.57E-2
		Reference	1.96E-3
	Lead	**Test**	0
		Reference	0
	Nickel	**Test**	0
		Reference	0
	Zinc	**Test**	4.02E-3
		Reference	5.31E-3

FDA Action Limit/Tolerance (see EPA Table 3, Columns D & E)

Receptor: Adult Angler

Organism: Macoma nasuta

	Contaminant	FDA Action Level (mg/kg)	Steady State Corrected Mean Tissue Concentration (mg/kg)
Composite (10 Stations	Total PCBs	2E3	6.47E0
Composite (10 Stations	Mercury	1E0	2.08E-3
Composite (10 Stations	Total DDT	5E3	1.56E0
Composite (10 Stations	Total Chlordanes	3E2	1.53E-1

FDA Action Limit/Tolerance (see EPA Table 3, Columns D & E)

Receptor: Adult Angler

Organism: Nereis virens

	Contaminant	FDA Action Level (mg/kg)	Steady State Corrected Mean Tissue Concentration (mg/kg)
Composite (10 Stations	Total PCBs	2E3	1.42E1
Composite (10 Stations	Mercury	1E0	6.62E-3
Composite (10 Stations	Total DDT	5E3	1.36E0
Composite (10 Stations	Total Chlordanes	3E2	3.04E-1

Ecological Effects Level (see EPA Table 8a.1, Columns D & E)

Receptor: Adult Angler

Organism: Macoma nasuta

	Contaminant	Ecological Effect Level (mg/kg)	Steady State Corrected Mean Tissue Concentration (mg/kg)
Composite (10 Stations	Anthracene	3.75E3	2.69E0
Composite (10 Stations	Benzo(a)pyrene	8E3	3.47E0
Composite (10 Stations	PAH Total	1E4	8.04E1
Composite (10 Stations	Total PCBs	4E3	6.47E0
Composite (10 Stations	Aldrin	2.99E2	2.02E-2
Composite (10 Stations	Dieldrin	4.37E0	1.64E-2
Composite (10 Stations	Endosulfans	2.86E0	1.69E-2
Composite (10 Stations	Arsenic	1.26E1	2.54E0
Composite (10 Stations	Cadmium	3.03E0	2.66E-2
Composite (10 Stations	Chromium	1.18E1	4.34E-1
Composite (10 Stations	Copper	9.6E0	2.71E0
Composite (10 Stations	Lead	1.19E1	4.52E-1
Composite (10 Stations	Mercury	2E-1	2.08E-3
Composite (10 Stations	Nickel	3.8E0	5.7E-1
Composite (10 Stations	Zinc	1.52E3	1.28E1
Composite (10 Stations	Total DDT	3E3	1.56E0

Ecological Effects Level (see EPA Table 8a.1, Columns D & E)

Receptor: Adult Angler

Organism: Nereis virens

	Contaminant	Ecological Effect Level (mg/kg)	Steady State Corrected Mean Tissue Concentration (mg/kg)
Composite (10 Stations	Anthracene	3.75E3	6.1E-1
Composite (10 Stations	Benzo(a)pyrene	8E3	1.61E0
Composite (10 Stations	PAH Total	1E4	3.64E1
Composite (10 Stations	Total PCBs	4E3	1.42E1
Composite (10 Stations	Aldrin	2.99E2	4E-2
Composite (10 Stations	Dieldrin	4.37E0	3.25E-2
Composite (10 Stations	Endosulfans	2.86E0	3.33E-2
Composite (10 Stations	Arsenic	1.26E1	2.02E0
Composite (10 Stations	Cadmium	3.03E0	3.38E-2
Composite (10 Stations	Chromium	1.18E1	5.51E-1
Composite (10 Stations	Copper	9.6E0	1.12E0
Composite (10 Stations	Lead	1.19E1	1.91E-1
Composite (10 Stations	Mercury	2E-1	6.62E-3
Composite (10 Stations	Nickel	3.8E0	2.32E-1
Composite (10 Stations	Zinc	1.52E3	1.41E1
Composite (10 Stations	Total DDT	3E3	1.36E0

FDA Level of Concern (see EPA Table 7a, Columns B & D)

Receptor: Adult Angler

Organism: Macoma nasuta

	Contaminant	FDA Level of Concern(mg/kg)	Steady State Corrected Mean Tissue Concentration (mg/kg)
Composite (10 Stations	Arsenic	8.6E1	2.54E0
Composite (10 Stations	Cadmium	3.7E0	2.66E-2
Composite (10 Stations	Chromium	1.3E1	4.34E-1
Composite (10 Stations	Lead	1.7E0	4.52E-1
Composite (10 Stations	Nickel	8E1	5.7E-1

FDA Level of Concern (see EPA Table 7a, Columns B & D)

Receptor: Adult Angler

Organism: Nereis virens

	Contaminant	FDA Level of Concern(mg/kg)	Steady State Corrected Mean Tissue Concentration (mg/kg)
Composite (10 Stations	Arsenic	8.6E1	2.02E0
Composite (10 Stations	Cadmium	3.7E0	3.38E-2
Composite (10 Stations	Chromium	1.3E1	5.51E-1
Composite (10 Stations	Lead	1.7E0	1.91E-1
Composite (10 Stations	Nickel	8E1	2.32E-1

Selected Chemicals

Invertebrate Name Macoma nasuta

	Composite (10
118	X
153	X
4,4'-DDD	X
4,4'-DDE	X
Anthracene	X
Benzo(a)anthracene	X
Benzo(a)pyrene	X
Benzo(b)fluoranthene	X
Benzo(k)fluoranthene	X
Chrysene	X
Fluoranthene	X
Fluorene	X
Naphthalene	X
PAH Total	X
Phenanthrene	X
Pyrene	X
Total DDT	X
Total PCBs	X
Copper	X
Lead	X
Nickel	X

Invertebrate Name Nereis virens

	Composite (10
105	X
4,4'-DDD	X
52	X
Anthracene	X
Benzo(b)fluoranthene	X
Benzo(g,h,i)perylene	X
Benzo(k)fluoranthene	X
Chrysene	X
Fluoranthene	X
Fluorene	X
Naphthalene	X
PAH Total	X
Pyrene	X
Total DDT	X
Total PCBs	X
Cadmium	X
Chromium	X
Lead	X
Nickel	X
Zinc	X

Appendix D
Elutriate Chemistry Results

Kennebunkport River Projects			ME WQC	Elutriate Average	Q	Site Water Average	Q	Lab Water Average	Q
Parameter	CAS Number	Units							
Metals									
Arsenic	7440382	ug/L	69	3.67		1.22		0.140	U
Cadmium	7440439	ug/L	33	0.295	U	0.30	U	0.295	U
Hexavalent Chromium	18540299	ug/L	1108	1.50	U	1.50	U	1.50	U
Copper	7440508	ug/L	5.78	1.92	U	1.92	U	1.92	U
Lead	7439921	ug/L	221	1.72	U	1.72	U	1.72	U
Mercury	7439976	ug/L	2.1	0.010	U	0.010	U	0.010	U
Nickel	7440020	ug/L	75	2.78	U	2.78	U	2.78	U
Selenium	7782492	ug/L	291	0.115	*	0.065	U	0.560	U
Silver	7440224	ug/L	2.24	0.815	U	0.82	U	0.815	U
Zinc	7440666	ug/L	95	17.1	U	17.1	U	17.1	U
Industrial Chemicals									
Pentachlorophenol	87865	ug/L	13	0.290	U	0.224	U	0.222	U
Pesticides									
4,4`-DDT	50293	ug/L	0.13	0.00012	U	0.00008	U	0.00008	U
Aldrin	309002	ug/L	1.3	0.00023	U	0.00016	U	0.00016	U
Alpha-Chlordane (cis)	5103719	ug/L		0.00011	U	0.00008	U	0.00008	U
Dieldrin	60571	ug/L	0.71	0.00006	U	0.00004	U	0.00004	U
Chlorpyrifos	2921882	ug/L	0.011*	0.00011	U	0.00008	U	0.00008	U
Endosulfan I	959988	ug/L	0.034	0.00011	U	0.00008	U	0.00008	U
Endosulfan II	33213659	ug/L	0.034	0.00010	U	0.00007	U	0.00007	U
Endrin	72208	ug/L	0.037	0.00012	U	0.00008	U	0.00008	U
Gamma-Chlordane (trans)	5103742	ug/L		0.00005	U	0.00004	U	0.00004	U
Heptachlor	76448	ug/L	0.053	0.00008	U	0.00006	U	0.00006	U
Heptachlor epoxide	1024573	ug/L	0.053	0.00010	U	0.00007	U	0.00007	U
Lindane	58899	ug/L	0.16	0.00007	U	0.00005	U	0.00005	U
Toxaphene	8001352	ug/L	0.21	0.00365	U	0.00257	U	0.00257	U
Chlordane (alpha + gamma)	*SUMCHLOR*	ug/L	0.09	0.00016	U	0.00011	U	0.00011	U
PCBs									
PCB 008	34883437	ug/L		0.00010	U	0.00007	U	0.00007	U
PCB 018	37680652	ug/L		0.00013	U	0.00009	U	0.00009	U
PCB 028	7012375	ug/L		0.00013	U	0.00009	U	0.00009	U
PCB 044	41464395	ug/L		0.00008	U	0.00006	U	0.00006	U
(PCB 049)	41464408	ug/L		0.00028	J	0.00005	U	0.00005	U
PCB 052	35693993	ug/L		0.00037	J	0.00005	U	0.00005	U
PCB 066	32598100	ug/L		0.00010	U	0.00007	U	0.00007	U
(PCB 087)	38380028	ug/L		0.00013	U	0.00009	U	0.00009	U
PCB 101	37680732	ug/L		0.00016	U	0.00011	U	0.00011	U
PCB 105	32598144	ug/L		0.00011	U	0.00008	U	0.00008	U
PCB 118	31508006	ug/L		0.00009	U	0.00006	U	0.00006	U
PCB 128	38380073	ug/L		0.00011	U	0.00008	U	0.00008	U
PCB 138	35065282	ug/L		0.00008	U	0.00005	U	0.00005	U
PCB 153	35065271	ug/L		0.00009	*	0.00004	U	0.00004	U
PCB 170	35065306	ug/L		0.00012	U	0.00008	U	0.00008	U
PCB 180	35065293	ug/L		0.00010	U	0.00007	U	0.00007	U
(PCB 183)	52663691	ug/L		0.00011	U	0.00007	U	0.00007	U
(PCB 184)	74472483	ug/L		0.00010	U	0.00007	U	0.00007	U
PCB 187	52663680	ug/L		0.00007	U	0.00005	U	0.00005	U
PCB 195	52663782	ug/L		0.00006	U	0.00004	U	0.00004	U
PCB 206	40186729	ug/L		0.00013	U	0.00009	U	0.00009	U
PCB 209	2051243	ug/L		0.00006	U	0.00004	U	0.00004	U
Total PCBs	*SumNOAA18*	ug/L	0.03	0.00416		0.00243	U	0.00243	U

Notes

U: Compound was analyzed for but was not detected (non-detect)
J: Indicates an estimated value
* indicates average includes detects and non-detects
Non-detects are reported as 1/2 the MDL
Half the MDL was used for U-qualified values to calculate summary and average values
Yellow=exceedance of water quality criteria
Total PCBs were calculated using the NOAA 18 method
Total PCB WQC is for chronic exposure as no acute exposure value available

Attachment 9 – List of Authorizations Required for Project

9.0 List of Authorizations Required for Project

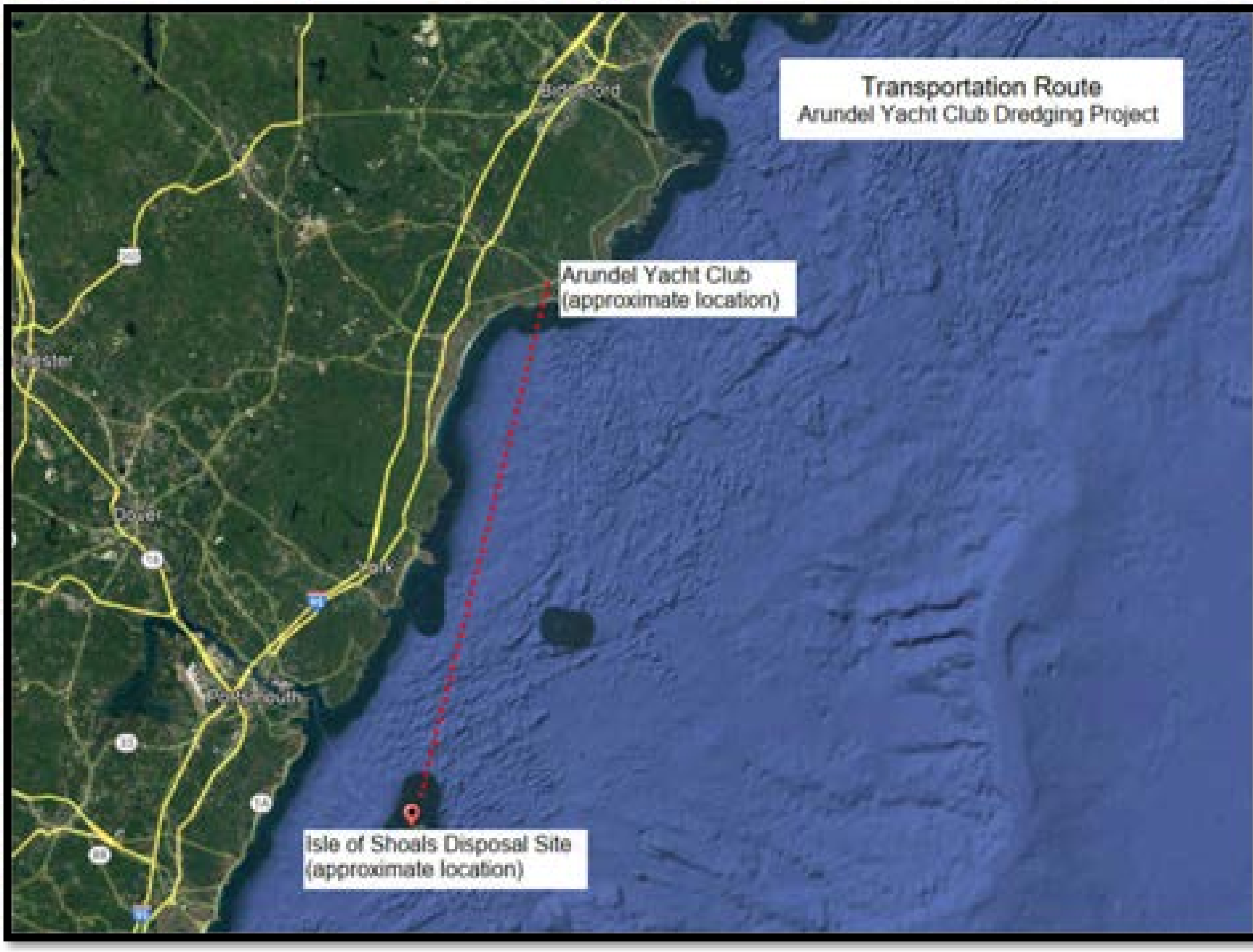
The following authorizations are required by federal, state, and local agencies to conduct the proposed dredging work at the AYC:

Authorization	Regulatory Entity	Status
Section 408	U.S. Army Corps of Engineers	Submitted on 9/6/2024
Pre-Construction Notification	U.S. Army Corps of Engineers	Application included herein
Individual NRPA Permit	Maine Department of Environmental Protection	Submitted concurrently with this Pre-Construction Notification
Kennebunk River Committee Approval	Town of Kennebunkport/Kennebunk	To be submitted in late winter/early spring 2025
Kennebunk River Harbor Master Approval	Town of Kennebunkport/Kennebunk	To be submitted in late winter/early spring 2025
Activities and Land Use Permit	Town of Kennebunkport	To be submitted following Kennebunk River Committee/ Harbor Master approval
Site Plan Review	Town of Kennebunkport	To be submitted following Kennebunk River Committee/ Harbor Master approval
Flood Hazard Development Permit	Town of Kennebunkport	To be submitted following Kennebunk River Committee/ Harbor Master approval

Water Quality Certification

The Maine Department of Environmental Protection (DEP) "has combined the decision concerning water quality certification with the review of an application for a state permit that already requires compliance with state water quality standards…the issuance of the order approving the project constitutes both the state permit and the water quality certification." The project team is filing a Maine DEP Natural Resources Protection Act (NRPA) Permit Application concurrently with this Pre-Construction Notification Application. In accordance with the statement quoted above, the NRPA Permit Approval will constitute both the state permit and the Water Quality Certification and can be provided to the USACE upon receipt.

Isle of Shoals North Disposal Site Transportation Route



Location: The Isle of Shoals North (IOSN) Disposal Site is located in the Gulf of Maine, approximately 20 km (10.8 nmi) east of Portsmouth, New Hampshire, 17.7 km (9.55 nmi) southeast of Kittery, Maine, and 11.2 km (6.04 nmi) north of Eastern Island, the closest within the Isle of Shoals. The site is defined as a 2,600 m (8,530 ft) diameter circle on the seafloor with its center located at 70° 26.995' W and 43° 1.142' N.

Route: From the Arundel Yacht Club (AYC), navigate in a southerly direction towards the mouth of the Kennebunk River, then in a southwestern direction through the Gulf of Maine to the IOSN Disposal Site. The total transportation route distance from the AYC to the IOSN Disposal Site is 23 nautical miles.

Estimated Number of Trips to IOSN: The estimated quantity of dredge material expected to be removed from the AYC is 8,031 cubic yards. It is estimated that the dredge scow that will be used to transport sediment to the IOSN Disposal Site will have between 500 and 600 cubic yards of capacity, which would result in 14 to 17 trips to the IOSN Disposal Site.

AYC Maine DEP NRPA Individual Permit Application
(Submitted on October 3, 2024)

Maine DEP
Natural Resources Protection Act (NRPA)
Permit Application

For

Arundel Yacht Club
51 Ocean Ave
Kennebunkport, Maine

October 3, 2024

Applicant
Arundel Yacht Club
51 Ocean Ave
Kennebunkport, Maine

Prepared By:

WALSH
ENGINEERING ASSOCIATES, INC.

One Karen Drive, Suite 2A
Westbrook, Maine
207.553.9898

*THIS IS A RESUBMISSION OF THE NRPA PERMIT APPLICATION PACKAGE ORIGINALLY SUBMITTED TO THE DEP ON OCTOBER 3, 2024. THIS PACKAGE HAS BEEN UPDATED TO INCLUDE NOTICE TO ABUTTERS WITHIN 1,000 FEET, INSTEAD OF 150 FEET. PLEASE SEE THE ATTACHED EMAIL CORRESPONDENCE WITH DEP ABOUT THE RESUBMISSION AND WAIVED REVIEW FEE.

DEP EMAIL CORRESPONDENCE REGARDING THE RESUBMISSION AND WAIVED REVIEW FEE

Leyna Tobey

From:	Sirois, Alison <Alison.Sirois@maine.gov>
Sent:	Friday, November 8, 2024 10:06 AM
To:	Leyna Tobey
Subject:	RE: L-19091-4E-B-N, ATS#93178 Kennebunkport - Arundel Yacht Club - NRPA Individual Permit Application

I can let our admin staff know you are withdrawing the application.

Once you have sent the notice to the additional abutters, repackage and resubmit via the online portal noting that the application is a resubmittal and the fee is being waived. You can include this email with the application.

From: Leyna Tobey <leyna@Walsh-eng.com>
Sent: Friday, November 08, 2024 8:36 AM
To: Sirois, Alison <Alison.Sirois@maine.gov>
Subject: RE: L-19091-4E-B-N, ATS#93178 Kennebunkport - Arundel Yacht Club - NRPA Individual Permit Application

EXTERNAL: This email originated from outside of the State of Maine Mail System. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hey Alison,

Thanks so much for the explanation and guidance on this! I will let the rest of the Walsh office know about the Chapter 2 rule changes as well, so we get this right moving forward.

To withdraw the application: Do I just reply to my original submission email and say that I am withdrawing the application and will resubmit with updated abutter notice documentation under a separate email? I just want to make sure I get the process right.

Thanks!

Leyna

From: Sirois, Alison <Alison.Sirois@maine.gov>
Sent: Friday, November 8, 2024 8:30 AM
To: Leyna Tobey <leyna@Walsh-eng.com>
Subject: RE: L-19091-4E-B-N, ATS#93178 Kennebunkport - Arundel Yacht Club - NRPA Individual Permit Application

Hi Leyna,

We are updating the website and removing this element from the NRPA handbook but some applications came in during this transition period. We apologize for that.

The best path forward is for you to withdraw and resubmit this application. If you do that then you only must notice the additional abutters and then submit those newly noticed with the other list of abutters you already noticed for the initial submittal. We can waive the fee for the resubmittal (obviously). We also can honor the original submittal date toward the statutory deadline. Another change you should be aware of is the fact that you do not have to notice abutters with certificate of mailing or certified mailings any longer. We just need a list of abutters notices, evidence of the date of mailing and a map and list with all abutters notified within 1000 feet.

Let me know if you have questions. I am including the new Chapter 2 rules below.

A. ***Recipients and Publication.*** *Notice must be mailed to the following:*

(1) abutters and all persons owning land within 1,000 feet of the proposed project. Use of local tax records or other reliable means is acceptable for purposes of identifying property owners requiring notice;

(2) the municipal office(s) where the proposed project is located; and

(3) the county commissioner(s) where the proposed project is located, if the proposed project is located in an unorganized or deorganized area of the State.

Notwithstanding section 13(C) of this rule, notice must also be published once in a newspaper with a general circulation in the vicinity of or as close as possible to the area where the project is located, in accordance with 1 M.R.S. § 601.

Copies of the published notice and a list of persons to whom notice was provided must be submitted with the application. Failure to submit documentation that notice was provided as required may result in a determination that the application is incomplete and not acceptable for processing.

Alison Sirois (she/her)
Regional Manager, Bureau of Land Resources
Maine Department of Environmental Protection
Phone (207)699-7028 Office (207)822-6300
www.maine.gov/dep

From: Leyna Tobey <leyna@Walsh-eng.com>
Sent: Friday, November 08, 2024 8:01 AM
To: Sirois, Alison <Alison.Sirois@maine.gov>
Subject: RE: L-19091-4E-B-N, ATS#93178 Kennebunkport - Arundel Yacht Club - NRPA Individual Permit Application

Hey Alison,

I only sent notices to the direct abutters to the property following the instructions in the NRPA application information booklet (screenshotted below). I didn't notice that the Chapter 2 rules were updated, but can get the additional abutters notices sent out today. Should I wait to submit proof of notification to the Department until the project is assigned a Manager?

Thanks!

Leyna

08/2024

PUBLIC NOTICE FILING AND CERTIFICATION

Department Rules, Chapter 2, require an applicant to provide public notice for all Tier 2, Tier 3 and individual Natural Resources Protect Act projects. In the notice, the applicant must describe the proposed activity and where it is located. **"Abutter"** for the purposes of the notice provision means any person who owns property that is BOTH (1) adjoining and (2) within one mile of the delineated project boundary, including owners of property directly across a public or private right of way.

1. **Newspaper:** You must publish the Notice of Intent to File in a newspaper circulated in the area where the activity is located. The notice must appear in the newspaper within 30 days prior to the filing of the application with the Department. You may use the attached Notice of Intent to File form, or one containing identical information, for newspaper publication and certified mailing.
2. **Abutting Property Owners:** You must send a copy of the Notice of Intent to File by certified mail to the owners of the property abutting the activity. Their names and addresses can be obtained from the town tax maps or local officials. They must receive notice within 30 days prior to the filing of the application with the Department.
3. **Municipal Office:** You must send a copy of the Notice of Intent to File and a **duplicate of the entire application** to the Municipal Office.

ATTACH a list of the names and addresses of the owners of abutting property.

From: Sirois, Alison <Alison.Sirois@maine.gov>
Sent: Thursday, November 7, 2024 3:30 PM
To: Leyna Tobey <leyna@Walsh-eng.com>
Subject: RE: L-19091-4E-B-N, ATS#93178 Kennebunkport - Arundel Yacht Club - NRPA Individual Permit Application

Hi Leyna,

Did you notice all abutters within 1000 feet of the project site pursuant to the Chapter 2 rules for this application? This change went into effect on September 15th, 2024.

Alison Sirois (she/her)
Regional Manager, Bureau of Land Resources
Maine Department of Environmental Protection
Phone (207)699-7028 Office (207)822-6300
www.maine.gov/dep

From: Leyna Tobey <leyna@Walsh-eng.com>
Sent: Thursday, October 03, 2024 11:41 AM
To: DEP, Land Application <DEP.LandApplication@maine.gov>
Cc: Bill Walsh <bill@Walsh-eng.com>; Werner Gilliam <werner@Walsh-eng.com>; Matt Tuller <matt@atlanticcomfort.com>; Costas Balomenos <fredandoakie@gmail.com>
Subject: L-19091-4E-B-N, ATS#93178 Kennebunkport - Arundel Yacht Club - NRPA Individual Permit Application

Good morning,

On behalf of the Arundel Yacht Club (AYC), Walsh Engineering Associates, Inc. is submitting the attached NRPA Individual Permit Application for proposed dredging activities at the AYC's property at 51 Ocean Avenue in Kennebunkport, ME.

The attached PDF includes the NRPA Application form, proof of processing/licensing payment on the DEP's Payment Portal, and Attachments 1 through 13. Due to file size, Attachments 14 through 16 and Appendices A through D were not included in this email. Our team will await correspondence from the assigned DEP project manager to submit the remainder of the application.

Please let us know if you have any questions. Thanks in advance for your time!

Leyna

Leyna Tobey, PE*
Project Manager | Civil Engineer
*Licensed in MA

WALSH
ENGINEERING ASSOCIATES, INC.

One Karen Drive, Suite 2A
Westbrook, ME 04092
P: (207) 553-9898, Ext 105
www.walsh-eng.com

WALSH
ENGINEERING ASSOCIATES, INC.

October 3, 2024

Maine Department of Environmental Protection
312 Canco Road
Portland, Maine 04103

RE: Individual NRPA Permit Application
Arundel Yacht Club
Kennebunkport, Maine 04046

To Whom it May Concern,

On behalf of the Arundel Yacht Club (AYC, Applicant), Walsh Engineering Associates, Inc. (WEA), is pleased to submit the enclosed Natural Resources Protection Act (NRPA) application for the proposed dredging activities to take place in the Kennebunk River located adjacent to the AYC.

The AYC is located at 51 Ocean Ave in Kennebunkport, Maine, with 161 feet of frontage along the Kennebunk River. The Town of Kennebunkport Assessor's Office identifies the parcel as Map 10, Block 5, Lot 1 The facility is a 0.42-acre parcel of land with an 18,100 square foot 1.5-story shingled historical building known as the "Thomas Goodwin Rope Walk," which is now used as the AYC. The property maintains associated parking areas and fifty boat slips. The proposed dredge area is coincidental with the area that was previously permitted under Maine DEP Permit #L-22701-4E-A-N in 2006. Since that time, it has been dredged in August 2015 under Maine DEP's Permit by Rule (PBR) process and U.S. Army Corps of Engineers (USACE) Permit #NAE-2006-26, and once more in January 2017 under another PBR.

A copy of this application has been sent to the USACE Maine Project Office, as well as the Town of Kennebunkport Planning & Code Enforcement Department. WEA has notified the applicable abutting parties of the proposed development and has provided the notice of intent to file to the *Portland Press Herald* for publication. On behalf of the applicant, thank you in advance for your review of this application. We look forward to working with you and the department to make this project successful.

Respectfully,

Leyna L Tobey

Leyna Tobey, PE – Project Manager
Walsh Engineering Associates, Inc.

cc. AYC
Enc. NRPA Application & Supporting Documents

Table of Contents
Maine DEP – NRPA Application
Arundel Yacht Club
Kennebunkport, ME 04046

NRPA Permit Application
Proof of Payment
Agent Authorization
Certificate of Good Standing
Deed/Right/Title/Interest

Activities Description... Attachment 1
Alternatives Analysis... Attachment 2
Site Location Map... Attachment 3
Photo Log... Attachment 4
Site Plan... Attachment 5
Additional Plan (Section Views) .... Attachment 6
Construction Plan... Attachment 7
Erosion and Sedimentation Control Plan.................................. Attachment 8
Site Conditions Report .... Attachment 9
Notice of Intent to File ....Attachment 10
Historic Sites ....Attachment 11
Functional Assessment...Attachment 12
Wetland Compensation Plan ....Attachment 13
Sampling and Analysis Plan ....Attachment 14
Disposal Site Transportation Route ....Attachment 15
Notice to Fisherman...Attachment 16

<u>Appendices</u>

MDEP Visual Evaluation Field Survey Checklist .... Appendix A
MDEP Coastal Wetland Field Survey Checklist ....Appendix B
Supplemental Information for Dredging Activities ....Appendix C
Sediment Sampling Results .... Appendix D

Department of Environmental Protection
Bureau of Land & Water Quality
17 State House Station
Augusta, Maine 04333
Telephone: 207-287-7688

FOR DEP USE
ATS #
L-
Total Fees:
Date: Received

APPLICATION FOR A NATURAL RESOURCES PROTECTION ACT PERMIT

➔PLEASE TYPE OR PRINT IN *BLACK INK ONLY*

1. Name of Applicant:	Arundel Yacht Club c/o Matthew Tuller	**5. Name of Agent:**	Walsh Engineering Associates, LLC
2. Applicant's Mailing Address:	PO Box 328 Kennebunkport, Maine 04046	**6. Agent's Mailing Address:**	One Karen Drive, Suite 2A Westbrook, Maine 04092
3. Applicant's Daytime Phone #:		**7. Agent's Daytime Phone #:**	207.553.9898
4. Applicant's Email Address (Required from *either* applicant or agent):	matt@atlanticcomfort.com	**8. Agent's Email Address:**	Leyna@walsh-eng.com

9. Location of Activity: (Nearest Road, Street, Rt.#)	51 Ocean Ave	**10. Town:**	Kennebunkport	**11. County:**	York

12. Type of Resource: (Check all that apply)	❑ River, stream or brook ❑ Great Pond ■ Coastal Wetland ❑ Freshwater Wetland ❑ Wetland Special Significance ❑ Significant Wildlife Habitat ❑ Fragile Mountain	**13. Name of Resource:**	Kennebunk River
		14. Amount of Impact: (Sq.Ft.) 45,356+- Sq Ft (Dredge Area)	**Fill:** 0 **Dredging/Veg Removal/Other:** 8,031 cy dredging (includes bulking factor)

		FOR FRESHWATER WETLANDS		
15. Type of Wetland: (Check all that apply)		*Tier 1*	*Tier 2*	*Tier 3*
	❑ Forested ❑ Scrub Shrub ❑ Emergent ❑ Wet Meadow ❑ Peatland ■ Open Water ❑ Other__________	❑ 0 - 4,999 sq ft. ❑ 5,000-9,999 sq ft ❑ 10,000-14,999 sq ft	❑ 15,000 – 43,560 sq. ft.	❑ > 43,560 sq. ft. or ❑ smaller than 43,560 sq. ft., not eligible for Tier 1

16. Brief Activity Description:	Dredging of the river at the Arundel Yacht Club to provide adequate depth for navigation
17. Size of Lot or Parcel & UTM Locations:	❑ ______square feet, or ☑ 0.42 acres UTM Northing: 4801636.13 m N UTM Easting: 19 T 380382.60 m E
18. Title, Right or Interest:	■ own ❑ lease ❑ purchase option ❑ written agreement

19. Deed Reference Numbers:	Book#: 2324	Page: 326	**20. Map and Lot Numbers:**	Map #: Map 10 / Lot #: Block 5, Lot 1

21. DEP Staff Previously Contacted:	Alison Sirois Alex Groblewski	**22. Part of a larger project:**	❑ Yes ■ No	**After-the-Fact:**	❑ Yes ■ No
23. Resubmission of Application?:	■ Yes➔ ❑ No	**If yes, previous application #**	L-22701-4E-A-N	**Previous project manager:**	Alison Sirois
24. Written Notice of Violation?:	❑ Yes ➔ ■ No	**If yes, name of DEP enforcement staff involved:**		**25. Previous Wetland Alteration:**	❑ Yes ■ No

26. Detailed Directions to the Project Site:	From Portland, take I-95 South; Exit 32, Route ME-111, then onto Precourt Street; turn right onto US-1 South, then left onto Log Cabin Road; left onto Maine Street; right onto ME-9; then 2nd left onto Ocean Ave.

27. TIER 1	**TIER 2/3 AND INDIVIDUAL PERMITS**	
❒ Title, right or interest documentation ❒ Topographic Map ❒ Narrative Project Description ❒ Plan or Drawing (8 1/2" x 11") ❒ Photos of Area ❒ Statement of Avoidance & Minimization ❒ Statement/Copy of cover letter to MHPC	■ Title, right or interest documentation ■ Topographic Map ■ Copy of Public Notice/Public Information Meeting Documentation ❒ Wetlands Delineation Report (Attachment 1) that contains the Information listed under Site Conditions ■ Alternatives Analysis (Attachment 2) including description of how wetland impacts were Avoided/Minimized	■ Erosion Control/Construction Plan ■ Functional Assessment (Attachment 3), if required ■ Compensation Plan (Attachment 4), if required ■ Appendix A and others, if required ■ Statement/Copy of cover letter to MHPC ❒ Description of Previously Mined Peatland, if required

28. FEES Amount Enclosed:	Proof of Payment on DEP's Online Payment Portal Attached

CERTIFICATIONS AND SIGNATURES LOCATED ON PAGE 2

<u>IMPORTANT</u>: IF THE SIGNATURE BELOW IS NOT THE APPLICANT'S SIGNATURE, ATTACH LETTER OF AGENT AUTHORIZATION SIGNED BY THE APPLICANT.

By signing below the applicant (or authorized agent), certifies that he or she has read and understood the following :

DEP SIGNATORY REQUIREMENT

PRIVACY ACT STATEMENT

Authority: 33 USC 401, Section 10; 1413, Section 404. Principal Purpose: These laws require permits authorizing activities in or affecting navigable waters of the United States, the discharge of dredged or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. Disclosure: Disclosure of requested information is voluntary. If information is not provided, however, the permit application cannot be processed nor a permit be issued.

CORPS SIGNATORY REQUIREMENT

USC Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry shall be fines not more than $10,000 or imprisoned not more than five years or both. I authorize the Corps to enter the property that is subject to this application, at reasonable hours, including buildings, structures or conveyances on the property, to determine the accuracy of any information provided herein.

DEP SIGNATORY REQUIREMENT

"I certify under penalty of law that I have personally examined the information submitted in this document and all attachments thereto and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the information is true, accurate, and complete. I authorize the Department to enter the property that is the subject of this application, at reasonable hours, including buildings, structures or conveyances on the property, to determine the accuracy of any information provided herein. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Further, I hereby authorize the DEP to send me an electronically signed decision on the license I am applying for with this application by emailing the decision to the address located on the front page of this application (see #4 for the applicant and #8 for the agent)."

Leyna L Tobey

Digitally signed by Leyna Tobey, PE
Contact Info: leyna@walsh-eng.com
Date: 2024.10.03 10:01:39-04'00'

SIGNATURE OF AGENT/APPLICANT

Date: 10/3/2024

NOTE: Any changes in activity plans must be submitted to the DEP and the Corps in writing and must be approved by both agencies prior to implementation. Failure to do so may result in enforcement action and/or the removal of the unapproved changes to the activity.

State of Maine DEP Payment Receipt

Contact Informa Leyna Tobey - 1 Karen Drive, Suite 2A, Westbrook, ME, 04092

(207) 553-9898

leyna@walsh-eng.com

Product	Reference Number	Customer Number	Payment Amount	Comments
Natural Resources Protection Act (Individual Permit)	New Application		$651.00	Arundel Yacht Club Dredging NRPA Individual Permit Code: 4E - other activity on a Coastal Wetland Processing Fee: $521; Licensing Fee: $130;

Receipt ID: 7520

Transaction Date: 10/3/2024 10:22:55 AM

Transaction Summary	
Payment	$651.00
Service Fee	$2.00
Total	**$653.00**

Thank you for your successful transaction.

If you have questions or concerns, please call (207) 287-7688

or Email: Payments.DEP@maine.gov

Print

WALSH

ENGINEERING ASSOCIATES, INC.

To Whom It May Concern,

By this letter, the undersigned, a representative of the Arundel Yacht Club authorizes Walsh Engineering Associates, Inc. to act as the agent for the undersigned in the preparation and submission of all Federal, State, and Local City permit applications and relevant documents and correspondence for all necessary permits for the dredging of the AYC Marina located at 51 Ocean Ave, Kennebunkport, Maine; to attend meetings and site visits; to appear before all boards, commissions, and committees, and to provide such other services as are necessary and appropriate in furtherance of the aforementioned project.

Sincerely,

[signature]

Signature

Anita O. Carroll AYC Vice Commodore

Printed Name and Title

1/27/2022

Date

Information Summary

Subscriber activity report

This record contains information from the CEC database and is accurate as of: Thu Feb 24 2022 12:58:37. Please print or save for your records.

Legal Name	Charter Number	Filing Type	Status
ARUNDEL YACHT CLUB	19570017ND	NONPROFIT CORPORATION (T13-B)	GOOD STANDING

Filing Date	Expiration Date	Jurisdiction
05/23/1957	N/A	MAINE

Other Names	(A=Assumed ; F=Former)
NONE	

Clerk/Registered Agent

DURWARD W. PARKINSON
C/O BERGEN & PARKINSON, LLC
62 PORTLAND ROAD, SUITE 25
KENNEBUNK, ME 04043

 04451

Know All Men by These Presents, that

The, ARUNDEL YACHT CLUB OF KENNEBUNKPORT, Maine, a Maine Corporation duly organized by law and having its established place of business in the Town of Kennebunkport, County of York and State of Maine,

in consideration of ***SIXTY-EIGHT THOUSAND ($68,000.00)*** dollars, paid by The Ocean National Bank of Kennebunk, a national banking association and corporation established under the laws of The United States at Kennebunk, in the County of York, and State of Maine, the receipt whereof is hereby acknowledged, do hereby give, grant, bargain, sell and convey unto the said The Ocean National Bank of Kennebunk, its successors and assigns forever a certain lot or parcel of land with all buildings or other structures thereon now owned by the Grantor and commonly known as the "Ropewalk", situated in Kennebunkport, County of York and State of Maine, on the westerly side of Ocean Avenue (formerly known as Water Street and formerly known as River Road), bounded and described as follows:

BEGINNING at a point marked by a one (1) inch iron pipe driven in the ground on the southwesterly side of said Ocean Avenue, said iron pipe being located thirty-six and forty-nine hundredths (36.49) feet southwesterly from the center of a hydrant located near the northeasterly sideline of said Ocean Avenue, said iron pipe also being located seventy-five and twenty-five hundredths (75.25) feet northerly from the center of a U.S. Army Corps of Engineers "flagpole", situated on land of George W. Day, et al, said iron pipe also being one hundred sixty-five and fifty hundredths (165.50) feet southeasterly, as measured along said Ocean Avenue from another one (1) inch iron pipe driven in the ground on the southwesterly side of said Avenue at the northerly corner of the premises herein described; thence South 61° 33' 29" West by said Day land to the channel of the Kennebunk River; thence North bounding westerly by the channel of said River to land now or formerly of Marian B. Cox; thence North 59° 18' 49" East by said Cox land to said Ocean Avenue, which point is marked by a one (1) inch iron pipe driven into the ground, said iron pipe being located sixty-eight and five hundredths (68.05) feet southeasterly from the norhterly corner of the main building standing on said Cox land and also being thirty-five and twelve hundredths (35.12) feet easterly from the easterly corner of said building standing on said Cox land and also being sixty-eight and sixty-three hundredths (68.33) feet easterly from the southerly corner of said building standing on said Cox land; thence southeasterly by said Ocean Avenue, one hundred sixty-five and fifty hundredths (165.50) feet to the point of beginning.

Together with all its right, title and interest in and to the land under said Ocean Avenue to the center line thereof, and also together with all its right, title and interest in and to that portion of the bed of Kennebunk River between high and low water mark covered by the above description, subject to all rights of navigation and other rights of the public in riparian lands on tide water, as now owned by the Grantor.

The above described premises are conveyed subject to any existing easements for the maintenance of drainage of other pipe lines crossing the same and any other easements or servitudes of record insofar as any of the same may now be in force and effect.

Reference may be had to a plan entitled "Plan Showing Land of the Arundel Yacht Club of Kennebunkport, Maine" drawn by Thomas J. Ober, Surveyor, November 2, 1964 and duly recorded in the York County Registry of Deeds, Plan Book 40, Page 5, said plan gives the bearing of the southwesterly side of said Ocean Avenue as North 30° 41' 11" West, true meridian and the courses herein given are calculated from it. the above described premises are conveyed subject to such additional agreements as were set forth in a certain exchange of quit-claim deeds by and between the within Grantor and Marian B. Cox both dated December 14, 1964 and duly recorded in said York Registry of Deeds, Book 1633, Pages 10 and 73.

Further reference may also be had to another exchange of quit-claim deeds by and between the within Grantor and George W. Day, et al duly recorded in said York Registry, Book 1633, Pages 248 and 251.

The within Grantor traces title to the above described premises under deed from Julia B. Fuller dated February 28, 1962 and recorded in said York Registry, Book 1484, Page 32.

The above described premises are conveyed subject to the conditions, covenants and restrictions set forth in said deed from Julia B. Fuller to the within Grantor as aforesaid.

To Have and to Hold the aforegranted and bargained premises, with all the privileges and appurtenances thereof, to the said The Ocean National Bank of Kennebunk, its successors and assigns forever, to its and their use and behoof forever. And it for itself and its heirs, executors, administrators, successors and assigns do covenant with the said Grantee, its successors and assigns, that it is lawfully seized in fee of the granted premises; that they are free from all incumbrances; that it has have good right to sell and convey the same to said Grantee to hold as aforesaid; and that it and its heirs, successors and assigns shall and will Warrant and Defend the same to the said Grantee, its successors and assigns forever, against the lawful claims and demands of all persons.

Together with all heating furnaces and boilers, oil burners and attachments thereto, heaters, water tanks, mantels, gas and electric light fixtures, screens, storm doors and windows, screen doors, window shades, awnings, and all other fixtures of whatever kind or nature at present contained in said buildings and hereinafter placed therein prior to the full payment and discharge of this mortgage, which are hereby agreed to be a part of the mortgaged real estate.

And it does covenant and agree with the Grantee herein that it will not suffer or commit any strip or waste of the above granted premises.

Provided Nevertheless, That if the said Grantor, its heirs, executors or administrators, successors and assigns shall pay to the said Grantee, its successors or assigns, the sum of ***SIXTY-EIGHT THOUSAND*** dollars, from the date hereof, with interest on said sum at the rate of 9% per centum per annum, payable until said note mentioned herein, is fully paid, and shall pay all taxes and other assessments laid upon said property, promptly when due, and shall at all times keep said buildings insured, payable to said Grantee, to the extent of the claim hereby secured, and shall repay to said Grantee its successors or assigns, all sums it or they may pay for taxes, water and sewer charges, discharge of liens, assessments, insurance, including insurance under the Provisions of the Flood Disaster Protection Act of 1973, reasonable repairs and improvements upon said premises, and all expenses, if any are incurred, of foreclosure of this mortgage, with interest on said sums as aforesaid, then this deed, as also one certain promissory note bearing even date with these presents, given by the said Grantor to the said Grantee, to pay the said sum of $ 68,000.00 and interest at the time aforesaid, shall both be void, otherwise shall remain in full force.

Provided, further, that it is an additional covenant of the Grantor herein for breach of which foreclosure may be claimed and for breach of which all indebtedness secured hereby may be declared due and payable at once, that title to the within described mortgaged premises shall not pass from Grantor or from any subsequent title holders, either voluntarily or involuntarily. This covenant shall continue until all indebtedness and obligations secured hereby are satisfied, or permission given, or election not to foreclose or accelerate said indebtedness by Grantee, its successors or assigns. Failure of Grantee to make such election as to any one such transfer, shall not constitute a waiver of any rights of Grantee, its successors or assigns, as to any subsequent such transfer of title as to which this covenant shall remain in full force and effect. The term title as used herein shall mean the estate of the Grantor subject to the lien of this mortgage.

Provided, further, that if the Grantor herein is a corporation, the Grantee, its successors and assigns, shall have the Statutory Power of Sale in addition to any other remedies for breach of any covenant, condition or agreement herein contained.

In Witness Whereof, it, the said Arundel Yacht Club of Kennebunkport, Maine, has caused this instrument to be sealed with its corporate seal and signed in its corporate name by David C. Richardson, Commodore, ~~xxxxxxxxxxxxxxx~~ and Stephen I. Harriman, Treasurer, thereunto duly authorized,

~~joining herein as Grantor for the consideration aforesaid to bar right by descent and all other rights and relinquishment of all rights in the above described premises~~ ~~have hereunto set~~ this twentieth day of March, in the year of our Lord one thousand nine hundred and seventy-eight.

Signed and Sealed in the presence of

ARUNDEL YACHT CLUB OF KENNEBUNKPORT, MAINE

By: [signature] Commodore

By: [signature] Treasurer

State of Maine

YORK, SS. March 20, 1978

Personally appeared the above named David C. Richardson, Commodore and Stephen ~~xxxxxxxxx~~ I. Harriman, ~~xxxxxxxxxxxxxxxxxxxxxxxxxxxx~~ Treasurer and acknowledged the above ~~xxxxx~~ instrument to be their free act and deed, in their said capacities and the free act and deed of said corporation.

[signature]
Notary Public
My Commission Expires March 25, 1984

York, ss.
Received MAR 20 1978 at 3 h 05 m P M
and recorded from the original

Attachment 1:

Activities Description

1.0 Activities Description

The Arundel Yacht Club (AYC) is located at 51 Ocean Avenue in Kennebunkport, Maine, with 161 feet of frontage along the Kennebunk River. The Town of Kennebunkport's Assessor's Office identifies the parcel as Map 10, Block 5 Lot 1. The facility is a 0.42-acre parcel of land with an 18,100 square foot 1.5-story shingled historical building known as the "Thomas Goodwin Rope Walk," which is now used as the yacht club. The property maintains associated parking areas and 50 boat slips.

Existing Conditions

The AYC is located approximately 0.75-mile from the mouth of the Kennebunk River. The Kennebunk River flows generally southeast, past the towns of Lyman, Arundel, Kennebunk, and Kennebunkport. It enters the Atlantic Ocean in Kennebunkport, approximately 0.5-mile downstream from the town center. The surrounding area, with its high density of marinas and other waterfront uses, has an extensive history of dredging. The AYC's dredging activities date back to the 1970s, with the most recent permits issued for maintenance dredging in 2017. Silt, sand, and other natural deposits have impacted the marina of the AYC and have limited boat navigation and berthing depths, especially during periods of low tide.

Proposed Project

The applicant is proposing to mechanically dredge approximately 8,031± cubic yards of sediment from the area in front of the AYC, including in and around the boat slips, to provide adequate depth for navigation and berthing.

The area of the dredge will be an approximately 180-foot by 250-foot area (~45,356 square feet). The proposed dredge depth will be to elevation -6.0 feet mean low water, with about one foot of over-dig. It is anticipated that dredging will coincide with neighboring marinas performing dredging at the same approximate time (see "Adjacent Dredging Projects" section below). The material will be transported by barge to the Isle of Shoals North Disposal Site (IOSN). The IOSN is located approximately 15 nautical miles east of Portsmouth, New Hampshire, in the Gulf of Maine.

The proposed AYC dredge area is coincidental with the area that was previously permitted under Maine Department of Environmental Protection (DEP) Permit #L-22701-4E-A-N in 2006. Since that time, it has been dredged in August 2015 under Maine DEP's Permit by Rule (PBR) and U.S. Army Corps of Engineers (USACE) Permit #NAE-2006-26, and in January 2017 under Maine DEP's PBR.

Given the timing for receiving permit approvals from Maine DEP and USACE, WEA anticipates that the work will occur during the winter 2025-2026 dredge window.

Adjacent Dredging Projects

The dredging of the AYC will coincide with similar dredging work at three adjacent marinas on the Kennebunk River, including the Yachtsman Marina, the Kennebunkport Marina, and the Kennebunk River Club.

Attachment 2:

Alternative Analysis

2.0 Alternatives Analysis

Dredging Alternatives Analysis

WEA studied several alternatives for the Arundel Yacht Club (AYC) dredging project, all evaluated against its purpose and need. The project's purpose is to dredge and dispose of dredged material from the site in an efficient, environmentally cautious, and effective manner; the project's need is to provide the AYC with safe navigation and anchoring conditions for watercraft.

The existing conditions and dredging alternatives analysis are described in the following narrative:

Existing Conditions
The AYC (site) encompasses approximately 0.42 acres of land. The Arundel Wharf, Ocean Avenue and a residence border the site to the north; residences and Ocean Avenue border the site to the east; the Yachtsman Hotel & Marina Club are located south of the property; and the Kennebunk River borders the property to the west.

Alternative 1 – No Action
WEA investigated the possibility of not dredging, however, the project's purpose is to provide effective navigation for watercraft and boat slips at the AYC. If Alternative 1 is utilized, the club members and guest mariners will not be able to safely navigate to the boat slips. The area would continue to fill in with sediment and eventually the mooring and docking space would become unusable. Alternative 1 is not practicable as it would eventually force the AYC to close due to unsafe navigation and does not satisfy the project need.

Alternative 2 – Reduced Dredge
WEA investigated the option of dredging 50% less than the proposed amount of 8,031 cubic yards. Though there may be a slight environmental benefit to dredging less (a smaller area would be disturbed and the length of dredging activities would be reduced), the dredged area would quickly fill in again within a few years, requiring the area to be dredged again sooner than if the area was dredged to elevation -6.0 feet. Again, this would not allow the club members and others to navigate or use the docks in a safe manner. Alternative 2 would not advance the project's need.

Alternative 3 – Full Dredge
WEA investigated the option of fully dredging the marina to the proposed elevation of -6.0 feet mean low water, totaling 8,031 cubic yards of dredge material. The dredging will provide adequate sediment removal for boat owners to navigate safely for 6-8 years at the current rate of sedimentation, and therefore has been selected as the most appropriate alternative for this project to meet the project's purpose and need.

Selection
Given the information above, Alternative 3 was selected as the most appropriate alternative for the project. This alternative will provide the maximum efficiency of dredging and will optimize the time between necessary dredging events.

Dredge Material Disposal Alternatives Analysis

The USACE approved a Sampling and Analysis Plan (SAP) for the project on May 24, 2022, which provided proposed sediment sampling locations, methods, and testing criteria to determine disposal suitability. The sampling results were submitted to the USACE for the AYC and the nearby Yachtsman Marina, Kennebunkport Marina, and Kennebunk River Club. The USACE issued a Suitability Determination for all 4 sites on June 10, 2024, which documents the suitability of the dredged material for disposal at the Isle of Shoals North (IOSN) open water disposal site.

It is WEA's understanding that the USACE requires General Permit applicants to conduct an alternatives analysis to evaluate options for disposal of dredged material. In order of disposal method preference, the USACE favors onshore disposal, followed by beneficial use, and then open water placement.

The dredge material disposal alternatives analysis is described in the following narrative:

Alternative A – Onshore Disposal

Onshore Disposal – Storage of Material at the AYC

WEA investigated the option of onshore disposal of the 8,031 cubic yards of dredged materials from the AYC. The AYC encompasses approximately 0.42 acres of land, as shown in the aerial site map attached to this Alternatives Analysis as Figure 1. Due to the small size of the AYC lot, there is minimal space available to conduct onshore disposal operations at the site.

Logistically, to conduct onshore disposal of the dredged material, the following steps would need to be taken:

- Use barge-mounted dredging equipment to dredge sediment.
- Place the dredged material onshore into a stockpile or a large container from the dredge barge.
    - As shown in the attached aerial site map, the largest area available for a stockpile of dredged materials is located within a 23-foot by 23-foot grassed area east of the AYC building. If a 4-foot walkway is kept clear around the stockpile, the allowable diameter of the stockpile would be 15 feet (therefore the allowable radius would be 7.5 feet). Using the following standard soil stockpile volume equation, the required height of a 8,031 cubic yard (216,837 cubic feet) stockpile would need to be 3,681 feet tall, which is infeasible.
        - $Volume = \frac{1}{3} \times \pi \times Radius^2 \times Height \rightarrow$
        - $Height = Volume \times 3 \times \frac{1}{\pi} \times \frac{1}{Radius^2} \rightarrow$
        - $Height = 216{,}837 ft^3 \times 3 \times \frac{1}{\pi} \times \frac{1}{(7.5ft)^2} = 3{,}681\ ft$
    - In addition, this step is infeasible due to the layout of the AYC's dock/boat slips; the closest a dredge barge could get to the "open space" located to the east of the AYC building is at least 90 feet away, requiring the dredging equipment to have a very large reach.
- Give the dredged sediment appropriate time to dewater.

- Load dried dredged sediment into dump trucks or roll-off containers and haul offsite to a final disposal location.
    - Dump trucks have an approximately 20 cubic yard capacity and roll-off containers have a maximum capacity of 40 cubic yards. With these capacities, the hauling and disposal of the dried dredged sediment would require approximately 402 or 201 truckloads, respectively. The hauling of sediment would be infeasible due to major increases in project duration and costs.
    - In addition, because the proposed and allowable dredging window occurs during winter, local roadways will be posted for heavy truck traffic, which would likely require hauling vehicles to reduce the quantity of sediment they can transport at once.

As documented above, onshore disposal of dredged sediment using the AYC site is infeasible due to site constraints and sediment hauling duration/costs. As mentioned, an aerial map of the site is included as Figure 1 to this Alternatives Analysis for reference.

Onshore Disposal – Storage of Material at Alternative Locations on the Kennebunk River
The proposed dredge volume for the Arundel Yacht Club is 8,031 cubic yards, or 216,837 cubic feet. Area estimates for storing the dredged material in a stockpile or in roll-off dumpsters for dewatering are described below. Dewatering the dredged sediment could take anywhere from a couple days to a couple weeks.

<u>Storage via Stockpile</u>
It is assumed that acceptable side slopes for a stockpile of wet, silty sediment would be between 4:1 and 5:1 (horizontal to vertical), and an acceptable stockpile height would be between 20 and 25 feet. Using these criteria and the estimated dredge volume of 216,837 cubic feet, the diameter of the stockpile needed to store the dredged material would be approximately 200 feet. It is assumed that around 20 feet of additional space would be required around the perimeter of the stockpile for erosion and sedimentation controls, dewatering materials, and equipment access, increasing the diameter of the storage area to 240 feet. Figure 2, included with this Alternatives Analysis, shows what a 240-foot diameter stockpile would look like on nearby facilities with open space along the Kennebunk River; there are no facilities with adequate space to accommodate the stockpile storage area. In addition, the AYC does not have control or interest in any of the nearby facilities along the Kennebunk River shown in Figure 2.

<u>Storage via Roll-Off Dumpster</u>
The largest readily available roll-off dumpster size is 40 cubic yards. It is assumed that wet sediment dumped into a roll-off dumpster to dewater would contain about 20-percent water, which would reduce the soil capacity in the dumpster to 32 cubic yards. With this assumption, it would require 251 dumpsters to store 8,031 cubic yards of sediment. Each roll-off dumpster is 22 feet long by 7.5 feet wide; adding a 5-foot walking area around the roll-off would increase the footprint of each roll-off to 27 feet by 12.5 feet, or 337.5 square feet. The total space required for 251 roll-off dumpsters would be approximately 84,715 square feet. Figure 3, included with this Alternatives Analysis, shows what an 84,715 square foot roll-off dumpster storage area would look like on nearby facilities with open space along the Kennebunk River; there are no facilities with adequate

space to accommodate the roll-off storage area. In addition, the AYC does not have control or interest in any of the nearby facilities along the Kennebunk River shown in Figure 3.

Onshore Disposal – Disposal Location Alternatives

As stated above, it is infeasible to get the dredged material onshore for dewatering and subsequent hauling to a disposal location at the AYC and other nearby facilities along the Kennebunk River. As a result, the following onshore disposal location alternatives are also considered infeasible:

- Landfill
    - This alternative is also infeasible due to the estimated cost to dispose of the material at a landfill. Tipping and hauling fees for material disposal would likely be between $75 and $100 per cubic yard, totaling around $600,000 to $800,000 for disposal of 8,031 cubic yards of material.
    - The Juniper Ridge Landfill in Alton/Old Town, Maine and the Waste Management Crossroads Landfill in Norridgewock, Maine currently do not have sufficient capacity to accommodate the dredge materials and the increase in daily traffic to dispose of the dredge materials. The Waste Management Turnkey Landfill in Rochester, NH could accommodate the materials, however, as documented above, this option is both infeasible due to inability to get the dredge material upland, and cost prohibitive.
- Well injection
    - The Environmental Protection Agency's "General Information About Injection Wells" webpage states that injected fluids may include "water, wastewater, brine (salt water), or water mixed with chemicals." The dredged materials will consist of silty sediment and therefore well injection is not a feasible disposal alternative.
    - In addition, the Maine Department of Environmental Protection's Underground Injection Control (UIC) Program webpage states that Class I, II, III, and IV injections wells are prohibited in Maine.
- Incineration
    - This alternative is also infeasible due to the estimated cost to incinerate soils. Hauling and incineration fees would likely be around $700 per cubic yard, totaling around $5.6M for the incineration of 8,031 cubic yards of material. (Source: Federal Remediation Technologies Roundtable Screening Matrix and Reference Guide, Version 4.0, Section 4.22 Incineration.) In addition, it appears that the closest soil incineration facilities to the AYC are in Illinois or Arkansas.
- Spread of material over open ground
    - This alternative is also infeasible because the AYC does not have access to a land area appropriate for spreading the material over open ground. Spreading 216,837 cubic feet of soil across a land area would consist of: 1 foot of sediment spread across a 216,837 square foot (~5 acre) land area; or 6 inches of sediment spread across a 433,674 square foot (~10 acre) land area.
- Additional biological, chemical, or physical treatment of intermediate or final waste streams
    - Additional treatment of the dredged sediment would not increase the feasibility of onshore disposal.

Alternative B – Beneficial Use

WEA used the USACE's New England District Beneficial Use Planning Tool (Tool) to identify potential beneficial use dredge material disposal sites within a 30-mile radius of the project site, which is the distance from the AYC to the IOSN open water disposal site. The Tool identified 17 potential beneficial use sites; an analysis of the suitability of each of these sites is as follows:

- Beach Nourishment (4 sites – Wells Beach, Drakes Island Beach, Camp Ellis, Western Beach)
  - A representative from the USACE confirmed that all beach nourishment projects require sand, whereas the dredged material from the Kennebunk River will be primarily silt. Therefore, beneficial use of dredged material at the beach nourishment sites is infeasible.
- Construction and Industrial or Commercial Uses (2 sites – Cobble Berm in Ogunquit, ME and Dune Erosion/Stormwater Improvements in Wells, ME)
  - The two construction projects require cobble and sand materials, respectively, whereas the material dredged from the Kennebunk River will be primarily silt. Therefore, beneficial use of dredged material at the construction sites is infeasible.
- Nearshore Berm (6 sites – Wallis Sands, Wells, Goochs Beach, Kennebunk River, Saco, and Little River Rock Disposal Sites)
  - A representative from the USACE confirmed that all nearshore berm projects require sand, whereas the dredged material from the Kennebunk River will be primarily silt. Therefore, beneficial use of dredged material at nearshore berm sites is infeasible.
- Salt Marshes (5 sites – Piscataqua, Ogunquit/Rachel Carson National Wildlife Refuge, Webhannet, and Little River Salt Marsh Priority Areas Accepting Sediment; and Goosefare Salt Marsh)
  - Piscataqua Salt Marsh Priority Area: A representative from the New Hampshire Division of Environmental Services (NHDES) stated that the Piscataqua Salt Marsh is not a potential dredge disposal site.
  - Ogunquit/Rachel Carson National Wildlife Refuge, Webhannet, and Little River Salt Marsh Priority Areas Accepting Sediment and Goosefare Salt Marsh: A representative from the U.S. Fish and Wildlife Service (USFWS) stated that the State of Maine's current regulations and permitting processes do not allow the use of dredged materials on salt marshes.
  - Beneficial use of dredged material at salt marsh sites is infeasible.

A summary of the 17 potential beneficial use sites is included as Table 1, attached to this Alternatives Analysis along with a list of references and copies of relevant email communications.

Alternative C – Open Water Placement

Open Water Placement – Saco Bay Open Water Disposal Site

In order to get Maine DEP's approval for disposal at the Saco Bay Open Water Disposal Site, additional benthic environment testing of the river sediment is required. The time it will take to conduct the additional sediment testing and analysis, to receive an updated Suitability Determination for Saco Bay from the USACE, and to receive permit approvals for dredging from the USACE and Maine DEP would push the dredging activities to the Winter 2026-2027 dredge window. The AYC has a critical need to conduct their maintenance dredging in the Winter 2025-2026 dredge window, as boats at their marina are already experiencing navigation challenges due to river sediment accumulation at the marina. As a result, consideration of the Saco Bay Disposal Site is not a feasible alternative for this round of maintenance dredging.

Open Water Placement – Isle of Shoals North Open Water Disposal Site

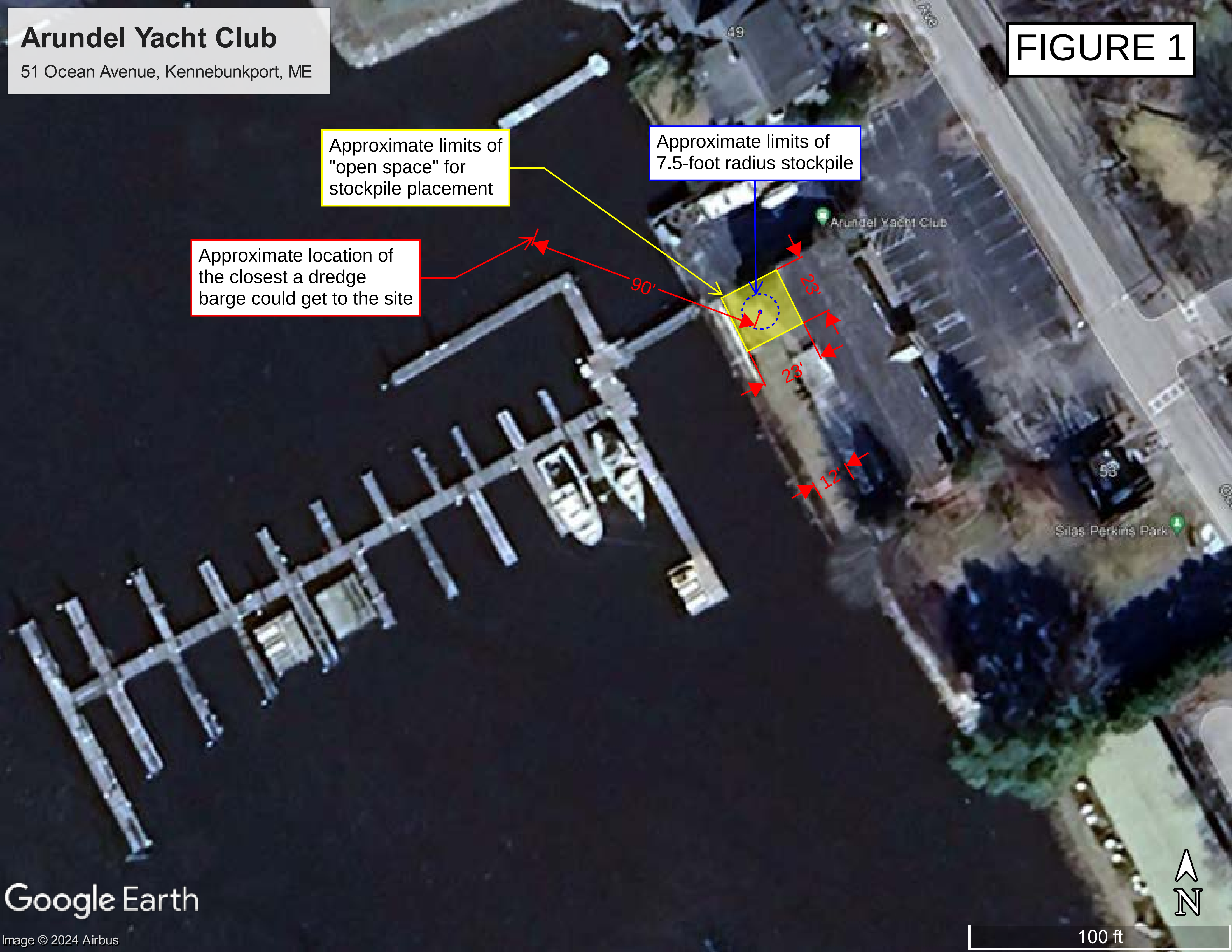
As stated above, the USACE issued a Suitability Determination for the AYC and the nearby Yachtsman Marina, Kennebunkport Marina, and Kennebunk River Club on June 10, 2024, which documents the suitability of the dredged material for disposal at the IOSN open water disposal site.

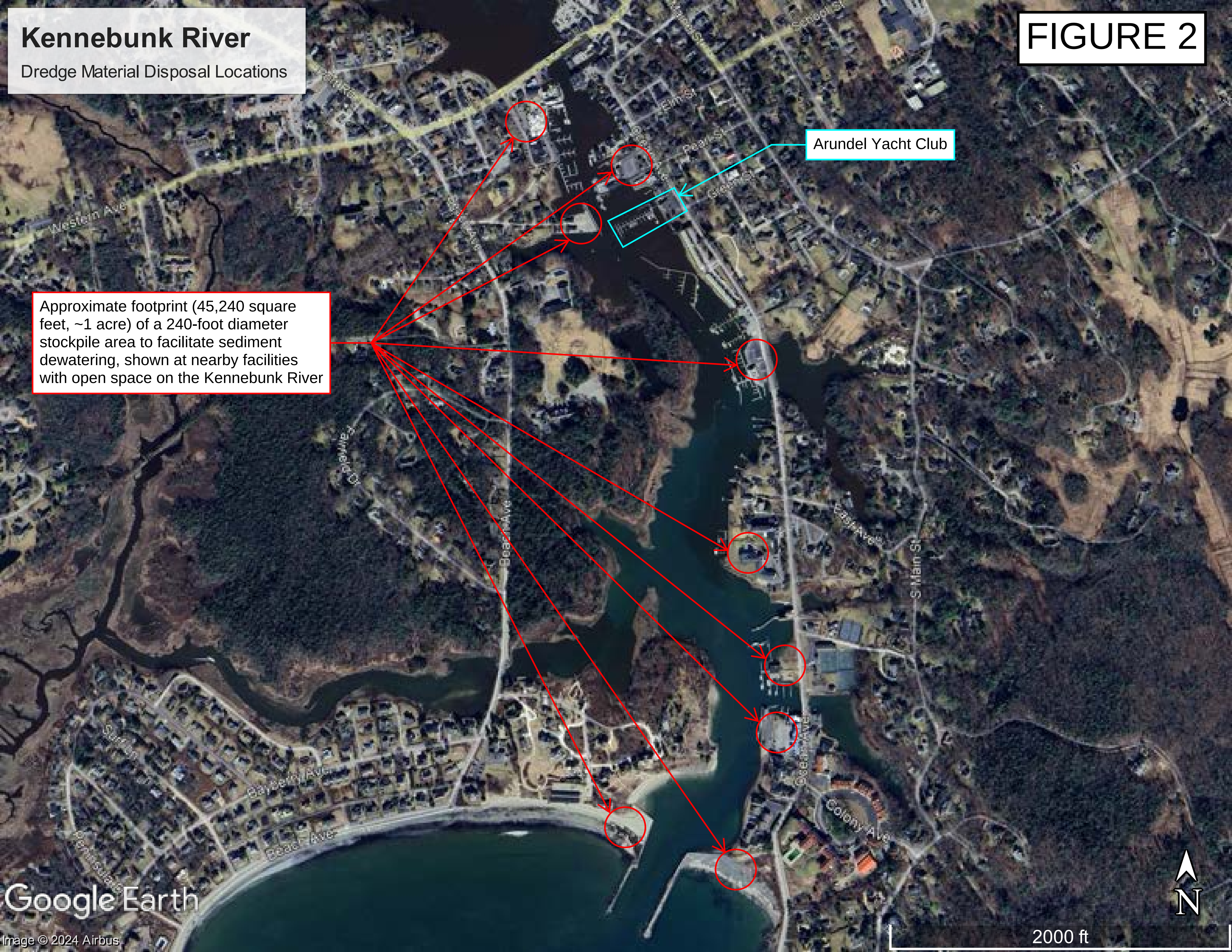
Selection

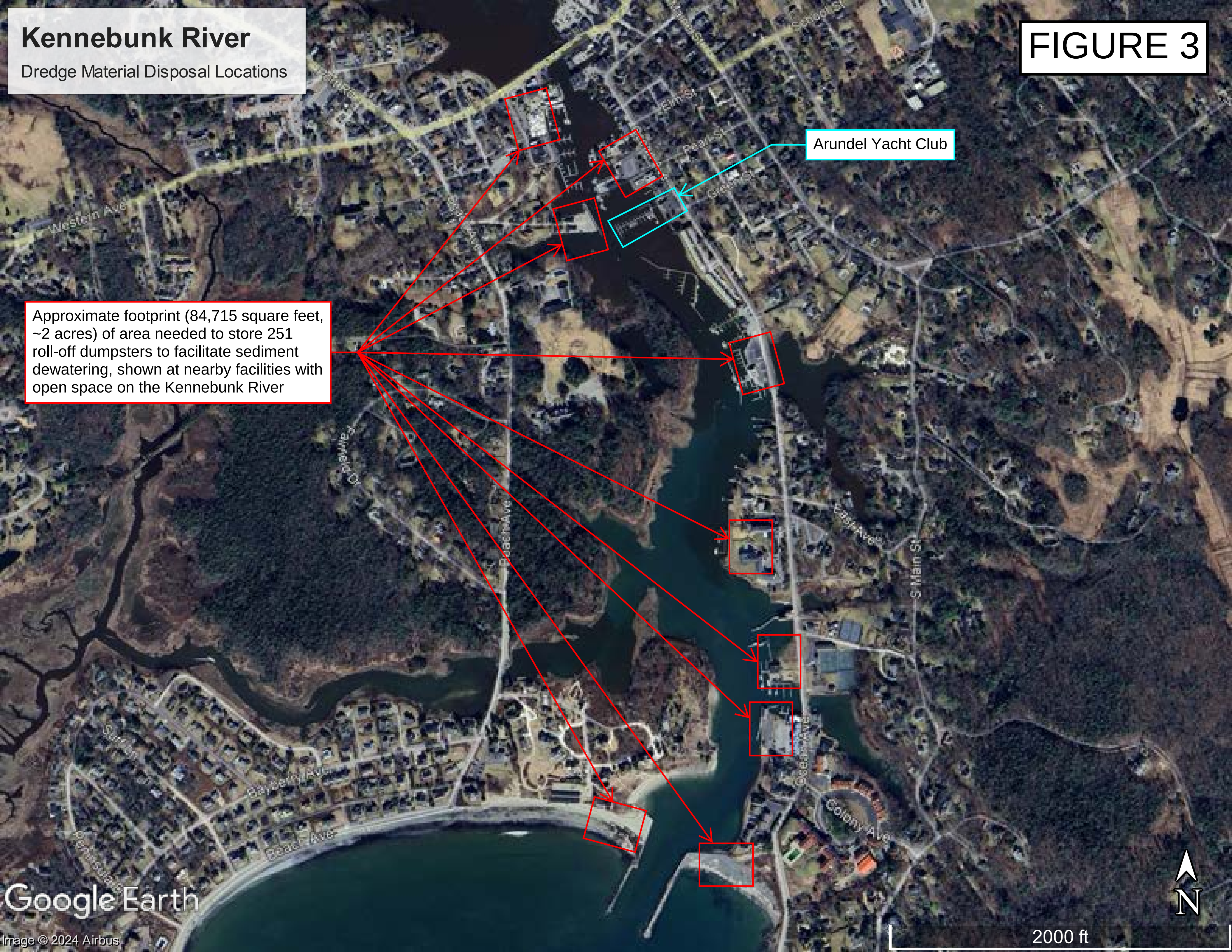
Due to the infeasibility of disposing of dredged material onshore and there being no beneficial use sites suitable for disposal, Alternative C, open water placement at IOSN, was selected as the most appropriate alternative for the project.

Figures

Figure 1: AYC Site Aerial Map
Figure 2: Kennebunk River – Stockpile Locations
Figure 3: Kennebunk River – Roll-Off Dumpster Locations


Arundel Yacht Club
51 Ocean Avenue, Kennebunkport, ME
FIGURE 1
Approximate limits of "open space" for stockpile placement
Approximate limits of 7.5-foot radius stockpile
Approximate location of the closest a dredge barge could get to the site
90'
23'
23'
12'
Arundel Yacht Club
Silas Perkins Park
49
53
N
100 ft
Google Earth
Image © 2024 Airbus


Kennebunk River
Dredge Material Disposal Locations
FIGURE 2
Arundel Yacht Club
Approximate footprint (45,240 square feet, ~1 acre) of a 240-foot diameter stockpile area to facilitate sediment dewatering, shown at nearby facilities with open space on the Kennebunk River
Western Ave
Beach Ave
S Main St
Colony Ave
Bayberry Ave
Google Earth
Image © 2024 Airbus
N
2000 ft



Kennebunk River
Dredge Material Disposal Locations
FIGURE 3
Arundel Yacht Club
Approximate footprint (84,715 square feet, ~2 acres) of area needed to store 251 roll-off dumpsters to facilitate sediment dewatering, shown at nearby facilities with open space on the Kennebunk River
Western Ave
Beach Ave
S Main St
Colony Ave
Bayberry Ave
Google Earth
Image © 2024 Airbus
N
2000 ft

Tables

Table 1: Dredge Material Disposal Beneficial Use Alternatives – Arundel Yacht Club

Table 1
Dredge Material Disposal Beneficial Use Alternatives - Arundel Yacht Club
Summary Table & References

Project Name[1]	Project Category	Location	Coordinates	Contact	Feasible Disposal Location?	Reasoning
Wells Beach	Beach Nourishment	Wells, ME	43.311208N -70.561063W	USACE	No	Beach nourishment projects require sand; dredged material from the Kennebunk River will be primarily silt.[4,5]
Drakes Island Beach	Beach Nourishment	Wells, ME	43.321900N -70.552082W	USACE	No	Beach nourishment projects require sand; dredged material from the Kennebunk River will be primarily silt.[4,5]
Camp Ellis	Beach Nourishment	Saco, ME	43.466204N -70.381264W	USACE	No	This beach nourishment project requires "sandy shoal material," and dredged material from the Kennebunk River will be primarily silt.[4,5,6]
Western Beach	Beach Nourishment	Scarborough, ME	43.539528N -70.321888W	USACE	No	Beach nourishment projects require sand; dredged material from the Kennebunk River will be primarily silt.[4,5]
Cobble Berm	Construction and Industrial or Commercial Uses	Ogunquit, ME	43.236523N -70.589087W	USACE	No	Project requires cobble, and dredged material from the Kennebunk River will be primarily silt.
Dune Erosion and Stormwater Improvements	Construction and Industrial or Commercial Uses	Wells, ME	43.248998N -70.595158W	USACE	No	Dune requires sand, and dredged material from the Kennebunk River will be primarily silt.
Wallis Sands Disposal Site	Nearshore Berm	Rye, NH	43.020324N -70.726276W	USACE	No	Nearshore berm projects require sand, and dredged material from the Kennebunk River will be primarily silt.[4,5]
Wells Nearshore Disposal Site	Nearshore Berm	Wells, ME	43.307605N -70.560229W	USACE	No	20,000 CY of dredged "sandy" material from the 2020 Wells Harbor federal navigation project was placed here; however, nearshore berm projects require sand, and dredged material from the Kennebunk River will be primarily silt.[4,5,6]
Goochs Beach Nearshore Site	Nearshore Berm	Kennebunkport, ME	43.345503N -70.481053W	USACE	No	20,000 CY of dredged material from the 2020 Kennebunk/Kennebunkport federal navigation project was placed here; however, nearshore berm projects require sand, and dredged material from the Kennebunk River will be primarily silt.[4,5,6]
Kennebunk River Disposal Site	Nearshore Berm	Kennebunkport, ME	43.345134N -70.479100W	USACE	No	Nearshore berm projects require sand, and dredged material from the Kennebunk River will be primarily silt.[4,5]
Saco Nearshore Disposal Site	Nearshore Berm	Saco, ME	43.467543N -70.366173W	USACE	No	Nearshore berm projects require sand, and dredged material from the Kennebunk River will be primarily silt.[4,5]
Little River Rock Nearshore	Nearshore Berm	Saco, ME	43.518925N -70.364468W	USACE	No	Nearshore berm projects require sand, and dredged material from the Kennebunk River will be primarily silt.[4,5]
Piscataqua Salt Marsh Priority Area[2]	Salt Marsh Priority Area	Rye, NH	--	USFWS	No	Piscataqua Salt Marsh is not a potential dredge disposal site.[7]
Ogunquit Salt Marsh Priority Area/Rachel Carson National Wildlife Refuge[3]	Salt Marsh Priority Area	Ogunquit/Wells, ME	--	USFWS	No	Maine state permitting does not allow the use of dredged materials on salt marshes.[8]

Table 1
Dredge Material Disposal Beneficial Use Alternatives - Arundel Yacht Club
Summary Table & References

Project Name[1]	Project Category	Location	Coordinates	Contact	Feasible Disposal Location?	Reasoning
Webhannet Salt Marsh Priority Area[3]	Salt Marsh Priority Area	Wells, ME	--	USFWS	No	Maine state permitting does not allow the use of dredged materials on salt marshes.[8]
Little River Salt Marsh Priority Area[3]	Salt Marsh Priority Area	Wells, ME	--	USFWS	No	Maine state permitting does not allow the use of dredged materials on salt marshes.[8]
Goosefare Salt Marsh	Wetland Habitats/Salt Marsh	Saco, ME	43.493752N -70.392875W	USFWS	No	Maine state permitting does not allow the use of dredged materials on salt marshes.[8]

References:
1. USACE New England District Beneficial Use Planning Tool: https://www.arcgis.com/apps/dashboards/4f1c828081684605af2972cb6297dacf
2. New Hampshire Saltmarsh Restoration Priorities for the Saltmarsh Sparrow: https://acjv.org/documents/NH_SALS_comp_guidance_doc.pdf
3. Maine Saltmarsh Restoration Priorities for the Saltmarsh Sparrow: https://acjv.org/documents/ME_SALS_comp_guidance_doc.pdf
4. Email Correspondence Between WEA and USACE, dated August 13, 2024 (attached).
5. Email Correspondence Between WEA and USEPA, dated August 14, 2024 (attached).
6. USACE Update Report - Maine, dated January 31, 2024: https://www.nae.usace.army.mil/Portals/74/ME-UpdateReport_31Jan2024.pdf
7. Email Correspondence Between WEA and NHDES, dated August 19, 2024 (attached).
8. Email Correspondence Between WEA and USFWS, dated August 14, 2024 (attached).

References

1. Email Correspondence Between WEA and USACE, dated August 13, 2024.
2. Email Correspondence Between WEA and USEPA, dated August 14, 2024.
3. Email Correspondence Between WEA and NHDES, dated August 19, 2024.
4. Email Correspondence Between WEA and USFWS, dated August 14, 2024.

Leyna Tobey

From: Hopkins, Aaron D CIV USARMY CENAE (USA) <Aaron.D.Hopkins@usace.army.mil>
Sent: Tuesday, August 13, 2024 12:44 PM
To: Leyna Tobey; Saloio, Gabriella J CIV USARMY CEHQ (USA)
Subject: RE: Beneficial Use Sites for Dredging

Hi Leyna,

I got your voicemail the other day and I apologize for not returning your call yet.

Great to see that you used the Beneficial Use of Dredged Material Planning Tool as a screening step for your project. You are correct about the beach nourishment sites needing sandy material – and the same can be said for the nearshore berm sites you identified in the Planning Map as those are intended to be feeder berms for the adjacent beaches. The openwater sites in your list are included in the Planning Map to compare openwater disposal alternatives and are not considered beneficial use themselves. That leaves the five salt marsh sites on your list which are all potential restoration sites from the USFWS. I would suggest you reach out to the contacts in the Atlantic Coast Joint Venture reference at USFWS or Maine Dept of Inland Fisheries and Wildlife to see if there are any potential beneficial uses for your project at those sites. We were able to provide some dredged material recently to the Rachel Carson National Wildlife Refuge in Wells, ME for a small beneficial use project.

Aaron

Aaron Hopkins
DAMOS Program Manager
US Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742
978.318.8973

From: Leyna Tobey <leyna@Walsh-eng.com>
Sent: Tuesday, August 13, 2024 10:54 AM
To: Saloio, Gabriella J CIV USARMY CEHQ (USA) <Gabriella.J.Saloio@usace.army.mil>; Hopkins, Aaron D CIV USARMY CENAE (USA) <Aaron.D.Hopkins@usace.army.mil>
Subject: [Non-DoD Source] Beneficial Use Sites for Dredging

Good morning Gabriella and Aaron,

I am working on permitting a dredging project for several marinas on the lower Kennebunk River in Kennebunk, ME, and am currently conducting an alternatives analysis on where to dispose of the 25,000 CY of silty dredge material. I used the Army Corp's Beneficial Use of Dredged Material Planning Tool and found the potential disposal locations in the attached spreadsheet within a 30-mile radius of the project site.

As Gabriella is listed as the ACOE contact for several of the disposal locations and Aaron is listed at the contact for the DAMOS Beneficial Use Planning Map, I was hoping either of you would be able to provide me with some details for the disposal sites listed in the attached spreadsheet (e.g. if they are accepting materials, what types of materials they are accepting, timeline for acceptance, etc.) or could point me in the right direction to another contact to reach out to. (Note that the attached spreadsheet does not include any beach nourishment projects, as those projects are assumed to need sand and the material we will be dredging is primarily silt.)

Please give me a call to discuss if that would be easier. Thanks in advance!

Leyna

Leyna Tobey, PE*
Project Manager | Civil Engineer
*Licensed in MA

WALSH
ENGINEERING ASSOCIATES, INC.

One Karen Drive, Suite 2A
Westbrook, ME 04092
P: (207) 553-9898, Ext 105
www.walsh-eng.com

Leyna Tobey

From:	Wolf, Steven <Wolf.Steven@epa.gov>
Sent:	Wednesday, August 14, 2024 10:18 AM
To:	Leyna Tobey
Cc:	Sterling, Alexa
Subject:	FW: Dredged Material Disposal Inquiry
Attachments:	2024-08-12 Dredge Disposal Alternatives Analysis_to EPA.xlsx

Hi Leyna, EPA co-manages the ocean dredged material disposal sites with the Army Corps – the goal of the alternatives analysis is to evaluate other uses of the dredged material rather than just straight disposal. The nearshore sites are considered "beneficial" in that material placed at those sites is integrated into coastal sediment transport and can actually nourish beaches with material under the right hydrodynamic conditions. Unfortunately, as I recall, the material from the projects you referenced contains too high a percentage of fine-grained material to be placed at the nearshore sites. For evaluating the feasibility of using the material as part of salt marsh restoration, I'd direct you back to the Corps and to ME and NH state agencies. I'd suggest starting with Todd Randall at the New England District Corps (todd.a.randall@usace.army.mil) who could provide information on any federal marsh restoration projects as well as the contact information for the states folks involved in marsh restoration. Feel free to reach back it you need additional information - Steve

Steven Wolf | US Environmental Protection Agency, Region 1 (New England)
5 Post Office Square, Suite 100, Mail Code OEP06-1 Boston, MA 02109-3912
Office: 617-918-1617 Mobile: 978-201-1928 wolf.steven@epa.gov

---

From: Leyna Tobey <leyna@Walsh-eng.com>
Sent: Tuesday, August 13, 2024 12:12 PM
To: Sterling, Alexa <Sterling.Alexa@epa.gov>; Wolf, Steven <Wolf.Steven@epa.gov>
Subject: Dredged Material Disposal Inquiry

Caution: This email originated from outside EPA, please exercise additional caution when deciding whether to open attachments or click on provided links.

Good afternoon Alexa and Steven,

I am working on permitting a dredging project for several marinas on the lower Kennebunk River in Kennebunk, ME, and am currently conducting an alternatives analysis on where to dispose of the 25,000 CY of silty dredge material. I used the Army Corp's Beneficial Use of Dredged Material Planning Tool and found the potential disposal locations in the attached spreadsheet within a 30-mile radius of the project site.

As you are both listed on the EPA's website for dredged material disposal, I was hoping either of you would be able to provide me with some details for the disposal sites listed in the attached spreadsheet (e.g. if they are accepting materials, what types of materials they are accepting, timeline for acceptance, etc.) or could point me in the right direction to another contact to reach out to. (Note that the attached spreadsheet does not include any beach nourishment projects, as those projects are assumed to need sand and the material we will be dredging is primarily silt.)

Please give me a call to discuss if that would be easier. Thanks in advance!

Leyna

Leyna Tobey, PE*
Project Manager | Civil Engineer
*Licensed in MA

WALSH
ENGINEERING ASSOCIATES, INC.

One Karen Drive, Suite 2A
Westbrook, ME 04092
P: (207) 553-9898, Ext 105
www.walsh-eng.com

Leyna Tobey

From: Lucey, Kevin <kevin.p.lucey@des.nh.gov>
Sent: Monday, August 19, 2024 11:59 AM
To: Leyna Tobey; tracy@rockinghamccd.org
Subject: RE: Piscataqua Saltmarsh Restoration Inquiry

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Leyna,
There are only 3 NH sites listed as Beneficial Use Sites (Seabrook Beach, Hampton Beach, and Wallis Sands Offshore Berm). The "Piscataqua Salt Marsh" is not a potential dredge disposal site. Its included on the USACE mapper because it is a USFWS Priority for Salt Marsh. NH has not yet undertaken any sediment placement projects on tidal wetlands.

I don't know much about it, but I understand that there is a dredge sediment reuse project at the Webhannet Salt Marsh in Wells.

Good luck,
Kevin Lucey, Habitat Coordinator
Coastal Program | Watershed Management Bureau | Water Division
New Hampshire Department of Environmental Services
222 International Drive, Suite 175
Portsmouth, NH 03801
603-559-0026
kevin.p.lucey@des.nh.gov

From: Leyna Tobey <leyna@Walsh-eng.com>
Sent: Tuesday, August 13, 2024 1:53 PM
To: Lucey, Kevin <kevin.p.lucey@des.nh.gov>; tracy@rockinghamccd.org
Subject: Piscataqua Saltmarsh Restoration Inquiry

Good afternoon Tracy and Kevin,

I am working on permitting a dredging project for several marinas on the lower Kennebunk River in Kennebunk, ME, and am currently conducting an alternatives analysis on where to dispose of the 25,000 CY of silty dredge material. I used the Army Corp's Beneficial Use of Dredged Material Planning Tool (here) and found that the Piscataqua Saltmarsh is listed as a potential dredge material disposal location.

I saw that you were both listed as contacts for the project on the New Hampshire Saltmarsh Restoration Priorities for the Saltmarsh Sparrow document, and I was hoping either of you would be able to provide me with some details regarding whether you are accepting materials for the Saltmarsh, what types of materials are being accepted, timeline for material acceptance, etc. Or, if you are not the right contacts to be reaching out to, could you please point me in the right direction of who I should be contacting?

Please give me a call to discuss if that would be easier. Thanks in advance!

Leyna

Leyna Tobey, PE*
Project Manager | Civil Engineer
**Licensed in MA*

WALSH
ENGINEERING ASSOCIATES, INC.

One Karen Drive, Suite 2A
Westbrook, ME 04092
P: (207) 553-9898, Ext 101
www.walsh-eng.com

Leyna Tobey

From: Sanders, Nicole A <nicole_sanders@fws.gov>
Sent: Wednesday, August 14, 2024 9:50 AM
To: Leyna Tobey; danielle.dauria@maine.gov
Cc: Adamowicz, Susan; Stromayer, Karl
Subject: RE: [EXTERNAL] Webhannet Saltmarsh Restoration Inquiry

Hi Leyna,

Thank you for reaching out! Right now, in Maine, state permitting does now allow the use of dredged materials on salt marshes. We are going to pilot the first thin-layer placement on Refuge land in Maine but the reason we are able to do this is because ours is a true pilot study permitted under an innovate pilot program with the Maine DEP. This permitting pathway operates under a pilot solid waste permit. We initiated conversations with the Army Corps and regulators years prior to getting our small (~1,000 cy) amount of clean, sandy sediment. Though it's certainly not out of the question to apply for another thin-layer placement project, it will not be a fast process, and DEP may not permit it at all based on the current regulatory processes. Usually for a pilot, there is only a small amount of sediment used 1-2,000 cubic yards over a ~2 acre area. Still, they may consider scaling up, which is an important part of learning and attempting new restoration techniques in Maine. And, there are salt marsh areas that we have conceptually considered for future thin-layer projects. All comes down to the permitting process! Once our refuge manager, Karl, has returned from annual leave myself, Sue, and Karl can discuss viable options and get back to you. Thanks again for reaching out and thinking of us.

Best,
Nicole

From: Leyna Tobey <leyna@Walsh-eng.com>
Sent: Tuesday, August 13, 2024 2:00 PM
To: Sanders, Nicole A <nicole_sanders@fws.gov>; danielle.dauria@maine.gov
Subject: [EXTERNAL] Webhannet Saltmarsh Restoration Inquiry

Good afternoon Nicole and Danielle,

I am working on permitting a dredging project for several marinas on the lower Kennebunk River in Kennebunk, ME, and am currently conducting an alternatives analysis on where to dispose of the 25,000 CY of silty dredge material. I used the Army Corp's Beneficial Use of Dredged Material Planning Tool (here) and found that the Webhannet River Complex Saltmarsh is listed as a potential dredge material disposal location.

I saw that you were both listed as contacts for the project on the Maine Saltmarsh Restoration Priorities for the Saltmarsh Sparrow document, and I was hoping either of you would be able to provide me with some details regarding whether you are accepting materials for the project(s), what types of materials are being accepted, timeline for material acceptance, etc. Or, if you are not the right contacts to be reaching out to, could you please point me in the right direction of who I should be contacting?

Please give me a call to discuss if that would be easier. Thanks in advance!

Leyna

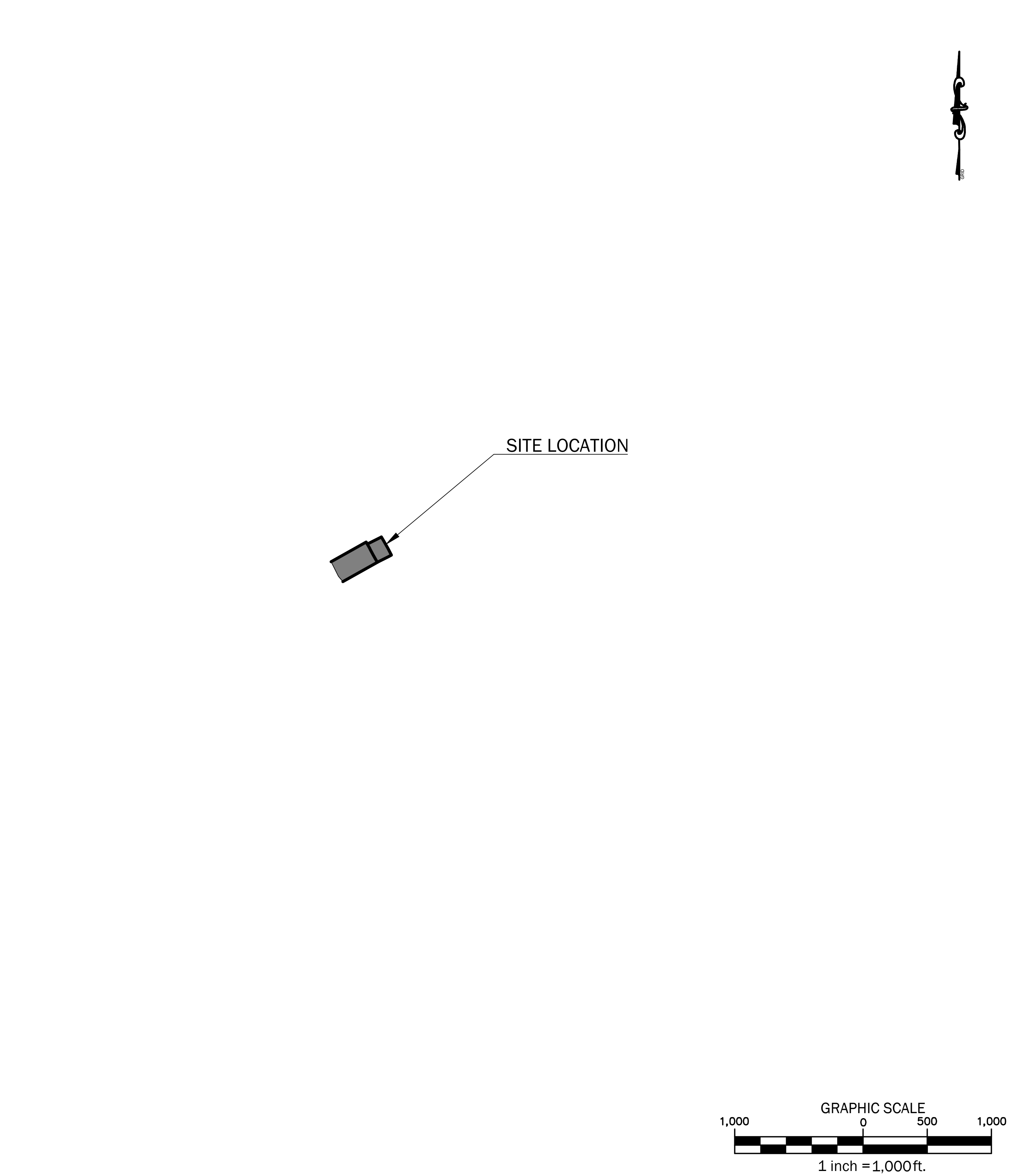
Leyna Tobey, PE*
Project Manager | Civil Engineer
**Licensed in MA*

WALSH
ENGINEERING ASSOCIATES, INC.

One Karen Drive, Suite 2A
Westbrook, ME 04092
P: (207) 553-9898, Ext 105
www.walsh-eng.com

Attachment 3:

Site Location Map



WALSH
ENGINEERING ASSOCIATES, INC.
One Karen Dr., Suite 2A | Westbrook, Maine 04092
ph: 207.553.9898 | www.walsh-eng.com

Arundel Yacht Club Dredging

Arundel Yacht Club
51 Ocean Avenue
Kennebunkport, Maine 04046

Sheet Title:
Figure 1: Overview Plan

Job No.:	782
Date:	November 2021
Scale:	1" = 1,000'
Drawn:	CAR
Checked:	WRW

Attachment 4:

Photo Log

Attachment 4.0
PHOTO LOG

WALSH ENGINEERING ASSOCIATES, INC.

Arundel Yacht Club Dredge

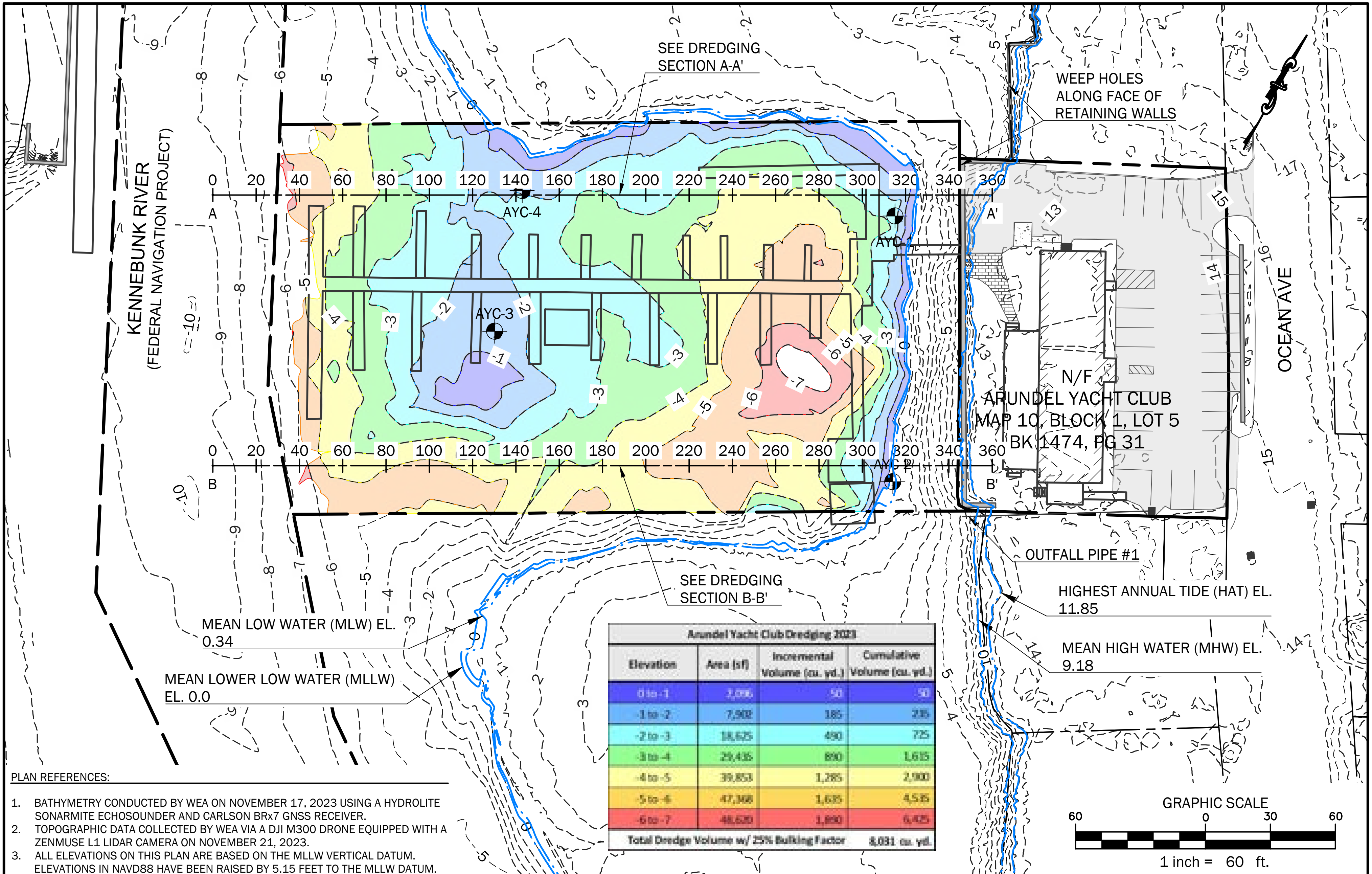
Kennebunkport, ME

Photo No. 1	
Date: 1/28/2022	
Site Location: Arundel Yacht Club	
Description: View of the Arundel Yacht Club.	
Photo No. 2	
Date: 11/15/2021	
Site Location: Arundel Yacht Club	
Description: View of the adjacent Kennebunk River and approximate dredge location.	

Photo No. 3	
Date: 11/15/2021	
Site Location: Arundel Yacht Club	
Description: Additional view of approximate dredge location.	
Photo No. 4	
Date: 8/4/2023	
Site Location: Arundel Yacht Club	
Description: Boat slips in the marina.	

Attachment 5:

Site Plan



Arundel Yacht Club Dredging 2023			
Elevation	Area (sf)	Incremental Volume (cu. yd.)	Cumulative Volume (cu. yd.)
0 to -1	2,096	50	50
-1 to -2	7,902	185	235
-2 to -3	18,625	490	725
-3 to -4	29,435	890	1,615
-4 to -5	39,853	1,285	2,900
-5 to -6	47,368	1,635	4,535
-6 to -7	48,620	1,890	6,425
Total Dredge Volume w/ 25% Bulking Factor			8,031 cu. yd.

PLAN REFERENCES:

1. BATHYMETRY CONDUCTED BY WEA ON NOVEMBER 17, 2023 USING A HYDROLITE SONARMITE ECHOSOUNDER AND CARLSON BRx7 GNSS RECEIVER.
2. TOPOGRAPHIC DATA COLLECTED BY WEA VIA A DJI M300 DRONE EQUIPPED WITH A ZENMUSE L1 LIDAR CAMERA ON NOVEMBER 21, 2023.
3. ALL ELEVATIONS ON THIS PLAN ARE BASED ON THE MLLW VERTICAL DATUM. ELEVATIONS IN NAVD88 HAVE BEEN RAISED BY 5.15 FEET TO THE MLLW DATUM.

WALSH
ENGINEERING ASSOCIATES, INC.
One Karen Dr., Suite 2A | Westbrook, Maine 04092
ph: 207.553.9898 | www.walsh-eng.com

ARUNDEL YACHT CLUB DREDGING

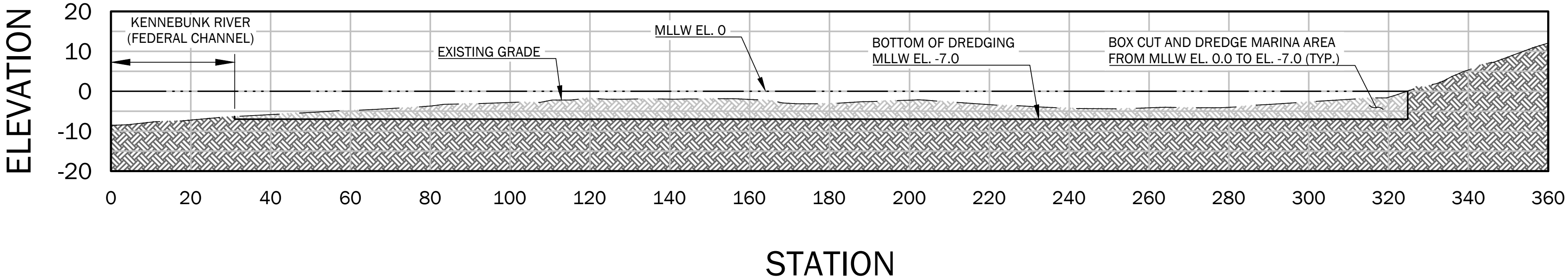
ARUNDEL YACHT CLUB
51 OCEAN AVE
KENNEBUNKPORT, ME 04046

Sheet Title:
FIG. 1: PLAN VIEW

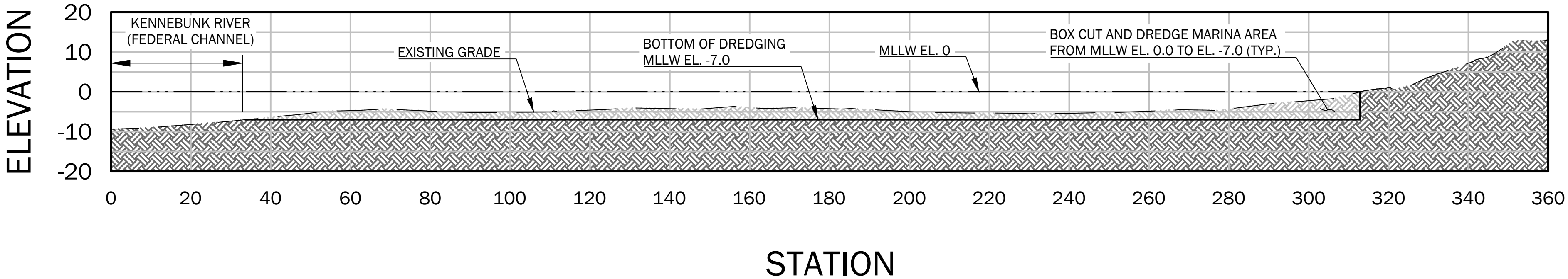
Job No.:	782
Date:	OCT. 23, 2024
Scale:	AS SHOWN
Drawn:	CAR/MNW
Checked:	WRW

Attachment 6:

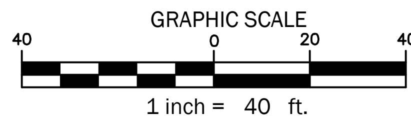
Additional Plan (Section Views)



Dredging Section A-A'



Dredging Section B-B'



WALSH
ENGINEERING ASSOCIATES, INC.
One Karen Dr., Suite 2A | Westbrook, Maine 04092
ph: 207.553.9898 | www.walsh-eng.com

ARUNDEL YACHT CLUB DREDGING

ARUNDEL YACHT CLUB
51 OCEAN AVE
KENNEBUNKPORT, ME 04046

Sheet Title:
FIG 2: SECTION VIEWS

Job No.:	782
Date:	OCT. 23, 2024
Scale:	AS SHOWN
Drawn:	CAR/MNW
Checked:	WRW

P:\782 - Arundel Yacht Club Dredging\3. CAD\782 - Base.dwg plot date: 10/23/2024 2:07 PM

Attachment 7:

Construction Plan

7.0 Construction Plan

The dredging will be conducted utilizing a floating barge and dredging crane with a clamshell bucket. The barge will access the project area from traveling upriver from the Kennebunk River Breakwater. The area of the dredge will be an approximately 180-foot by 250-foot area (~45,356 square feet). The proposed dredge depth will be to elevation -6.0 feet mean low water, with about one foot of over-dig. It is anticipated that dredging will coincide with neighboring marinas performing dredging at the same approximate time, including the Yachtsman Marina, the Kennebunkport Marina, and the Kennebunk River Club. The material will be transported by barge to the Isle of Shoals North Disposal Site (IOSN). The IOSN is located approximately 15 nautical miles east of Portsmouth, New Hampshire, in the Gulf of Maine.

Attachment 8:

Erosion and Sedimentation Control Plan

8.0 Erosion and Sedimentation Control Plan

The dredging will be conducted from a floating barge using a dredging crane with a clamshell bucket. The dredged material will be placed on the barge and brought to the Isle of Shoals North (IOSN) open water placement site for disposal. There will be no storage of the dredged material on land which negates the need for erosion and sedimentation control measures in this regard. No formal erosion control measures are proposed for the project. However, turbidity curtains will be implemented, if deemed necessary, around the proposed dredging area to mitigate the travel of sediment during the in-water disturbance.

Attachment 9:

Site Conditions Report

9.0 Site Conditions Report

The dredging activity will occur at the AYC within the Kennebunk River, which is located approximately 0.75 miles from the mouth of the Kennebunk River.

The shoreline area southeast of the AYC consists of large riprap placed to prevent bank erosion. The yacht club and its neighbor to the northeast have vertical concrete retaining walls. The sandy area in front of those walls is completely covered at high tide and is partially exposed at low tide. Minimal rockweed was observed in this area, but no other plant or marine species were noted.

According to the Maine Department of Inland Fisheries & Wildlife (IF&W) Beginning with Habitat website (https://www.maine.gov/ifw/fish-wildlife/wildlife/beginning-with-habitat/maps/index.html), the dredging location is bordered to the northwest and southeast by wetlands identified by the National Wetland Inventory (NWI). The area of the dredging is located in a relatively small area of the Kennebunk River's shellfish growing area.

According to the U.S. Department of Fish & Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) website (https://ipac.ecosphere.fws.gov/), the following are listed species that may occur in the area of the property: the Northern Long-eared Bat and the Monarch Butterfly.

According to the National Oceanic and Atmospheric Administration (NOAA) Fisheries Essential Fish Habitat (EFH) Mapper, the project location is mapped within a New England/Mid-Atlantic EFH for the following species: Acadian redfish (larvae); haddock (juvenile); little skate (adult); monkfish (eggs, larvae, juvenile, adult); silver hake (eggs, larvae, adult); and winter flounder (eggs). The project is likely to have short-term and localized impacts to EFH, with no significant impacts to these habitats anticipated.

According to the NOAA Fisheries Greater Atlantic Region Endangered Species Act (ESA) Section 7 Mapper (Section 7 Mapper), adult and subadult Atlantic sturgeon (threatened/endangered) and adult shortnose sturgeon (endangered) migrate and forage in the Kennebunk River within the limits of the project boundary. The migrating and foraging time of year for the Atlantic sturgeon is identified as all year, however, the Section 7 Mapper notes that the Atlantic sturgeon exhibit seasonal coastal movements in the spring and fall; the migrating and foraging time of year for the shortnose sturgeon is identified as April 1 to November 30.

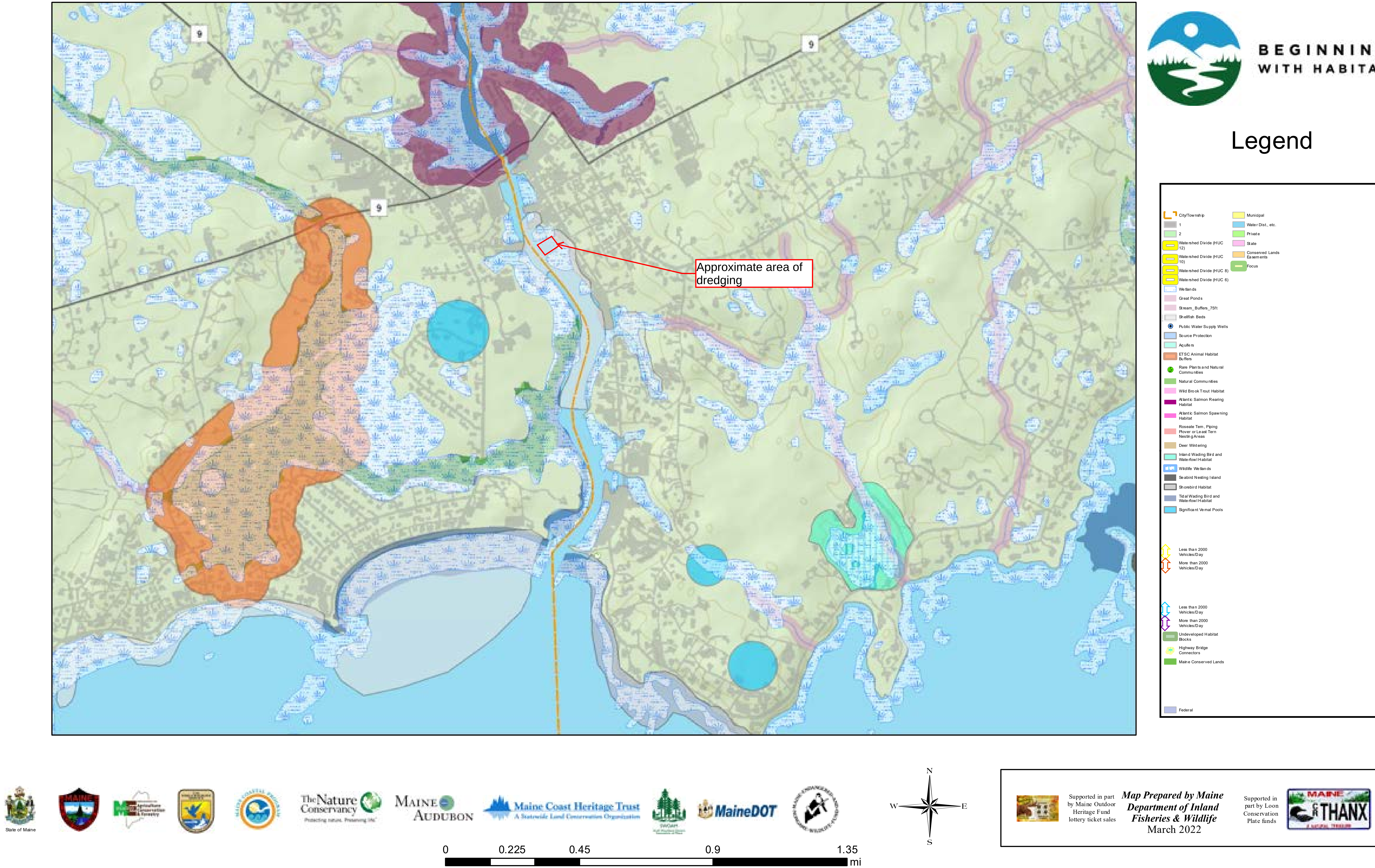
The AYC dredging work is proposed to take place in winter 2025-2026 and to avoid disturbances to EFH and sturgeon populations to the maximum extent possible.

Refer to photos in Section 4.0 and the Maine DEP Coastal Wetland Characterization form provided in Appendix B. Based on the resource mapping shown, the project will have minimal impact on existing natural resources.

The Kennebunk River (Assessment Unit ID ME0106000301_622 R01) is listed on the Maine Department of Environmental Protection's (DEP's) Final 2018/2020/2022 Integrated Water Quality Report as a Delisted Category 5 Waterbody, as a Total Maximum Daily Load (TMDL) for

E. coli was approved for the river in 2009. The proposed dredging activities will not discharge any bacteria into the river.

Maine IF&W Beginning with Habitat Map


9
9
9
Approximate area of dredging
BEGINNING WITH HABITAT
Legend
City/Township
1
2
Watershed Divide (HUC 12)
Watershed Divide (HUC 10)
Watershed Divide (HUC 8)
Watershed Divide (HUC 6)
Wetlands
Great Ponds
Stream_Buffers_75ft
Shellfish Beds
Public Water Supply Wells
Source Protection
Aquifers
ETSC Animal Habitat Buffers
Rare Plants and Natural Communities
Natural Communities
Wild Brook Trout Habitat
Atlantic Salmon Rearing Habitat
Atlantic Salmon Spawning Habitat
Roseate Tern, Piping Plover or Least Tern Nesting Areas
Deer Wintering
Inland Wading Bird and Waterfowl Habitat
Wildlife Wetlands
Seabird Nesting Island
Shorebird Habitat
Tidal Wading Bird and Waterfowl Habitat
Significant Vernal Pools
Less than 2000 Vehicles/Day
More than 2000 Vehicles/Day
Less than 2000 Vehicles/Day
More than 2000 Vehicles/Day
Undeveloped Habitat Blocks
Highway Bridge Connectors
Maine Conserved Lands
Federal
Municipal
Water Dist., etc.
Private
State
Conserved Lands Easements
Focus
State of Maine
The Nature Conservancy
Protecting nature. Preserving life.
Maine Audubon
Maine Coast Heritage Trust
A Statewide Land Conservation Organization
MaineDOT
0
0.225
0.45
0.9
1.35
mi
N
W
E
S
Supported in part by Maine Outdoor Heritage Fund lottery ticket sales
Map Prepared by Maine Department of Inland Fisheries & Wildlife
March 2022
Supported in part by Loon Conservation Plate funds
MAINE
THANX

USFWS IPaC Official Species List

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Maine Ecological Services Field Office
P. O. Box A
East Orland, ME 04431
Phone: (207) 469-7300 Fax: (207) 902-1588

In Reply Refer To: June 15, 2022
Project Code: 2022-0013708
Project Name: AYC

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see https://www.fws.gov/birds/policies-and-regulations.php.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/birds/policies-and-regulations/executive-orders/e0-13186.php.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Maine Ecological Services Field Office
P. O. Box A
East Orland, ME 04431
(207) 469-7300

Project Summary

Project Code:	2022-0013708
Event Code:	None
Project Name:	AYC
Project Type:	Disposal Dredge Material
Project Description:	This project consists of dredging an area in front of the Arundel Yacht Club.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@43.358029450000004,-70.47593825153226,14z

Counties: York County, Maine

Endangered Species Act Species

There is a total of 2 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

IPaC User Contact Information

Agency: Walsh Engineering Associates, Inc.
Name: Randee McDonald
Address: One Karen Drive, Suite 2A
City: Westbrook
State: ME
Zip: 04092
Email randee@walsh-eng.com
Phone: 2075539898

NOAA Fisheries EFH Mapper Report

EFH Mapper Report

EFH Data Notice

Essential Fish Habitat (EFH) is defined by textual descriptions contained in the fishery management plans developed by the regional fishery management councils. In most cases mapping data can not fully represent the complexity of the habitats that make up EFH. This report should be used for general interest queries only and should not be interpreted as a definitive evaluation of EFH at this location. A location-specific evaluation of EFH for any official purposes must be performed by a regional expert. Please refer to the following links for the appropriate regional resources.

Greater Atlantic Regional Office
Atlantic Highly Migratory Species Management Division

Query Results

Degrees, Minutes, Seconds: Latitude = 43º 21' 30" N, Longitude = 71º 31' 27" W
Decimal Degrees: Latitude = 43.358, Longitude = -70.476

The query location intersects with spatial data representing EFH and/or HAPCs for the following species/management units.

***** W A R N I N G *****

Please note under "Life Stage(s) Found at Location" the category "ALL" indicates that all life stages of that species share the same map and are designated at the queried location.

EFH

Link	Data Caveats	Species/Management Unit	Lifestage(s) Found at Location	Management Council	FMP
		Acadian Redfish	Larvae	New England	Amendment 14 to the Northeast Multispecies FMP
		Haddock	Juvenile	New England	Amendment 14 to the Northeast Multispecies FMP
		Little Skate	Adult	New England	Amendment 2 to the Northeast Skate Complex FMP
		Monkfish	Adult, Eggs/Larvae, Juvenile	New England	Amendment 4 to the Monkfish FMP
		Silver Hake	Adult, Eggs/Larvae	New England	Amendment 14 to the Northeast Multispecies FMP
		Winter Flounder	Eggs	New England	Amendment 14 to the Northeast Multispecies FMP

Pacific Salmon EFH

No Pacific Salmon Essential Fish Habitat (EFH) were identified at the report location.

Atlantic Salmon

No Atlantic Salmon were identified at the report location.

HAPCs

No Habitat Areas of Particular Concern (HAPC) were identified at the report location.

EFH Areas Protected from Fishing

No EFH Areas Protected from Fishing (EFHA) were identified at the report location.

Spatial data does not currently exist for all the managed species in this area. The following is a list of species or management units for which there is no spatial data. ****For links to all EFH text descriptions see the complete data inventory: open data inventory -->**
All EFH species have been mapped for the Greater Atlantic region, **Atlantic Highly Migratory Species EFH**, Bigeye Sand Tiger Shark, Bigeye Sixgill Shark, Caribbean Sharpnose Shark, Galapagos Shark, Narrowtooth Shark, Sevengill Shark, Sixgill Shark, Smooth Hammerhead Shark, Smalltail Shark

NOAA Fisheries Greater Atlantic Region ESA Section 7 Map

Drawn Action Area & Overlapping S7 Consultation Areas

Area of Interest (AOI) Information

Area : 2.79 acres

Aug 27 2024 14:26:21 Eastern Daylight Time

Summary

Name	Count	Area(acres)	Length(mi)
Atlantic Sturgeon	2	5.59	N/A
Shortnose Sturgeon	1	2.79	N/A
Atlantic Salmon	0	0	N/A
Sea Turtles	0	0	N/A
Atlantic Large Whales	0	0	N/A
In or Near Critical Habitat	0	0	N/A

Atlantic Sturgeon

#	Feature ID	Species	Lifestage	Behavior	Zone
1	ANS_C50_ADU_MAF	Atlantic sturgeon	Adult	Migrating & Foraging	N/A
2	ANS_C50_SUB_MAF	Atlantic sturgeon	Subadult	Migrating & Foraging	N/A

#	From	Until	From (2)	Until (2)	Area(acres)
1	01/01	12/31	N/A	N/A	2.79
2	01/01	12/31	N/A	N/A	2.79

Shortnose Sturgeon

#	Feature ID	Species	Life Stage	Behavior	Zone
1	SNS_C50_ADU_MAF	Shortnose sturgeon	Adult	Migrating & Foraging	N/A

#	From	Until	From (2)	Until (2)	Area(acres)
1	04/01	11/30	N/A	N/A	2.79

Attachment 10:

Notice of Intent to File

10.0 Notice of Intent to File

The applicant must provide public notice for all Individual (Tier III) NRPA permit applications.

1. **Newspaper**: The NOI was published in the *Portland Press Herald* on October 2, 2024, which falls within the required 30 days prior to the filing of the application. Proof of the notification is attached.

2. **Abutting Property Owners**: Abutters were sent the NOI via certified mail on October 2, 2024, which falls within the 30 days prior to the filing of the application. A list of abutters and proof of certified mailing is attached.

3. **Municipal Office**: A copy of the NOI and a duplicate of the entire application has been sent to the applicable municipal office.

Newspaper Public Notice

PUBLIC NOTICE:
NOTICE OF INTENT TO FILE

Please take notice that the Arundel Yacht Club, of 51 Ocean Ave, Kennebunkport, ME 04046, is intending to file a Natural Resources Protection Act (NRPA) Permit application with the Maine Department of Environmental Protection (DEP) pursuant to the provisions of 38 M.R.S. §§ 480-A through 480-BB on or about October 4, 2024. This application is for dredging activities to take place in the Kennebunk River to improve the boating operations (navigation) of the Arundel Yacht Club.

A request for a public hearing or a request that the Board of Environmental Protection assume jurisdiction over this application must be received by the Department in writing no later than 20 days after the application is found by the Department to be complete and is accepted for processing. A public hearing may or may not be held at the discretion of the Commissioner or Board of Environmental Protection. Public comment on the application will be accepted throughout the processing of the application. The application will be filed for public inspection at the Maine DEP's office in Portland during normal working hours. A copy of the application may also be seen at the municipal offices in Kennebunkport, Maine. Written public comments may be sent to the regional office in Portland where the application is filed for public inspection: Maine DEP, Southern Maine Regional Offices, 312 Canco Road, Portland, Maine 04103.

Proof of Newspaper Public Notice

Portland Press Herald
EST 1862
Maine Sunday Telegram
pressherald.com

Classified Advertising Proof

Bill Walsh
Walsh Engineering Associates
1 Karen Dr #2A
Westbrook
ME
04092 -192
+1 (207) 553-9898
jenileigh@Walsh-eng.com

Thank you for placing your advertisement with us.

Your order information and a preview of your advertisement are attached below for your review. If there are changes or questions, please contact the classified department at (207) 791-6100

Thank you

(207) 791-6100 jjensen@mainetoday.com Monday – Friday 8:00 am – 5pm

Order Number	**0521094**	Order Price	**$404.53**
Sales Rep.	**Joan Jensen**	PO No.	**10.1 - Public Notice / Sherry Pinard**
Account	**10155**	Payment Type	**Invoice**
Publication	**Portland Press Herald**	Number of dates	**1**
First Run Date	**10/02/2024**	Last Run Date	**10/02/2024**
Publication	**Online Upsell PPH**	Number of dates	**1**
First Run Date	**10/02/2024**	Last Run Date	**10/02/2024**

Public Notice

NOTICE OF INTENT TO FILE

Please take notice that the Arundel Yacht Club, of 51 Ocean Ave, Kennebunkport, ME 04046, is intending to file a Natural Resources Protection Act (NRPA) Permit application with the Maine Department of Environmental Protection (DEP) pursuant to the pursuant to the provisions of 38 M.R.S. §§ 480-A through 480-BB on or about October 4, 2024. This application is for dredging activities to take place in the Kennebunk River to improve the boating operations (navigation) of the Arundel Yacht Club.

A request for a public hearing or a request that the Board of Environmental Protection assume jurisdiction over this application must be received by the Department in writing no later than 20 days after the application is found by the Department to be complete and is accepted for processing. A public hearing may or may not be held at the discretion of the Commissioner or Board of Environmental Protection. Public comment on the application will be accepted throughout the processing of the application. The application will be filed for public inspection at the Maine DEP's office in Portland during normal working hours. A copy of the application may also be seen at the municipal offices in Kennebunkport, Maine. Written public comments may be sent to the regional office in Portland where the application is filed for public inspection: Maine DEP Southern

Maine DEP, Southern Maine Regional Offices, 312 Canco Road, Portland, Maine 04103.

Abutters Letter

WALSH
ENGINEERING ASSOCIATES, INC.

October 1, 2024

Dear Abutter/Neighbor of 51 Ocean Ave:

On behalf of the Arundel Yacht Club (AYC) of 51 Ocean Ave, Kennebunkport, ME 04046, I am writing to inform you of their intent to submit a Natural Resources Protection Act (NRPA) permit application to the Maine Department of Environmental Protection (DEP). The NRPA permit will provide for dredging activities in the Kennebunk River to improve the boating operations of the AYC.

You are receiving this letter as the Maine DEP requires that all abutters of the subject property receive notification of the NRPA application. I have attached a copy of the Public Notice that will be published in the *Portland Press Herald* on or around October 2, 2024.

Should you have any questions or concerns, please do not hesitate to contact me at (207) 553-9898 or leyna@walsh-eng.com.

Respectfully,

Leyna L Tobey

Leyna Tobey, PE – Project Manager
Walsh Engineering Associates, Inc.

Enc. Public Notice
Site Location Plan

WALSH
ENGINEERING ASSOCIATES, INC.

November 8, 2024

Dear Abutter/Neighbor of 51 Ocean Ave:

On behalf of the Arundel Yacht Club (AYC) of 51 Ocean Ave, Kennebunkport, ME 04046, I am writing to inform you of their intent to submit a Natural Resources Protection Act (NRPA) permit application to the Maine Department of Environmental Protection (DEP). The NRPA permit will provide for dredging activities in the Kennebunk River to improve the boating operations of the AYC.

You are receiving this letter as the Maine DEP requires that all abutters of the subject property receive notification of the NRPA application. I have attached a copy of the Public Notice that was published in the *Portland Press Herald* on October 2, 2024.

Should you have any questions or concerns, please do not hesitate to contact me at (207) 553-9898 or leyna@walsh-eng.com.

Respectfully,

Leyna L Tobey

Leyna Tobey, PE – Project Manager
Walsh Engineering Associates, Inc.

Enc. Public Notice
Site Location Plan

Abutters List (1,000-foot)

1000 feet Abutters List Report

Kennebunkport, ME
November 08, 2024

Subject Property:

Parcel Number:	10-1-5	Mailing Address:	ARUNDEL YACHT CLUB
CAMA Number:	10-1-5		PO BOX 328
Vision ID:	3428		KENNEBUNKPORT, ME 04046-0328
Property Address:	51 OCEAN AVENUE		

Abutters:

Parcel Number:	10-1-10	Mailing Address:	ENOCH, MATTHEW S & DONNA C
CAMA Number:	10-1-10		642 ALLEGIANCE DRIVE
Vision ID:	3438		LITITZ, PA 17543
Property Address:	41 OCEAN AVENUE		
Parcel Number:	10-1-11	Mailing Address:	HALL, JONATHAN S
CAMA Number:	10-1-11		PO BOX 811
Vision ID:	539		WINDHAM, NH 03087
Property Address:	4 WHARF LANE		
Parcel Number:	10-1-12	Mailing Address:	ROMINE, DONALD J & RHODA M
CAMA Number:	10-1-12		325 DUNES BLVD., APT 803
Vision ID:	3439		NAPLES, FL 34110
Property Address:	7 WHARF LANE		
Parcel Number:	10-1-13	Mailing Address:	SWEENEY, JOHN & ANN-MARIE
CAMA Number:	10-1-13		16 MARTIN STREET
Vision ID:	105940		ACTON, MA 01720
Property Address:	5 WHARF LANE		
Parcel Number:	10-1-14	Mailing Address:	2538970 ONTARIO, INC
CAMA Number:	10-1-14		765 WESTNEY ROAD SOUTH
Vision ID:	543		AJAX, ON L1S 6W1
Property Address:	3 WHARF LANE		
Parcel Number:	10-1-15	Mailing Address:	KENNEBUNKPORT, TOWN OF
CAMA Number:	10-1-15		PO BOX 566
Vision ID:	3441		KENNEBUNKPORT, ME 04046
Property Address:	53 OCEAN AVENUE		
Parcel Number:	10-1-2	Mailing Address:	KPT MARINE, LLC
CAMA Number:	10-1-2		PO BOX 2734
Vision ID:	3426		KENNEBUNKPORT, ME 04046
Property Address:	67 OCEAN AVENUE		
Parcel Number:	10-1-3	Mailing Address:	YACHTSMAN HOSPITALITY, LLC
CAMA Number:	10-1-3		2 LIVEWELL DRIVE, #203
Vision ID:	3427		KENNEBUNK, ME 04043
Property Address:	57 OCEAN AVENUE		

Parcel Number:	10-1-4	Mailing Address:	KENNEBUNKPORT, TOWN OF
CAMA Number:	10-1-4		PO BOX 566
Vision ID:	525		KENNEBUNKPORT, ME 04046
Property Address:	OCEAN AVENUE		

Parcel Number:	10-1-6	Mailing Address:	EDITH HG MCCONNELL REVOCABLE TRUST
CAMA Number:	10-1-6		PO BOX 1813
Vision ID:	527		KENNEBUNKPORT, ME 04046
Property Address:	49 OCEAN AVENUE		

Parcel Number:	10-1-7	Mailing Address:	BARTLETT, HUGH J & JUDITH
CAMA Number:	10-1-7		PO BOX 293
Vision ID:	105722		KENNEBUNKPORT, ME 04046
Property Address:	47 OCEAN AVENUE #5		

Parcel Number:	10-1-7	Mailing Address:	FANTON, ROMA F
CAMA Number:	10-1-7A		39 MEETINGHOUSE LANE
Vision ID:	105722		FAIRFIELD, CT 06430
Property Address:	47 OCEAN AVENUE #7		

Parcel Number:	10-1-7	Mailing Address:	NOWAK, LORI
CAMA Number:	10-1-7B		4940 N HACIENDA DEL SOL ROAD
Vision ID:	105722		TUCSON, AZ 85718
Property Address:	47 OCEAN AVENUE #8		

Parcel Number:	10-1-7	Mailing Address:	NOWAK, LORI
CAMA Number:	10-1-7C		4940 N HACIENDA DEL SOL ROAD
Vision ID:	105722		TUCSON, AZ 85718
Property Address:	47 OCEAN AVENUE #6		

Parcel Number:	10-1-7	Mailing Address:	MCFB, LLC
CAMA Number:	10-1-7D		PO BOX 2675
Vision ID:	105722		KENNEBUNKPORT, ME 04046
Property Address:	47 OCEAN AVENUE #4		

Parcel Number:	10-1-7	Mailing Address:	MULBERGER, VIRGINIA A
CAMA Number:	10-1-7E		804 HALL PLACE
Vision ID:	105722		ALEXANDRIA, VA 22302
Property Address:	47 OCEAN AVENUE #2		

Parcel Number:	10-1-7	Mailing Address:	REDDEN, MICHAELA A & OLSHAN, ARTHUR
CAMA Number:	10-1-7F		8 FRAESCO LANE
Vision ID:	105722		NORWOOD, NJ 07648
Property Address:	47 OCEAN AVENUE #3		

Parcel Number:	10-1-7	Mailing Address:	PELLETIER, THOMAS J & CYNTHIA L
CAMA Number:	10-1-7G		182 LOWELL STREET
Vision ID:	105722		PEABODY, MA 01960
Property Address:	47 OCEAN AVENUE #1		

Parcel Number:	10-1-7	Mailing Address:	RIVERBANK CONDO
CAMA Number:	10-1-7Z		
Vision ID:	105722		,
Property Address:	47 OCEAN AVENUE #MAIN		

Parcel Number:	10-1-8	Mailing Address:	WOMEN & WINE, LLC
CAMA Number:	10-1-8		PO BOX 1148
Vision ID:	3437		KENNEBUNKPORT, ME 04046
Property Address:	45 OCEAN AVENUE		

Parcel Number:	10-1-9	Mailing Address:	WILLIAMSON, ROBERT S
CAMA Number:	10-1-9		PO BOX 1950
Vision ID:	537		KENNEBUNKPORT, ME 04046
Property Address:	43 OCEAN AVENUE		

Parcel Number:	10-2-1	Mailing Address:	BYERLY, WILLIAM F & MARY C
CAMA Number:	10-2-1		PO BOX 2675
Vision ID:	3442		KENNEBUNKPORT, ME 04046
Property Address:	46 OCEAN AVENUE		

Parcel Number:	10-2-2	Mailing Address:	KENNEBUNKPORT CONSERVATION TRUST
CAMA Number:	10-2-2		PO BOX 7004
Vision ID:	546		CAPE PORPOISE, ME 04014-07004
Property Address:	OCEAN AVENUE		

Parcel Number:	10-2-3	Mailing Address:	KENNEBUNKPORT CAPTAINS COLLECTION, LLC
CAMA Number:	10-2-3		PO BOX 3089
Vision ID:	547		KENNEBUNKPORT, ME 04046
Property Address:	5 PEARL STREET		

Parcel Number:	10-3-1	Mailing Address:	BALCOM, WILLIAM BRIAN
CAMA Number:	10-3-1		3002 WINDSOR RIDGE DRIVE
Vision ID:	548		WESTBOROUGH, MA 01581
Property Address:	7 PEARL STREET		

Parcel Number:	10-3-2	Mailing Address:	KENNEBUNKPORT CAPTAINS COLLECTION, LLC
CAMA Number:	10-3-2		PO BOX 3089
Vision ID:	549		KENNEBUNKPORT, ME 04046
Property Address:	6 PLEASANT STREET		

Parcel Number:	10-3-3	Mailing Address:	KCC-CGH HOLDINGS, LLC
CAMA Number:	10-3-3		PO BOX 3089
Vision ID:	550		KENNEBUNKPORT, ME 04046
Property Address:	35 MAINE STREET		

Parcel Number:	10-3-4	Mailing Address:	MICHELLE L DRAGHETTI REVOCABLE TRUST
CAMA Number:	10-3-4		PO BOX 2797
Vision ID:	551		KENNEBUNKPORT, ME 04046
Property Address:	33 MAINE STREET		

Parcel Number:	10-3-5	Mailing Address:	WIDMER, MATTHEW A & AMY M
CAMA Number:	10-3-5		18 LOUDEN HEIGHTS NORTH
Vision ID:	552		ALBANY, NY 12211
Property Address:	31 MAINE STREET		
Parcel Number:	10-4-1	Mailing Address:	KENNEBUNKPORT CAPTAINS
CAMA Number:	10-4-1		COLLECTION, LLC
Vision ID:	3443		PO BOX 3089
Property Address:	8 PLEASANT STREET		KENNEBUNKPORT, ME 04046
Parcel Number:	10-4-2	Mailing Address:	MIDDLETON, MARJORIE D & JOHN L JR
CAMA Number:	10-4-2		PO BOX 1046
Vision ID:	3444		KENNEBUNKPORT, ME 04046
Property Address:	10 PLEASANT STREET		
Parcel Number:	10-4-3	Mailing Address:	DAVID L KELLY FAMILY TRUST
CAMA Number:	10-4-3		25 OAK STREET
Vision ID:	555		CHARLESTOWN, MA 02129
Property Address:	12 PLEASANT STREET		
Parcel Number:	10-4-4	Mailing Address:	MALTE LUKAS REVOCABLE TRUST
CAMA Number:	10-4-4		PO BOX 2798
Vision ID:	556		KENNEBUNKPORT, ME 04046
Property Address:	5 SOUTH STREET		
Parcel Number:	10-4-5	Mailing Address:	MATTUCHIO FAMILY IRREVOCABLE
CAMA Number:	10-4-5		TRUST
Vision ID:	3445		PO BOX 169
Property Address:	3 SOUTH STREET		KENNEBUNKPORT, ME 04046
Parcel Number:	10-4-6	Mailing Address:	MORELLI, MICHAEL J & KERRY H
CAMA Number:	10-4-6A		42 BOULDER TRAIL
Vision ID:	105723		BRONXVILLE, NY 10708
Property Address:	41 MAINE STREET #1		
Parcel Number:	10-4-6	Mailing Address:	LEA RAE LEVINES REVOCABLE TRUST
CAMA Number:	10-4-6B		610 SOUTH ROME AVE, UNIT 303
Vision ID:	105723		TAMPA, FL 33606
Property Address:	41 MAINE STREET #2		
Parcel Number:	10-4-6	Mailing Address:	CAPPS, NOBLE F & NANCY H
CAMA Number:	10-4-6C		PO BOX 1023
Vision ID:	105723		KENNEBUNKPORT, ME 04046
Property Address:	41 MAINE STREET #3		
Parcel Number:	10-4-6	Mailing Address:	PORT COMMONS CONDO
CAMA Number:	10-4-6Z		
Vision ID:	105723		,
Property Address:	41 MAINE STREET #MAIN		

Parcel Number:	10-4-7	Mailing Address:	MARINO, ELAINE
CAMA Number:	10-4-7		PO BOX 1537
Vision ID:	561		KENNEBUNKPORT, ME 04046
Property Address:	11 GREENE STREET		

Parcel Number:	10-4-8	Mailing Address:	MARINO, ELAINE
CAMA Number:	10-4-8		PO BOX 1537
Vision ID:	562		KENNEBUNKPORT, ME 04046
Property Address:	CORNER MAINE & GREENE ST		

Parcel Number:	10-4-9	Mailing Address:	HUNTER, JAMES & JOAN F
CAMA Number:	10-4-9		39 MAINE STREET
Vision ID:	563		KENNEBUNKPORT, ME 04046
Property Address:	39 MAINE STREET		

Parcel Number:	10-5-10	Mailing Address:	MAHONEY FAMILY REVOCABLE TRUST
CAMA Number:	10-5-10		52 OCEAN AVENUE
Vision ID:	587		KENNEBUNKPORT, ME 04046
Property Address:	52 OCEAN AVENUE		

Parcel Number:	10-5-11	Mailing Address:	STOHLMAN, SUZANNE
CAMA Number:	10-5-11		PO BOX 127
Vision ID:	588		KENNEBUNKPORT, ME 04046
Property Address:	5 GREENE STREET		

Parcel Number:	10-5-12	Mailing Address:	MARQUIS, ALFRED C JR & JULIE A
CAMA Number:	10-5-12		PO BOX 1835
Vision ID:	3465		KENNEBUNKPORT, ME 04046
Property Address:	60 OCEAN AVENUE		

Parcel Number:	10-5-13	Mailing Address:	DORAN, WILLIAM M & SUSAN L
CAMA Number:	10-5-13		4807 MARBLE HILL DRIVE
Vision ID:	590		LAFAYETTE HILL, PA 19444
Property Address:	66 OCEAN AVENUE		

Parcel Number:	10-5-14	Mailing Address:	WINSTANLEY, ADAM D
CAMA Number:	10-5-14		150 BAKER AVENUE SUITE 303
Vision ID:	3466		CONCORD, MA 01742
Property Address:	68 OCEAN AVENUE		

Parcel Number:	10-5-17	Mailing Address:	SPENCER, MARY A
CAMA Number:	10-5-17		PO BOX 1422
Vision ID:	593		KENNEBUNKPORT, ME 04046
Property Address:	10 SOUTH STREET		

Parcel Number:	10-5-5	Mailing Address:	ANDONIAN, DAVID & KRIS A
CAMA Number:	10-5-5		PO BOX 800
Vision ID:	569		KENNEBUNKPORT, ME 04046
Property Address:	53 MAINE STREET		

Parcel Number:	10-5-6	Mailing Address:	CROW, KAREN W
CAMA Number:	10-5-6		PO BOX 342
Vision ID:	105752		KENNEBUNK, ME 04043
Property Address:	47 MAINE STREET #7		

Parcel Number:	10-5-6	Mailing Address:	DIETZ, KATHLEEN
CAMA Number:	10-5-6A		107 OLD PORT ROAD
Vision ID:	105752		KENNEBUNK, ME 04043
Property Address:	47 MAINE STREET #8		

Parcel Number:	10-5-6	Mailing Address:	CALDERA, RICHARD & MARGARET
CAMA Number:	10-5-6B		47 MAINE STREET, UNIT 10
Vision ID:	105752		KENNEBUNKPORT, ME 04046
Property Address:	47 MAINE STREET #10		

Parcel Number:	10-5-6	Mailing Address:	GRAHAM, MARY ANN
CAMA Number:	10-5-6C		PO BOX 183
Vision ID:	105752		KENNEBUNKPORT, ME 04046
Property Address:	47 MAINE STREET #14		

Parcel Number:	10-5-6	Mailing Address:	GROMAN, ELIZABETH L
CAMA Number:	10-5-6D		47 MAINE STREET UNIT #9
Vision ID:	105752		KENNEBUNKPORT, ME 04046
Property Address:	47 MAINE STREET #9		

Parcel Number:	10-5-6	Mailing Address:	RANDALL, KAREN
CAMA Number:	10-5-6E		PO BOX 40
Vision ID:	105752		LUDLOW, MA 01056
Property Address:	47 MAINE STREET #11		

Parcel Number:	10-5-6	Mailing Address:	DROMGOOLE, JOHN & CAROL ANN
CAMA Number:	10-5-6F		150 HUBBARD STREET #A
Vision ID:	105752		CONCORD, MA 01742
Property Address:	47 MAINE STREET #6		

Parcel Number:	10-5-6	Mailing Address:	DENOIA, MARC
CAMA Number:	10-5-6G		590 TREMONT STREET
Vision ID:	105752		BOSTON, MA 02118
Property Address:	47 MAINE STREET #2		

Parcel Number:	10-5-6	Mailing Address:	MARGUERITE J WATERS REVOCABLE TRUST
CAMA Number:	10-5-6H		47 MAINE STREET #3
Vision ID:	105752		KENNEBUNKPORT, ME 04046
Property Address:	47 MAINE STREET #3		

Parcel Number:	10-5-6	Mailing Address:	KENNEDY, ILONA & LESLIE
CAMA Number:	10-5-6I		47 MAINE STREET, UNIT 1
Vision ID:	105752		KENNEBUNKPORT, ME 04046
Property Address:	47 MAINE STREET #1		

Parcel Number:	10-5-6	Mailing Address:	HAGER, CHRISTIE L & STARK, ROYAL J
CAMA Number:	10-5-6J		26 BREWER DRIVE
Vision ID:	105752		WESTBOROUGH, MA 01581
Property Address:	47 MAINE STREET #13		

Parcel Number:	10-5-6	Mailing Address:	AUSTIN, JACK N & HOYT, KATHERINE L
CAMA Number:	10-5-6K		47 MAINE STREET, UNIT 12
Vision ID:	105752		KENNEBUNKPORT, ME 04046
Property Address:	47 MAINE STREET #12		

Parcel Number:	10-5-6	Mailing Address:	MARTHA NIKITAS STONE REV TRUST
CAMA Number:	10-5-6L		42 PINE STREET
Vision ID:	105752		CONCORD, MA 01742
Property Address:	47 MAINE STREET #5		

Parcel Number:	10-5-6	Mailing Address:	MCGINN, HOWARD D & JAYNE A
CAMA Number:	10-5-6M		9 SHANANDOAH DRIVE
Vision ID:	105752		PAXTON, MA 01612
Property Address:	47 MAINE STREET #4		

Parcel Number:	10-5-6	Mailing Address:	TAMARACKS CONDO
CAMA Number:	10-5-6Z		
Vision ID:	105752		,
Property Address:	47 MAINE STREET #MAIN		

Parcel Number:	10-5-7	Mailing Address:	KUDAS, JACEK & SHARRY
CAMA Number:	10-5-7		43 MAINE STREET
Vision ID:	584		KENNEBUNKPORT, ME 04046
Property Address:	43 MAINE STREET		

Parcel Number:	10-5-8	Mailing Address:	YANKOWSKI, GEORGE E JR & JANICE G
CAMA Number:	10-5-8		
Vision ID:	3464		PO BOX 1333
Property Address:	6 SOUTH STREET		KENNEBUNKPORT, ME 04046

Parcel Number:	10-5-9	Mailing Address:	CARNEY, DONALD A
CAMA Number:	10-5-9		PO BOX 675
Vision ID:	586		KENNEBUNKPORT, ME 04046
Property Address:	8 SOUTH STREET		

Parcel Number:	10-6-1	Mailing Address:	KENNEBUNKPORT CAPTAINS
CAMA Number:	10-6-1		COLLECTION, LLC
Vision ID:	3467		PO BOX 3089
Property Address:	34 MAINE STREET		KENNEBUNKPORT, ME 04046

Parcel Number:	10-6-11A	Mailing Address:	TYLER, TROY
CAMA Number:	10-6-11A		15 TOWNE STREET
Vision ID:	3472		KENNEBUNKPORT, ME 04046
Property Address:	15 TOWNE STREET		

Parcel Number:	10-6-2	Mailing Address:	CUP AND SAUCER, LLC
CAMA Number:	10-6-2		133 SEASPRAY AVENUE
Vision ID:	595		PALM BEACH, FL 33480
Property Address:	38 MAINE STREET		

Parcel Number:	10-6-3	Mailing Address:	40 MAINE STREET, LLC
CAMA Number:	10-6-3		ATTN: KRISTIN BEAN 7019 S 45TH PLACE
Vision ID:	3468		PHOENIX, AZ 85042
Property Address:	40 MAINE STREET		

Parcel Number:	10-6-4	Mailing Address:	KIVLEHAN REVOCABLE TRUST
CAMA Number:	10-6-4		PO BOX 1727
Vision ID:	597		KENNEBUNKPORT, ME 04046
Property Address:	42 MAINE STREET		

Parcel Number:	10-6-5	Mailing Address:	LINDA BROOKS REVOCABLE TRUST
CAMA Number:	10-6-5		PO BOX 3085
Vision ID:	598		KENNEBUNKPORT, ME 04046
Property Address:	44 MAINE STREET		

Parcel Number:	10-6-6	Mailing Address:	PAPPAGEORGE, PATRICIA
CAMA Number:	10-6-6		1267 REALTA DRIVE
Vision ID:	3469		CHARLOTTE, NC 28211
Property Address:	48 MAINE STREET		

Parcel Number:	10-6-7	Mailing Address:	PRICE, EUGENE THOMAS & KRISTEN E
CAMA Number:	10-6-7		15 FERNWOOD ROAD
Vision ID:	3470		WEST HARTFORD, CT 06119
Property Address:	50 MAINE STREET		

Parcel Number:	11-1-1	Mailing Address:	ADAMS, DAVID R & ELLEN L
CAMA Number:	11-1-1		PO BOX 1016
Vision ID:	105724		KENNEBUNKPORT, ME 04046
Property Address:	37 OCEAN AVENUE #4		

Parcel Number:	11-1-11A1	Mailing Address:	SHMALO FAMILY, LLC
CAMA Number:	11-1-11A1		1023 WAGON WHEEL DRIVE
Vision ID:	3480		SARASOTA, FL 34240
Property Address:	17 OCEAN AVENUE		

Parcel Number:	11-1-11A2	Mailing Address:	SHMALO FAMILY, LLC
CAMA Number:	11-1-11A2		1023 WAGON WHEEL DRIVE
Vision ID:	3481		SARASOTA, FL 34240
Property Address:	15 OCEAN AVENUE		

Parcel Number:	11-1-11B	Mailing Address:	SAND DOLLAR HOLDINGS, LLC
CAMA Number:	11-1-11B		6720 SE HARBOR CIRCLE
Vision ID:	624		STUART, FL 34996
Property Address:	19 OCEAN AVENUE		

Parcel Number:	11-1-12	Mailing Address:	RED BUILDING TRUST
CAMA Number:	11-1-12		121 NORTH STREET
Vision ID:	625		KENNEBUNKPORT, ME 04046
Property Address:	13 OCEAN AVENUE		
Parcel Number:	11-1-13	Mailing Address:	B & C PROPERTIES, LLC
CAMA Number:	11-1-13		C/O JENNIFER LANIGAN 5301 WESTON
Vision ID:	3482		DOWNS DRIVE
Property Address:	11 OCEAN AVENUE		DURHAM, NC 27707
Parcel Number:	11-11-3	Mailing Address:	JENKINS, DAVID W & DIANE
CAMA Number:	11-11-3		PO BOX J
Vision ID:	765		KENNEBUNKPORT, ME 04046
Property Address:	4 UNION STREET		
Parcel Number:	11-1-1	Mailing Address:	SIMONETTI, ALEXIS A
CAMA Number:	11-1-1A		37 OCEAN AVENUE, #6
Vision ID:	105724		KENNEBUNKPORT, ME 04046
Property Address:	37 OCEAN AVENUE #6		
Parcel Number:	11-1-1	Mailing Address:	STRAUB, CHARLES W JR & CAROL J
CAMA Number:	11-1-1B		100 STONEHAVEN DRIVE
Vision ID:	105724		COLUMBIANA, OH 44408
Property Address:	37 OCEAN AVENUE #2		
Parcel Number:	11-1-1	Mailing Address:	DESCOTEAUX, DAVID & JULIA
CAMA Number:	11-1-1C		89 HAIGHT HILL ROAD
Vision ID:	105724		STANFORDVILLE, NY 12581
Property Address:	37 OCEAN AVENUE #5		
Parcel Number:	11-1-1	Mailing Address:	REVOCABLE TRUST OF ALICE L ROSE
CAMA Number:	11-1-1D		51 PETTEE STREET #34
Vision ID:	105724		NEWTON, MA 02464
Property Address:	37 OCEAN AVENUE #1		
Parcel Number:	11-1-1	Mailing Address:	DRANOW, STEVEN & JAMIE
CAMA Number:	11-1-1E		5 ROOKERY CIRCLE
Vision ID:	105724		NEW CITY, NY 10956
Property Address:	37 OCEAN AVENUE #3		
Parcel Number:	11-1-1	Mailing Address:	LEESIDE CONDO
CAMA Number:	11-1-1Z		
Vision ID:	105724		,
Property Address:	37 OCEAN AVENUE #MAIN		
Parcel Number:	11-1-2	Mailing Address:	HANDLEN, FRANK W & CUMMINS,
CAMA Number:	11-1-2		SHARON L
Vision ID:	614		PO BOX 210
Property Address:	35 OCEAN AVENUE		KENNEBUNKPORT, ME 04046

Parcel Number:	11-1-3	Mailing Address:	THOMPSON, HARRY A III & JILL M
CAMA Number:	11-1-3		PO BOX 20
Vision ID:	3475		KENNEBUNKPORT, ME 04046
Property Address:	33 OCEAN AVENUE		
Parcel Number:	11-1-4	Mailing Address:	RINALDI, JOHN F & POWELL, BRIAN
CAMA Number:	11-1-4		PO BOX 1079
Vision ID:	3476		KENNEBUNKPORT, ME 04046
Property Address:	31 OCEAN AVENUE		
Parcel Number:	11-1-5	Mailing Address:	SHAHIAN, DOUGLAS & LISA
CAMA Number:	11-1-5		37 HICKORY LANE
Vision ID:	617		BOXFORD, MA 01921
Property Address:	29 OCEAN AVENUE		
Parcel Number:	11-1-6	Mailing Address:	DAVID C KRIEG LIVING TRUST
CAMA Number:	11-1-6		PO BOX 664
Vision ID:	3477		KENNEBUNKPORT, ME 04046
Property Address:	27 OCEAN AVENUE		
Parcel Number:	11-1-7	Mailing Address:	2538970 ONTARIO, INC
CAMA Number:	11-1-7		765 WESTNEY ROAD SOUTH
Vision ID:	620		AJAX, ON L1S 6W1
Property Address:	25 OCEAN AVENUE		
Parcel Number:	11-1-8	Mailing Address:	BOATHOUSE AT KENNEBUNKPORT, LLC
CAMA Number:	11-1-8		
Vision ID:	3479		2 LIVEWELL DR., SUITE 203
Property Address:	21 OCEAN AVENUE		KENNEBUNK, ME 04043
Parcel Number:	11-4-5	Mailing Address:	KEATING, SALLY R
CAMA Number:	11-4-5		PO BOX 1921
Vision ID:	677		KENNEBUNKPORT, ME 04046
Property Address:	22 MAINE STREET		
Parcel Number:	11-4-6	Mailing Address:	CLIFTON & MARLENE RAUM
CAMA Number:	11-4-6		REVOCABLE TRUST
Vision ID:	678		24 MAINE STREET
Property Address:	24 MAINE STREET		KENNEBUNKPORT, ME 04046
Parcel Number:	11-6-1	Mailing Address:	MILES, DANIEL F & ANDREA
CAMA Number:	11-6-1		11 TOWNE STREET
Vision ID:	713		KENNEBUNKPORT, ME 04046
Property Address:	11 TOWNE STREET		
Parcel Number:	11-6-10	Mailing Address:	SPICEWOOD MAINE, LLC
CAMA Number:	11-6-10		8 SPICEWOOD LANE
Vision ID:	722		WILTON, CT 06897
Property Address:	28 MAINE STREET		

Parcel Number:	11-6-11	Mailing Address:	EISING, PETER A & SUSANNE
CAMA Number:	11-6-11		PO BOX 2761
Vision ID:	723		KENNEBUNKPORT, ME 04046
Property Address:	30 MAINE STREET		

Parcel Number:	11-6-2	Mailing Address:	LILLIAN M BARTLETT REVOCABLE TRUST
CAMA Number:	11-6-2		PO BOX 2549
Vision ID:	714		KENNEBUNKPORT, ME 04046
Property Address:	9 TOWNE STREET		

Parcel Number:	11-6-3	Mailing Address:	GERE, NICHOLAS D & TRACI L
CAMA Number:	11-6-3		7 TOWNE STREET
Vision ID:	715		KENNEBUNKPORT, ME 04046
Property Address:	7 TOWNE STREET		

Parcel Number:	11-6-5	Mailing Address:	GAROTTA, CHRISTIAN
CAMA Number:	11-6-5		235 RUE SAINT MAURICE
Vision ID:	717		BROSSARD, QUEBEC, QC J4X 2X1
Property Address:	3 TOWNE STREET		

Parcel Number:	11-6-8	Mailing Address:	DONESKI, DAVID J & SANDRA D
CAMA Number:	11-6-8		94 ROSE HILL WAY
Vision ID:	720		WALTHAM, MA 02453
Property Address:	3 SCHOOL STREET		

Parcel Number:	11-6-9	Mailing Address:	STAMPLIS, JOANNE M & MATTHEW
CAMA Number:	11-6-9		26 MAINE STREET
Vision ID:	721		KENNEBUNKPORT, ME 04046
Property Address:	26 MAINE STREET		

Parcel Number:	11-7-1	Mailing Address:	MAINE PEARL LLC
CAMA Number:	11-7-1		1370 FAN PALM ROAD
Vision ID:	724		BOCA RATON, FL 33432
Property Address:	29 MAINE STREET		

Parcel Number:	11-7-10	Mailing Address:	MATTHEW C ALLARD REVOCABLE TRUST
CAMA Number:	11-7-10		54 WESSCUM WOOD ROAD
Vision ID:	3505		RIVERSIDE, CT 06878
Property Address:	4 PEARL STREET		

Parcel Number:	11-7-11	Mailing Address:	STEPHEN C PAGE REVOCABLE TRUST
CAMA Number:	11-7-11		6539 SOUTH MARINA WAY
Vision ID:	3506		STUART, FL 34996
Property Address:	8 PEARL STREET		

Parcel Number:	11-7-12	Mailing Address:	PAUL L MAHONEY REVOCABLE TRUST
CAMA Number:	11-7-12		6825 SAN MARINO DRIVE
Vision ID:	735		NAPLES, FL 34108
Property Address:	10 PEARL STREET		

Parcel Number:	11-7-13	Mailing Address:	DOWNS, EVA M
CAMA Number:	11-7-13		PO BOX 1778
Vision ID:	736		KENNEBUNKPORT, ME 04046
Property Address:	12 PEARL STREET		
Parcel Number:	11-7-2	Mailing Address:	KARAKHANIAN, ALEXANDER & RENA
CAMA Number:	11-7-2		661 MELALEUCA LANE
Vision ID:	3503		MIAMI, FL 33137
Property Address:	27 MAINE STREET		
Parcel Number:	11-7-3	Mailing Address:	DELANCEY-KAY REVOCABLE TRUST
CAMA Number:	11-7-3		600 MAIN STREET, APT 2303
Vision ID:	726		WORCESTER, MA 01608
Property Address:	9 ELM STREET		
Parcel Number:	11-7-4	Mailing Address:	CONDON, ROBERT & ELLICE
CAMA Number:	11-7-4		80 S RIVER ROAD
Vision ID:	727		STUART, FL 34996
Property Address:	7 ELM STREET		
Parcel Number:	11-7-5	Mailing Address:	KUBIAK, FAITH & KATHERINE
CAMA Number:	11-7-5		PO BOX 6
Vision ID:	728		KENNEBUNKPORT, ME 04046
Property Address:	5 ELM STREET		
Parcel Number:	11-7-6	Mailing Address:	M&T BANK
CAMA Number:	11-7-6		C/O CONCENTRIX PO BOX 2410
Vision ID:	729		OMAHA, NE 68103
Property Address:	3 ELM STREET		
Parcel Number:	11-7-7	Mailing Address:	1 ELM STREET, LLC
CAMA Number:	11-7-7		135 GRAFTON STREET
Vision ID:	730		CHEVY CHASE, MD 20815
Property Address:	40 OCEAN AVENUE		
Parcel Number:	11-7-8	Mailing Address:	PAINE, W ROBERT & EVELYN
CAMA Number:	11-7-8		PO BOX 1364
Vision ID:	3504		KENNEBUNKPORT, ME 04046
Property Address:	42 OCEAN AVENUE		
Parcel Number:	11-7-9	Mailing Address:	BLACK FAMILY REVOCABLE TRUST
CAMA Number:	11-7-9		PO BOX 837
Vision ID:	732		KENNEBUNKPORT, ME 04046
Property Address:	2 PEARL STREET		
Parcel Number:	11-8-1	Mailing Address:	KENNEBUNKPORT, TOWN OF
CAMA Number:	11-8-1		PO BOX 566
Vision ID:	3507		KENNEBUNKPORT, ME 04046
Property Address:	6 ELM STREET		

Parcel Number:	11-8-2	Mailing Address:	DULEY, BRIGITTE I
CAMA Number:	11-8-2		PO BOX 567
Vision ID:	738		KENNEBUNKPORT, ME 04046
Property Address:	3 CHESTNUT STREET		

Parcel Number:	11-8-3	Mailing Address:	OCEAN AVENUE REALTY TRUST
CAMA Number:	11-8-3		PO BOX 949
Vision ID:	3508		KENWOOD, CA 95452
Property Address:	32 OCEAN AVENUE		

Parcel Number:	11-8-4	Mailing Address:	CABE, MARIO & JOANN
CAMA Number:	11-8-4		1008 E KENNEDY RD
Vision ID:	740		NORTH WALES, PA 19454
Property Address:	2 ELM STREET		

Parcel Number:	11-8-5	Mailing Address:	WHETSELL, M HEYWARD JR &
CAMA Number:	11-8-5		SHERRILL A
Vision ID:	741		2820 COUNTRY CLUB RD
Property Address:	4 ELM STREET		WINSTON-SALEM, NC 27104

Parcel Number:	11-9-1	Mailing Address:	BELYEA, JOHN A
CAMA Number:	11-9-1		PO BOX 401
Vision ID:	742		KENNEBUNKPORT, ME 04046
Property Address:	14 CHESTNUT STREET		

Parcel Number:	11-9-10	Mailing Address:	SHMALO FAMILY, LLC
CAMA Number:	11-9-10		1023 WAGON WHEEL DRIVE
Vision ID:	751		SARASOTA, FL 34240
Property Address:	24 OCEAN AVENUE		

Parcel Number:	11-9-11	Mailing Address:	PERKINS, CARLA L
CAMA Number:	11-9-11		PO BOX 796
Vision ID:	3511		KENNEBUNKPORT, ME 04046-0796
Property Address:	30 OCEAN AVENUE		

Parcel Number:	11-9-12	Mailing Address:	KNOWLES, ROBERT W
CAMA Number:	11-9-12		PO BOX 130
Vision ID:	753		KENNEBUNKPORT, ME 04046
Property Address:	4 CHESTNUT STREET		

Parcel Number:	11-9-13	Mailing Address:	KILBURN HOUSE, LLC
CAMA Number:	11-9-13		1601 EAST BLOUNT ST.
Vision ID:	3512		PENSACOLA, FL 32503
Property Address:	6 CHESTNUT STREET		

Parcel Number:	11-9-14	Mailing Address:	GOODWIN, KAREN A
CAMA Number:	11-9-14		PO BOX 545
Vision ID:	755		KENNEBUNKPORT, ME 04046
Property Address:	8 CHESTNUT STREET		

Parcel Number:	11-9-15	Mailing Address:	CAREY, MEGHAN & HUEBINGER, BRAD
CAMA Number:	11-9-15		155 DODD BLVD
Vision ID:	756		HAMPTON, VA 23665
Property Address:	10 CHESTNUT STREET		

Parcel Number:	11-9-16	Mailing Address:	VASQUEZ, NICHOLAS & KERCADO, MELISSA
CAMA Number:	11-9-16		PO BOX 2742
Vision ID:	757		KENNEBUNKPORT, ME 04046
Property Address:	12 CHESTNUT STREET		

Parcel Number:	11-9-2	Mailing Address:	MCWILLIAMS FAMILY TRUST
CAMA Number:	11-9-2		28 COLTON LANE
Vision ID:	743		SHREWSBURY, MA 01545
Property Address:	10 ELM STREET		

Parcel Number:	11-9-3	Mailing Address:	HECKLER, JOHN H & CAROL A
CAMA Number:	11-9-3		PO BOX 831
Vision ID:	3509		KENNEBUNKPORT, ME 04046
Property Address:	12 ELM STREET		

Parcel Number:	11-9-4	Mailing Address:	NATOLI, JOAN E & RICHARD
CAMA Number:	11-9-4		PO BOX 763
Vision ID:	745		KENNEBUNKPORT, ME 04046
Property Address:	25 MAINE STREET		

Parcel Number:	11-9-5	Mailing Address:	SCOTT, ANDREW & GRAHAM, KELLY
CAMA Number:	11-9-5		PO BOX 524
Vision ID:	746		KENNEBUNKPORT, ME 04046
Property Address:	23 MAINE STREET		

Parcel Number:	11-9-6	Mailing Address:	HENRY, JOHN G & AOIFE C
CAMA Number:	11-9-6		MOUNTAIN VIEW BLACKROCK
Vision ID:	747		DUNDALK, CO. LOUTH, A91 N923
Property Address:	19 MAINE STREET		

Parcel Number:	11-9-8	Mailing Address:	PAGANO, ROBERT & DIANE
CAMA Number:	11-9-8		PO BOX 1743
Vision ID:	749		KENNEBUNKPORT, ME 04046
Property Address:	7 UNION STREET		

Parcel Number:	11-9-9	Mailing Address:	JJPT REALTY PARTNERS, LLC
CAMA Number:	11-9-9		3802 WOODBRIDGE ROAD
Vision ID:	3510		PEABODY, MA 01960
Property Address:	3 UNION STREET		

Parcel Number:	8-1-22	Mailing Address:	TIDEMARK CORPORATION
CAMA Number:	8-1-22		273 CORPORATE DRIVE, SUITE 150
Vision ID:	197		PORTSMOUTH, NH 03801
Property Address:	75 OCEAN AVENUE		

1000 feet Abutters List Report

Kennebunkport, ME
November 08, 2024

Parcel Number:	9-4-1E	Mailing Address:	FAESSLER, WILLY A & JANICE M
CAMA Number:	9-4-1E		12 ARBOR LEDGE DRIVE
Vision ID:	103703		KENNEBUNKPORT, ME 04046
Property Address:	12 ARBOR LEDGE DRIVE		

Abutting Properties for
11 DOANES WHARF ROAD
088/ / 068/ /
(500 Feet)

Location:
088/ / 014/ 022/
8 WESTERN AVENUE #22
Owner:
D'ITALIA, JEFFREY &
HOWES, MARY
12 COMMODORES WAY
KENNEBUNK, ME 04043

Location:
088/ / 014/ 009/
8 WESTERN AVENUE #9
Owner:
HART, ROBERT &
HART, MARY
42 RIVERSIDE DRIVE
READING, MA 01867

Location:
088/ / 014/ 018/
8 WESTERN AVENUE #18
Owner:
UNCLE GF BABA FAMILY IRREVOC TRST&
CAOUETTE, MICHAEL A TRUSTEE & ET AL
C/O M&JC PROPERTY MNGMNT
480 ROUTE 101
BEDFORD, NH 03110

Location:
088/ / 014/ 012/
8 WESTERN AVENUE #12
Owner:
CAMPBELL, BRIAN J
5706 ROCKMERE DRIVE
BETHESDA, MD 20816

Location:
088/ / 071/ /
8 DOANES WHARF ROAD
Owner:
HARMAN, GERALD K &
HARMAN, ALICE M
P.O. BOX 1554
ARLINGTON, MA 02474

Location:
088/ / 014/ 008/
8 WESTERN AVENUE #8
Owner:
PRM-RGM, LLC
F/K/A PRM-CMM LLC
40 STARK STREET
MANCHESTER, NH 03101

Location:
088/ / 014/ 005/
8 WESTERN AVENUE #5
Owner:
SINCLAIR, THOMAS J REVOC TRUST&
SINCLAIR, THOMAS J & SARA E TRUSTEES
PO BOX 377
KENNEBUNKPORT, ME 04046

Location:
088/ / 014/ 002/
8 WESTERN AVENUE #2
Owner:
ODONNELL, JOHN M &
FERREIRO, ROXANA
368 HIGHLAND STREET
WESTON, MA 02493

Location:
088/ / 014/ 004/
8 WESTERN AVENUE #4
Owner:
UNCLE GF BABA FAMILY IRREVOC TRST&
CAOUETTE, MICHAEL A. TRSTEE & ET AL
C/O M&JC PROPERTY MNGMNT
480 ROUTE 101
BEDFORD, NH 03110

Location:
088/ / 014/ 020/
8 WESTERN AVENUE #20
Owner:
109 PORT ROAD LLC
5 HEARTHSTONE DRIVE
KENNEBUNK, ME 04043

Location:
088/ / 052/ /
21 BEACH AVENUE
Owner:
CHRISTIANSEN, JOHN
144 COMMONWEALTH AVE
BOSTON, MA 02116

Location:
088/ / 014/ 023/
8 WESTERN AVENUE #23
Owner:
TALMAGE SOLAR ENGINEERING, INC
25 ROCKMARSH ROAD
KENNEBUNKPORT, ME 04046

Location:
088/ / 014/ 014/
8 WESTERN AVENUE #14
Owner:
PRM-RGM, LLC
F/K/A PRM-CMM LLC
40 STARK STREET
MANCHESTER, NH 03101

Location:
088/ / 014/ 010/
8 WESTERN AVENUE #10
Owner:
MULLEN, EUGENE M &
MULLEN, LAUREL A
103 LORING ROAD
WESTON, MA 02493

Location:
088/ / 014/ 024/
8 WESTERN AVENUE #24
Owner:
UMANZIO, ROY D &
ZANDER, CHRISTINE
PO BOX 4277
ANDOVER, MA 01810

Location:
088/ / 014/ 015/
8 WESTERN AVENUE #15
Owner:
UNCLE GF BABA FAMILY IRREVOC TRST&
CAOUETTE, MICHAEL A TRSTEE& ET AL
C/O M&JC PROPERTY MNGMNT
480 ROUTE 101
BEDFORD, NH 03110

Location:
088/ / 014/ 017/
8 WESTERN AVENUE #17
Owner:
MURRAY, BENJAMIN &
MURRAY, SARAH D
235 BROWN STREET
KENNEBUNK, ME 04043

Location:
088/ / 014/ 006/
8 WESTERN AVENUE #6
Owner:
MULLEN, EUGENE M
103 LORING ROAD
WESTON, MA 02493

Location:
088/ / 014/ 021/
8 WESTERN AVENUE #21
Owner:
ESIELONIS, STEVEN M
ESIELONIS, SUSAN H
15 CHRISTENSEN LANE
KENNEBUNK, ME 04043

Location:
088/ / 014/ 019/
8 WESTERN AVENUE #19
Owner:
EAST RIDGE REALTY OF SC LLC
1602 BEAUFORD PLACE
VALDOSTA, GA 31602

Location:
088/ / 014/ 011/
8 WESTERN AVENUE #11
Owner:
COSTELLO, MICHAEL &
COSTELLO, DONNA
37 FAIRFIELD DRIVE
KENNEBUNK, ME 04043

Location:
088/ / 014/ 013/
8 WESTERN AVENUE #13
Owner:
NOBLE, RENN E
15 HOLLAND ROAD
KENNEBUNK, ME 04043

Location:
088/ / 075/ /
5 DOANES WHARF ROAD
Owner:
PIMENTEL, ALLYSON B REVOC TRST&
PIMENTEL, ALLYSON B & ARMANDO,JR
TRUSTEE
19730 GRANDVIEW TERRACE
JUPITER, FL 33458

Location:
088/ / 051/ /
19 BEACH AVENUE
Owner:
RODRIGUES, JOSEPH S &
RODRIGUES, NANCY C
19 BEACH AVENUE
KENNEBUNK, ME 04043

Location:
088/ / 069/ /
12 DOANES WHARF ROAD
Owner:
KENNEBUNK SEWER DISTRICT
P.O. BOX 648
KENNEBUNK, ME 04043

Location:
088/ / 014/ 016/
8 WESTERN AVENUE #16
Owner:
MURRAY, JAMES SR, TRUST &
MURRAY, JAMES M SR
PO BOX 1174
KENNEBUNKPORT, ME 04046

Location:
088/ / 035/ /
20 CHASE HILL ROAD
Owner:
BEACH DOGS KPT LLC
5220 CASABLANCA DRIVE
PARADISE VALLEY, AZ 85253

Location:
088/ / 072/ /
6 DOANES WHARF ROAD
Owner:
LAMBERTS, RICHARD J REVOC TRUST&
LAMBERTS, EDITH L REVOC TRUST &
PO BOX 2599
KENNEBUNKPORT, ME 04046

Location:
088/ / 074/ /
7 DOANES WHARF ROAD
Owner:
TCLL LLC
PO BOX 2688
KENNEBUNKPORT, ME 04046

Location:
088/ / 063/ /
25 BEACH AVENUE
Owner:
MERZ, MARTHA A
316 HALSEY ROAD
ANNAPOLIS, MD 21401

Location:
088/ / 017/ /
CHASE HILL ROAD
Owner:
PORT SCAPE CONDOMINIUMS
CHASE HILL ROAD
KENNEBUNK, ME 04043

Location:
088/ / 076/ /
1 DOANES WHARF ROAD
Owner:
TRELINA LLC
62 PORTLAND ROAD
SUITE 25
KENNEBUNK, ME 04043

Location:
088/ / 068/ /
11 DOANES WHARF ROAD
Owner:
HIOS HOSPITALITY LLC
WHITE BARN INN OWNER LLC
11 DOANES WHAR ROAD
KENNEBUNK, ME 04043

Location:
088/ / 028/ /
9 CHASE HILL ROAD
Owner:
FOLEY, PATRICIA A &
DANT, SHANNON HAYES & ET AL
9 CHASE HILL ROAD
KENNEBUNK, ME 04043

Location:
088/ / 022/ /
10 CHASE HILL ROAD
Owner:
GLOBEVEST CAPITAL REAL ESTATE US
LP
1005 RUE LIONEL DAUMAIS BUREAU
BOUCHERVILLE, QC J4B 0B1

Location:
088/ / 037/ /
12 BEACH AVENUE
Owner:
GGPP DEAN LLC
c/o WILK, NINA
1901 OLDE MILL FOREST DRIVE
RALEIGH, NC 27606

Location:
088/ / 067/ /
4 DOANES WHARF ROAD
Owner:
BR2 LLC
86 NEWBURY STREET
PORTLAND, ME 04101

Location:
088/ / 077/ /
22 BEACH AVENUE
Owner:
PERKINS, CARLA L
P.O. BOX 796
KENNEBUNKPORT, ME 04046

Location:
088/ / 014/ 007/
8 WESTERN AVENUE #7
Owner:
HANNON, SHEILA W &
HANNON, THOMAS A, SR
161 BIANCA ROAD
DUXBURY, MA 02332

Location:
088/ / 023/ /
12 CHASE HILL ROAD
Owner:
J&S HOSPITALITY LLC
PO BOX 620C
KENNEBUNKPORT, ME 04046

Location:
088/ / 062/ /
23 BEACH AVENUE
Owner:
23 BEACH AVE LAND TRUST
8502 MARBLEHEAD ROAD
LUTHERVILLE, MD 20193

Location:
088/ / 070/ /
10 DOANES WHARF ROAD
Owner:
MCAVOY, KEITH FRANCIS &
MCAVOY, MARY-ANN
10 DOANES WHARF ROAD
KENNEBUNK, ME 04043

Location:
088/ / 014/ 003/
8 WESTERN AVENUE #3
Owner:
SINCLAIR, THOMAS J REVOC TRUST &
SINCLAIR, SARA E REVOC TRUST&
PO BOX 377
KENNEBUNKPORT, ME 04046

Location:
088/ / 024/ /
16 CHASE HILL ROAD
Owner:
NARVAEZ, DAMIAN M &
NARVAEZ, RACHEL G
2500 REGATTA AVENUE
MIAMI BEACH, FL 33140

Location:
088/ / 066/ /
2 DOANES WHARF ROAD
Owner:
BR2 LLC
86 NEWBURY STREET
PORTLAND, ME 04101

Location:
088/ / 073/ /
9 DOANES WHARF ROAD
Owner:
WEADOCK, FLORENCE T
256 SIMON WILLARD ROAD
CONCORD, MA 01742

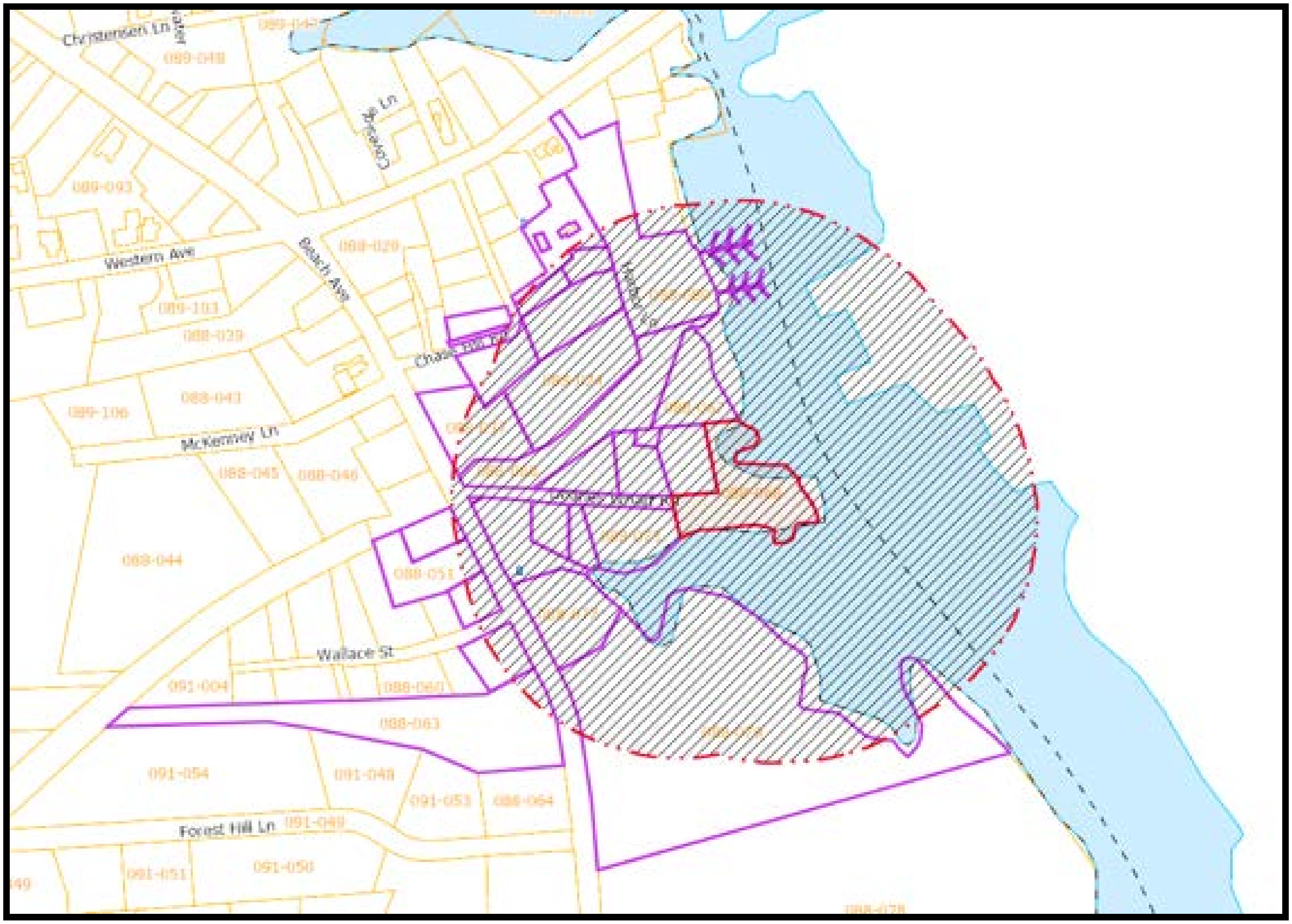
Location:
088/ / 079/ /
26 BEACH AVENUE
Owner:
SOCIETY OF FRANCISCAN FATHERS
P.O. BOX 980
KENNEBUNKPORT, ME 04046

Location:
088/ / 014/ /
8 WESTERN AVENUE
Owner:
RIVERVIEW BOATSLIPS
CONDOMINIUMS
CONTROL CARD
KENNEBUNK, ME 04043

Location:
088/ / 080/ /
8 WESTERN AVENUE
Owner:
SHIPYARD, INC
8 WESTERN AVENUE
KENNEBUNK, ME 04043

Location:
088/ / 050/ /
17 BEACH AVENUE
Owner:
MUTINO, PETER A &
MUTINO, SUSAN L
8 APPLE TREE LANE
DARIEN, CT 06820

Location:
088/ / 018/ /
14 CHASE HILL ROAD
Owner:
BULL, STEPHEN B &
TURNER, SHERRY M
12720 HUNTSMAN WAY
POTOMAC, MD 20854-2307



Proof of Certified Mailing to Abutters
Within 150 Feet

Walsh Engineering Associates, Inc.
1 KAREN DR STE 2A
WESTBROOK ME 04092-1917

$5.54 US POSTAGE
FIRST-CLASS
Oct 01 2024
Mailed from ZIP 04092
1 OZ FIRST-CLASS MAIL LETTER RATE
11923275

stamps endicia
062S0010282496

USPS CERTIFIED MAIL

9407 1118 9876 5488 3032 04

BARTLETT, HUGH J & JUDITH
PO BOX 293
KENNEBUNKPORT ME 04046-0293

Walsh Engineering Associates, Inc.
1 KAREN DR STE 2A
WESTBROOK ME 04092-1917

$5.54 US POSTAGE
FIRST-CLASS
Oct 01 2024
Mailed from ZIP 04092
1 OZ FIRST-CLASS MAIL LETTER RATE
11923275

stamps endicia

062S0011485640

USPS CERTIFIED MAIL

9407 1118 9876 5488 3032 97

BYERLY, WILLIAM F & MARY C
PO BOX 2675
KENNEBUNKPORT ME 04046-2675

Walsh Engineering Associates, Inc.
1 KAREN DR STE 2A
WESTBROOK ME 04092-1917

$5.54 US POSTAGE
FIRST-CLASS
Oct 01 2024
Mailed from ZIP 04092
1 OZ FIRST-CLASS MAIL LETTER RATE
11923275

stamps endicia

062S0010282497

USPS CERTIFIED MAIL

9407 1118 9876 5488 3032 80

EDITH HG MCCONNELL REVOCABLE TRUST
PO BOX 1813
KENNEBUNKPORT ME 04046-4813

Walsh Engineering Associates, Inc.
1 KAREN DR STE 2A
WESTBROOK ME 04092-1917

$5.54 US POSTAGE
FIRST-CLASS
Oct 01 2024
Mailed from ZIP 04092
1 OZ FIRST-CLASS MAIL LETTER RATE
11923275

stamps endicia
062S0011485645

USPS CERTIFIED MAIL

9407 1118 9876 5488 3032 35

FANTON, ROMA F
39 MEETING HOUSE LN
FAIRFIELD CT 06824-2022

Walsh Engineering Associates, Inc.
1 KAREN DR STE 2A
WESTBROOK ME 04092-1917

$5.54 US POSTAGE
FIRST-CLASS
Oct 01 2024
Mailed from ZIP 04092
1 OZ FIRST-CLASS MAIL LETTER RATE
11923275

stamps endicia

062S0010937441

USPS CERTIFIED MAIL

9407 1118 9876 5488 3032 73

KENNEBUNKPORT CONSERVATION TRUST
PO BOX 7004
CAPE PORPOISE ME 04014-7004

Walsh Engineering Associates, Inc.
1 KAREN DR STE 2A
WESTBROOK ME 04092-1917

$5.54 US POSTAGE
FIRST-CLASS
Oct 01 2024
Mailed from ZIP 04092
1 OZ FIRST-CLASS MAIL LETTER RATE
11923275

stamps endicia
062S0011485632

USPS CERTIFIED MAIL

9407 1118 9876 5488 3038 15

KENNEBUNKPORT, TOWN OF
PO BOX 566
KENNEBUNKPORT ME 04046-0566

Walsh Engineering Associates, Inc.
1 KAREN DR STE 2A
WESTBROOK ME 04092-1917

$5.54 US POSTAGE
FIRST-CLASS
Oct 01 2024
Mailed from ZIP 04092
1 OZ FIRST-CLASS MAIL LETTER RATE
11923275

stamps endicia
062S0011485645

USPS CERTIFIED MAIL

9407 1118 9876 5488 3038 53

MAHONEY FAMILY REVOCABLE TRUST
52 OCEAN AVE
KENNEBUNKPORT ME 04046

Walsh Engineering Associates, Inc.
1 KAREN DR STE 2A
WESTBROOK ME 04092-1917

$5.54 US POSTAGE
FIRST-CLASS
Oct 01 2024
Mailed from ZIP 04092
1 OZ FIRST-CLASS MAIL LETTER RATE
11923275

stamps endicia

062S0011485632

USPS CERTIFIED MAIL

9407 1118 9876 5488 3038 60

MCFB, LLC
PO BOX 2675
KENNEBUNKPORT ME 04046-2675

Walsh Engineering Associates, Inc.
1 KAREN DR STE 2A
WESTBROOK ME 04092-1917

$5.54 US POSTAGE
FIRST-CLASS
Oct 01 2024
Mailed from ZIP 04092
1 OZ FIRST-CLASS MAIL LETTER RATE
11923275

stamps endicia

062S0011485645

USPS CERTIFIED MAIL

9407 1118 9876 5488 3038 22

MULBERGER, VIRGINIA A
804 HALL PL
ALEXANDRIA VA 22302-3405

Walsh Engineering Associates, Inc.
1 KAREN DR STE 2A
WESTBROOK ME 04092-1917

$5.54 US POSTAGE
FIRST-CLASS
Oct 01 2024
Mailed from ZIP 04092
1 OZ FIRST-CLASS MAIL LETTER RATE
11923275

stamps endicia
062S0011485632

USPS CERTIFIED MAIL

9407 1118 9876 5488 3038 08

NOWAK, LORI
4940 N HACIENDA DEL SOL RD
TUCSON AZ 85718-6021

Walsh Engineering Associates, Inc.
1 KAREN DR STE 2A
WESTBROOK ME 04092-1917

$5.54 US POSTAGE
FIRST-CLASS
Oct 01 2024
Mailed from ZIP 04092
1 OZ FIRST-CLASS MAIL LETTER RATE
11923275

stamps endicia

062S0010282497

USPS CERTIFIED MAIL

9407 1118 9876 5488 3038 91

PELLETIER, THOMAS J & CYNTHIA L
182 LOWELL ST
PEABODY MA 01960-4264

Walsh Engineering Associates, Inc.
1 KAREN DR STE 2A
WESTBROOK ME 04092-1917

$5.54 US POSTAGE
FIRST-CLASS
Oct 01 2024
Mailed from ZIP 04092
1 OZ FIRST-CLASS MAIL LETTER RATE
11923275

stamps endicia

062S0011485632

USPS CERTIFIED MAIL

9407 1118 9876 5488 3038 46

REDDEN, MICHAELA A & OLSHAN, ARTHUR
8 FRASCO LN
NORWOOD NJ 07648-2407

Walsh Engineering Associates, Inc.
1 KAREN DR STE 2A
WESTBROOK ME 04092-1917

$5.54 US POSTAGE
FIRST-CLASS
Oct 01 2024
Mailed from ZIP 04092
1 OZ FIRST-CLASS MAIL LETTER RATE
11923275

stamps endicia

062S0010282493

USPS CERTIFIED MAIL

9407 1118 9876 5488 3038 84

STOHLMAN, SUZANNE
PO BOX 127
KENNEBUNKPORT ME 04046-0127

Walsh Engineering Associates, Inc.
1 KAREN DR STE 2A
WESTBROOK ME 04092-1917

$5.54 US POSTAGE
FIRST-CLASS
Oct 01 2024
Mailed from ZIP 04092
1 OZ FIRST-CLASS MAIL LETTER RATE
11923275

stamps endicia
062S0010282496

USPS CERTIFIED MAIL

9407 1118 9876 5488 3038 77

YACHTSMAN HOSPITALITY, LLC
2 LIVEWELL DR STE 203
KENNEBUNK ME 04043-6763

Mailing Labels for Additional Abutters
Within 1,000 Feet

1 ELM STREET, LLC
135 GRAFTON STREET
CHEVY CHASE MD 20815

1 ELM STREET, LLC
135 GRAFTON STREET
CHEVY CHASE MD 20815

1 ELM STREET, LLC
135 GRAFTON STREET
CHEVY CHASE MD 20815

2538970 ONTARIO, INC
765 WESTNEY ROAD SOUTH
AJAX ON L1S 6W1

40 MAINE STREET, LLC
ATTN: KRISTIN BEAN
7019 S 45TH PLACE
PHOENIX AZ 85042

ADAMS, DAVID R & ELLEN L
PO BOX 1016
KENNEBUNKPORT ME 04046

ANDONIAN, DAVID & KRIS A
PO BOX 800
KENNEBUNKPORT ME 04046

AUSTIN, JACK N & HOYT, KATHERINE L
47 MAINE STREET, UNIT 12
KENNEBUNKPORT ME 04046

B & C PROPERTIES, LLC
C/O JENNIFER LANIGAN
5301 WESTON DOWNS DRIVE
DURHAM NC 27707

BALCOM, WILLIAM BRIAN
3002 WINDSOR RIDGE DRIVE
WESTBOROUGH MA 01581

BELYEA, JOHN A
PO BOX 401
KENNEBUNKPORT ME 04046

BLACK FAMILY REVOCABLE TRUST
PO BOX 837
KENNEBUNKPORT ME 04046

BOATHOUSE AT KENNEBUNKPORT, LLC
2 LIVEWELL DR., SUITE 203
KENNEBUNK ME 04043

CABE, MARIO & JOANN
1008 E KENNEDY RD
NORTH WALES PA 19454

CALDERA, RICHARD & MARGARET
47 MAINE STREET, UNIT 10
KENNEBUNKPORT ME 04046

CAPPS, NOBLE F & NANCY H
PO BOX 1023
KENNEBUNKPORT ME 04046

CAREY, MEGHAN & HUEBINGER, BRAD
155 DODD BLVD
HAMPTON VA 23665

CARNEY, DONALD A
PO BOX 675
KENNEBUNKPORT ME 04046

CLIFTON & MARLENE RAUM REVOCABLE TRUST
24 MAINE STREET
KENNEBUNKPORT ME 04046

CONDON, ROBERT & ELLICE
80 S RIVER ROAD
STUART FL 34996

CROW, KAREN W
PO BOX 342
KENNEBUNK ME 04043

CUP AND SAUCER, LLC
133 SEASPRAY AVENUE
PALM BEACH FL 33480

DAVID C KRIEG LIVING TRUST
PO BOX 664
KENNEBUNKPORT ME 04046

DAVID L KELLY FAMILY TRUST
25 OAK STREET
CHARLESTOWN MA 02129

DELANCEY-KAY REVOCABLE TRUST
600 MAIN STREET, APT 2303
WORCESTER MA 01608

DENOIA, MARC
590 TREMONT STREET
BOSTON MA 02118

DESCOTEAUX, DAVID & JULIA
89 HAIGHT HILL ROAD
STANFORDVILLE NY 12581

DOWNS, EVA M
PO BOX 1778
KENNEBUNKPORT ME 04046

DOWNS, EVA M
PO BOX 1778
KENNEBUNKPORT ME 04046

DOWNS, EVA M
PO BOX 1778
KENNEBUNKPORT ME 04046

DRANOW, STEVEN & JAMIE
5 ROOKERY CIRCLE
NEW CITY NY 10956

DROMGOOLE, JOHN & CAROL ANN
150 HUBBARD STREET #A
CONCORD MA 01742

DULEY, BRIGITTE I
PO BOX 567
KENNEBUNKPORT ME 04046

EISING, PETER A & SUSANNE
PO BOX 2761
KENNEBUNKPORT ME 04046

ENOCH, MATTHEW S & DONNA C
642 ALLEGIANCE DRIVE
LITITZ PA 17543

FAESSLER, WILLY A & JANICE M
12 ARBOR LEDGE DRIVE
KENNEBUNKPORT ME 04046

GAROTTA, CHRISTIAN
235 RUE SAINT MAURICE
BROSSARD, QUEBEC QC J4X 2X1

GERE, NICHOLAS D & TRACI L
7 TOWNE STREET
KENNEBUNKPORT ME 04046

GOODWIN, KAREN A
PO BOX 545
KENNEBUNKPORT ME 04046

GRAHAM, MARY ANN
PO BOX 183
KENNEBUNKPORT ME 04046

GROMAN, ELIZABETH L
47 MAINE STREET UNIT #9
KENNEBUNKPORT ME 04046

HAGER, CHRISTIE L & STARK, ROYAL J
26 BREWER DRIVE
WESTBOROUGH MA 01581

HALL, JONATHAN S
PO BOX 811
WINDHAM NH 03087

HANDLEN, FRANK W & CUMMINS, SHARON L
PO BOX 210
KENNEBUNKPORT ME 04046

HECKLER, JOHN H & CAROL A
PO BOX 831
KENNEBUNKPORT ME 04046

HENRY, JOHN G & AOIFE C
MOUNTAIN VIEW
BLACKROCK
DUNDALK. CO. LOUTH A91 N923

HUNTER, JAMES & JOAN F
39 MAINE STREET
KENNEBUNKPORT ME 04046

JENKINS, DAVID W & DIANE
PO BOX J
KENNEBUNKPORT ME 04046

JJPT REALTY PARTNERS, LLC
3802 WOODBRIDGE ROAD
PEABODY MA 01960

KARAKHANIAN, ALEXANDER & RENA
661 MELALEUCA LANE
MIAMI FL 33137

KCC-CGH HOLDINGS, LLC
PO BOX 3089
KENNEBUNKPORT ME 04046

KEATING, SALLY R
PO BOX 1921
KENNEBUNKPORT ME 04046

KENNEBUNKPORT CAPTAINS COLLECTION, LLC
PO BOX 3089
KENNEBUNKPORT ME 04046

KENNEDY, ILONA & LESLIE
47 MAINE STREET, UNIT 1
KENNEBUNKPORT ME 04046

KPT MARINE, LLC
PO BOX 2734
KENNEBUNKPORT ME 04046

KPT MARINE, LLC
PO BOX 2734
KENNEBUNKPORT ME 04046

KPT MARINE, LLC
PO BOX 2734
KENNEBUNKPORT ME 04046

KUBIAK, FAITH & KATHERINE
PO BOX 6
KENNEBUNKPORT ME 04046

KUDAS, JACEK & SHARRY
43 MAINE STREET
KENNEBUNKPORT ME 04046

LEA RAE LEVINES REVOCABLE TRUST
610 SOUTH ROME AVE, UNIT 303
TAMPA FL 33606

LEESIDE CONDO

LILLIAN M BARTLETT REVOCABLE TRUST
PO BOX 2549
KENNEBUNKPORT ME 04046

LINDA BROOKS REVOCABLE TRUST
PO BOX 3085
KENNEBUNKPORT ME 04046

M&T BANK
C/O CONCENTRIX
PO BOX 2410
OMAHA NE 68103

MAINE PEARL LLC
1370 FAN PALM ROAD
BOCA RATON FL 33432

MALTE LUKAS REVOCABLE TRUST
PO BOX 2798
KENNEBUNKPORT ME 04046

MARGUERITE J WATERS REVOCABLE TRUST
47 MAINE STREET #3
KENNEBUNKPORT ME 04046

MARINO, ELAINE
PO BOX 1537
KENNEBUNKPORT ME 04046

MARQUIS, ALFRED C JR & JULIE A
PO BOX 1835
KENNEBUNKPORT ME 04046

MARTHA NIKITAS STONE REV TRUST
42 PINE STREET
CONCORD MA 01742

MATTHEW C ALLARD REVOCABLE TRUST
54 WESSCUM WOOD ROAD
RIVERSIDE CT 06878

MATTUCHIO FAMILY IRREVOCABLE TRUST
PO BOX 169
KENNEBUNKPORT ME 04046

MCGINN, HOWARD D & JAYNE A
9 SHANANDOAH DRIVE
PAXTON MA 01612

MCWILLIAMS FAMILY TRUST
28 COLTON LANE
SHREWSBURY MA 01545

MICHELLE L DRAGHETTI REVOCABLE TRUST
PO BOX 2797
KENNEBUNKPORT ME 04046

MIDDLETON, MARJORIE D & JOHN L JR
PO BOX 1046
KENNEBUNKPORT ME 04046

MILES, DANIEL F & ANDREA
11 TOWNE STREET
KENNEBUNKPORT ME 04046

MORELLI, MICHAEL J & KERRY H
42 BOULDER TRAIL
BRONXVILLE NY 10708

NATOLI, JOAN E & RICHARD
PO BOX 763
KENNEBUNKPORT ME 04046

OCEAN AVENUE REALTY TRUST
PO BOX 949
KENWOOD CA 95452

PAGANO, ROBERT & DIANE
PO BOX 1743
KENNEBUNKPORT ME 04046

PERKINS, CARLA L
PO BOX 796
KENNEBUNKPORT ME 04046-0796

PERKINS, CARLA L
PO BOX 796
KENNEBUNKPORT ME 04046-0796

PERKINS, CARLA L
PO BOX 796
KENNEBUNKPORT ME 04046-0796

PORT COMMONS CONDO

PRICE, EUGENE THOMAS & KRISTEN E
15 FERNWOOD ROAD
WEST HARTFORD CT 06119

RANDALL, KAREN
PO BOX 40
LUDLOW MA 01056

RED BUILDING TRUST
121 NORTH STREET
KENNEBUNKPORT ME 04046

REVOCABLE TRUST OF ALICE L ROSE
51 PETTEE STREET #34
NEWTON MA 02464

RINALDI, JOHN F & POWELL, BRIAN
PO BOX 1079
KENNEBUNKPORT ME 04046

ROMINE, DONALD J & RHODA M
325 DUNES BLVD., APT 803
NAPLES FL 34110

SAND DOLLAR HOLDINGS, LLC
6720 SE HARBOR CIRCLE
STUART FL 34996

SCOTT, ANDREW & GRAHAM, KELLY
PO BOX 524
KENNEBUNKPORT ME 04046

SHAHIAN, DOUGLAS & LISA
37 HICKORY LANE
BOXFORD MA 01921

SHMALO FAMILY, LLC
1023 WAGON WHEEL DRIVE
SARASOTA FL 34240

SIMONETTI, ALEXIS A
37 OCEAN AVENUE, #6
KENNEBUNKPORT ME 04046

SPENCER, MARY A
PO BOX 1422
KENNEBUNKPORT ME 04046

SPICEWOOD MAINE, LLC
8 SPICEWOOD LANE
WILTON CT 06897

STAMPLIS, JOANNE M & MATTHEW
26 MAINE STREET
KENNEBUNKPORT ME 04046

STEPHEN C PAGE REVOCABLE TRUST
6539 SOUTH MARINA WAY
STUART FL 34996

STRAUB, CHARLES W JR & CAROL J
100 STONEHAVEN DRIVE
COLUMBIANA OH 44408

SWEENEY, JOHN & ANN-MARIE
16 MARTIN STREET
ACTON MA 01720

TAMARACKS CONDO

THOMPSON, HARRY A III & JILL M
PO BOX 20
KENNEBUNKPORT ME 04046

TIDEMARK CORPORATION
273 CORPORATE DRIVE, SUITE 150
PORTSMOUTH NH 03801

TYLER, TROY
15 TOWNE STREET
KENNEBUNKPORT ME 04046

VASQUEZ, NICHOLAS & KERCADO, MELISSA
PO BOX 2742
KENNEBUNKPORT ME 04046

WHETSELL, M HEYWARD JR & SHERRILL A
2820 COUNTRY CLUB RD
WINSTON-SALEM NC 27104

WOMEN & WINE, LLC
PO BOX 1148
KENNEBUNKPORT ME 04046

WOMEN & WINE, LLC
PO BOX 1148
KENNEBUNKPORT ME 04046

WOMEN & WINE, LLC
PO BOX 1148
KENNEBUNKPORT ME 04046

YANKOWSKI, GEORGE E JR & JANICE G
PO BOX 1333
KENNEBUNKPORT ME 04046

Public Notice Certification

PUBLIC NOTICE FILING AND CERTIFICATION

Department Rules, Chapter 2, require an applicant to provide public notice for all Tier 2, Tier 3 and individual Natural Resources Protect Act projects. In the notice, the applicant must describe the proposed activity and where it is located. **"Abutter"** for the purposes of the notice provision means any person who owns property that is BOTH (1) adjoining and (2) within one mile of the delineated project boundary, including owners of property directly across a public or private right of way.

1. **Newspaper:** You must publish the Notice of Intent to File in a newspaper circulated in the area where the activity is located. The notice must appear in the newspaper within 30 days prior to the filing of the application with the Department. You may use the attached Notice of Intent to File form, or one containing identical information, for newspaper publication and certified mailing.

2. **Abutting Property Owners:** You must send a copy of the Notice of Intent to File by certified mail to the owners of the property abutting the activity. Their names and addresses can be obtained from the town tax maps or local officials. They must receive notice within 30 days prior to the filing of the application with the Department.

3. **Municipal Office:** You must send a copy of the Notice of Intent to File <u>and</u> a **duplicate of the entire application** to the Municipal Office.

   ATTACH a list of the names and addresses of the owners of abutting property.

<u>CERTIFICATION</u>

By signing below, the applicant or authorized agent certifies that:

5. A Notice of Intent to File was published in a newspaper circulated in the area where the project site is located within 30 days prior to filing the application;
6. A certified mailing of the Notice of Intent to File was sent to all abutters within 30 days of the filing of the application;
7. A certified mailing of the Notice of Intent to File, and a duplicate copy of the application was sent to the town office of the municipality in which the project is located; and
8. Provided notice of and held a public informational meeting, if required, in accordance with Chapter 2, Rules Concerning the Processing of Applications, Section 13, prior to filing the application. Notice of the meeting was sent by certified mail to abutters and to the town office of the municipality in which the project is located at least ten days prior to the meeting. Notice of the meeting was also published once in a newspaper circulated in the area where the project site is located at least seven days prior to the meeting.

The Public Informational Meeting was held on N/A.
Date

Approximately N/A members of the public attended the Public Informational Meeting.

Leyna L. Tobey   10/2/2024

Signature of Applicant or authorized agent   Date

Attachment 11:

Historic Sites

11.0 Historic Sites

As required by the Army Corps of Engineers (ACOE), the Maine Historic Preservation Commission (MHPC) and the Tribal Historic Preservation Officers (THPO) of Maine have been consulted regarding this project. A copy of these communications are included with this section.

WALSH
ENGINEERING ASSOCIATES, INC.

February 24, 2022

Mr. Kirk F. Mohney, Director
Maine Historic Preservation Commission
55 Capitol Street
65 State House Station
Augusta, Maine 04333-0065

RE: Arundel Yacht Club Historic Review
51 Ocean Ave, Kennebunkport ME
Map 10, Lot 1, Block 5

Dear Mr. Mohney,

Please take note that the Arundel Yacht Club intends to file permit applications with the Maine DEP for dredging activities located in the Kennebunk River offshore of 51 Ocean Ave in Kennebunkport, Maine. Walsh Engineering Associates is requesting that the MHPC review the area for any known historic and/or archaeological resources. A site plan location map is attached for your review.

If you have any questions or concerns with this project, please feel free to contact me at (207) 553-9898 or by e-mail at randee@walsh-eng.com. Thank you in advance for your timely comments.

Respectfully,

R McDonald

Randee McDonald
Project Coordinator
Walsh Engineering Associates

Enc: Location Plan

Based on the information submitted, I have concluded that there will be no historic properties affected by the proposed undertaking, as defined by Section 106 of the National Historic Preservation Act. Consequently, pursuant to 36 CFR 800.4(d)(1), no further Section 106 consultation is required unless additional resources are discovered during project implementation pursuant to 36 CFR 800.13.

Kirk F. Mohney

Kirk F. Mohney,
State Historic Preservation Officer
Maine Historic Preservation Commission

3/9/22
Date

February 24, 2022

THPO
Houlton Band of Maliseet Indians
88 Bell Road Littleton, Maine 04730
istjohn@maliseets.com

THPO
Passamaquoddy Tribe of Indians
Pleasant Point Reservation
PO Box 343 Perry, Maine 04667
soctomah@gmail.com

THPO
Passamaquoddy Tribe of Indians
Indian Township Reservation
P.O. Box 301 Princeton, Maine 04668
soctomah@gmail.com

THPO
Mi'kmaq Nation
7 Northern Road Presque Isle, Maine 04769
kreis@micmac-nsn.gov

THPO
Cultural and Historic Preservation Dept.12
Wabanaki Way Indian Island, Maine 04468
chris.sockalexis@penobscotnation.org

VIA email as noted above

RE: Arundel Yacht Club Historic Review
51 Ocean Ave, Kennebunkport ME
Map 10, Lot 1, Block 5

Please take note that the Arundel Yacht Club intends to file permit applications with the Maine DEP for dredging activities located in the Kennebunk River offshore of 51 Ocean Ave in Kennebunkport, Maine. Walsh Engineering Associates is requesting that the THPO review the area for any known historic and/or archaeological resources. A site plan location map is attached for your review.

If you have any questions or concerns with this project, please feel free to contact me at (207) 553-9898 or by e-mail at randee@walsh-eng.com. Thank you in advance for your timely comments.

Respectfully,

RMcDonald

Randee McDonald
Project Coordinator
Walsh Engineering Associates

Enc: Location Plan

Tribal Historic Preservation Office
Passamaquoddy Tribe
PO Box 159 Princeton, Me. 04668
207-214-4051

March 2, 2022

Randee McDonald
Project Coordinator
One Karen Drive, Suite 2A
Westbrook, ME 04092

- Re: Kennebunkport – 51 Ocean Ave

Dear Randee;

The Passamaquoddy THPO has reviewed the following applications regarding the historic properties and significant religious and cultural properties in accordance with NHPA, NEPA, AIRFA, NAGPRA, ARPA, Executive Order 13007 Indian Sacred Sites, Executive Order 13175 Consultation and Coordination with Indian Tribal Governments, and Executive Order 12898 Environmental Justice.

The Projects listed above will not have any impact on cultural and historical concerns of the Passamaquoddy Tribe. Should buried artifacts, human remains, cultural sites or ground features be unexpectedly unearthed during ground disturbing activities, all construction should immediately cease and the resources be examined by a professional archaeologist. Additionally, all appropriate authorities-including all pertinent tribal entities should be notified.

Sincerely;

Donald Soctomah
Soctomah@gmail.com
THPO
Passamaquoddy Tribe

Tribal Historic Preservation Office
Mi'kmaq Nation (Formerly known as the Aroostook Band of Micmac)
Kendyl Reis
Tribal Historic Preservation Officer
7 Northern Road
Presque Isle, ME 04769
Phone: (207)764-1972 ext. 161
Fax: (207)764-7667
Email: kreis@micmac-nsn.gov
Arundel Yacht Club Project

51 Ocean Ave, Kennebunkport, Maine
March 3rd, 2022

Thank you for the opportunity to review the above-referenced project for compliance with National Environmental Policy Act (NEPA) and National Historic Preservation Act (NHPA), or other, requirements.

Based on the project description, we do not have knowledge of any specific sites or cultural features that exist at the proposed project location.

However, this geographic area does constitute traditional areas that were historically utilized by members of the Mi'kmaq Nation and the other Wabanaki Tribes. Therefore, we respectfully request that if during the course of excavation/construction activities, human remains, artifacts, or any other evidence of Native American presence is discovered, that site activities in the vicinity of the discovery immediately cease, pending notification to us.

In addition, if this project results in wetland disturbances requiring mitigation, we are requesting that you utilize the black ash (Fraginus nigra) as the principal wetland species for wetland restoration activities. The black ash tree has special significance in the culture of the northeastern Tribes and is used extensively for weaving baskets and other Native American crafts. The black ash tree also provides valuable food and habitat for migratory waterfowl and other wildlife. Unfortunately, however, this species has been selected against by foresters and landowners who favor other tree species. As a result of this, and other environmental factors, the black ash tree is in serious decline in Maine. The Mi'kmaq Nation has completed several black ash wetland restoration projects and have a dependable source for highly-quality seedlings, and the experience and expertise to assist you with black ash wetland restoration projects.

On the subject of human remains, artifacts, or any other evidence of Native American presence is discovered. The human remains will be reburied with the appropriate respect for the remains that is required at a distinctive and respectable site. The artifacts and other evidence of Native American discovery will be documented with appropriate detail. The items will be analyzed for the precise period of the items' distinctive period and will be documented by the Tribal Historic Preservation Officer for the Mi'kmaq Nation.

If you have any questions or comments, please feel free to contact me.

Sincerely,

Kendyl Reis
Tribal Historic Preservation Officer

PENOBSCOT NATION
CULTURAL & HISTORIC PRESERVATION
12 WABANAKI WAY, INDIAN ISLAND, ME 04468

CHRIS SOCKALEXIS – TRIBAL HISTORIC PRESERVATION OFFICER
E-MAIL: chris.sockalexis@penobscotnation.org

NAME	Randee McDonald
ADDRESS	Walsh Engineering Associates One Karen Drive, Suite 2A Westbrook, ME 04092
OWNER'S NAME	Arundel Yacht Club
TELEPHONE	(207) 553-9898
EMAIL	Randee@Walsh-eng.com
PROJECT NAME	Maintenance Dredging
PROJECT SITE	Kennebunkport, ME
DATE OF REQUEST	February 24, 2022
DATE REVIEWED	June 15, 2022

Thank you for the opportunity to comment on the above referenced project. This project appears to have no impact on a structure or site of historic, architectural or archaeological significance to the Penobscot Nation as defined by the National Historic Preservation Act of 1966, as amended.

If there is an inadvertent discovery of Native American cultural materials during the course of the project, please contact my office at (207) 817-7471. Thank you for consulting with the Penobscot Nation Tribal Historic Preservation Office with this project.

Chris Sockalexis, THPO
Penobscot Nation

Attachment 12:

Functional Assessment

12.0 Functional Assessment

In accordance with the Wetlands and Waterbodies Protection Rules, Section 5.C(6)(b) Coastal Wetlands: *a coastal wetland alteration that does not cover, remove or destroy marsh vegetation, does not fill more than 500 square feet of intertidal or subtidal are, and has no adverse effect on marine resource or on wildlife habitat as determined by the DMR or IF&W as applicable* requires neither a functional assessment nor compensation.

Because this area has been frequently dredged, the project will have minimal impact on the existing natural resources, and the impact to wetland functions and values from this activity will be insignificant, this project does not require a functional assessment.

Attachment 13:

Wetland Compensation Plan

13.0 Wetland Compensation Plan

In accordance with the Wetlands and Waterbodies Protection Rules, Section 5.C(6)(b) Coastal Wetlands: *a coastal wetland alteration that does not cover, remove or destroy marsh vegetation, does not fill more than 500 square feet of intertidal or subtidal are, and has no adverse effect on marine resource or on wildlife habitat as determined by the DMR or IF&W as applicable* requires neither a functional assessment nor compensation.

The proposed activities result in minimal impact to the coastal wetland. No loss or degradation of wetland function is anticipated because of this activity. No compensation is proposed.

Attachment 14:

Sampling and Analysis Plan

14.0 Sampling and Analysis Plan

The U.S. Army Corps of Engineers (USACE) approved a Sampling and Analysis Plan (SAP) for the project on May 24, 2022, which provided proposed sediment sampling locations, methods, and testing criteria to determine disposal suitability. The sampling results were submitted to the USACE for the AYC and the nearby Yachtsman Marina, Kennebunkport Marina, and Kennebunk River Club. The USACE issued a Suitability Determination for all 4 sites on June 10, 2024, which documents the suitability of the dredged material for disposal at the Isle of Shoals North (IOSN) open water disposal site.

The SAP and USACE's Suitability Determination are included as an attachment to this permit section for reference.

Sampling and Analysis Plan (SAP)

CENAE–PDE 24 May 2022

FINAL Sampling and Analysis Plan for Arundel Yacht Club, Kennebunkport, ME, File Number NAE-2022-00288

1. **Project Description:** The applicant is proposing to mechanically dredge approximately 3,775 cubic yards (CY) of material from shoaled areas totaling just over one acre within the property's marina basin located in the town of Kennebunkport, ME (Figures 1 and 2). This area will be dredged to the proposed depth of -6 feet at mean lower low water (MLLW) plus one foot of allowable overdepth. The applicant proposes to dispose of this material at the Isles of Shoals North Disposal Site (IOSN).

This sampling and analysis plan (SAP) has been developed by the New England District (NAE) U.S. Army Corps of Engineers (USACE) to gather information to support a dredged material suitability determination for the open water disposal alternative associated with this project. This sampling and analysis effort will be divided into two phases. The first phase will include sampling and testing of dredge site sediment for grain size and bulk chemistry in order to identify contaminants of concern. The second phase will include sampling of dredge site sediment and water for elutriate and biological testing in order to evaluate the material for placement at IOSN. The results of biological testing will be evaluated against the most recent NAE dataset for the IOSN reference area. All sampling and analysis activities described in this plan shall follow the requirements set forth in the "*Regional Implementation Manual for the Evaluation of Dredged Material Proposed for Disposal in New England Waters*" (RIM) dated May 6, 2004. A copy of the RIM may be downloaded from the NAE website: http://www.nae.usace.army.mil/Missions/Regulatory/DredgedMaterialProgram/RegionalImplementationManual.aspx

2. **Conceptual Site Model:** NAE reviewed historic testing data, water quality data, spill records, and adjacent land use information to develop a conceptual site model (CSM) for the proposed project. The CSM was used to characterize the system and identify potential sources of contamination, site-specific contaminants of concern, exposure pathways, and biological receptors in order to inform this sampling and analysis plan.

Project Setting: The property is associated with the Arundel Yacht Club located along the Kennebunk River in Kennebunkport, ME. The yacht club building was originally constructed in 1806 and was used as a rope making business until 1816. Sanborn maps from 1911 show that the property was used for a boat house, carriage house, and wagon shed. It has served as the Arundel Yacht Club since 1957 and provides dockage for up to fifty recreational boats and the launching of small sailboats. There is no boat or engine repair that takes place at the property. Land use in the surrounding area includes a mix of residential properties, many with docks, and marina facilities. The Yachtsman Hotel and

Marina Club, which provides dockage for recreational watercraft, is directly adjacent to the south of the property. The nearby Kennebunkport Marina is approximately 800 feet south of the project area and offers boat slips, full mechanical services, and repairs as well as a boat ramp. Chicks Marina, which has a fuel dock, is adjacent to the southern property boundary of the Kennebunkport Marina, approximately 1,200 feet south of the project area. Downtown Kennebunkport, an area with several restaurants, retail shops, and marine services, is approximately 1,000 feet north of the property. The Kennebunkport River Federal Navigation Project (FNP) -6 foot MLLW channel is located directly adjacent to the western boundary of the project area.

Water Quality: Water Quality in the project area is dictated by tidal exchange with the Gulf of Maine with freshwater input from the Kennebunk River to the north and a series of stormwater discharge pipes within the Arundel Yacht Club and the other marina properties along the river (Figure 3). The 2014 Environmental Assessment for dredging of the Kennebunk River FNP noted that there have been reported increases of bacterial counts in the water, attributed to faulty septic systems, agriculture, and overboard discharges. Tidal waters of the Kennebunk River are classified as SB by the Maine Department of Environmental Protection (MEDEP). Class SB waters must be of such quality that they are suitable for the designated uses of recreation in and on the water, fishing, aquaculture, propagation and harvesting of shellfish, industrial process and cooling water supply, hydroelectric power generation, navigation and as habitat for fish and other estuarine and marine life (38 M.R.S. § 465(B)(2) https://www.mainelegislature.org/legis/statutes/38/title38sec465-B.html).

Dredge History and Existing Testing Data: The project area was last dredged in 2017 when approximately 1,800 CY of material were removed to a depth of -6 feet Mean Low Water (MLW) and placed at the Cape Arundel Disposal Site (CADS). Sampling and testing of this material in 2003 documented sediments to be predominately fine grained. Chemistry data, also from 2003, revealed elevated levels of metals (cadmium, copper, and mercury) at the project site. A review of biological testing data from 2014 found sediment from the project area not likely to be acutely toxic to benthic organisms. A suitability determination from 2015 concluded that project sediments were suitable for open water placement at CADS.

The adjacent Yachtsman Marina was last dredged in 2015 when approximately 3,914 CY of material were removed to a depth of -5 feet MLW and placed at the CADS. Sampling and testing of this material in 2014 documented sediments from two samples along the shoreline in the middle of the basin to be predominately fine grained (passing the No. 200 sieve) while the remaining four samples, located away from the shoreline, were predominately sand with some silt. A review of the associated chemistry data found elevated levels of pesticides (total DDX [4,4'-DDD + 4,4'-DDE + 4,4'-DDT]) and total high molecular weight polyaromatic hydrocarbons (HPAHs). A review of the associated biological testing data found sediment from the project area not likely to be acutely toxic to benthic organisms. A suitability determination from 2014 for the project area found sediments suitable for open water disposal at CADS. A residual dredging event of 100 CY was authorized by USACE in 2020 and the material was placed upland.

Spill Data: Based on information provided by the applicant and a review of the Maine Department of Environmental Protection (MEDEP) Oil and Hazardous Waste Spill Database (https://www.maine.gov/dep/spills/index.html), NAE determined that there have been several small diesel, gasoline, and oil spills within the surrounding area of the project site since 2011.

Risk Ranking: Following the tier one review of the site characteristics, location, and the available historical data, the proposed project was given a **low-moderate** risk ranking according to the following matrix.

Table 1: Project Risk Ranking

Rank	Guidelines
Low	Few or no sources of contamination. Data available to verify no significant potential for adverse biological effects.
Low-Moderate	Few or no sources of contamination but existing data is insufficient to confirm ranking.
Moderate	Contamination sources exist within the vicinity of the project with the potential to produce chemical concentrations that may cause adverse biological effects.
High	Known sources of contamination within the project area and historical data exists that has previously failed biological testing.

3. **Sample Collection:** In the first phase of testing the applicant shall collect sediment cores from four locations within the proposed dredge areas as specified in Table 2 (also see Figure 3). These locations were selected based on information from the CSM described above, the low to moderate risk ranking for the project, and shoaled areas identified in the project conditions survey submitted by the applicant. All core samples shall be collected to the proposed dredge depth plus overdredge amount using inert core liners. Estimated core lengths based on the bathymetry provided by the applicant are provided in Table 2, but the actual required core lengths shall be determined at the time of the sampling effort using measured water depths at each location corrected to MLLW. In order to ensure that the core samples adequately represent the dredge interval at each location, all cores to be used for this project shall have a recovered length that is within 75% of the core penetration depth. In addition, any cores that display significant disturbance such as compaction or wash out shall be disregarded. If the cores from any location do not meet the acceptability criteria after six attempts, then the applicant should retain the best core from that location and contact NAE for

further guidance. The penetration and recovery for the core used for the chemistry and grain size samples should be recorded on the sample log.

Upon collection, all cores shall be measured and maintained in an upright position for a minimum of 15 minutes to allow any fine-grained material to settle. After a core has settled, it shall be re-measured before any overlying water is drained, taking care to not include overlying water with sediment flocculant in the measurement. All cores shall be split lengthwise, photographed with a stadia rod for scale, and described in accordance with ASTM D 2488 (Standard Practice for Description and Identification of Soils). Samples shall be collected from the dredge interval (dredge depth + overdepth) within each core for grain size and bulk chemical analysis as described in the sections below. If the dredge interval within a core is homogenous then the entire length may be composited as a single sample with the chemistry/grain size sample interval noted on the sampling log. If any core shows significant stratification or obvious signs of contamination, then subsamples shall be collected from each layer and noted on the sampling log and the applicant shall consult NAE for guidance prior to the start of analysis. The term "significant stratification" includes any distinct change in sediment composition that could represent a change in depositional history or waterway usage such as a change in color or lithology. Compositing of dissimilar sediment layers without prior approval from NAE will result in the rejection of any resulting data products. In addition, a field duplicate sample should be collected for bulk chemistry and grain size analysis and an equipment blank should be collected for chemical analysis off any non-dedicated equipment used in the sampling process.

All sediments held for testing shall be stored in accordance with the requirements in Table 3 (from Table 8-9 in *Evaluation of Dredged Material Proposed for Ocean Disposal, Testing Manual, 1991).* Sample chain of custody forms shall be maintained by the applicant and submitted to NAE with the data package described in section 5 of this SAP.

Based on the results of the grain size and bulk chemistry sediment testing, NAE will provide the applicant with a biological testing compositing plan. In the second phase of testing, dredge area sediment shall be collected from the same sample locations described in Table 2 and composited according to NAE's biological testing compositing plan. Sufficient amounts of sediment and water shall be collected for elutriate preparation and analysis, water column toxicity testing, 10-day whole sediment toxicity testing, and 28-day bioaccumulation testing according to the sections below. Sediment cores from each station shall be collected using inert core liners and may be transferred directly into food grade polyethylene pails after core recovery has been measured. In addition, the applicant shall collect dredge site water from a central location within the proposed project area. All water samples shall be collected from the middle of the water column using either a non-contaminating pump or a discrete water sampler.

Please note that the applicant is not required to collect sediment or water samples from the IOSN reference site as the results of the biological testing will be compared to recent reference site data collected by NAE.

Again, all sediment and water samples held for testing shall be stored in accordance with the requirements in Table 3 (from Table 8-2 in Evaluation of Dredged Material Proposed for Ocean Disposal, Testing Manual, 1991). Sample chain of custody forms shall be maintained by the applicant and submitted to NAE with the data package described in section 5 of this SAP.

Vessel positioning shall be achieved using a Global Positioning System (GPS) that has been calibrated on site using a known reference point. The required horizontal accuracy at each sample location shall be 10 feet or less. All coordinate data shall be reported in geographic NAD 83 decimal degree format. All depth data shall be reported in tenths of feet. Water depths at each location are to be determined with an accuracy of ±0.1 feet (relative to MLLW). All depth data shall be reported in tenths of feet.

For phase one sampling, sample data including date, time, latitude, longitude, GPS accuracy at each sample station, measured water depth, tidal correction, core penetration, recovery, and chemistry sample intervals(s) shall be recorded in a sampling log (Figure 4 or equivalent) and provided to NAE with the applicant's core descriptions and photographs.

For phase two sampling, all sample data including date, time, latitude, longitude, GPS accuracy at each sample station, measured water depth, tidal correction, number of cores collected at each station, core lengths, and a general description of the sediment shall be recorded in a sampling log and provided to NAE. Note that if any of the phase two cores are significantly different from the material that was sampled during phase one, a representative core should be photographed and described and NAE should be consulted for guidance.

4. **Sample Analysis:** Sediment and water samples from the dredge area shall undergo physical, chemical, and biological analysis as described in the sections below. All laboratories used for this project shall have an approved Laboratory Quality Assurance Plan (LQAP) on file with NAE. Any data produced by a lab without an approved LQAP will not be accepted. The RIM, a list of laboratories with approved LQAPs, and the reporting format and requirements for electronic submission of data are available for download through the NAE website: http://www.nae.usace.army.mil/Missions/Regulatory/Dredged-Material-Program/.

Grain Size and Bulk Sediment Chemistry: All samples from the proposed dredge footprint shall be individually analyzed for grain size and bulk sediment chemistry. Testing parameters, analytical methods, and reporting limits to be used are outlined in Table 4. The listed analytical methods are recommended but can be replaced by other methods that will provide the required reporting limits. Additional guidance on the physical and chemical analysis of sediments can be found in chapter 5 of the RIM. NAE will provide the applicant with a compositing plan for biological testing based on sample proximity, physical characteristics recorded during the core description process, and the results of grain size and bulk chemistry analysis.

<u>Elutriate Chemistry:</u> Elutriate samples shall be prepared from the dredge area water and sediments according to the project compositing plan. The elutriate samples and clean seawater (provided by the applicant's testing facility) used for dilutions in the suspended phase particulate bioassays shall undergo chemical analysis according to the testing parameters, analytical methods, and reporting limits outlined in Table 5. The listed analytical methods are recommended but can be replaced by other methods that will give the required reporting limits. Additional guidance can be found in Section 6.1 of the RIM and Section 9.4 of the Green Book.

<u>Water Column Toxicity Testing:</u> Suspended phase particulate bioassays shall be performed on each composite sample in accordance with the requirements specified in Section 6.2 of the RIM, and Section 11.1 of the Green Book. Refer to the RIM for guidance in selecting the test species. Clean seawater provided by the applicant's testing facility shall be used as both control and dilution water.

Please note that excessive ammonia concentrations in the elutriate samples may cause a toxic response that is not of interest to the SPP bioassay, which focuses on persistent contaminants. To account for this scenario, the US Environmental Protection Agency (EPA) and NAE have devised a protocol to determine if ammonia is the driver of toxicity in situations where unionized ammonia is present at concentrations above the applicable water quality criteria (WQC). In order to facilitate this protocol, the applicant may choose to have their laboratory measure total ammonia in the undiluted elutriate samples prior to SPP bioassay initiation and calculate the unionized ammonia concentrations based on measurements of pH, temperature, and salinity. If the calculated unionized ammonia concentrations are greater than the applicable WQC, the testing facility shall immediately notify the applicant, who may wish to seek guidance from NAE on project-specific procedures for preparation of additional elutriate samples requiring ammonia reduction and the need for additional SPP testing. This protocol is not a requirement, but NAE recommends it to prevent a 'false positive' toxicity result that would limit the applicant's disposal alternatives.

<u>10-Day Whole Sediment Toxicity Testing:</u> 10-day whole sediment toxicity testing shall be performed on each composite sample in accordance with the

requirements specified in Chapter 7.1 of the RIM, Section 11.2 of the Green Book, and Methods for Assessing the Toxicity of Sediment-Associated Contaminants with Estuarine and Marine Amphipods, 1994. The bioassay test shall use two species of test animals, the amphipod *Leptocheirus plumulosus* and the mysid shrimp *Americamysis bahia*. If the applicant wishes to use alternate species listed in the RIM, then NAE must be contacted prior to sampling to coordinate the need for reference area sample collection and analysis.

28-Day Bioaccumulation Testing: 28-day bioaccumulation testing shall be performed on each composite sample in accordance with the requirements specified in Chapter 7.2 of the RIM and Section 12.1 of the Green Book. The bioaccumulation test shall use a bivalve, *Macoma nasuta*, and the polychaete *Nereis virens* as test animals. If alternate species are selected from the RIM then contact NAE prior to sampling to coordinate necessary reference data collection. At the end of the 28–day test, the tissues of the survivors shall be tested for the project contaminants of concern according to Tables 8 and 9 of the RIM. The contaminants of concern will be determined from the bulk sediment chemistry testing described above.

5. **Reporting requirements:** All sediment testing data is required to be submitted electronically in the electronic data deliverable (EDD) format available on the NAE website (http://www.nae.usace.army.mil/Missions/Disposal-Area-Monitoring-System-DAMOS/Electronic-Data-Deliverables.aspx). Hard copy data submission is also required but may be substituted with a printer friendly, easy-to-read format (e.g., PDF, MS Word). Any analytes not detected shall be reported as half the method detection limit (MDL) and qualified with a "U". RIM quality control summary tables are required to be submitted with each project dataset. These tables are found in Appendix II of the RIM.

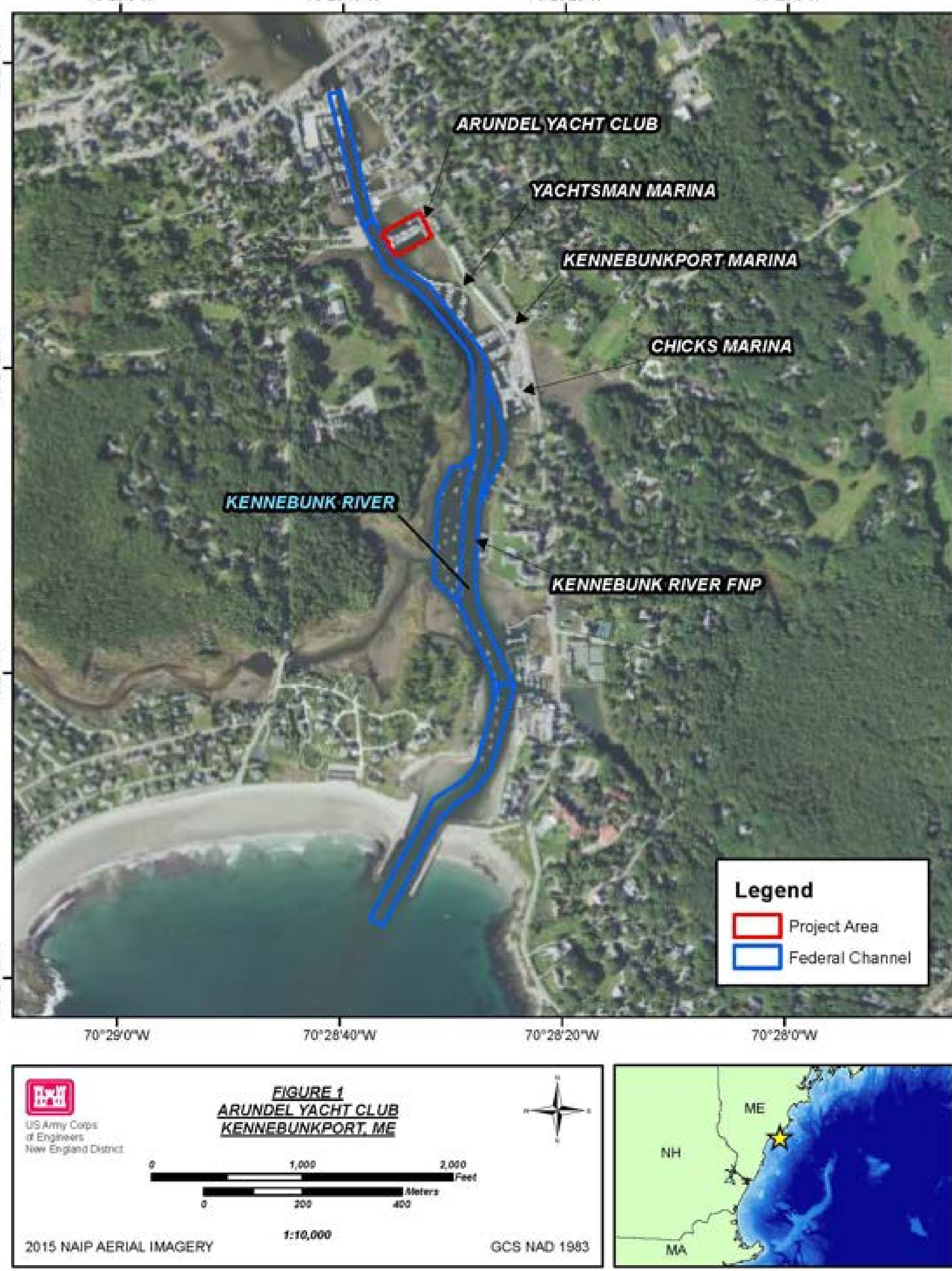
6. **Contact Information:** Questions about this plan should be directed to Gabriella Saloio (phone: 978-318-8138 e-mail: Gabriella.J.Saloio@usace.army.mil)

Gabriella Saloio

Gabriella Saloio
Biologist
New England District
U.S. Army Corps of Engineers

Table 2: Arundel Yacht Club Sample Locations

Station	Latitude (NAD 83)	Longitude (NAD 83)	Survey Depth (Feet MLLW)	Project Depth (Feet MLLW)	Overdepth (Feet)	Estimated Core length (Feet)
AYC-1	-70.475810	43.358305	-3.9	-6.0	1.0	3.1
AYC-2	-70.475589	43.358010	-1.7	-6.0	1.0	5.3
AYC-3	-70.476321	43.357931	-3.0	-6.0	1.0	4.0
AYC-4	-70.476397	43.358105	-3.0	-6.0	1.0	4.0


70°29'0"W
70°28'40"W
70°28'20"W
70°28'0"W
43°21'40"N
43°21'20"N
43°21'0"N
43°20'40"N
ARUNDEL YACHT CLUB
YACHTSMAN MARINA
KENNEBUNKPORT MARINA
CHICKS MARINA
KENNEBUNK RIVER
KENNEBUNK RIVER FNP
Legend
Project Area
Federal Channel
US Army Corps of Engineers New England District
FIGURE 1
ARUNDEL YACHT CLUB
KENNEBUNKPORT, ME
0
1,000
2,000
Feet
0
200
400
Meters
1:10,000
2015 NAIP AERIAL IMAGERY
GCS NAD 1983
ME
NH
MA

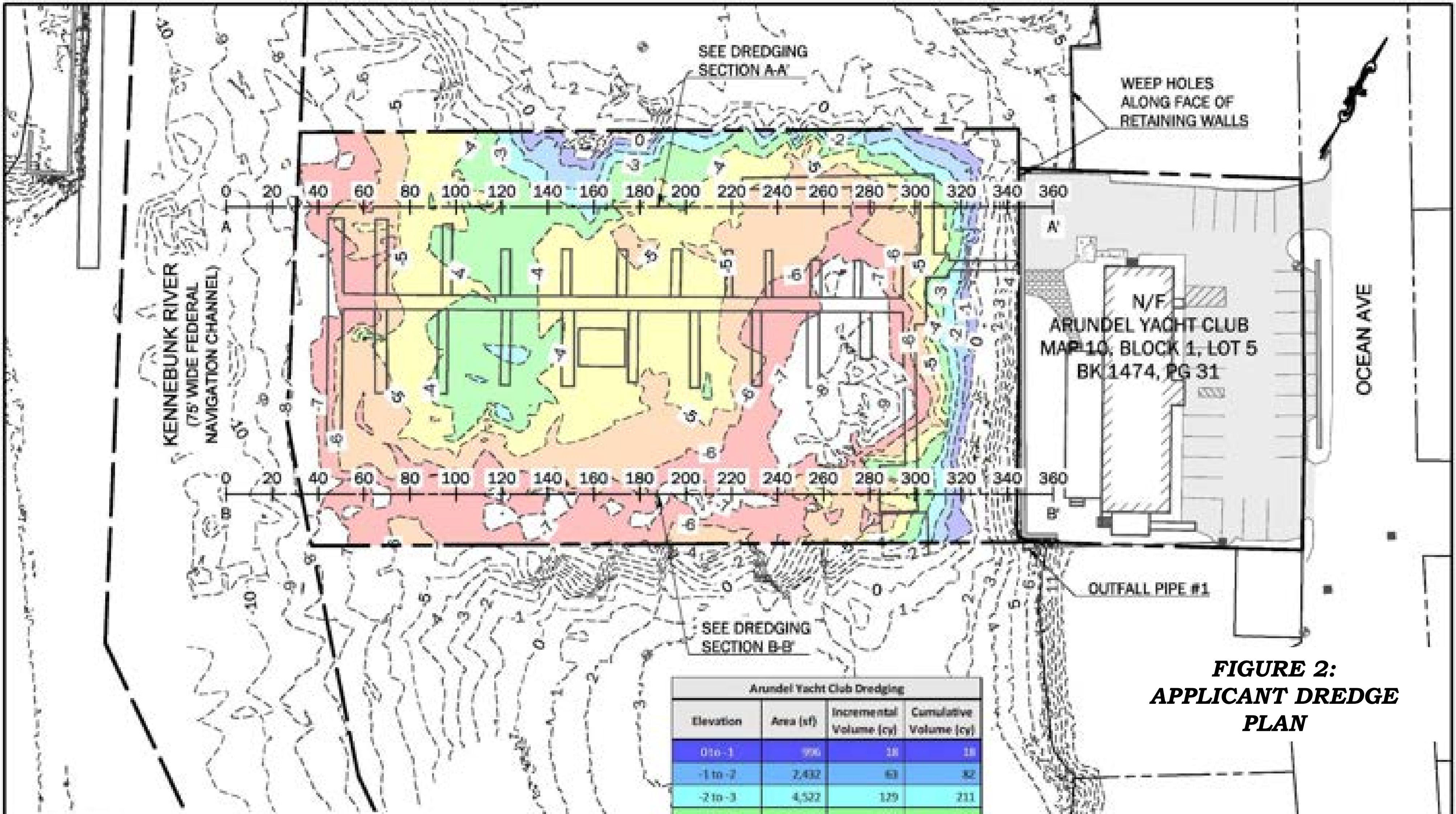


FIGURE 2: APPLICANT DREDGE PLAN

Arundel Yacht Club Dredging			
Elevation	Area (sf)	Incremental Volume (cy)	Cumulative Volume (cy)
0 to -1	996	18	18
-1 to -2	2,432	63	82
-2 to -3	4,522	129	211
-3 to -4	11,832	303	514
-4 to -5	24,323	670	1,183
-5 to -6	35,131	1,101	2,284
-6 to -7	45,356	1,491	3,775
Including 25% Bulking Factor			4,718

PLAN REFERENCES:

1. BATHYMETRY CONDUCTED BY WEA ON DECEMBER 17, 2021 USING HYDROLITE SONARMITE ECHOSOUNDER AND CARLSON BRx7 GNSS RECEIVER.
2. FIELD OBSERVATIONS AND TOPOGRAPHY COLLECTED VIA DRONE PHOTOGRAMERTY BY WEA ON DECEMBER 13, 2021.
3. ALL ELEVATIONS ON THIS PLAN ARE BASED ON MLLW. THE MLLW TO NAVD88 CORRECTIONS FOR THIS PROJECT IS 5.09 FEET.

WALSH ENGINEERING ASSOCIATES, INC.

One Karen Dr., Suite 2A | Westbrook, Maine 04092
ph: 207.553.9898 | www.walsh-eng.com

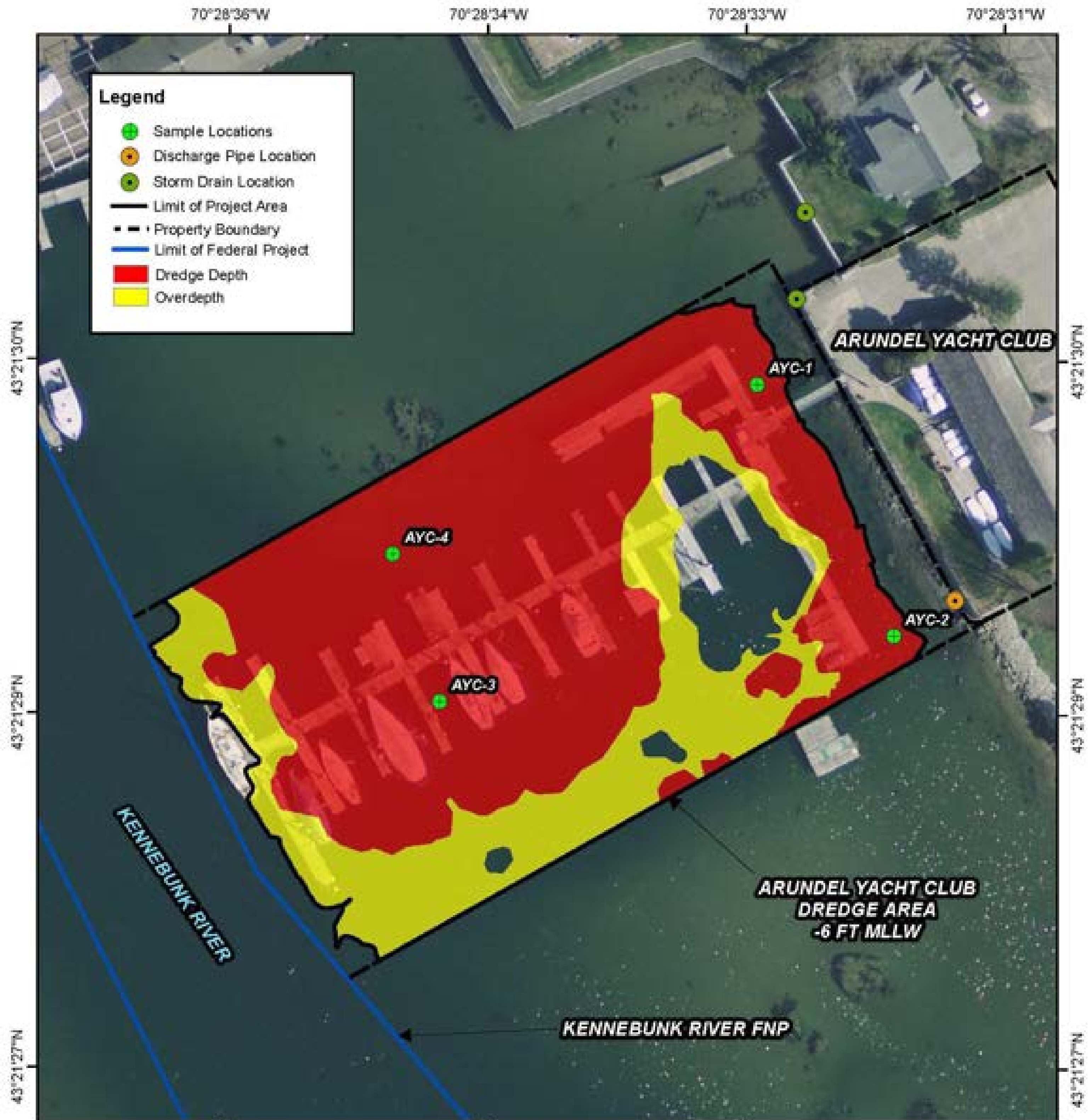
Arundel Yacht Club Dredging

Arundel Yacht Club
51 Ocean Ave
Kennebunkport, Maine 04046

Sheet Title:
Figure 2A: Plan View

Job No.:	782
Date:	January 2022
Scale:	1" = 60'
Drawn:	CAR
Checked:	WRW

P:\782 - Arundel Yacht Club Dredging\3. CAD\782 - Base.dwg plot date: 1/28/2022 3:50 PM



US Army Corps of Engineers New England District

FIGURE 3
ARUNDEL YACHT CLUB
2022 SAMPLE LOCATIONS

0 70 140 Feet
0 20 40 Meters

1:700

2022 ESRI WORLD IMAGERY

GCS NAD 1983

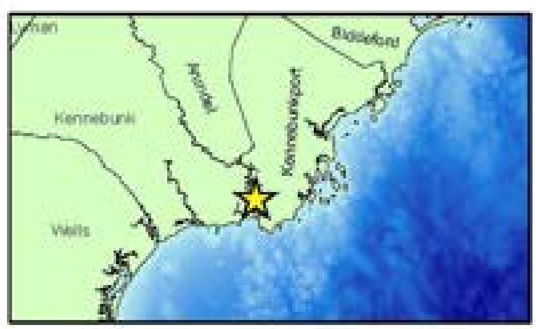


TABLE 3: RECOMMENDED PROCEDURES FOR SAMPLE COLLECTION, PRESERVATION, AND STORAGE

Analyses	Collection Method	Sample Volume	Container	Preservation Technique	Storage Conditions	Holding Time[b]
Sediment						
Chemical/Physical Analyses						
Metals	Grab/corer	200 mL	Precleaned polyethylene jar[c]	Refrigerate. Dry ice[b] or freezer storage is recommended for extended holding times.	≤ 4° C[c]	Hg - 28 days Others - 6 Months[d]
Organic Compounds	Grab/corer	475 mL	Solvent-rinsed glass jar with Teflon lid[c]	Refrigerate. Dry ice[b] or freezer storage is recommended for extended holding times.	≤ 4° C/dark[d]	14 days[e]
Particle Size	Grab/corer	75 mL	Whirl-pac bag[b]	Refrigerate	≤ 4° C	Undetermined
Total Organic Carbon	Grab/corer	3 L	Heat treated glass vial with Teflon lined lid[c]	Refrigerate. Dry ice[c] or freezer storage is recommended for extended holding times.	≤ 4° C[c]	14 days
Sediment from Which Elutriate is Prepared	Grab/corer	Dependent on tests performed	Glass with Teflon lined lid	Completely fill and Refrigerate	≤ 4° C/dark/airtight	Undetermined
Biological Tests						
Dredged Material	Grab/corer	12-15 L per sample	Plastic bag or container[e]	Completely fill and Refrigerate; sieve	≤ 4° C/dark/airtight	14 days[i] [f]
Reference Sediment	Grab/corer	45-50 L per test	Plastic bag or container[e]	Completely fill and Refrigerate; sieve	≤ 4° C/dark/airtight	14 days[i] [f]
Control Sediment	Grab/corer	21-25 L per test	Plastic bag or container[e]	Completely fill and Refrigerate; sieve	≤ 4° C/dark/airtight	14 days[i] [f]
Water and Elutriate						
Chemical/Physical Analyses						
Metals		Discrete sampler or pump	1 L	Acid-rinsed polyethylene or glass jar	pH <2 with HNO_3[d]	4° C ± 2° C[d]

TABLE 3: RECOMMENDED PROCEDURES FOR SAMPLE COLLECTION, PRESERVATION, AND STORAGE (CONTINUED)

Organics	Discrete sampler or pump	4 L	Amber glass bottle[d]	Airtight seal; refrigerate	4° C ± 2° C[d]	5 days[d]
Tissue						
Metals	Trawl/ Teflon coated grab	30 g	Double Ziploc[c]	Handle with non-metallic forceps; plastic gloves; dry ice[c]	≤ -20° C[C]	Hg - 14 days Others - 6 months[i]
PCBs and Chlorinated Pesticides	Trawl/ Teflon coated grab	100 g	Hexane-rinsed double aluminum foil and double Ziploc[c]	Handle with hexane-rinsed stainless steel forceps; dry ice[c]	≤ -20° C[C]	10 days[i e]
Volatile Organic Compounds	Trawl/ Teflon coated grab	50 g	Heat cleaned aluminum foil and watertight plastic bag[i]	Covered ice chest[d]	≤ -20° C[i]	10 days[i e]
PAHs	Trawl/ Teflon coated grab	50 g	Hexane-rinsed double aluminum foil and double Ziploc[c]	Handle with hexane-rinsed stainless steel forceps; dry ice[c]	≤ -20° C[i]	10 days[i e]
Lipids	Trawl/ Teflon coated grab	50 g	Hexane-rinsed aluminum foil	Handle with hexane-rinsed stainless steel forceps; quick freeze	20° C	Undetermined

[a] *This table contains only a summary of collection, preservation, and storage procedures for samples. The cited references should be consulted for a more detailed description of these procedures.*

[b] *These holding times are for sediment, water, and tissue based on guidance that is sometimes administrative rather than technical in nature. There are no promulgated, scientifically based holding time criteria for sediments, tissues, or elutriates. References should be consulted if holding times for sample extracts are desired. Holding times are from the time of sample collection.*

[c] *NOAA (1989).*

[d] *Tetra Tech (1986a)*

[e] *Sample may be held for up to one year if maintained ≤ -20° C*

[f] *Two weeks is recommended; sediments must not be held for longer than 8 weeks prior to biological testing.*

[g] *NOAA (1989).*

[h] *Plumb (1981).*

[i] *Tetra Tech (1986b)*

TABLE 4: BULK SEDIMENT TESTING PARAMETERS

Parameter		Analytical Method	Reporting Limit (ppm)
Metals			
	Arsenic	6010B, 6020, 7060, 7061	0.4
	Cadmium	6010B, 6020, 7130, 7131	0.07
	Chromium	6010B, 6020, 7190, 7191	0.5
	Copper	6010B, 6020, 7210	0.5
	Lead	6010B, 6020, 7420, 7421	0.5
	Mercury	7471	0.02
	Nickel	6010B, 6020, 7520	0.5
	Zinc	6010B, 6020, 7950	1.0
PCBs (total by NOAA summation of congeners)			
	See next page	8082A	0.001
Pesticides		NOAA (1993), 8081B	0.001
	Aldrin	Heptachlor epoxide	
	cis- & trans-Chlordane	Hexachlorobenzene	
	4,4'-DDT, DDD, DDE	Lindane	
	Dieldrin	Methoxychlor	
	α & β Endosulfan	cis- & trans-Nonachlor	
	Endrin	Oxychlordane	
	Heptachlor	Toxaphene	0.025
Polycyclic Aromatic Hydrocarbons (PAHs)		8270C-SIM	0.01
	Acenaphthene	Chrysene	
	Acenaphthylene	Dibenzo(a,h)anthracene	
	Anthracene	Fluoranthene	
	Benzo(a)anthracene	Fluorene	
	Benzo(a)pyrene	Indeno(1, 2, 3-cd)pyrene	
	Benzo(b)fluoranthene	Naphthalene	
	Benzo(k)fluoranthene	Phenanthrene	
	Benzo(g, h, i)perylene	Pyrene	
Total Organic Carbon		Plumb (1981), APHA (1995)	0.1%
Percent Moisture		Plumb (1981), EPA (1992), PSEP (1986)	1.0%
Grain Size		Wet Sieve (#4, 10, 40, 200)	

TABLE 4: BULK SEDIMENT TESTING PARAMETERS (CONTINUED)

PCB CONGENERS

Analytical Method: NOAA (1993), 8082A

Reporting Limit: 1 ppb

Congeners:

8*	2,4' diCB
18*	2,2',5 triCB
28*	2,4,4' triCB
44*	2,2',3,5' tetraCB
49	2,2',4',5 tetraCB
52*	2,2',5,5' tetraCB
66*	2,3',4,4' tetraCB
87	2,2',3,4,5' pentaCB
101*	2,2',4,5,5' pentaCB
105*	2,3,3',4,4' pentaCB
118*	2,3',4,4',5 pentaCB
128*	2,3,3',4,4' hexaCB
138*	2,2',3,4,4',5' hexaCB
153*	2,2',4,4',5,5' hexaCB
170*	2,2',3,3',4,4',5 heptaCB
180*	2,2',3,4,4',5,5' heptaCB
183	2,2',3,4,4',5',6 heptaCB
184	2,2',3,4,4',6,6' heptaCB
187*	2,2',3,4',5,5',6 heptaCB
195*	2,2',3,3',4,4',5,6 octaCB
206*	2,2',3,3',4,4',5,5',6 nonaCB
209*	2,2',3,3',4,4',5,5',6,6' decaCB

* denotes a congener to be used in estimating Total PCB. To calculate Total PCB, sum the concentrations of all eighteen congeners marked with a "*" and multiply by 2.

The specified methods are recommendations only. Other acceptable methodologies capable of meeting the Reporting Limits can be used. Sample preparation methodologies (e.g. extraction and cleanup) and sample size may need to be modified to achieve the required Reporting Limits.

TABLE 5: ELUTRIATE TESTING PARAMETERS

Parameter	Recommended Analytical Method	Reporting Limit (µg/L)
Metals		
Arsenic	200.9, 1632	1.0
Cadmium	200.9, 1637	1.0
Chromium (VI)	218.6, 1636	1.0
Copper	200.9, 1639, 1640	0.6
Lead	200.9, 1639, 1640	1.0
Mercury	245.7, 1631	0.4
Nickel	200.9, 1639, 1640	1.0
Selenium	200.9, 1639	1.0
Silver	200.9	0.5
Zinc	200.9, 1639	1.0
PCBs (total, by either of these methods)		
	3510B, 8080A, NYSDEC	0.006
Pentachlorophenol	3501B, 8270C	2.60
Pesticides	3510B, 8080A	
Aldrin		0.26
Chlordane		0.02
Chloropyrifos		0.002
Dieldrin		0.14
4, 4'-DDT		0.03
α & β Endosulfan		0.007
Endrin		0.007
Heptachlor		0.01
Heptachlor epoxide		0.01
Lindane		0.26
Toxaphene		0.04

Reference:

NYSDEC. 1991. Analytical Method for the Determination of PCB Congeners by Fused Silica Capillary Column Gas Chromatography with Electron Capture Detector. NYSDEC #91-11.

FIGURE 4: EXAMPLE CORE LOG DATA SHEET

PROJECT NAME: ______ DATE: ______

PROJECT LOCATION: ______ SEA STATE: ______

VESSEL: ______ POSITIONING EQUIPMENT: ______

SAMPLING EQUIPMENT: ______

SAMPLING PERSONNEL: ______ LOGGED BY: ______

CORE ID: ______ TIME: ______

LATITUDE: ______ LONGITUDE: ______ POSITION ACCURACY: ______

MEASURED WATER DEPTH: ______ CORRECTED WATER DEPTH: ______

TARGET PENETRATION: ______ ACTUAL PENETRATION: ______ RECOVERY: ______

COMMENTS: ______

SAMPLE INTERVAL(S): ______

CORE PHOTO:	CORE DESCRIPTION:
Insert core photograph with scale	*Insert field notes and ASTM description of core*

USACE's Suitability Determination for Isle of Shoals North

CENAE-PDE **10 June 2024**

FINAL Suitability Determination for Maintenance Dredging of the Kennebunk River Projects, Kennebunkport, Maine

Summary:
This determination addresses the suitability of shoaled sediments within four project areas along the Kennebunk River, in Kennebunkport, Maine (ME): Arundel Yacht Club (AYC), Yachtsman Marina, Kennebunkport Marina, and Kennebunk River Club (KBRC) for unconfined open water disposal at the Isle of Shoals North Disposal Site (IOSN) (Figure 1). The New England District (NAE) of the US Army Corps of Engineers (USACE) finds that sufficient data have been provided to satisfy the evaluation and testing requirements of Section 103 of the Marine Protection Research and Sanctuaries Act (MPRSA). Based on an evaluation of the project sites and the material proposed to be dredged, NAE finds these sediments suitable for unconfined open water disposal at IOSN as proposed.

1. Project Description:
The applicants are proposing to mechanically dredge shoaled areas from four project areas along the Kennebunk River in Kennebunkport, ME.

- The Arundel Yacht Club is proposing to dredge approximately 8,031 cubic yards (cy) from shoaled areas totaling just over 1 acre within the property's marina basin (Figures 1, 2, and 6).
- The Yachtsman Marina is proposing to dredge approximately 6,400 cy of shoaled material from areas totaling 1.4 acres within the property's marina basin (Figures 1, 3, and 7).
- The Kennebunkport Marina is proposing to dredge approximately 3,675 cy of shoaled material from 0.8 acres within the property's marina basin (Figures 1, 4, and 8).
- The Kennebunk River Club is proposing to dredge a total of approximately 8,935 cy of shoaled material: 3,026 cy of material will be removed from the 0.4 acre north marina basin, and 5,909 cy will be removed from the 0.8 acre south marina basin (Figures 1, 5, and 9).

All areas will be dredged to the authorized project depth of -6 feet at mean lower low water (MLLW) plus 1 foot of allowable overdepth. The applicant requested that disposal of the proposed dredge material be evaluated for IOSN as a potential alternative for this project.

Table 1: Project Area Summary

Project Area	File Number	Project Depth (ft MLLW) plus 1 ft OD	Dredge Volume (cy)	Acreage
Arundel Yacht Club	NAE-2022-00288	-6.0	8,031	1.0
Yachtsman Marina	NAE-2004-00319	-6.0	6,400	1.4
Kennebunkport Marina	NAE-2005-00280	-6.0	3,675	0.8
Kennebunk River Club – North Marina Basin	NAE-2007-2704	-6.0	3,026	0.4
Kennebunk River Club – South Marina Basin		-6.0	5,909	0.8

2. Conceptual Site Model:

USACE reviewed historic testing data, previous environmental assessments, water quality data, and adjacent land use information to develop a conceptual site model (CSM) for the Kennebunk River projects (Figure 10). NAE used this CSM to characterize the system and to identify potential sources of contamination, site-specific contaminants of concern, exposure pathways, and biological receptors to inform this suitability determination.

Project Setting: All four projects are located along the eastern shoreline of the Kennebunk River in Kennebunkport, ME. The Arundel Yacht Club is located farthest upriver (approximately 0.8 miles from the river's mouth), the Yachtsman Marina and Kennebunkport Marina are adjacent to each other just to the south of Arundel Yacht Club, and the Kennebunk River Club is located farther down river, about 0.25 miles from the mouth of the river (Figure 1).

The Arundel Yacht Club building was constructed in 1806 and served as a rope making facility until 1816. Sanborn maps from 1911 show that the property was used as a boat house, carriage house, and wagon shed prior to the establishment of the yacht club in 1957. The yacht club provides dockage for up to fifty recreational boats and has a launch for small sailboats. There are no repair or fuel facilities on the property. The Yachtsman Marina offers boat dockage to the Yachtsman Hotel guests. The Marina is now leased to and managed by the adjacent Kennebunkport Marina, located directly to the south. The applicant is proposing to dredge the leased area to connect the two marinas. The Kennebunkport Marina is a year-round facility offering slips, full mechanical services, a ship store, engine sales, power boat and canoe rentals, as well as a boat ramp. The Kennebunk River Club provides seasonal dockage for recreational vessels, as well as shoreside facilities for social and recreational functions.

Land use in the surrounding area is largely a mix of residential property, many with private docks, and other marina facilities. Chicks Marina, which has a fuel dock, is adjacent to Kennebunkport Marina. Downtown Kennebunkport, which has several restaurants, retail shops, and marine services, is approximately 1,000 feet north of Arundel Yacht Club. The Kennebunkport River Federal Navigation Project (FNP) -6 foot MLLW channel is located directly adjacent to the western boundary of the project areas.

Water Quality: Water Quality in the project area is dictated by tidal exchange with the Gulf of Maine with freshwater input from the Kennebunk River to the north and a series of stormwater discharge pipes within the marina properties along the river (Figures 6-9). Tidal waters of the Kennebunk River are classified as SB by the Maine Department of Environmental Protection (MEDEP). Class SB waters must be of such quality that they are suitable for the designated uses of recreation in and on the water, fishing, aquaculture, propagation and harvesting of shellfish, industrial process and cooling water supply, hydroelectric power generation, navigation and as habitat for fish and other estuarine and marine life (38 M.R.S. § 465(B)(2) https://www.mainelegislature.org/legis/statutes/38/title38sec465-B.html).

Dredge History and Existing Testing Data: The Arundel Yacht Club was last dredged in 2017 when approximately 1,800 cy of material were removed to a depth of -6 feet at Mean Low Water (MLW) and placed at the Cape Arundel Disposal Site (CADS). Sampling and testing of this material in 2003 documented sediments to be predominately fine grained. A review of the associated chemistry data found cadmium, copper, and mercury detected at concentrations with the potential to cause toxicity based on current sediment screening guidelines. Based on the results of elutriate, toxicity, and bioaccumulation studies, NAE found the material from the Arundel Yacht Club suitable for placement at CADS in a 2015 suitability determination.

The Yachtsman Marina was last dredged in 2015 when approximately 3,914 cy of material were removed to a depth of -5 feet MLW and placed at CADS. Sampling and testing of this material in 2014 documented sediments from two samples along the shoreline in the middle of the basin to be predominately fine grained while the remaining four samples, located away from the shoreline, were predominately sand with some silt. A review of the associated chemistry data found levels of total DDX (sum of 4,4'-DDD + 4,4'-DDE +4,4'-DDT) and total high molecular weight polyaromatic hydrocarbons (HPAHs) detected at concentrations with the potential to cause toxicity based on current sediment screening guidelines. Based on the results of elutriate, toxicity, and bioaccumulation studies, NAE found the material from the Yachtsman Marina suitable for placement at CADS in a 2014 suitability determination. In addition, a residual dredging event of 100 cy was authorized by USACE in 2020 and this material was placed upland.

The Kennebunkport Marina was last dredged in 2015 when approximately 1,500 cy of material were removed to a depth of -5 feet MLW and placed at CADS. Sampling and testing of this material in 2014 documented predominately fine grained sediments with little sand. A review of the associated chemistry data found total DDX and total HPAHs detected at concentrations with the potential to cause toxicity based on current sediment screening guidelines. Based on the results of elutriate, toxicity, and bioaccumulation studies, NAE found the material from the Kennebunkport Marina suitable for placement at CADS in a 2014 suitability determination.

The Kennebunk River Club was last dredged in 2009 when 7,609 cy of fine grained material were mechanically removed and placed at CADS. A review of the associated chemistry data found cadmium, total HPAHs, total DDX, and total chlordane detected at concentrations with the potential to cause toxicity based on current sediment screening guidelines. Based on the results of elutriate, toxicity, and bioaccumulation studies, NAE found the material from the Kennebunk River Club suitable for placement at CADS in a 2009 suitability determination.

Spill Data: Based on information provided by the applicant and a review of the MEDEP Oil and Hazardous Waste Spill Database (https://www.maine.gov/dep/spills/index.html) and the U.S. Coast Guard's National Response Center website, NAE determined that there have been several small sheens, diesel, gasoline, and oil spills within the vicinity of the project sites since 2009.

Disposal Site: IOSN is located approximately 23 miles south of the project locations. IOSN is regularly monitored by the NAE Disposal Area Monitoring System (DAMOS) Program. The most recent DAMOS report on IOSN was based on a 2022 survey of the site (USACE, 2023).

Risk Ranking: Based on the site characteristics and the available testing data outlined above, all four projects were given a **low-moderate** risk ranking according to the following matrix in Table 2.

Table 2: Project Risk Ranking

Rank	Guidelines
Low	Few or no sources of contamination. Data available to verify no significant potential for adverse biological effects.
Low-Moderate	Few or no sources of contamination but existing data is insufficient to confirm ranking.
Moderate	Contamination sources exist within the vicinity of the project with the potential to produce chemical concentrations that may cause adverse biological effects.
High	Known sources of contamination within the project area and historical data exists that has previously failed biological testing.

3. Sampling, Testing, and Analysis:

NAE prepared sampling and analysis plans (SAPs) in January of 2022 for the Kennebunkport (three samples) and Yachtsman Marinas (five samples) and in May 2022 for the Arundel Yacht Club (four samples) that called for the collection of samples for bulk sediment chemistry and grain size, as well as full biological testing, including elutriate preparation and analysis, water column toxicity testing, 10-day whole sediment toxicity testing, and 28-day bioaccumulation testing. The applicants collected sediment cores from these three marina basins in July of 2022 (Table 3, Figures 6 through 8) for chemistry and grain size analysis. In addition, NAE prepared a biological testing SAP in June of 2020 for the Kennebunk River Club using bulk sediment chemistry and grain size data collected in December of 2018 which was also used in this evaluation (Table 3, Figure 9).

Table 3: Core Locations

Sample Location	Latitude	Longitude	Project Depth with Overdepth (ft MLLW)	Water Depth (ft MLLW)	Required Core Length (ft)	Recovery/ Penetration (ft)	Sample Interval (ft)
Arundel Yacht Club							
AYC-1	43.35831	-70.47582	-7.0	-3.9	3.1	3.2/3.2	0-3.2
AYC-2	43.35800	-70.47561	-7.0	-2.1	4.9	2.4/2.4	0-2.4
AYC-3	43.35793	-70.47634	-7.0	-3.2	3.8	0.75/1.0	0-0.75
AYC-4	43.35811	-70.47638	-7.0	-3.0	4.0	4.0/4.1	0-4.0
Yachtsman Marina							
Y-1	43.35735	-70.47578	-7.0	-1.5	5.5	3.5/3.5	0-3.5
Y-2	43.35724	-70.47533	-7.0	-1.2	5.8	2.5/2.5	0-2.5
Y-3	43.35701	-70.47488	-7.0	-4.2	2.8	2.7/2.7	0-2.7
Y-4	43.35673	-70.47467	-7.0	-4.4	2.6	3.4/3.4	0-2.6
Y-5	43.35629	-70.47437	-7.0	-1.0	6.0	6.1/6.1	0-6.0
Kennebunkport Marina							
K-1	43.35587	-70.47367	-7.0	-1.8	5.2	4.2/4.2	0-4.2
K-2	43.35607	-70.47394	-7.0	-4.8	2.2	3.1/3.1	0-2.2
K-3	43.35634	-70.47400	-7.0	-1.7	5.3	4.2/4.3	0-4.2
Kennebunk River Club							
KBRC-A	43.34975	-70.47269	-7.0	-2.5	5.0	4.5/4.5	0-4.5
KBRC-B	43.34982	-70.47327	-7.0	-4.0	3.0	3.0/3.0	0-3.0
KBRC-C	43.35007	-70.47322	-7.0	-2.0	4.0	5.0/5.0	0-5.0
KBRC-D	43.35008	-70.47340	-7.0	-5.0	1.0	2.0/2.0	0-2.0
KBRC-E	43.35046	-70.47323	-7.0	-2.5	6.0	4.5/4.5	0-4.5
KBRC-F	43.35039	-70.47352	-7.0	-2.0	4.0	5.0/5.0	0-5.0
KBRC-G	43.35063	-70.47326	-7.0	-1.0	2.0	6.0/6.0	0-6.0
KBRC-H	43.35055	-70.47354	-7.0	-4.0	3.0	3.0/3.0	0-3.0
KBRC-I	43.35082	-70.47331	-7.0	-1.5	6.0	5.5/5.5	0-5.5

Physical and Chemical Analysis of Sediments

Samples were largely composed of fines with little to some fine sand though several stations from the Yachtsman Marina and Kennebunk River Club were composed of fine sand with little to some fines. Grain size data are presented in Table 4 and core logs are provided in Appendix A.

Table 4: Grain Size Results

Sample ID	%Gravel	%Sand			%Fines
		Coarse	*Medium*	*Fine*	
Arundel Yacht Club					
AYC-1	0.1	1.7	6.4	13.1	78.7
AYC-2	3.1	2.2	12.5	31.4	50.8
AYC-3	0.4	0.9	5.2	14.4	79.1
AYC-4	3.6	0.8	4.5	10.7	80.4
Yachtsman Marina					
Y-1	4.9	0.8	6.0	64.7	23.6
Y-2	0.3	1.5	9.8	60.6	27.8
Y-3	2.3	1.7	5.7	20.6	69.7
Y-4	0.0	0.8	5.4	26.5	67.3
Y-5	1.0	1.2	4.4	80.6	12.8
Kennebunkport Marina					
K-1	0.1	0.6	4.4	43.9	51.0
K-2	0.0	1.2	7.9	28.9	62.0
K-3	2.4	1.5	8.0	19.7	68.4
Kennebunk River Club					
KBRC-A	0.0	1.0	4.0	32.0	62.7
KBRC-B	0.1	1.0	7.0	40.0	51.6
KBRC-C	0.0	1.0	2.0	61.0	35.6
KBRC-D	0.0	1.0	4.0	56.0	38.6
KBRC-E	0.0	0.0	3.0	71.0	25.9
KBRC-F	0.2	1.0	1.0	81.0	16.6
KBRC-G	0.2	1.0	4.0	61.0	33.8
KBRC-H	0.6	2.0	4.0	64.0	29.7
KBRC-I	0.7	2.0	10.0	45.0	43.4

As no project specific contaminants of concern were identified in the CSM, samples were analyzed for the standard suite of contaminants specified in the Regional Implementation Manual for the Evaluation of Dredged Material Proposed for Disposal in New England Waters (RIM) (EPA/USACE, 2004).

To examine the sediment concentrations in an ecologically meaningful context, NAE used Sediment Quality Guidelines (SQGs) to screen the chemical concentrations found in the sediment samples from the Kennebunk River project areas samples. Applicable SQG screening values for marine and estuarine sediments are the National Oceanic and Atmospheric Administration (NOAA) effects-range low (ERL) and effects-range median (ERM). It is important to understand that these values were not derived as toxicity pass-fail thresholds. Rather, ERL and ERM values are empirically derived guidelines based on a large number of studies nationwide that identify contaminant levels that indicate probability of toxic effects to inform decision making (Long et al., 1998). Effects are considered unlikely at concentrations below the ERL with an increased probability of toxic effects as concentrations increase. At concentrations above the ERM toxic effects are considered likely. For samples with sediment concentrations that fall between the ERL and ERM levels, consideration is given to both the number of contaminants that exceed ERL values and where the concentrations fall in the range between ERL and ERM values in assessing the probability of toxic effects and the potential need for additional testing.

Metals concentrations were largely below the ERL with many concentrations also less than the IOSN reference concentrations in all four project areas. Arsenic was detected at concentrations just above the ERL and reference value at stations AYC-1 and AYC-4, though both stations were below the established natural background level, 16 mg/kg, in Maine sediments (MEDEP, 2018). Nickel concentrations at Arundel Yacht Club stations AYC-1 and AYC-4 and Yachtsman Marina station Y-3 were also slightly greater than the ERL and IOSN reference value. The lead concentration in the Kennebunkport Marina station K-1 was greater than both the ERL and reference value. All metal concentrations in the Kennebunk River Club samples were below the ERL.

A few individual low molecular weight polyaromatic hydrocarbons (LPAHs) were found at concentrations above their respective ERLs, including acenaphthene and fluorene at station K-2 in the Kennebunkport Marina, acenaphthene, anthracene, and fluorene at stations KBRC-A and B in the Kennebunk River Club, and all individual LPAHs except for naphthalene at the Arundel Yacht Club station AYC-2. Additionally, the total LPAH concentration at AYC-2 was greater than the ERL and IOSN reference value. Individual HPAHs benzo(a)anthracene and fluoranthene were found at concentrations greater than their respective ERLs at stations AYC-2, KBRC-A, and KBRC-B. Pyrene and chrysene were also found above the ERL at KBRC-B and pyrene was found above the ERL in station KBRC-C. Total HPAH concentrations were found above the ERL at stations AYC-2 at the Arundel Yacht Club and stations KBRC-A, B, and C in the Kennebunk River Club. All PAH concentrations were below ERL values in all samples from the Yachtsman Marina.

The pesticides 4,4’-DDD, 4,4’-DDE, and 4,4’-DDT as well as total DDX concentrations were found at concentrations greater than the ERL at stations K-1 and 2 at the Kennebunkport Marina and stations AYC-1 and 2 at the Arundel Yacht Club, where station AYC-4 also had 4,4’-DDE, 4,4’-DDT, and total DDX at concentrations over the ERL. Stations Y-1 and 2 at the Yachtsman Marina contained concentrations of 4,4’-DDE and total DDX that were greater than the ERL and the concentration of 4,4’-DDD was also above the ERL at station Y-2. Total DDX was found in concentrations above the ERL in all the Kennebunk River Club stations except for KBRC-F. 4,4`-DDT concentrations were also greater than the ERL in stations KBRC-B, KBRC-C, and KBRC-I and 4,4`-DDD exceeded the ERL in station KBRC-C. Dieldrin was found at concentrations greater than the ERL at Kennebunk River Club stations KBRC-A, B, D, E, and I and total chlordane was found at concentrations greater than the ERL at all stations in the Kennebunk River Club project area except for KBRC-E and KBRC-G.

Individual polychlorinated biphenyls (PCBs) were generally not detected. Where detected, total PCBs were found at concentrations well below the ERL at all stations sampled.

A summary of the bulk sediment chemistry data is presented in Table 5 with comparison to the ERL/ERM values and reference concentrations for IOSN. The full bulk chemistry results are presented in Appendix B.

Table 5. Summary of Bulk Sediment Chemistry Results

							Kennebunkport Marina						*Yachtsman Marina*											
					IOSN		K-1		K-2		K-3		Y-1		Y-2		Y-3		Y-4		Y-5	
Parameter	CAS Number	Units	ERL	ERM	Value	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Physical																						
Total organic carbon	14762744	%			1.28		0.37		3.04		2.32		0.93		0.72		1.90		1.19		0.20	
Metals																						
Arsenic	7440382	mg/kg	8.2	70	9.66		2.85		6.68		6.34		6.65		3.20		7.96		4.54		0.984	
Cadmium	7440439	mg/kg	1.2	9.6	0.072		0.295		0.410		0.344		0.225		0.235		0.388		0.430		0.093	
Chromium	7440473	mg/kg	81	370	31.5		21.9		27.1		26.4		17.7		14.7		33.6		23.1		6.71	
Copper	7440508	mg/kg	34	270	10.9		14.2		16.7		15.4		12.5		8.64		18.3		9.82		1.59	
Lead	7439921	mg/kg	46.7	218	18.1		134		21.9		17.1		12.4		12.9		20.2		7.79		1.81	
Mercury	7439976	mg/kg	0.150	0.710	0.032		0.051		0.063		0.047		0.045		0.051		0.052		0.011	J	0.005	J
Nickel	7440020	mg/kg	20.9	51.6	20.8		9.17		15.6		15.4		11.3		8.37		21.4		15.1		3.81	
Zinc	7440666	mg/kg	150	410	60.6		56.6		67.4		57.2		42.2		37.6		71.2		45.2		10.2	
PAHs																						
Total LPAH	*SUMLPAH*	ug/kg	552	3,160	48.2		185		225		225		188		191		118		7.87		8.67	
Total HPAH	*SUMHPAH*	ug/kg	1,700	9,600	260		1238		1697		1664		1336		1338		863		33.3		48.3	
Pesticides																						
4,4`-DDD	72548	ug/kg	2	20	0.020	U	4.98	J	4.66	J	0.112	UJ	1.16	J	2.86	J	0.093	UJ	0.016	UJ	0.013	UJ
4,4`-DDE	72559	ug/kg	2.2	27	0.066		2.23		4.53	J	0.068	U	2.50	J	2.78		0.057	U	0.010	U	0.008	U
4,4`-DDT	50293	ug/kg	1	7	0.026	U	1.44		1.44		0.148	U	0.960		0.808		0.123	U	0.020	U	0.017	U
Total DDX	SUMDDX	ug/kg	1.58	46.1	0.112		8.65		10.6		0.328	U	4.62		6.45		0.272	U	0.045	U	0.038	U
Dieldrin	60571	ug/kg	0.02	8	0.040	U	0.031	U	0.038	U	0.226	U	0.038	U	0.031	U	0.187	U	0.031	U	0.026	U
Total Chlordane	*SUMCHLOR*	ug/kg	0.5	6	0.300	U	0.233	U	0.289	U	1.710	U	0.285	U	0.234	U	1.42	U	0.233	U	0.198	U
PCBs																						
Total PCBs	*SumNOAA18*	ug/kg	22.7	180	4.02	U	8.34		3.98		2.77		1.92		2.33		3.56		1.56	U	1.33	U

Table 5. Summary of Bulk Sediment Chemistry Results, cont.

							Arundel Yacht Club							
					IOSN		AYC-1		AYC-2		AYC-3		AYC-4	
Parameter	CAS Number	Units	ERL	ERM	Value	Q	Result	Q	Result	Q	Result	Q	Result	Q
Physical														
Total organic carbon	14762744	%			1.28		1.14		1.15		8.46		2.64	
Metals														
Arsenic	7440382	mg/kg	8.2	70	9.66		9.75		6.72		7.78		10.3	
Cadmium	7440439	mg/kg	1.2	9.6	0.072		0.335		0.330		0.453		0.613	
Chromium	7440473	mg/kg	81	370	31.5		41.6		26.2		25.6		38.1	
Copper	7440508	mg/kg	34	270	10.9		29.4		15.7		25.6		24.3	
Lead	7439921	mg/kg	46.7	218	18.1		30.9		26.1		21.4		33.7	
Mercury	7439976	mg/kg	0.150	0.710	0.032		0.064		0.086		0.059	J	0.108	
Nickel	7440020	mg/kg	20.9	51.6	20.8		25.4		13.0		15.0		22.7	
Zinc	7440666	mg/kg	150	410	60.6		101		58.1		68.6		98.0	
PAHs														
Total LPAH	*SUMLPAH*	ug/kg	552	3,160	48.2		189		654		90.9		104	
Total HPAH	*SUMHPAH*	ug/kg	1,700	9,600	260		1482		3341		411		986	
Pesticides														
4,4`-DDD	72548	ug/kg	2	20	0.020	U	3.87	J	4.34	J	0.274	UJ	1.99	J
4,4`-DDE	72559	ug/kg	2.2	27	0.066		7.51	J	5.74		0.167	U	4.37	J
4,4`-DDT	50293	ug/kg	1	7	0.026	U	1.62	J	2.60		0.360	U	1.51	J
Total DDX	SUMDDX	ug/kg	1.58	46.1	0.112		13.0		12.7		0.801	U	7.87	
Dieldrin	60571	ug/kg	0.02	8	0.040	U	0.23	U	0.15	U	0.550	U	0.225	U
Total Chlordane	*SUMCHLOR*	ug/kg	0.5	6	0.300	U	1.72	U	1.11	U	4.2	U	1.7	U
PCBs														
Total PCBs	*SumNOAA18*	ug/kg	22.7	180	4.02	U	3.95		8.87		5.59	U	2.29	U

Table 5. Summary of Bulk Sediment Chemistry Results, cont.

							Kennebunk River Club																	
					IOSN		KBRC-A		KBRC-B		KBRC-C		KBRC-D		KBRC-E		KBRC-G		KBRC-H		KBRC-I		KBRC-F	
Parameter	CAS Number	Units	ERL	ERM	Value	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Physical																								
Total organic carbon	14762744	%			1.28		-		-		-		-		-		-		-		-		-	
Metals																								
Arsenic	7440382	mg/kg	8.2	70	9.66		5.34		4.98		3.52		3.30		2.47		3.34		2.82		5.12		1.58	
Cadmium	7440439	mg/kg	1.2	9.6	0.072		0.463		0.433		0.300		0.350		0.229		0.277		0.237		0.451		0.119	
Chromium	7440473	mg/kg	81	370	31.5		27.5		26.0		20.0		20.5		15.6		18.0		16.5		24.8		11.0	
Copper	7440508	mg/kg	34	270	10.9		13.7		13.8		9.34		9.52		18.6		8.28		7.16		13.6		5.32	
Lead	7439921	mg/kg	46.7	218	18.1		18.8		17.8		12.2		13.3		8.67		11.5		9.29		17.7		4.81	
Mercury	7439976	mg/kg	0.150	0.710	0.032		0.062		0.054		0.052		0.053		0.032		0.067		0.046		0.056		0.023	
Nickel	7440020	mg/kg	20.9	51.6	20.8		15.9		14.5		11.4		11.3		8.57		9.92		8.67		13.4		6.12	
Zinc	7440666	mg/kg	150	410	60.6		68.9		67.7		48.3		50.9		37.2		50.5		39.9		78.2		28.9	J
PAHs																								
Total LPAH	*SUMLPAH*	ug/kg	552	3,160	48.2		316		321		208		106		114		101		127		217		104	
Total HPAH	*SUMHPAH*	ug/kg	1,700	9,600	260		2644		4212		2028		866		838		756		653		1301		567	
Pesticides																								
4,4`-DDD	72548	ug/kg	2	20	0.020	U	1.30		1.90		2.10		1.30		1.00		1.20		0.880		1.70		0.680	
4,4`-DDE	72559	ug/kg	2.2	27	0.066		1.90		1.30		1.40		1.30		0.790		1.40		1.30		2.00		0.400	
4,4`-DDT	50293	ug/kg	1	7	0.026	U	0.850		1.50		4.00		0.750		0.620		0.900		0.530		2.20		0.028	U
Total DDX	SUMDDX	ug/kg	1.58	46.1	0.112		4.05		4.70		7.50		3.35		2.41		3.50		2.71		5.90		1.11	
Dieldrin	60571	ug/kg	0.02	8	0.040	U	0.460		0.850		0.026	U	1.00		1.20		0.026	U	0.026	U	0.610		0.026	U
Total Chlordane	*SUMCHLOR*	ug/kg	0.5	6	0.300	U	1.4		0.95		1.8		1.8		0.044	U	0.265		1.54		1.04		1.25	
PCBs																								
Total PCBs	*SumNOAA18*	ug/kg	22.7	180	4.02	U	1.4		2.1		1.2		0.751		0.326	U	0.326	U	0.831		1.3		0.706	

Notes:
Yellow indicates an exceedance of the ERL
Red indicates an exceedance of the ERM
U= Compound was analyzed for but was not detected (non-detect)
J= Indicates an estimated value
Non-detects reported as half the MDL
Reference site data from DAMOS monitoring surveys (2019 IOSN)
Total PCBs were calculated using the NOAA 18 method
Total Chlordane is a sum of alpha and gamma chlordane, cis and trans nonachlor, and oxychlordane; IOSN value is a sum of only alpha and gamma chlordane

Elutriate Chemistry and Biological Analysis of Sediments

Based on the lithology, chemistry results, and location of sample stations, NAE provided the applicant with a compositing plan for biological testing following the tiered testing protocol outlined in the Evaluation of Dredged Material Proposed for Ocean Disposal – Testing Manual (Green Book, EPA/USACE, 1991). Sediment and water for biological testing were collected by the applicant in February of 2023 to characterize the potential risk associated with open water placement of the dredged material from the four Kennebunk River projects. Sediment was collected from ten representative sample locations across all four project areas to create one composite sample (Table 2 and Figures 6 through 9). The composite sample for biological testing was comprised of sediment from stations AYC-1, 2, and 4 from the Arundel Yacht Club, Y-2 and 3 from the Yachtsman Marina, K-1 and 2 from the Kennebunkport Marina, and KBRC-B, C, and E from the Kennebunk River Club. Site water was also collected from a central location within each proposed project area and composited. The biological testing samples were collected according to the compositing plan to determine the potential for the dredged sediment to cause adverse effects to the biological receptors identified in the CSM. Compliance with water quality criteria was determined through elutriate testing, sediment toxicity was measured through a 10-day whole sediment acute toxicity test, human health risk was determined through a 28-day bioaccumulation test, and water column toxicity was determined through a suspended particulate phase test as described in the Green Book (USEPA/USACE, 1991).

Evaluating Potential Effects to Benthic Organisms

The CSM identified the uptake of contaminants from placed dredged material at IOSN as a primary exposure pathway for project sediments and the potential for acute toxicity was determined through a 10-day whole sediment acute toxicity test as described in the Green Book (EPA/USACE, 1991).

Mean mortality in the control samples of the 10-day whole sediment acute toxicity tests was less than 10% for the amphipod (*Leptocheirus plumulosus*) and the mysid (*Americamysis bahia*); therefore, the tests were valid based on criteria established in the testing protocol.

Mean survivability for *A. bahia* and *L. plumulosus* was 97% and 95%, respectively. Results were not statistically different when compared to survivability in the IOSN reference sediment. The material proposed to be dredged is not considered acutely toxic to the mysids or amphipods used in this assessment.

Results from the 10-day whole sediment toxicity test are summarized in Table 6.

Table 6: Mean Survivability in the 10-day Whole Sediment Toxicity Test

Organism	Lab Control	IOSN Reference	Comp 1
A. bahia	98%	98%	97%
L. plumulosus	98%	93%	95%

<u>Evaluating Potential Effects to Human Health</u>

In order to assess the potential risk to human health through the exposure pathways identified in the CSM, a 28-day bioaccumulation test was performed with the clam, *Macoma nasuta,* and marine polychaete worm, *Nereis virens,* using sediments from the composite sample.

Results showed statistically significant increases of certain contaminants of concern (COCs) in tissue samples from clams exposed to project sediments when compared to tissue samples from clams exposed to reference area sediments including three metals (copper, lead, and nickel), several individual PAHs, three PCB congeners, and two pesticides (4,4'-DDD and 4,4'-DDE). Generally, COC concentrations were only slightly higher in the composite tissue sample than in the pre-test or IOSN reference tissue. Anthracene, benzo(a)anthracene, benzo(b)fluoranthene, and chrysene concentrations were 5 times higher in the composite tissue sample than in the IOSN reference site tissue concentrations. Fluoranthene, pyrene and 4,4'-DDD concentrations were more than 10 times higher in the composite tissue sample than in the IOSN reference site tissue concentrations. Copper, nickel, fluorene, naphthalene, and PCB 52 were detected at concentrations less than were detected in the pre-test tissue, which reflects the initial contaminant load in the wild caught specimens prior to the test initiation, suggesting that these contaminants may not be attributable to site conditions. However, these analytes were conservatively included in subsequent risk modeling.

Significant increases in worm tissue samples as compared to reference area tissue samples included five metals (cadmium, chromium, lead, nickel, and zinc), several individual PAHs, two PCB congeners, and one pesticide (4,4'-DDD). Generally, COC concentrations were only slightly higher in the composite tissue sample than in the pre-test or IOSN reference tissue. Pyrene was 5 times higher in the composite tissue sample than the IOSN reference site tissue concentrations. Benzo(k)fluoranthene, fluoranthene, and PCB 105 were more than 10 times higher in the composite tissue sample than the IOSN reference site tissue concentrations. Chromium, lead, nickel, anthracene, naphthalene, and 4,4'-DDD were detected at concentrations less than were detected in the pre-test tissue, which reflects the initial contaminant load in the wild caught specimens prior to the test initiation, suggesting that these contaminants may not be attributable to site conditions, however these analytes were conservatively included in the subsequent risk modeling.

Based on these results, the tissue burden data were analyzed with the EPA Bioaccumulation Evaluation Screening Tool (BEST) model to determine the toxicological significance of bioaccumulation from exposure to the dredged sediment. The BEST model includes an evaluation of the non-carcinogenic risk, carcinogenic risk, and any observed exceedances of Food and Drug Administration (FDA) thresholds to determine potential adverse impacts to human health from the consumption of lobster, fish, or shellfish exposed to project sediments. Consideration was also given to the number of contaminants that were statistically elevated in comparison to the reference tissue concentrations and to the magnitude of those concentrations in comparison to the reference tissue concentrations and comparable organisms living in the vicinity of the disposal site according to the factors outlined in the Ocean Testing Manual (USEPA/USACE, 1991).

For both *Macoma nasuta* and *Alitta virens*, modeling based on the tissue contaminant loads measured in the composite sample found that all contaminants were below the EPA Hazard Quotient for non-carcinogenic risk of 1.0, below the EPA carcinogenic risk threshold (1×10^{-4}), and were also less than established FDA action levels. Statistically elevated concentrations of contaminants in the tissue samples that could not be evaluated using the BEST model were compared to background invertebrate concentrations in the NOAA Mussel Watch dataset (NCCOS, 2023) and all concentrations were found to be less than the dataset concentrations.

Based on this analysis, there is no unacceptable risk to the receptors identified in the CSM from the bioaccumulation of contaminants through exposure to the dredged material from the projects. BEST model outputs and tissue data are provided in Appendix C.

<u>Evaluating Potential Effects to Fish and Marine Invertebrates</u>

The CSM identified the uptake of contaminants from the water column during the placement of dredged material at IOSN as a primary exposure pathway for project sediments. Elutriate samples were prepared from the site composite sediment sample and site water and the potential for water column toxicity was determined through a suspended particulate phase (SPP) toxicity test as described in the Green Book (USEPA/USACE, 1991).

The results from the SPP toxicity test were used to determine the median lethal concentration (LC_{50}) for the three target species exposed to the sediment elutriates. All three species, the mysid, *A. bahia*, the minnow, *Menidia beryllina*, and the mussel, *Mytilus edulis,* showed no adverse effects on survival after exposure to the elutriate from the composite sample (Table 7).

Table 7: LC_{50} Values in Suspended Phase Toxicity Test

Composite	***A. bahia*** LC_{50} (%)	***M. beryllina*** LC_{50} (%)	***M. edulis*** LC_{50} (%)
Composite 1	>100%	>100%	>100%

To determine if the discharge of dredged material would meet the limiting permissible concentration (LPC), NAE utilized the Short-Term Fate (STFATE) numerical model to analyze the disposal cloud as it descends through the water column after release from a scow. Results of the STFATE evaluation using the lowest LPC (LC_{50} of 100% and an application factor of 0.01) predicted that the water column would attain the LPC within four hours of disposal at IOSN. Additionally, all contaminants of concern in the elutriate samples were below the federal and Maine water quality criteria. Elutriate chemistry concentrations are presented in Appendix D.

4. Suitability Determination:

Based on the weight of evidence, including the CSM, sediment chemistry results, biological testing results, and the subsequent risk modeling, no significant adverse impacts through the exposure pathways identified in the conceptual site model were found for the Arundel Yacht Club, Kennebunkport Marina, Yachtsman Marina, and Kennebunk River Club. Based on the testing and evaluation requirements set forth in Section 103 of the MPRSA, the sediments to be dredged are considered suitable for unconfined open water disposal at IOSN.

This suitability determination was coordinated with EPA Region 1 and MEDEP. MEDEP concurred with the determination and EPA Region 1 conducted an individual evaluation of the project and documented their findings in a separate memo.

Briley K. Barra
Digitally signed by BARRA.BRILEY.KATHERINE.1617990837
Date: 2024.06.10 12:19:48 -04'00'

Briley K. Barra
Technical Specialist
Dredged Material Management Team
USACE-New England District

Richard B. Loyd
Digitally signed by LOYD.RICHARD.B.1274669540
Date: 2024.06.12 15:46:38 -04'00'

Richard B. Loyd
Chief
Environmental Resources and Marine Programs Section
USACE-New England District

5. References:

Long E.R & MacDonald D.D. 1998. Recommended Uses of Empirically Derived, Sediment Quality Guidelines for Marine and Estuarine Ecosystems, Human and Ecological Risk Assessment: An International Journal, 4:5, 1019-1039.

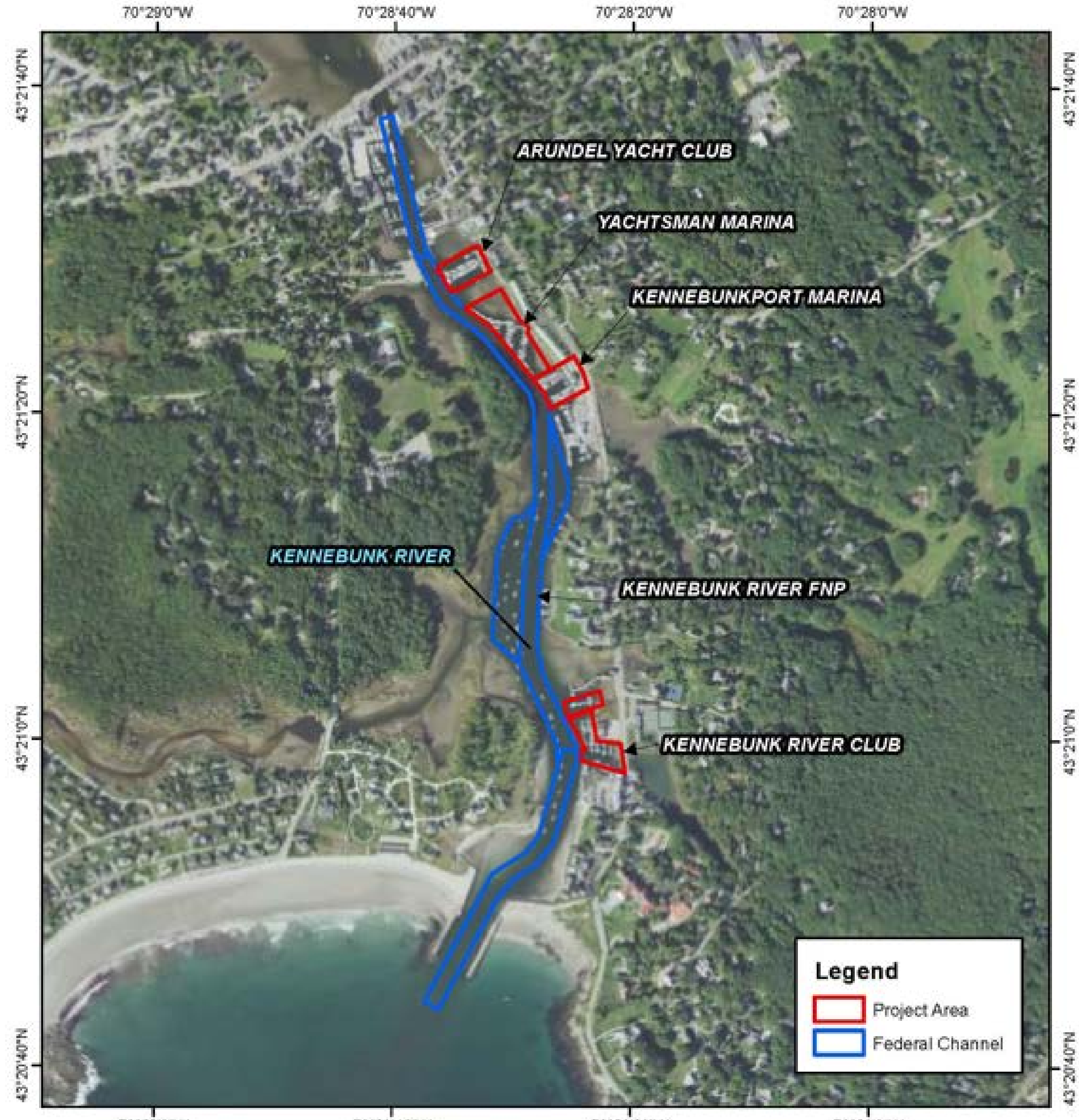
MEDEP 2018. Maine Remedial Action Guidelines (RAGS) for Sites Contaminated with Hazardous Substances. Maine Department of Environmental Protection, Bureau of Remediation and Waste Management. 19 October 2018.

National Centers for Coastal Ocean Science, 2023: National Status and Trends: Mussel Watch Program, https://www.fisheries.noaa.gov/inport/item/39400.

USACE 2022. Monitoring Survey at the Isles of Shoals North Disposal Site, October 2021. DAMOS Contribution No. 214. Prepared by INSPIRE Environmental, Newport, RI for the U.S. Army Corps of Engineers, New England District, Concord, MA. 46 pp plus Figures and Appendices.

USEPA/USACE 2004. Regional Implementation Manual for the Evaluation of Dredged Material Proposed for Disposal in New England Waters. U.S. EPA Region 1, Boston, MA/U.S. Army Corps of Engineers, New England District, Concord, MA.

USEPA/USACE 1991. Evaluation of Dredged Material Proposed for Ocean Disposal Testing Manual. Environmental Protection Agency, Office of Water and Department of the Army, United States Army Corps of Engineers. Washington, D.C.



US Army Corps of Engineers New England District

FIGURE 1
KENNEBUNK RIVER PROJECTS
KENNEBUNK, ME

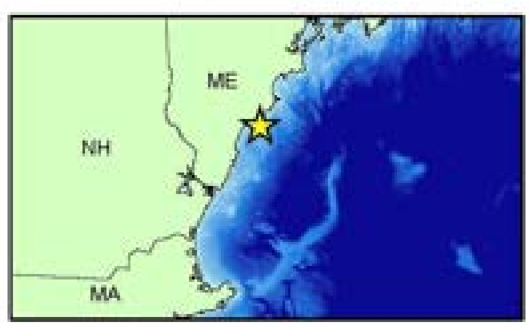
0 1,000 2,000 Feet

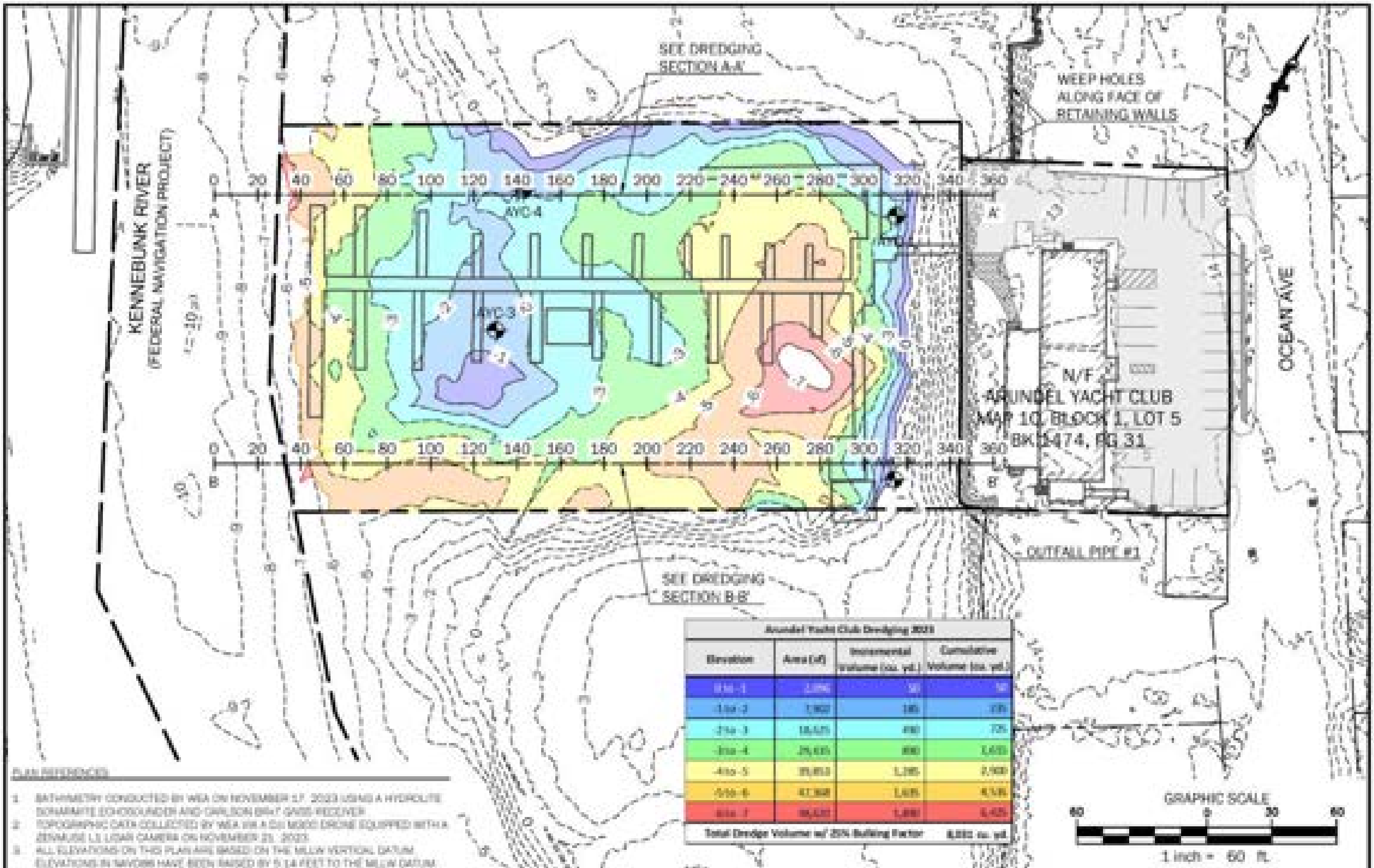
Meters 0 200 400

1:10,000

2015 NAIP AERIAL IMAGERY

GCS NAD 1983





Arundel Yacht Club Dredging 2023			
Elevation	Area (sf)	Incremental Volume (cu. yd.)	Cumulative Volume (cu. yd.)
0 to -1	2,090	50	50
-1 to -2	7,902	185	235
-2 to -3	18,625	490	725
-3 to -4	29,635	890	1,615
-4 to -5	35,853	1,285	2,900
-5 to -6	47,368	1,635	4,535
-6 to -7	66,620	1,890	6,425
Total Dredge Volume w/ 25% Bulking Factor			8,031 cu. yd.

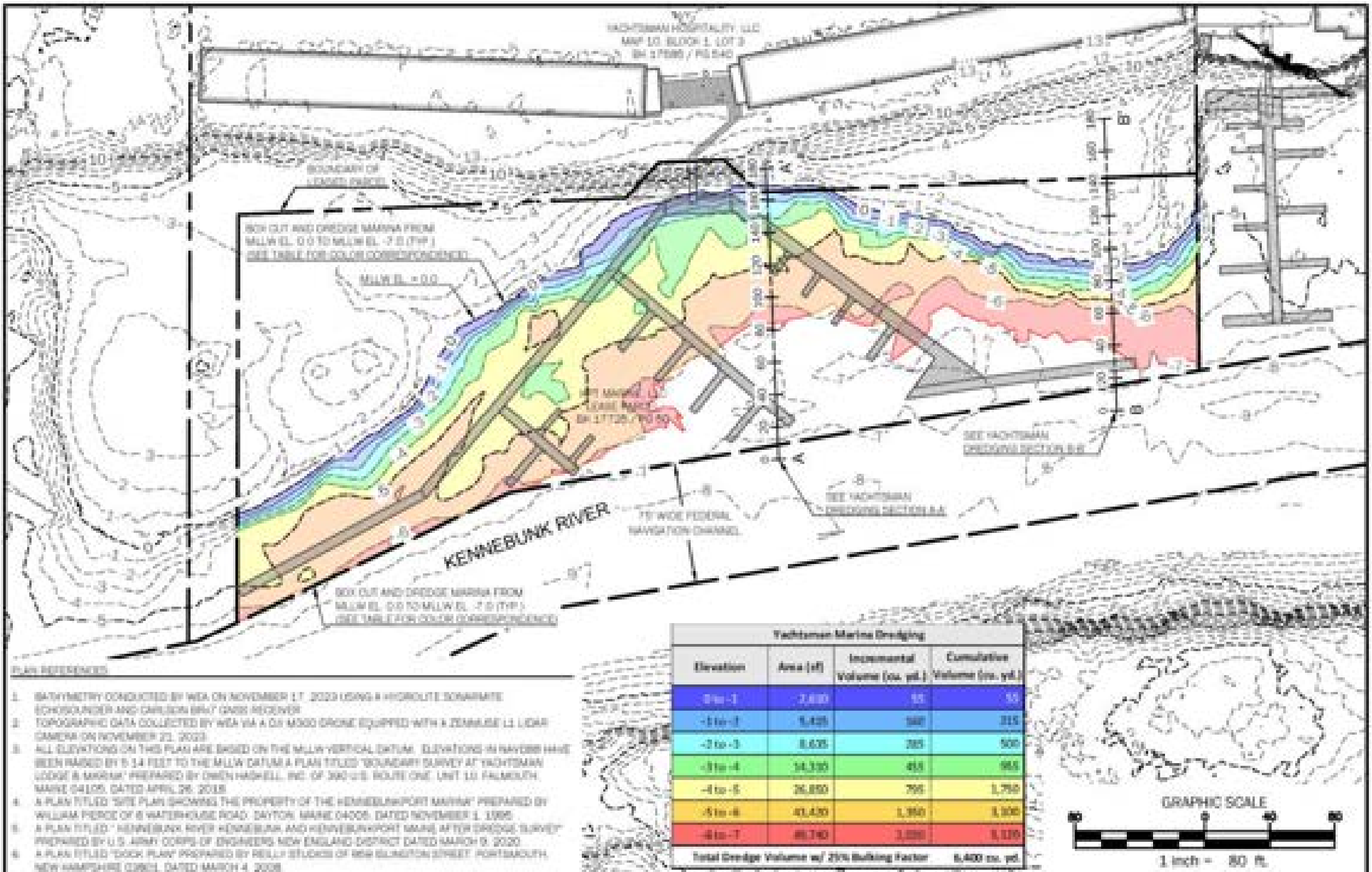
WALSH
ENGINEERING ASSOCIATES, INC.

Copyright © 2023

Arundel Yacht Club Dredging: 2023 Bathymetry

Arundel Yacht Club
51 Ocean Ave
Kennebunkport, Maine 04046

Figure 2:
Arundel Yacht Club Applicant Dredge Plan



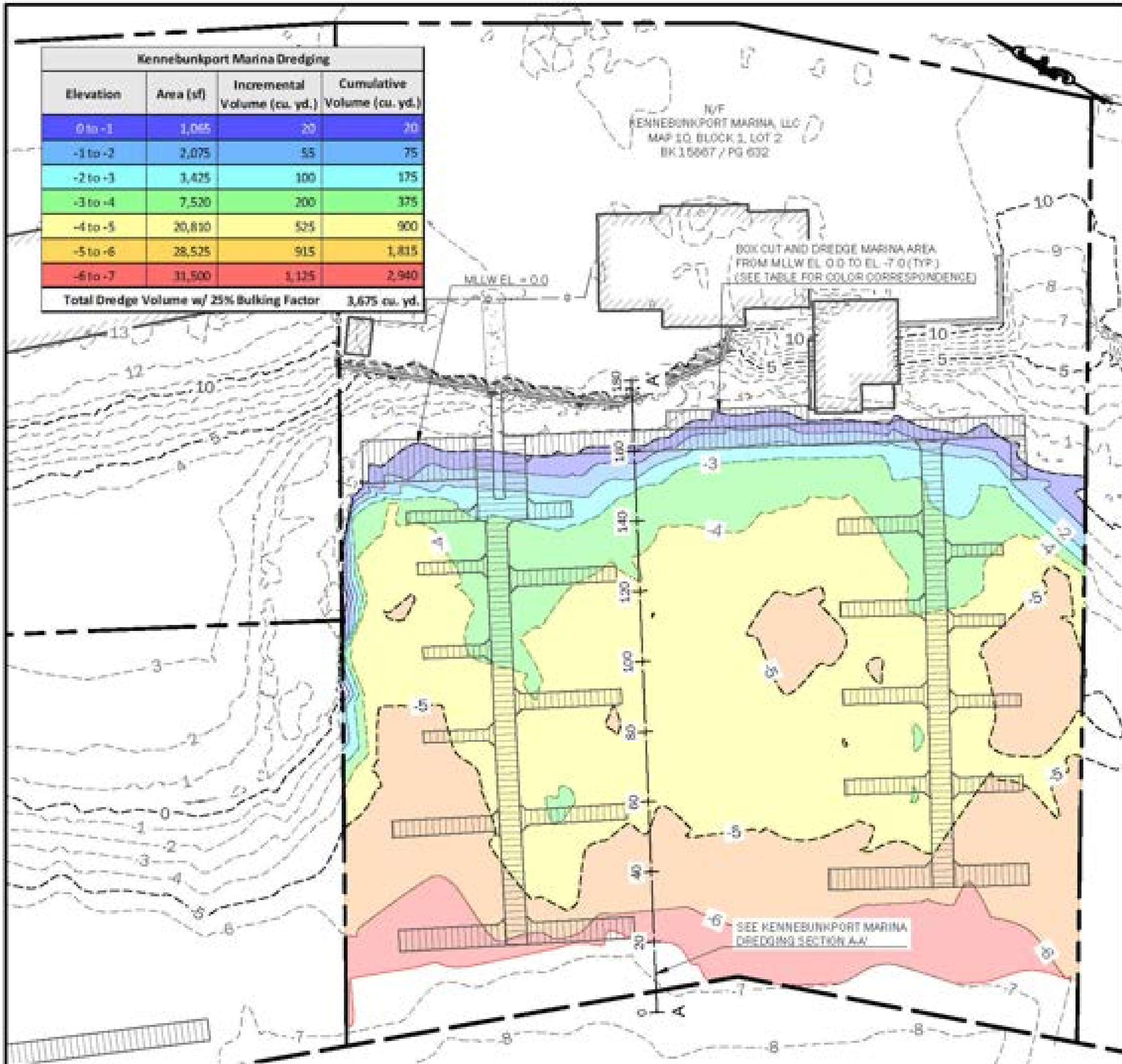
Yachtsman Marina Dredging			
Elevation	Area (sf)	Incremental Volume (cu. yd.)	Cumulative Volume (cu. yd.)
0 to -1	2,630	55	55
-1 to -2	5,435	160	215
-2 to -3	8,635	285	500
-3 to -4	14,330	455	955
-4 to -5	26,850	795	1,750
-5 to -6	43,430	1,350	3,100
-6 to -7	49,740	2,020	5,120
Total Dredge Volume w/ 25% Bulking Factor			6,400 cu. yd.

WALSH
ENGINEERING ASSOCIATES, INC.
One Karen Dr., Suite 2A | Westbrook, Maine 04092
ph. 207.553.9898 | www.walsh-eng.com

Yachtsman Marina Dredging: 2023 Bathymetry

Kennebunkport Marina
59 Ocean Ave
Kennebunkport, Maine 04046

Figure 3: Yachtsman Marina Applicant Dredge Plan



Kennebunkport Marina Dredging			
Elevation	Area (sf)	Incremental Volume (cu. yd.)	Cumulative Volume (cu. yd.)
0 to -1	1,065	20	20
-1 to -2	2,075	55	75
-2 to -3	3,425	100	175
-3 to -4	7,520	200	375
-4 to -5	20,810	525	900
-5 to -6	28,525	915	1,815
-6 to -7	31,500	1,125	2,940
Total Dredge Volume w/ 25% Bulking Factor			3,675 cu. yd.

PLAN REFERENCES

1. BATHYMETRY CONDUCTED BY WEA ON NOVEMBER 17, 2023 USING A HYDROLITE SONARMITE ECHOSOUNDER AND CARLSON BRx7 GNSS RECEIVER.
2. TOPOGRAPHIC DATA COLLECTED BY WEA VIA A DJI M300 DRONE EQUIPPED WITH A ZENMUSE L1 LIDAR CAMERA ON NOVEMBER 21, 2023.
3. ALL ELEVATIONS ON THIS PLAN ARE BASED ON THE MLLW VERTICAL DATUM. ELEVATIONS IN NAVD88 HAVE BEEN RAISED BY 5.14 FEET TO THE MLLW DATUM.
4. A PLAN TITLED "BOUNDARY SURVEY AT YACHTSMAN LODGE & MARINA" PREPARED BY OWEN HASKELL, INC OF 390 U.S. ROUTE ONE, UNIT 10, FALMOUTH, MAINE 04105, DATED APRIL 26, 2016.
5. A PLAN TITLED "SITE PLAN SHOWING THE PROPERTY OF THE KENNEBUNKPORT MARINA" PREPARED BY WILLIAM PIERCE OF 6 WATERHOUSE ROAD, DAYTON, MAINE 04005, DATED NOVEMBER 1, 1995.
6. A PLAN TITLED " KENNEBUNK RIVER KENNEBUNK AND KENNEBUNKPORT MAINE AFTER DREDGE SURVEY" PREPARED BY U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT DATED MARCH 9, 2020.
7. A PLAN TITLED "DOCK PLAN" PREPARED BY REILLY STUDIOS OF 959 ISLINGTON STREET, PORTSMOUTH, NEW HAMPSHIRE 03801, DATED MARCH 4, 2008.

WALSH
ENGINEERING ASSOCIATES, INC.
One Harbor Dr., Suite 3A | Westbrook, Maine 04092
ph. 207.553.9898 | www.walsh-eng.com

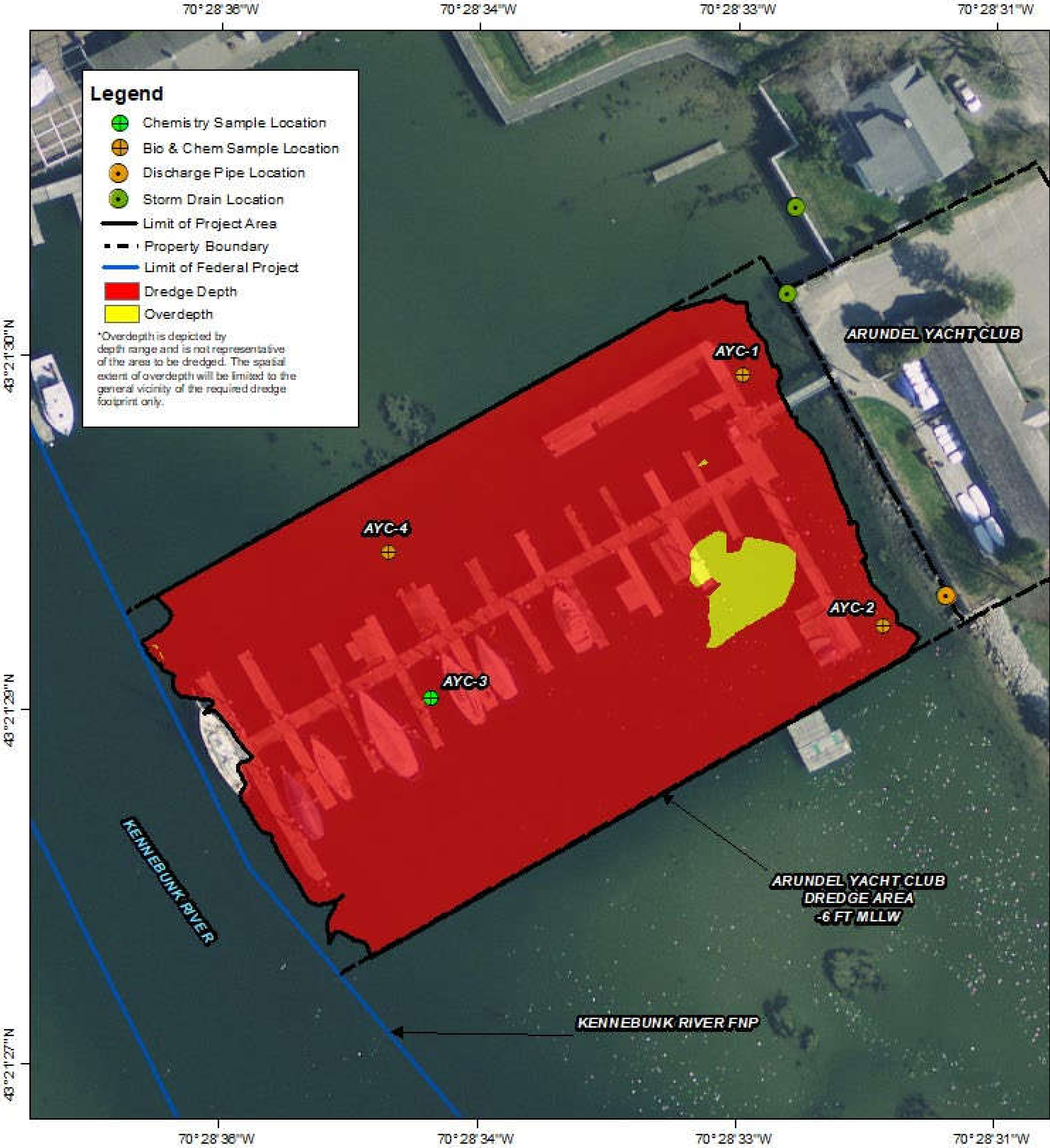
Kennebunkport Marina Dredging: 2023 Bathymetry

Kennebunkport Marina
67 Ocean Ave
Kennebunkport, Maine 04046

Figure 4: Kennebunkport Marina Applicant Dredge Plan

PLAN REFERENCES:
1. KENNEBUNK RIVER FEDERAL CHANNEL INFORMATION TAKEN FROM DIGITAL FILE FROM A.C.O.E. WEBSITE, FILE KNR_CS_2018_006.
2. CONTOURS SET TO M.L.L.W. = 0.00 FEET.
3. AERIAL IMAGE FROM M.E.G.I.S. WEBSITE, 2018

ECO-ANALYSTS, INC. ENVIRONMENTAL CONSULTANTS P.O. BOX 224 BATH, MAINE 04530 (207) 837-2442 raptor@gwi.net	Date: 12/9/2019 Project: KRC Drafted By: TF/SS	**Plan View of the Existing Condition and the proposed dredge window for the Kennebunk River Club, 116 Ocean Ave in Kennebunkport, Maine**	**Figure 5: Kennebunk River Club Applicant Dredge Plan**

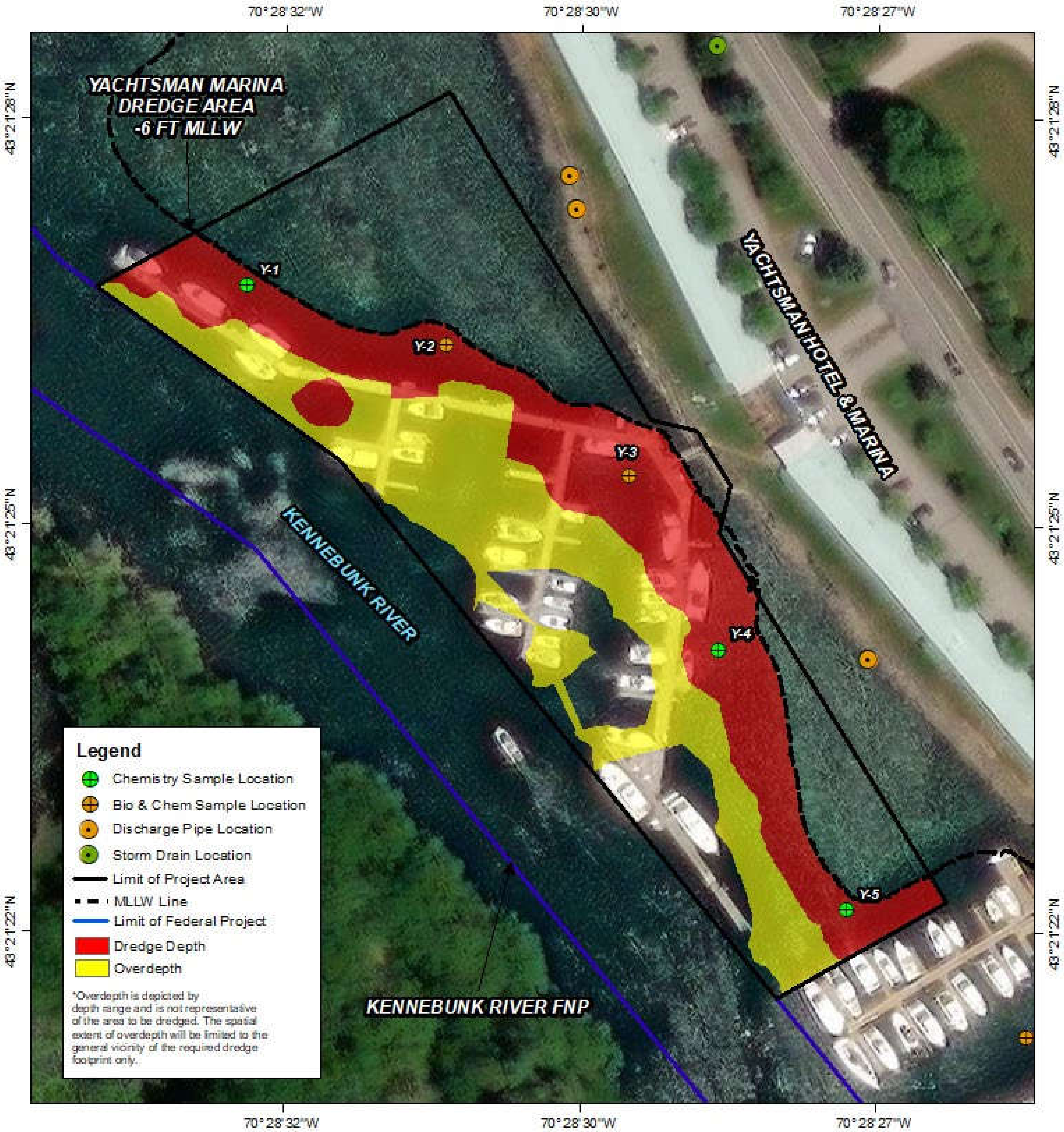


US Army Corps of Engineers New England District

FIGURE 6
ARUNDEL YACHT CLUB
SAMPLE LOCATIONS

2024 ESRI WORLD IMAGERY

GCS NAD 1983



US Army Corps of Engineers
New England District

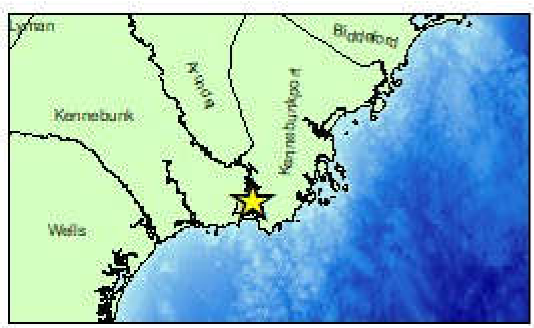
FIGURE 7
YACHTSMAN MARINA
SAMPLE LOCATIONS

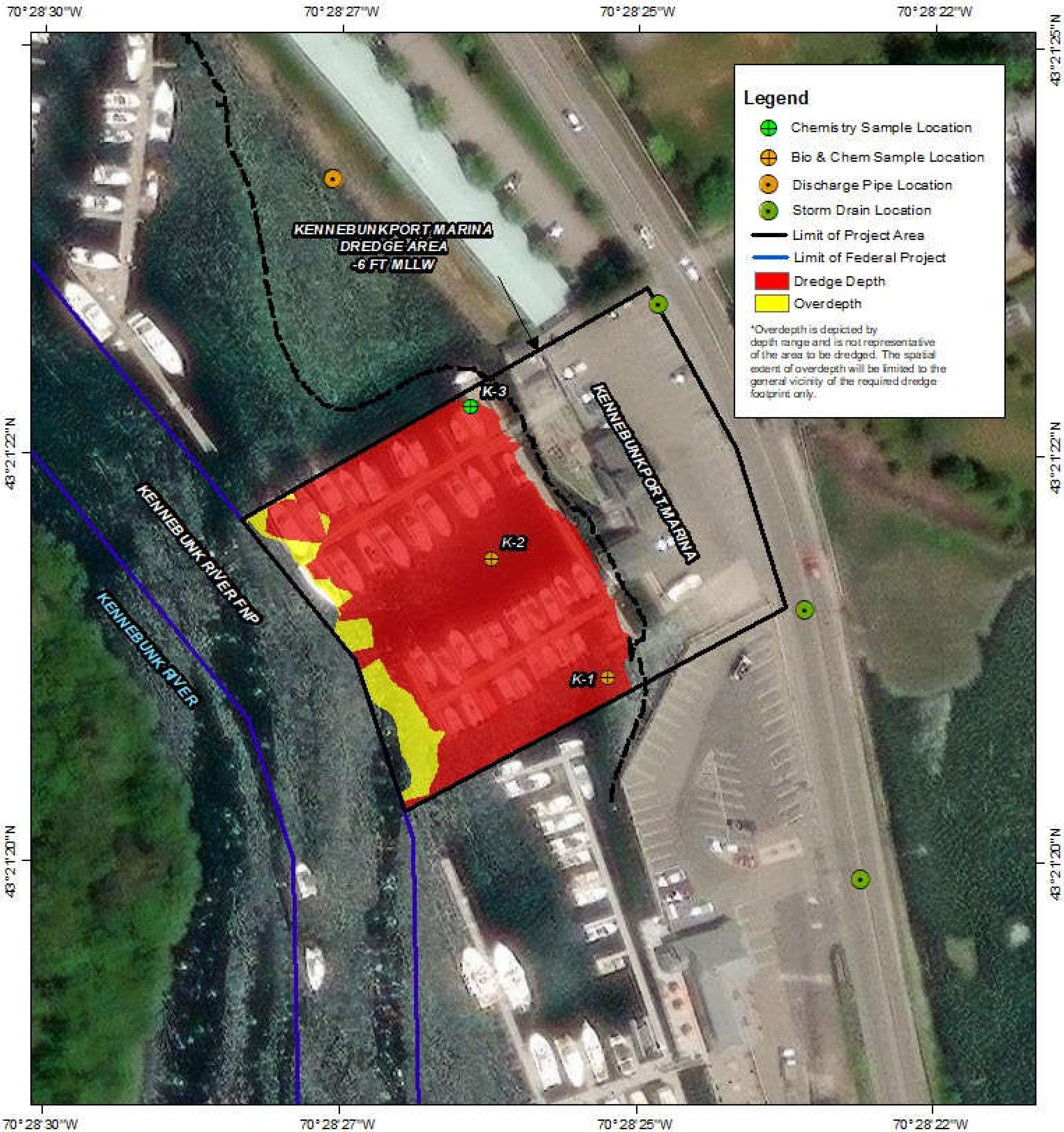
0 100 200 Feet
0 30 60 Meters

1:1,000

2024 ESRI WORLD IMAGERY

GCS NAD 1983





US Army Corps of Engineers
New England District

FIGURE 8
KENNEBUNKPORT MARINA
SAMPLE LOCATIONS

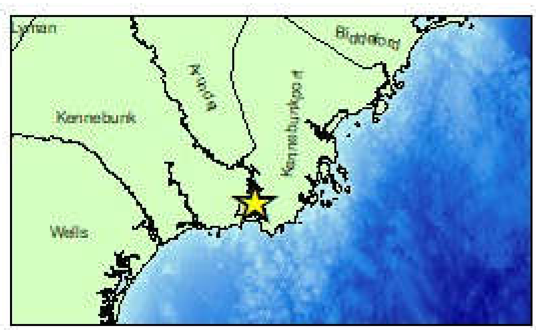
0 100 200 Feet

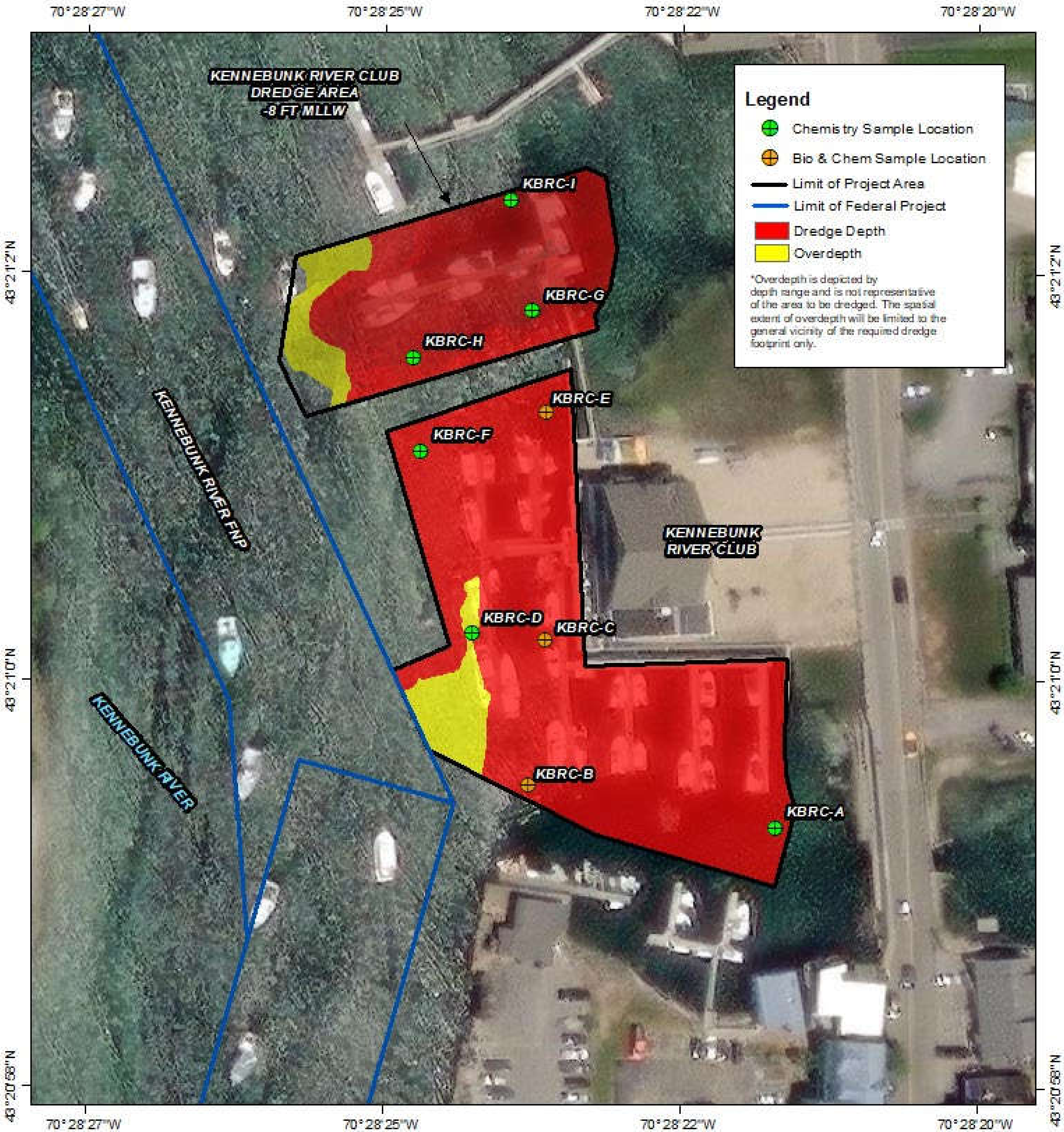
0 20 40 60 Meters

1:1,000

2024 ESRI WORLD IMAGERY

GCS NAD 1983





US Army Corps of Engineers
New England District

FIGURE 9
KENNEBUNK RIVER CLUB
SAMPLE LOCATIONS

1:1,000

2024 ESRI WORLD IMAGERY

GCS NAD 1983

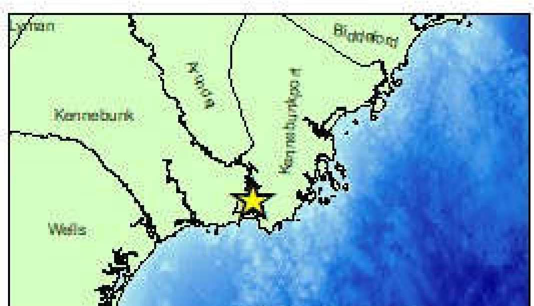
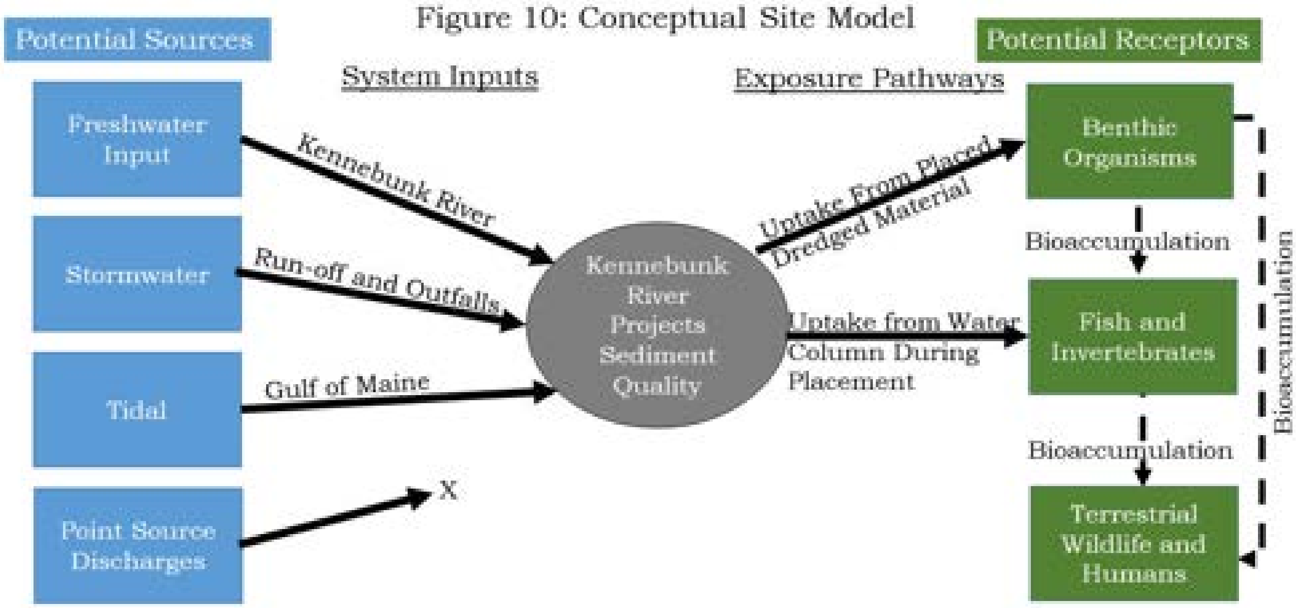


Figure 10: Conceptual Site Model



Appendix A
Core Logs and Photographs

Coastline Consulting & Development Core Log

Project: Arundel Yacht Club **Date**: 7/26/2022

Sampling Personnel: Dustin J Kach

Weather: Light Winds, Clear Skies

Location Method: DGPS: 1 meter accuracy

Sample ID: AYC-1 **Time:** 1:06 pm

Sampler Type: VibraCore Sampler

Depth: -3.9' MLLW

Coordinates: **Latitude:** 43.35831 **Longitude:** -70.47582

Penetration: 3.2' **Recovery:** 3.2' **No. Attempts:** 3

Material Description: 0-3.1, composited. Dark silt/mud with shell debris.

Core Photo

Coastline Consulting & Development Core Log

Project: Arundel Yacht Club **Date**: 7/26/2022

Sampling Personnel: Dustin J Kach

Weather: Light Winds, Clear Skies

Location Method: DGPS: 1 meter accuracy

Sample ID: AYC-2 **Time:** 12:20 pm

Sampler Type: VibraCore Sampler

Depth: -2.1' MLLW

Coordinates: **Latitude:** 43.35800 **Longitude:** -70.47561

Penetration: 2.4' **Recovery:** 2.4' **No. Attempts:** 9

Material Description: 0-2.4' composited. Hard packed sand with shell debris. Multiple attempts were made refusal was reached after 2.4' penetration.

Core Photo

Coastline Consulting & Development Core Log

Project: Arundel Yacht Club **Date**: 7/26/2022

Sampling Personnel: Dustin J Kach

Weather: Light Winds, Clear Skies

Location Method: DGPS: 1 meter accuracy

Sample ID: AYC-3 **Time:** 12:55 pm

Sampler Type: VibraCore Sampler

Depth: -3.2' MLLW

Coordinates: **Latitude:** 43.35793 **Longitude:** -70.47634

Penetration: 1' **Recovery:** 9" **No. Attempts:** 16

Material Description: 0-9" composited. Hard substrate encountered a lot of wood debris and shell material. We attempted to call ACOE contacts during sampling, messages were left but no one returned the calls that day. We kept the largest core and did not cut it because we did not want to lose any material. Sample was extruded directly into bucket for compositing. We attempted multiple cores within a 10' radius of the location and saved the best one. Multiple attempts were made refusal was reached after 1' penetration.

Core Photo

Coastline Consulting & Development Core Log

Project: Arundel Yacht Club **Date**: 7/26/2022

Sampling Personnel: Dustin J Kach

Weather: Light Winds, Clear Skies

Location Method: DGPS: 1 meter accuracy

Sample ID: AYC-4 **Time:** 12:35 pm

Sampler Type: VibraCore Sampler

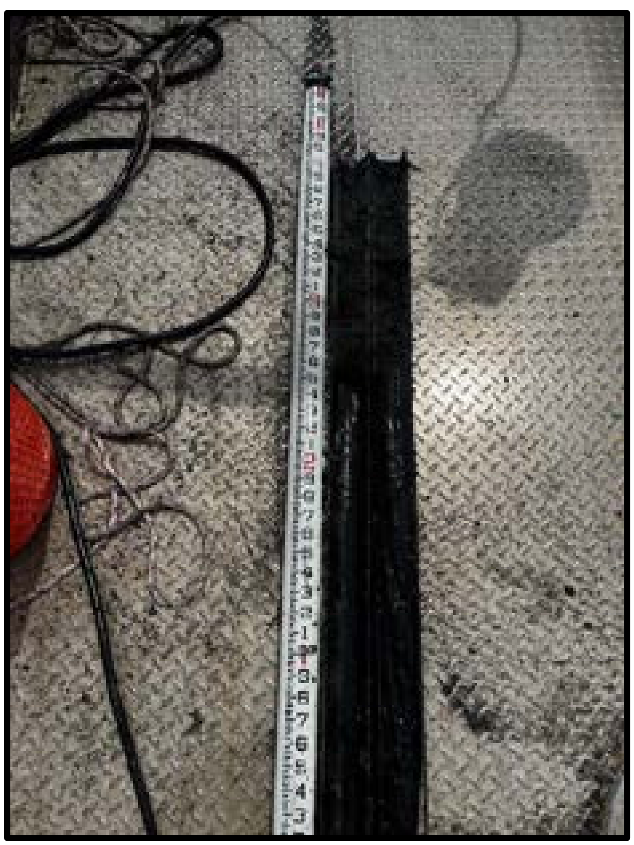
Depth: -3.0' MLLW

Coordinates: **Latitude:** 43.35811 **Longitude:** -70.47638

Penetration: 4.1' **Recovery:** 4.0' **No. Attempts:** 5

Material Description: 0-4.0 composited. Dark silt with hard packed sand at bottom of core.

Core Photo



Coastline Consulting & Development Core Log

Project: Kennebunkport Marina **Date**: 7/26/2022

Sampling Personnel: Dustin J Kach

Weather: Light Winds, Clear Skies

Location Method: DGPS: 1 meter accuracy

Sample ID: K-1 **Time:** 9:38 am

Sampler Type: VibraCore Sampler

Depth: -1.8' MLLW

Coordinates: **Latitude:** 43.35587 **Longitude:** -70.47367

Penetration: 4.2' **Recovery:** 4.2' **No. Attempts:** 6

Material Description: 0-4.2' composited. Dark silt with hard packed sand at bottom of core. Multiple attempts were made refusal was reached after 4.2' penetration.

Core Photo

Coastline Consulting & Development Core Log

Project: Kennebunkport Marina **Date**: 7/26/2022

Sampling Personnel: Dustin J Kach

Weather: Light Winds, Clear Skies

Location Method: DGPS: 1 meter accuracy

Sample ID: K-2 **Time:** 9:47 am

Sampler Type: VibraCore Sampler

Depth: -4.8' MLLW

Coordinates: **Latitude:** 43.35607 **Longitude:** -70.47394

Penetration: 3.1' **Recovery:** 3.1' **No. Attempts:** 3

Material Description: 0-2.2' composited. Dark silt with hard packed sand towards bottom of core.

Core Photo

Coastline Consulting & Development Core Log

Project: Kennebunkport Marina **Date**: 7/26/2022

Sampling Personnel: Dustin J Kach

Weather: Light Winds, Clear Skies

Location Method: DGPS: 1 meter accuracy

Sample ID: K-3 **Time:** 10:05 am

Sampler Type: VibraCore Sampler

Depth: -1.7' MLLW

Coordinates: **Latitude:** 43.35634 **Longitude:** -70.474

Penetration: 4.3' **Recovery:** 4.2' **No. Attempts:** 7

Material Description: 0-4.2' composited. Dark silt with hard packed sand at bottom of core. Multiple attempts were made refusal was reached after 4.3' penetration.

Core Photo

Coastline Consulting & Development Core Log

Project: Yachtsman Marina **Date**: 7/26/2022

Sampling Personnel: Dustin J Kach

Weather: Light Winds, Clear Skies

Location Method: DGPS: 1 meter accuracy

Sample ID: Y-1 **Time:** 11:29 am

Sampler Type: VibraCore Sampler

Depth: -1.5' MLLW

Coordinates: **Latitude:** 43.35735 **Longitude:** -70.47578

Penetration: 3.5' **Recovery:** 3.5' **No. Attempts:** 8

Material Description: 0-3.5' composited. Compact sand with shell debris. Multiple attempts were made refusal was reached after 3.5' penetration.

Core Photo

Coastline Consulting & Development Core Log

Project: Yachtsman Marina **Date**: 7/26/2022

Sampling Personnel: Dustin J Kach

Weather: Light Winds, Clear Skies

Location Method: DGPS: 1 meter accuracy

Sample ID: Y-2 **Time:** 11:15 am

Sampler Type: VibraCore Sampler

Depth: -1.2' MLLW

Coordinates: **Latitude:** 43.35724 **Longitude:** -70.47533

Penetration: 2.5' **Recovery:** 2.5' **No. Attempts:** 8

Material Description: 0-2.5' composited. Hard packed sand. Multiple attempts were made refusal was reached after 2.5' penetration.

Core Photo

Coastline Consulting & Development Core Log

Project: Yachtsman Marina **Date**: 7/26/2022

Sampling Personnel: Dustin J Kach

Weather: Light Winds, Clear Skies

Location Method: DGPS: 1 meter accuracy

Sample ID: Y-3 **Time:** 11:02 am

Sampler Type: VibraCore Sampler

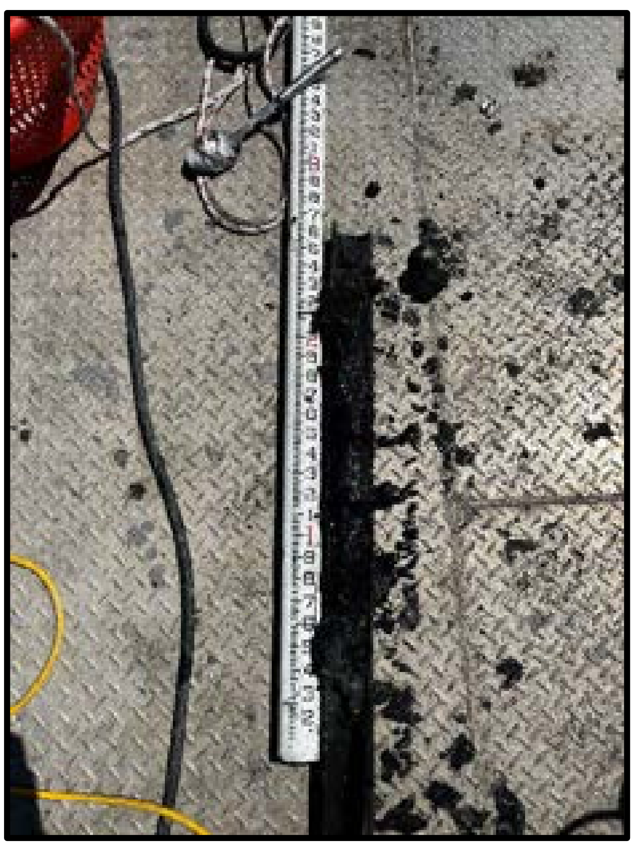
Depth: -4.2' MLLW

Coordinates: **Latitude:** 43.35701 **Longitude:** -70.47488

Penetration: 2.7' **Recovery:** 2.7' **No. Attempts:** 5

Material Description: 0-2.7' composited. Dark silt with hard packed sand at bottom of core.

Core Photo



Coastline Consulting & Development Core Log

Project: Yachtsman Marina **Date**: 7/26/2022

Sampling Personnel: Dustin J Kach

Weather: Light Winds, Clear Skies

Location Method: DGPS: 1 meter accuracy

Sample ID: Y-4 **Time:** 10:54 am

Sampler Type: VibraCore Sampler

Depth: -4.4' MLLW

Coordinates: **Latitude:** 43.35673 **Longitude:** -70.47467

Penetration: 3.4' **Recovery:** 3.4' **No. Attempts:** 4

Material Description: 0-2.6' composited. Dark silt with hard packed sand at bottom of core.

Core Photo

Coastline Consulting & Development Core Log

Project: Yachtsman Marina **Date**: 7/26/2022

Sampling Personnel: Dustin J Kach

Weather: Light Winds, Clear Skies

Location Method: DGPS: 1 meter accuracy

Sample ID: Y-5 **Time:** 10:40 am

Sampler Type: VibraCore Sampler

Depth: -1.0' MLLW

Coordinates: **Latitude:** 43.35629 **Longitude:** -70.47437

Penetration: 6.1' **Recovery:** 6.1' **No. Attempts:** 3

Material Description: 0-6.0' composited. Dark silt with hard packed sand at bottom of core.

Core Photo

Appendix B
Bulk Sediment Chemistry Results

							Kennebunkport Marina (NAE-2005-00280)						Yachtsman Marina (NAE-2004-00319)									
					IOSN		K-1		K-2		K-3		Y-1		Y-2		Y-3		Y-4		Y-5	
Parameter	CAS Number	Units	ERL	ERM	Value	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Physical																						
Total organic carbon	14762744	%			1.28		0.37		3.04		2.32		0.93		0.72		1.90		1.19		0.20	
Metals																						
Arsenic	7440382	mg/kg	8.2	70	9.66		2.85		6.68		6.34		6.65		3.20		7.96		4.54		0.984	
Cadmium	7440439	mg/kg	1.2	9.6	0.072		0.295		0.410		0.344		0.225		0.235		0.388		0.430		0.093	
Chromium	7440473	mg/kg	81	370	31.5		21.9		27.1		26.4		17.7		14.7		33.6		23.1		6.71	
Copper	7440508	mg/kg	34	270	10.9		14.2		16.7		15.4		12.5		8.64		18.3		9.82		1.59	
Lead	7439921	mg/kg	46.7	218	18.1		134		21.9		17.1		12.4		12.9		20.2		7.79		1.81	
Mercury	7439976	mg/kg	0.150	0.710	0.032		0.051		0.063		0.047		0.045		0.051		0.052		0.011	J	0.005	J
Nickel	7440020	mg/kg	20.9	51.6	20.8		9.17		15.6		15.4		11.3		8.37		21.4		15.1		3.81	
Zinc	7440666	mg/kg	150	410	60.6		56.6		67.4		57.2		42.2		37.6		71.2		45.2		10.2	
PAHs																						
Acenaphthene	83329	ug/kg	16	500	1.48		3.96	J	20.4		15.1		5.30		3.46	J	2.97	J	1.75	J	1.32	J
Acenaphthylene	208968	ug/kg	44	640	7.06		30.1		20.6		12.6		9.97		17.0		12.6		0.241	U	0.884	J
Anthracene	120127	ug/kg	85.3	1,100	4.14		32.5		34.5		40.4		26.3		32.5		18.1		0.692	J	0.640	J
Fluorene	86737	ug/kg	19	540	2.40		8.08		25.5		17.1		6.97		9.01		5.98		0.218	U	0.186	U
Naphthalene	91203	ug/kg	160	2,100	6.25		8.30		10.2		11.6		5.13		8.99		9.39		2.35	UJ	2.26	UJ
Phenanthrene	85018	ug/kg	240	1500	26.9		102		114		128		134	J	120		69.4		2.62	J	3.38	J
Total LPAH	*SUMLPAH*	ug/kg	552	3,160	48.2		185		225		225		188		191		118		7.87		8.67	
Benzo(a)anthracene	56553	ug/kg	261	1,600	21.3		115		157		133		127		128		74.0		2.98	J	3.97	
Benzo(a)pyrene	50328	ug/kg	430	1,600	23.4		129		160		130		132	J	130		85.3		3.12	J	4.60	
Benzo(b)fluoranthene	205992	ug/kg			36.4		126		180		137		116	J	141		95.8		3.61	J	5.28	
Benzo(g,h,i)perylene	191242	ug/kg			23.1		88.0		112		90.4		87.6	J	83.3		63.9		2.36	J	3.32	J
Benzo(k)fluoranthene	207089	ug/kg			18.5		91		131		117		106	J	94.6		61.4		2.23	J	3.38	J
Chrysene	218019	ug/kg	384	2,800	21.7		132		164		138		136	J	140		88.9		3.32	J	4.68	
Dibenz(a,h)anthracene	53703	ug/kg	63.4	260	4.41		19.6		24.4		20.4		19.6		21.2		15.2		0.253	U	0.723	J
Fluoranthene	206440	ug/kg	600	5,100	42.1		239		364		474		297	J	269		167		7.05		6.58	
Indeno(1,2,3-cd)pyrene	193395	ug/kg			23.6		83.5		108		94.6		90.1	J	86.5		67.2		2.39	J	3.20	J
Pyrene	129000	ug/kg	665	2,600	45.2		215		297		330		225		244		144		5.99		12.6	
Total HPAH	*SUMHPAH*	ug/kg	1,700	9,600	260		1238		1697		1664		1336		1338		863		33.3		48.3	
Pesticides																						
4,4`-DDD	72548	ug/kg	2	20	0.020	U	4.98	J	4.66	J	0.112	UJ	1.16	J	2.86	J	0.093	UJ	0.016	UJ	0.013	UJ
4,4`-DDE	72559	ug/kg	2.2	27	0.066		2.23		4.53	J	0.068	U	2.50	J	2.78		0.057	U	0.010	U	0.008	U
4,4`-DDT	50293	ug/kg	1	7	0.026	U	1.44		1.44		0.148	U	0.960		0.808		0.123	U	0.020	U	0.017	U
Total DDX	SUMDDX	ug/kg	1.58	46.1	0.112		8.65		10.6		0.328	U	4.62		6.45		0.272	U	0.045	U	0.038	U
Aldrin	309002	ug/kg			0.066	U	0.051	U	0.063	U	0.374	U	0.063	U	0.051	U	0.311	U	0.051	U	0.044	U
Alpha-Chlordane (cis)	5103719	ug/kg			0.142	U	0.110	U	0.137	U	0.810	U	0.135	U	0.111	U	0.670	U	0.110	U	0.094	U
cis-Nonachlor	5103731	ug/kg			0.019	U	0.015	U	0.019	U	0.109	U	0.018	U	0.015	U	0.090	U	0.015	U	0.013	U
Dieldrin	60571	ug/kg	0.02	8	0.040	U	0.031	U	0.038	U	0.226	U	0.038	U	0.031	U	0.187	U	0.031	U	0.026	U
Endosulfan I	959988	ug/kg			0.036	U	0.028	U	0.035	U	0.206	U	0.035	U	0.029	U	0.171	U	0.028	U	0.024	U
Endosulfan II	33213659	ug/kg			0.019	U	0.015	U	0.018	U	0.106	U	0.018	U	0.015	U	0.088	U	0.015	U	0.013	U
Endrin	72208	ug/kg			0.022	U	0.017	U	0.021	U	0.123	U	0.021	U	0.017	U	0.102	U	0.017	U	0.014	U
Gamma-Chlordane (trans)	5103742	ug/kg			0.040	U	0.031	U	0.039	U	0.228	U	0.038	U	0.031	U	0.189	U	0.031	U	0.027	U
Heptachlor	76448	ug/kg			0.041	U	0.032	U	0.040	U	0.235	U	0.039	U	0.032	U	0.195	U	0.032	U	0.027	U
Heptachlor epoxide	1024573	ug/kg			0.085	U	0.066	U	0.082	U	0.482	U	0.081	U	0.066	U	0.400	U	0.066	U	0.056	U
Hexachlorobenzene	118741	ug/kg			0.354	U	0.274	U	0.341	U	2.015	U	0.337	UJ	0.276	U	1.670	U	0.274	U	0.234	U
Lindane	58899	ug/kg			0.059	U	0.046	U	0.057	U	0.338	U	0.057	UJ	0.047	U	0.281	U	0.046	U	0.039	U
Methoxychlor	72435	ug/kg			0.913	U	0.073	U	0.090	U	0.530	U	0.089	U	0.073	U	0.442	U	0.073	U	0.062	U
Oxychlordane	27304138	ug/kg			0.082	U	0.063	U	0.079	U	0.464	U	0.078	U	0.064	U	0.385	U	0.063	U	0.054	U
Toxaphene	8001352	ug/kg			1.71	U	1.33	U	1.65	U	9.70	U	1.63	U	1.34	U	8.10	U	1.33	U	1.13	U
trans-Nonachlor	39765805	ug/kg			0.018	U	0.014	U	0.017	U	0.100	U	0.017	U	0.014	U	0.083	U	0.014	U	0.012	U
Total Chlordane	*SUMCHLOR*	ug/kg	0.5	6	0.300	U	0.233	U	0.289	U	1.710	U	0.285	U	0.234	U	1.42	U	0.233	U	0.198	U
PCBs																						
PCB 008	34883437	ug/kg			0.104	U	0.041	U	0.050	U	0.059	U	0.050	U	0.041	U	0.049	U	0.041	U	0.035	U
PCB 018	37680652	ug/kg			0.076	U	0.030	U	0.037	U	0.043	U	0.036	U	0.030	U	0.036	U	0.030	U	0.025	U
PCB 028	7012375	ug/kg			0.129	U	0.050	U	0.062	U	0.074	U	0.062	U	0.050	U	0.061	U	0.050	U	0.043	U
PCB 044	41464395	ug/kg			0.144	U	0.056	U	0.069	U	0.082	U	0.069	U	0.056	U	0.068	U	0.056	U	0.048	U
(PCB 049)	41464408	ug/kg			0.140	U	0.055	U	0.068	U	0.080	U	0.067	U	0.055	U	0.067	U	0.055	U	0.047	U
PCB 052	35693993	ug/kg			0.080	U	0.308	J	0.248	J	0.046	U	0.038	U	0.031	U	0.038	U	0.031	U	0.027	U
PCB 066	32598100	ug/kg			0.075	U	0.029	U	0.036	U	0.043	U	0.036	U	0.030	U	0.036	U	0.029	U	0.025	U
(PCB 087)	38380028	ug/kg			0.061	U	0.302	J	0.030	U	0.035	U	0.029	U	0.024	U	0.029	U	0.024	U	0.020	U
PCB 101	37680732	ug/kg			0.123	U	0.819		0.059	U	0.070	U	0.059	U	0.048	U	0.270	J	0.048	U	0.041	U
PCB 105	32598144	ug/kg			0.110	U	0.043	U	0.053	U	0.063	U	0.053	U	0.043	U	0.052	U	0.043	U	0.037	U
PCB 118	31508006	ug/kg			0.116	U	0.571		0.056	U	0.066	U	0.056	U	0.046	U	0.055	U	0.045	U	0.039	U
PCB 128	38380073	ug/kg			0.137	U	0.053	U	0.066	U	0.078	U	0.066	U	0.054	U	0.065	U	0.053	U	0.046	U
PCB 138	35065282	ug/kg			0.088	U	0.922		0.625		0.290	J	0.042	U	0.278	J	0.453	J	0.034	U	0.029	U
PCB 153	35065271	ug/kg			0.183	U	0.597		0.316	J	0.104	U	0.087	U	0.206	J	0.292	J	0.071	U	0.061	U
PCB 170	35065306	ug/kg			0.067	U	0.026	U	0.033	U	0.039	U	0.032	U	0.027	U	0.032	U	0.026	U	0.022	U
PCB 180	35065293	ug/kg			0.069	U	0.256	J	0.033	U	0.039	U	0.033	U	0.027	U	0.033	U	0.027	U	0.023	U
(PCB 183)	52663691	ug/kg			0.037	U	0.015	U	0.018	U	0.021	U	0.018	U	0.015	U	0.018	U	0.015	U	0.012	U
(PCB 184)	74472483	ug/kg			0.076	U	0.030	U	0.037	U	0.043	U	0.036	U	0.030	U	0.036	U	0.030	U	0.025	U
PCB 187	52663680	ug/kg			0.099	U	0.213	J	0.048	U	0.056	U	0.047	U	0.039	U	0.047	U	0.039	U	0.033	U
PCB 195	52663782	ug/kg			0.129	U	0.050	U	0.062	U	0.074	U	0.062	U	0.051	U	0.061	U	0.050	U	0.043	U
PCB 206	40186729	ug/kg			0.132	U	0.051	U	0.064	U	0.075	U	0.063	U	0.052	U	0.063	U	0.051	U	0.044	U
PCB 209	2051243	ug/kg			0.151	U	0.059	U	0.073	U	0.086	U	0.072	U	0.059	U	0.072	U	0.059	U	0.050	U
Total PCBs	*SumNOAA18*	ug/kg	22.7	180	4.02	U	8.34		3.98		2.77		1.92		2.33		3.56		1.56	U	1.33	U

	Arundel Yacht Club (NAE-2022-00288)								Kennebunk River Club (NAE-2007-2704)																	
	AYC-1		AYC-2		AYC-3		AYC-4		KBRC-A		KBRC-B		KBRC-C		KBRC-D		KBRC-E		KBRC-G		KBRC-H		KBRC-I		KBRC-F	
Parameter	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Physical																										
Total organic carbon	1.14		1.15		8.46		2.64		-		-		-		-		-		-		-		-		-	
Metals																										
Arsenic	9.75		6.72		7.78		10.3		5.34		4.98		3.52		3.30		2.47		3.34		2.82		5.12		1.58	
Cadmium	0.335		0.330		0.453		0.613		0.463		0.433		0.300		0.350		0.229		0.277		0.237		0.451		0.119	
Chromium	41.6		26.2		25.6		38.1		27.5		26.0		20.0		20.5		15.6		18.0		16.5		24.8		11.0	
Copper	29.4		15.7		25.6		24.3		13.7		13.8		9.34		9.52		18.6		8.28		7.16		13.6		5.32	
Lead	30.9		26.1		21.4		33.7		18.8		17.8		12.2		13.3		8.67		11.5		9.29		17.7		4.81	
Mercury	0.064		0.086		0.059	J	0.108		0.062		0.054		0.052		0.053		0.032		0.067		0.046		0.056		0.023	
Nickel	25.4		13.0		15.0		22.7		15.9		14.5		11.4		11.3		8.57		9.92		8.67		13.4		6.12	
Zinc	101		58.1		68.6		98.0		68.9		67.7		48.3		50.9		37.2		50.5		39.9		78.2		28.9	J
PAHs																										
Acenaphthene	11.3		23.4		1.40	U	4.94	J	21.7		18.2		1.35	U	1.35	U	1.35	U	1.35	U	1.35	U	1.35	U	1.35	U
Acenaphthylene	23.8		71.1		7.60	J	15.3		10.0		1.25	U	1.25	U	1.25	U	1.25	U	1.25	U	1.25	U	11.9		1.25	
Anthracene	25.0		119		7.96	J	18.6		90.3		143.0		46.3		19.6		26.2		18.9		25.2		29.1		15.4	U
Fluorene	12.9		37.4		3.53	J	4.86	J	37.8		30.6		15.9		1.45	U	1.45	U	1.45	U	10.9		14.2		1.45	
Naphthalene	14.5		21.8		29.7		7.95		1.15	U	1.15	U	1.15	U	1.15	U	1.15	U	1.15	U	1.15	U	1.15	U	1.15	U
Phenanthrene	101		381		40.7		52.2		155		127		142		81.5		82.9	J	76.5		87.1		159		82.9	
Total LPAH	189		654		90.9		104		316		321		208		106		114		101		127		217		104	
Benzo(a)anthracene	136		326		31.0		77.3		311		522		257		92		97.2		78.7		67.0		136		55.8	
Benzo(a)pyrene	140		328		35.7		90.0		171	J	226	J	146	J	80	J	76.8		71.4	J	58	J	129	J	51.8	J
Benzo(b)fluoranthene	163		320		42.7		93.5		282	J	303	J	210	J	109	J	87.2		86.6	J	86.2	J	201	J	63.6	J
Benzo(g,h,i)perylene	101		206		28.2		61.9		73.1	J	82.4	J	60.7	J	38.2	J	39.7		31.0	J	23.7	J	50	J	26.8	J
Benzo(k)fluoranthene	120		231		31.1		75.7		174	J	251	J	139	J	77.7	J	67.3		78.9	J	52.5	J	110	J	40.5	J
Chrysene	148		362		42.9		94.7		321		455		216		102		95.7		86.1		79.0		169		58.6	
Dibenz(a,h)anthracene	25.3		56.6		8.33	J	14.7		11.6	J	15.5	J	10.0	UJ	9.9	UJ	10.2		10.1	UJ	10.2	UJ	10.1	UJ	9.90	UJ
Fluoranthene	291		702		92.7		233		618		1130		264		152		162	J	136		127		209		123	
Indeno(1,2,3-cd)pyrene	102		215		27.4		64.2		71.2	J	87.5	J	60.5	J	39.5	J	43.8		33.4	J	27.2	J	51.0	J	28.1	J
Pyrene	256		594		71.2		181		611		1140		665		166		158		144		122		236		109	
Total HPAH	1482		3341		411		986		2644		4212		2028		866		838		756		653		1301		567	
Pesticides																										
4,4`-DDD	3.87	J	4.34	J	0.274	UJ	1.99	J	1.30		1.90		2.10		1.30		1.00		1.20		0.880		1.70		0.680	
4,4`-DDE	7.51	J	5.74		0.167	U	4.37	J	1.90		1.30		1.40		1.30		0.790		1.40		1.30		2.00		0.400	
4,4`-DDT	1.62	J	2.60		0.360	U	1.51	J	0.850		1.50		4.00		0.750		0.620		0.900		0.530		2.20		0.028	U
Total DDX	13.0		12.7		0.801	U	7.87		4.05		4.70		7.50		3.35		2.41		3.50		2.71		5.90		1.11	
Aldrin	0.378	U	0.243	U	0.915	U	0.374	U	0.008	U	0.008	U	0.008	U	0.008	U	0.008	U	0.008	U	0.008	U	0.008	U	0.200	UJ
Alpha-Chlordane (cis)	0.815	U	0.525	U	1.97	U	0.810	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
cis-Nonachlor	0.110	U	0.071	U	0.265	U	0.109	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U
Dieldrin	0.23	U	0.15	U	0.550	U	0.225	U	0.460		0.850		0.026	U	1.00		1.20		0.026	U	0.026	U	0.610		0.026	U
Endosulfan I	0.208	U	0.134	U	0.500	U	0.206	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U
Endosulfan II	0.107	U	0.069	U	0.260	U	0.106	U	0.019	U	0.019	U	0.019	U	1.20		0.019	U	0.019	U	0.019	U	0.740		0.019	U
Endrin	0.124	U	0.080	U	0.300	U	0.123	U	0.027	U	0.027	U	0.430		0.760		0.027	U	0.027	U	0.770		1.90		0.027	U
Gamma-Chlordane (trans)	0.23	U	0.15	U	0.555	U	0.228	U	0.710		0.910		0.220		1.8		0.009	U	0.009	U	1.50		0.720		0.830	J
Heptachlor	0.237	U	0.152	U	0.570	U	0.234	U	0.470		0.300		0.310		0.230		0.220		0.009	U	0.009	U	0.820		0.009	U
Heptachlor epoxide	0.487	U	0.312	U	1.18	U	0.482	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.200	UJ
Hexachlorobenzene	2.035	U	1.305	U	4.92	U	2.02	U	0.009	U	0.450		0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.009	U
Lindane	0.342	U	0.219	U	0.825	U	0.338	U	0.013	U	0.670		0.540		0.013	U	0.013	U	0.013	U	0.013	U	0.013	U	0.400	J
Methoxychlor	0.540	U	0.345	U	1.30	U	0.530	U	0.125	U	0.125	U	0.125	U	0.125	U	0.125	U	0.125	U	0.125	U	0.125	U	0.125	U
Oxychlordane	0.469	U	0.301	U	1.13	U	0.464	U	0.710		0.010	U	1.60		0.010	U	0.010	U	0.230		0.010	U	0.290		0.200	UJ
Toxaphene	9.80	U	6.30	U	23.8	U	9.70	U	0.019	U	0.019	U	0.019	U	0.019	U	0.019	U	0.019	U	0.019	U	0.019	U	0.019	U
trans-Nonachlor	0.101	U	0.065	U	0.244	U	0.100	U	0.009	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.200	UJ
Total Chlordane	1.72	U	1.11	U	4.2	U	1.7	U	1.4		0.95		1.8		1.8		0.044	U	0.265		1.54		1.04		1.25	
PCBs																										
PCB 008	0.060	U	0.039	U	0.145	U	0.06	U	0.015	U	0.015	U	0.015	U	0.015	U	0.015	U	0.015	U	0.015	U	0.015	U	0.015	U
PCB 018	0.044	U	0.028	U	0.105	U	0.043	U	0.017	U	0.017	U	0.017	U	0.017	U	0.017	U	0.017	U	0.017	U	0.017	U	0.017	U
PCB 028	0.074	U	0.048	U	0.179	U	0.073	U	0.015	U	0.015	U	0.015	U	0.015	U	0.015	U	0.015	U	0.015	U	0.015	U	0.015	U
PCB 044	0.083	U	0.393		0.200	U	0.082	U	0.008	U	0.008	U	0.008	U	0.008	U	0.008	U	0.008	U	0.008	U	0.008	U	0.008	U
(PCB 049)	0.081	U	0.052	U	0.195	U	0.080	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U
PCB 052	0.046	U	0.506		0.111	U	0.046	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U
PCB 066	0.043	U	0.028	U	0.105	U	0.043	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U
(PCB 087)	0.035	U	0.023	U	0.085	U	0.035	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U
PCB 101	0.357	J	0.747		0.170	U	0.070	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
PCB 105	0.063	U	0.041	U	0.153	U	0.063	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.010	U	0.200	
PCB 118	0.067	U	0.590		0.162	U	0.066	U	0.011	U	0.250		0.011	U	0.011	U	0.011	U	0.011	U	0.011	U	0.011	U	0.011	U
PCB 128	0.079	U	0.051	U	0.191	U	0.078	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
PCB 138	0.389	J	1.07		0.122	U	0.050	U	0.280		0.360		0.230		0.220		0.008	U	0.008	U	0.260		0.290		0.008	U
PCB 153	0.300	J	0.657		0.254	U	0.104	U	0.260		0.310		0.220		0.006	U	0.006	U	0.006	U	0.006	U	0.220		0.006	U
PCB 170	0.039	U	0.025	U	0.094	U	0.039	U	0.011	U	0.011	U	0.011	U	0.011	U	0.011	U	0.011	U	0.011	U	0.011	U	0.011	U
PCB 180	0.040	U	0.026	U	0.096	U	0.039	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U	0.007	U
(PCB 183)	0.022	U	0.014	U	0.052	U	0.021	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U	0.006	U
(PCB 184)	0.044	U	0.028	U	0.105	U	0.043	U	0.012	U	0.012	U	0.012	U	0.012	U	0.012	U	0.012	U	0.012	U	0.012	U	0.012	U
PCB 187	0.057	U	0.037	U	0.138	U	0.056	U	0.008	U	0.008	U	0.008	U	0.008	U	0.008	U	0.008	U	0.008	U	0.008	U	0.008	U
PCB 195	0.075	U	0.048	U	0.180	U	0.074	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U	0.009	U
PCB 206	0.076	U	0.049	U	0.184	U	0.075	U	0.011	U	0.011	U	0.011	U	0.011	U	0.011	U	0.011	U	0.011	U	0.011	U	0.011	U
PCB 209	0.087	U	0.056	U	0.211	U	0.086	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
Total PCBs	3.95		8.87		5.59	U	2.29	U	1.4		2.1		1.2		0.751		0.326	U	0.326	U	0.831		1.3		0.706	

Notes:

Yellow indicates an exceedance of the ERL

Red indicates an exceedance of the ERM

U= Compound was analyzed for but was not detected (non-detect)

J= Indicates an estimated value

J+= Indicates an estimated value biased high

Non-detects reported as half the MDL

Reference site data from DAMOS monitoring surveys (2019 IOSN)

Total PCBs were calculated using the NOAA 18 method

Total Chlordane is a sum of alpha and gamma chlordane, cis and trans nonachlor, and oxychlordane; IOSN value is a sum of only alpha and gamma chlordane

Appendix C
Tissue Concentrations and BEST Model Output

TABLE C-1 STATISTICAL COMPARISONS OF *N. virens* BODY BURDENS VS. IOSN 2019 REFERENCE DATA

Compound	Units	Pre-Test [d] Mean	Pre-Test [d] Qual	IOSN 2019 Mean	IOSN 2019 Qual	Composite Mean	Composite Qual
Trace Metals							
Arsenic, total	mg/Kg	2.00		2.25		2.02	NS
Cadmium, total	mg/Kg	0.0300	b	0.0252	b	0.0338	bS
Chromium, total	mg/Kg	0.620	b	0.0686	b	0.551	bS
Copper, total	mg/Kg	1.49		1.20		1.12	NS
Lead, total	mg/Kg	0.195		0.0744		0.191	S
Mercury, total	mg/Kg	0.0110	b	0.0156	b	0.00662	abNS
Nickel, total	mg/Kg	0.476		0.168		0.232	S
Zinc, total	mg/Kg	13.1		18.6		14.1	NS/S e
PAH Compounds							
Acenaphthene	µg/Kg	0.620	a	0.563	ab	0.883	abNS
Acenaphthylene	µg/Kg	0.381	a	0.286	a	4.22	aNS
Anthracene	µg/Kg	0.903	ab	0.310	a	0.610	abS
Benzo(a)anthracene	µg/Kg	0.775	a	0.581	a	0.766	ac
Benzo(a)pyrene	µg/Kg	0.813	a	0.610	a	0.805	ac
Benzo(b)fluoranthene	µg/Kg	1.08	a	0.807	a	2.43	aS
Benzo(k)fluoranthene	µg/Kg	0.493	a	0.371	a	6.45	aS
Benzo(g,h,i)perylene	µg/Kg	0.345	a	0.259	a	0.427	abS
Chrysene	µg/Kg	0.752	a	0.564	a	1.14	abS
Dibenz(a,h)anthracene	µg/Kg	0.400	a	0.300	a	0.396	ac
Fluoranthene	µg/Kg	0.610	a	0.569	ab	6.71	bS
Fluorene	µg/Kg	1.07	b	0.431	ab	2.05	bS
Indeno(1,2,3-cd)pyrene	µg/Kg	0.810	a	0.608	a	0.802	ac
Naphthalene	µg/Kg	1.64	b	0.651	ab	1.60	abS
Phenanthrene	µg/Kg	0.677	a	2.04	b	0.861	abNS
Pyrene	µg/Kg	0.898	a	0.674	a	6.23	bS
Total PAHs	µg/Kg	12.3		9.63		36.4	
PCB Congeners							
PCB 008	µg/Kg	0.0638	a	0.0480	a	0.0632	ac
PCB 018	µg/Kg	0.0465	a	0.0349	a	0.0460	ac
PCB 028	µg/Kg	0.0790	a	0.0593	a	0.0784	ac
PCB 044	µg/Kg	0.0880	a	0.0661	a	0.0873	ac
PCB 052	µg/Kg	0.0491	a	0.0369	a	0.136	abS
PCB 066	µg/Kg	0.0462	a	0.0347	a	0.0457	ac
PCB 101	µg/Kg	0.0752	a	0.0564	a	0.0745	ac
PCB 105	µg/Kg	0.0675	a	0.0506	a	0.810	aS
PCB 118	µg/Kg	0.0713	a	0.0534	a	0.0706	ac
PCB 128	µg/Kg	0.0842	a	0.0632	a	0.0834	ac
PCB 138	µg/Kg	0.305	ab	0.331	ab	0.462	aNS
PCB 153	µg/Kg	0.628	b	0.763		0.857	aNS
PCB 170	µg/Kg	0.0413	a	0.0310	a	0.0409	ac
PCB 180	µg/Kg	0.0423	a	0.0318	a	0.0419	ac
PCB 187	µg/Kg	0.256	a	0.0456	a	0.0601	ac
PCB 195	µg/Kg	0.0795	a	0.0596	a	0.0786	ac
PCB 206	µg/Kg	0.0810	a	0.0608	a	0.0802	ac
PCB 209	µg/Kg	0.0928	a	0.0697	a	0.0920	ac
Total PCBs	µg/Kg	4.39		3.79		6.42	
Pesticides							
Aldrin	µg/Kg	0.0404	a	0.0605	a	0.0400	ac
cis-Chlordane	µg/Kg	0.0870	a	0.131	a	0.0863	ac
trans-Chlordane	µg/Kg	0.0245	a	0.0369	a	0.0243	ac
cis-Nonachlor	µg/Kg	0.0117	a	0.0176	a	0.0116	ac
trans-Nonachlor	µg/Kg	0.0108	a	0.0161	a	0.0106	ac
Oxychlordane	µg/Kg	0.0501	a	0.0752	a	0.0495	ac
Total Chlordanes	µg/Kg	0.184		0.277		0.182	
4,4'-DDT	µg/Kg	0.0159	a	0.0238	a	0.0158	ac
4,4'-DDD	µg/Kg	3.29	ab	0.0182	a	0.665	S
4,4'-DDE	µg/Kg	0.00737	a	0.0111	a	0.00728	ac
Total DDT	µg/Kg	3.32		0.0531		0.688	
Dieldrin	µg/Kg	0.0243	a	0.0365	a	0.0241	ac
alpha-Endosulfan	µg/Kg	0.0222	a	0.0334	a	0.0220	ac
beta-Endosulfan	µg/Kg	0.0115	a	0.0173	a	0.0113	ac
Total Endosulfans	µg/Kg	0.0337		0.0507		0.0333	
Endrin	µg/Kg	0.0132	a	0.0199	a	0.0131	ac
Heptachlor	µg/Kg	0.0253	a	0.0379	a	0.0250	ac
Heptachlor epoxide	µg/Kg	0.0520	a	0.0780	a	0.0515	ac
Hexachlorobenzene	µg/Kg	0.217	a	0.326	a	0.215	ac
Lindane (gamma-BHC)	µg/Kg	0.0365	a	0.0548	a	0.0361	ac
Methoxychlor	µg/Kg	0.0575	a	0.843	a	0.0568	ac
Toxaphene	µg/Kg	1.05	a	1.58	a	1.04	ac

Notes:

Mean concentrations are reported to 3 significant figures.

a = COC not detected (below MDL) in at least one replicate; mean value was calculated using one-half of the project specific MDL for non-detected values.
b = COC concentration estimated (detected below RL but above MDL) in at least one replicate; mean value calculated using estimated value.
c = COC was not detected in either the dredge tissue replicates or in the historic reference tissue, therefore was eliminated from further evaluation.
[d] Pre-test tissue represents the mean of three replicates, whereas the reference and site composites represent a mean of 5 replicates.
[e] Analysis conducted after removal of a statistical outlier.

NS = Not Significant - mean tissue body burden was not statistically different from the associated reference site mean body burden. Statistical significance accepted at α=0.05.
S = Significant - mean tissue body burden was statistically different, greater than the associated reference site mean body burden. Statistical significance accepted at α=0.05.

TABLE C-2 STATISTICAL COMPARISONS OF *M. nasuta* BODY BURDENS VS. IOSN 2019 REFERENCE DATA

Compound	Units	Pre-Test [d] Mean	Pre-Test [d] Qual	IOSN 2019 Mean	IOSN 2019 Qual	Composite Mean	Composite Qual
Trace Metals							
Arsenic, total	mg/Kg	2.59		3.49		2.54	NS
Cadmium, total	mg/Kg	0.0297	b	0.0290	b	0.0266	bNS
Chromium, total	mg/Kg	0.465		0.334	b	0.434	bNS
Copper, total	mg/Kg	3.10		1.77		2.71	S
Lead, total	mg/Kg	0.129		0.349		0.452	S
Mercury, total	mg/Kg	0.00185	a	0.00170	a	0.00208	ac
Nickel, total	mg/Kg	0.713		0.521		0.570	NS/S [e]
Zinc, total	mg/Kg	11.6		11.8		12.8	NS
PAH Compounds							
Acenaphthene	µg/Kg	1.07	ab	0.453	a	1.56	abNS
Acenaphthylene	µg/Kg	0.378	a	0.279	a	0.381	ac
Anthracene	µg/Kg	0.853	ab	0.302	a	2.69	bS
Benzo(a)anthracene	µg/Kg	1.32	ab	0.565	a	5.40	bS
Benzo(a)pyrene	µg/Kg	0.805	a	0.594	a	1.74	abS
Benzo(b)fluoranthene	µg/Kg	1.07	a	0.786	a	4.41	bS
Benzo(k)fluoranthene	µg/Kg	0.490	a	0.455	ab	1.25	abS
Benzo(g,h,i)perylene	µg/Kg	0.342	a	0.518	ab	0.820	abNS
Chrysene	µg/Kg	2.01	b	0.550	a	2.92	bS
Dibenz(a,h)anthracene	µg/Kg	0.559	ab	2.97	b	0.400	aNS
Fluoranthene	µg/Kg	2.57	b	2.12	b	26.6	S
Fluorene	µg/Kg	2.11	b	0.253	a	1.74	bS
Indeno(1,2,3-cd)pyrene	µg/Kg	0.803	a	3.54	b	0.985	abNS
Naphthalene	µg/Kg	3.78	b	0.390	a	1.77	bS
Phenanthrene	µg/Kg	4.09	b	1.97	b	6.92	bS
Pyrene	µg/Kg	2.86	b	1.63	b	20.8	S
Total PAHs	µg/Kg	25.1		17.4		80.4	
PCB Congeners							
PCB 008	µg/Kg	0.0633	a	0.0467	a	0.0639	ac
PCB 018	µg/Kg	0.0461	a	0.0340	a	0.0465	ac
PCB 028	µg/Kg	0.0783	a	0.0578	a	0.0791	ac
PCB 044	µg/Kg	0.0873	a	0.0644	a	0.0883	ac
PCB 052	µg/Kg	2.09		0.0359	a	0.172	aS
PCB 066	µg/Kg	0.0457	a	0.0338	a	0.0462	ac
PCB 101	µg/Kg	0.0745	a	0.0550	a	0.0754	ac
PCB 105	µg/Kg	0.0668	a	0.0493	a	0.0675	ac
PCB 118	µg/Kg	0.0708	a	0.0522	a	0.142	abS
PCB 128	µg/Kg	0.0835	a	0.0616	a	0.0843	ac
PCB 138	µg/Kg	0.392	a	0.0394	a	0.0539	ac
PCB 153	µg/Kg	0.111	a	0.0820	a	0.142	abS
PCB 170	µg/Kg	0.0410	a	0.0303	a	0.0414	ac
PCB 180	µg/Kg	0.0419	a	0.0309	a	0.0423	ac
PCB 187	µg/Kg	0.0603	a	0.0445	a	0.0607	ac
PCB 195	µg/Kg	0.0787	a	0.0580	a	0.0794	ac
PCB 206	µg/Kg	0.0803	a	0.0594	a	0.0810	ac
PCB 209	µg/Kg	0.0920	a	0.0680	a	0.0929	ac
Total PCBs	µg/Kg	7.22		1.81		2.92	
Pesticides							
Aldrin	µg/Kg	0.0200	a	0.0296	a	0.0202	ac
cis-Chlordane	µg/Kg	0.0432	a	0.0638	a	0.0436	ac
trans-Chlordane	µg/Kg	0.0122	a	0.0180	a	0.0123	ac
cis-Nonachlor	µg/Kg	0.00582	a	0.00870	a	0.00587	ac
trans-Nonachlor	µg/Kg	0.00533	a	0.00780	a	0.00538	ac
Oxychlordane	µg/Kg	0.0248	a	0.0366	a	0.0250	ac
Total Chlordanes	µg/Kg	0.0913		0.135		0.0922	
4,4'-DDT	µg/Kg	0.00788	a	0.0117	a	0.00796	ac
4,4'-DDD	µg/Kg	0.00598	a	0.00880	a	0.391	S
4,4'-DDE	µg/Kg	0.00365	a	0.219	b	0.499	S
Total DDT	µg/Kg	0.0175		0.240		0.898	
Dieldrin	µg/Kg	0.0121	a	0.0178	a	0.0122	ac
alpha-Endosulfan	µg/Kg	0.0110	a	0.0163	a	0.0111	ac
beta-Endosulfan	µg/Kg	0.00568	a	0.00840	a	0.00573	ac
Total Endosulfans	µg/Kg	0.0167		0.0247		0.0168	
Endrin	µg/Kg	0.00653	a	0.00970	a	0.00662	ac
Heptachlor	µg/Kg	0.0125	a	0.0186	a	0.0127	ac
Heptachlor epoxide	µg/Kg	0.0257	a	0.0381	a	0.0260	ac
Hexachlorobenzene	µg/Kg	0.108	a	0.159	a	0.109	ac
Lindane (gamma-BHC)	µg/Kg	0.0181	a	0.0267	a	0.0183	ac
Methoxychlor	µg/Kg	0.0285	a	0.411	a	0.0287	ac
Toxaphene	µg/Kg	0.518	a	0.767	a	0.524	ac

Notes:

Mean concentrations are reported to 3 significant figures.

a = COC not detected (below MDL) in at least one replicate; mean value was calculated using one-half of the project specific MDL for non-detected values.
b = COC concentration estimated (detected below RL but above MDL) in at least one replicate; mean value calculated using estimated value.
c = COC was not detected in either the dredge tissue replicates or in the historic reference tissue, therefore was eliminated from further evaluation.
[d] Pre-test tissue represents the mean of three replicates, whereas the reference and site composites represent a mean of 5 replicates.
[e] Analysis conducted after removal of a statistical outlier.

NS = Not Significant - mean tissue body burden was not statistically different from the associated reference site mean body burden. Statistical significance accepted at α=0.05.
S = Significant - mean tissue body burden was statistically different, greater than the associated reference site mean body burden. Statistical significance accepted at α=0.05.

Project name: Yachtsman Marina, Kennebunkport, ME

Project number:

Model filename: EPA Reg 1 Template wChemical List.best

Chemical filename: Chemical_List_for_EPA_Reg1_template (in progress).xlsx

Table Of Contents

Adult Angler 1

Total Estimated Risks 1

Seafood Non-Cancer Risk 4

FDA Action Limit/Tolerance 6

Ecological Effect Level 8

FDA Level of Concern 10

Selected Chemicals 11

Macoma nasuta 11

Nereis virens 12

Human Subreport

Human: Adult Angler

Total Estimated Risks From Organics(see EPA Table Xa)

Receptor: Adult Angler

Organism: Macoma nasuta

		Cancer Risk	Non-Cancer Risk
Composite (10 Stations at		Fish Fillet	
	Test	6.01E-6	3.72E-2
	Reference	1.66E-6	1.74E-2
		Nereis virens	
	Test	0	0
	Reference	0	0
		Macoma nasuta	
	Test	6.23E-6	3.84E-2
	Reference	1.72E-6	1.8E-2
		Total Lobster	
	Test	3.1E-5	1.92E-1
	Reference	8.57E-6	9E-2

		Cancer Risk	Non-Cancer Risk
		Lobster Hepatopancreas	
	Test	2.14E-5	1.33E-1
	Reference	5.91E-6	6.21E-2
		Lobster Muscle	
	Test	9.62E-6	5.96E-2
	Reference	2.66E-6	2.79E-2

Total Estimated Risks From Organics(see EPA Table Xa)

Receptor: Adult Angler

Organism: Nereis virens

		Cancer Risk	Non-Cancer Risk
Composite (10 Stations at		Fish Fillet	
	Test	5.09E-6	8.9E-2
	Reference	1.63E-6	3.72E-2
		Nereis virens	
	Test	6.12E-6	1.08E-1
	Reference	1.97E-6	4.51E-2
		Macoma nasuta	
	Test	0	0
	Reference	0	0
		Total Lobster	
	Test	2.63E-5	4.59E-1
	Reference	8.39E-6	1.92E-1
		Lobster Hepatopancreas	
	Test	1.81E-5	3.17E-1
	Reference	5.79E-6	1.32E-1
		Lobster Muscle	
	Test	8.14E-6	1.42E-1
	Reference	2.6E-6	5.95E-2

Seafood Non-Cancer Risks (see EPA Table 6a, Columns F & G)

Receptor: Adult Angler

Organism: Macoma nasuta

			Non-Cancer Risk
Composite (10 Stations at 4 Marinas Mud)	Copper	**Test**	0
		Reference	0
	Lead	**Test**	0
		Reference	0
	Nickel	**Test**	0
		Reference	0

Seafood Non-Cancer Risks (see EPA Table 6a, Columns F & G)

Receptor: Adult Angler

Organism: Nereis virens

			Non-Cancer Risk
Composite (10 Stations at 4 Marinas Mud)	Cadmium	**Test**	2.9E-3
		Reference	2.16E-3
	Chromium	**Test**	1.57E-2
		Reference	1.96E-3
	Lead	**Test**	0
		Reference	0
	Nickel	**Test**	0
		Reference	0
	Zinc	**Test**	4.02E-3
		Reference	5.31E-3

FDA Action Limit/Tolerance (see EPA Table 3, Columns D & E)

Receptor: Adult Angler

Organism: Macoma nasuta

	Contaminant	FDA Action Level (mg/kg)	Steady State Corrected Mean Tissue Concentration (mg/kg)
Composite (10 Stations	Total PCBs	2E3	6.47E0
Composite (10 Stations	Mercury	1E0	2.08E-3
Composite (10 Stations	Total DDT	5E3	1.56E0
Composite (10 Stations	Total Chlordanes	3E2	1.53E-1

FDA Action Limit/Tolerance (see EPA Table 3, Columns D & E)

Receptor: Adult Angler

Organism: Nereis virens

	Contaminant	FDA Action Level (mg/kg)	Steady State Corrected Mean Tissue Concentration (mg/kg)
Composite (10 Stations	Total PCBs	2E3	1.42E1
Composite (10 Stations	Mercury	1E0	6.62E-3
Composite (10 Stations	Total DDT	5E3	1.36E0
Composite (10 Stations	Total Chlordanes	3E2	3.04E-1

Ecological Effects Level (see EPA Table 8a.1, Columns D & E)

Receptor: Adult Angler

Organism: Macoma nasuta

	Contaminant	Ecological Effect Level (mg/kg)	Steady State Corrected Mean Tissue Concentration (mg/kg)
Composite (10 Stations	Anthracene	3.75E3	2.69E0
Composite (10 Stations	Benzo(a)pyrene	8E3	3.47E0
Composite (10 Stations	PAH Total	1E4	8.04E1
Composite (10 Stations	Total PCBs	4E3	6.47E0
Composite (10 Stations	Aldrin	2.99E2	2.02E-2
Composite (10 Stations	Dieldrin	4.37E0	1.64E-2
Composite (10 Stations	Endosulfans	2.86E0	1.69E-2
Composite (10 Stations	Arsenic	1.26E1	2.54E0
Composite (10 Stations	Cadmium	3.03E0	2.66E-2
Composite (10 Stations	Chromium	1.18E1	4.34E-1
Composite (10 Stations	Copper	9.6E0	2.71E0
Composite (10 Stations	Lead	1.19E1	4.52E-1
Composite (10 Stations	Mercury	2E-1	2.08E-3
Composite (10 Stations	Nickel	3.8E0	5.7E-1
Composite (10 Stations	Zinc	1.52E3	1.28E1
Composite (10 Stations	Total DDT	3E3	1.56E0

Ecological Effects Level (see EPA Table 8a.1, Columns D & E)

Receptor: Adult Angler

Organism: Nereis virens

	Contaminant	Ecological Effect Level (mg/kg)	Steady State Corrected Mean Tissue Concentration (mg/kg)
Composite (10 Stations	Anthracene	3.75E3	6.1E-1
Composite (10 Stations	Benzo(a)pyrene	8E3	1.61E0
Composite (10 Stations	PAH Total	1E4	3.64E1
Composite (10 Stations	Total PCBs	4E3	1.42E1
Composite (10 Stations	Aldrin	2.99E2	4E-2
Composite (10 Stations	Dieldrin	4.37E0	3.25E-2
Composite (10 Stations	Endosulfans	2.86E0	3.33E-2
Composite (10 Stations	Arsenic	1.26E1	2.02E0
Composite (10 Stations	Cadmium	3.03E0	3.38E-2
Composite (10 Stations	Chromium	1.18E1	5.51E-1
Composite (10 Stations	Copper	9.6E0	1.12E0
Composite (10 Stations	Lead	1.19E1	1.91E-1
Composite (10 Stations	Mercury	2E-1	6.62E-3
Composite (10 Stations	Nickel	3.8E0	2.32E-1
Composite (10 Stations	Zinc	1.52E3	1.41E1
Composite (10 Stations	Total DDT	3E3	1.36E0

FDA Level of Concern (see EPA Table 7a, Columns B & D)

Receptor: Adult Angler

Organism: Macoma nasuta

	Contaminant	FDA Level of Concern(mg/kg)	Steady State Corrected Mean Tissue Concentration (mg/kg)
Composite (10 Stations	Arsenic	8.6E1	2.54E0
Composite (10 Stations	Cadmium	3.7E0	2.66E-2
Composite (10 Stations	Chromium	1.3E1	4.34E-1
Composite (10 Stations	Lead	1.7E0	4.52E-1
Composite (10 Stations	Nickel	8E1	5.7E-1

FDA Level of Concern (see EPA Table 7a, Columns B & D)

Receptor: Adult Angler

Organism: Nereis virens

	Contaminant	FDA Level of Concern(mg/kg)	Steady State Corrected Mean Tissue Concentration (mg/kg)
Composite (10 Stations	Arsenic	8.6E1	2.02E0
Composite (10 Stations	Cadmium	3.7E0	3.38E-2
Composite (10 Stations	Chromium	1.3E1	5.51E-1
Composite (10 Stations	Lead	1.7E0	1.91E-1
Composite (10 Stations	Nickel	8E1	2.32E-1

Selected Chemicals

Invertebrate Name Macoma nasuta

	Composite (10
118	X
153	X
4,4'-DDD	X
4,4'-DDE	X
Anthracene	X
Benzo(a)anthracene	X
Benzo(a)pyrene	X
Benzo(b)fluoranthene	X
Benzo(k)fluoranthene	X
Chrysene	X
Fluoranthene	X
Fluorene	X
Naphthalene	X
PAH Total	X
Phenanthrene	X
Pyrene	X
Total DDT	X
Total PCBs	X
Copper	X
Lead	X
Nickel	X

Invertebrate Name Nereis virens

	Composite (10
105	X
4,4'-DDD	X
52	X
Anthracene	X
Benzo(b)fluoranthene	X
Benzo(g,h,i)perylene	X
Benzo(k)fluoranthene	X
Chrysene	X
Fluoranthene	X
Fluorene	X
Naphthalene	X
PAH Total	X
Pyrene	X
Total DDT	X
Total PCBs	X
Cadmium	X
Chromium	X
Lead	X
Nickel	X
Zinc	X

Appendix D
Elutriate Chemistry Results

Kennebunkport River Projects			ME WQC	Elutriate Average	Q	Site Water Average	Q	Lab Water Average	Q
Parameter	CAS Number	Units							
Metals									
Arsenic	7440382	ug/L	69	3.67		1.22		0.140	U
Cadmium	7440439	ug/L	33	0.295	U	0.30	U	0.295	U
Hexavalent Chromium	18540299	ug/L	1108	1.50	U	1.50	U	1.50	U
Copper	7440508	ug/L	5.78	1.92	U	1.92	U	1.92	U
Lead	7439921	ug/L	221	1.72	U	1.72	U	1.72	U
Mercury	7439976	ug/L	2.1	0.010	U	0.010	U	0.010	U
Nickel	7440020	ug/L	75	2.78	U	2.78	U	2.78	U
Selenium	7782492	ug/L	291	0.115	*	0.065	U	0.560	U
Silver	7440224	ug/L	2.24	0.815	U	0.82	U	0.815	U
Zinc	7440666	ug/L	95	17.1	U	17.1	U	17.1	U
Industrial Chemicals									
Pentachlorophenol	87865	ug/L	13	0.290	U	0.224	U	0.222	U
Pesticides									
4,4`-DDT	50293	ug/L	0.13	0.00012	U	0.00008	U	0.00008	U
Aldrin	309002	ug/L	1.3	0.00023	U	0.00016	U	0.00016	U
Alpha-Chlordane (cis)	5103719	ug/L		0.00011	U	0.00008	U	0.00008	U
Dieldrin	60571	ug/L	0.71	0.00006	U	0.00004	U	0.00004	U
Chlorpyrifos	2921882	ug/L	0.011*	0.00011	U	0.00008	U	0.00008	U
Endosulfan I	959988	ug/L	0.034	0.00011	U	0.00008	U	0.00008	U
Endosulfan II	33213659	ug/L	0.034	0.00010	U	0.00007	U	0.00007	U
Endrin	72208	ug/L	0.037	0.00012	U	0.00008	U	0.00008	U
Gamma-Chlordane (trans)	5103742	ug/L		0.00005	U	0.00004	U	0.00004	U
Heptachlor	76448	ug/L	0.053	0.00008	U	0.00006	U	0.00006	U
Heptachlor epoxide	1024573	ug/L	0.053	0.00010	U	0.00007	U	0.00007	U
Lindane	58899	ug/L	0.16	0.00007	U	0.00005	U	0.00005	U
Toxaphene	8001352	ug/L	0.21	0.00365	U	0.00257	U	0.00257	U
Chlordane (alpha + gamma)	*SUMCHLOR*	ug/L	0.09	0.00016	U	0.00011	U	0.00011	U
PCBs									
PCB 008	34883437	ug/L		0.00010	U	0.00007	U	0.00007	U
PCB 018	37680652	ug/L		0.00013	U	0.00009	U	0.00009	U
PCB 028	7012375	ug/L		0.00013	U	0.00009	U	0.00009	U
PCB 044	41464395	ug/L		0.00008	U	0.00006	U	0.00006	U
(PCB 049)	41464408	ug/L		0.00028	J	0.00005	U	0.00005	U
PCB 052	35693993	ug/L		0.00037	J	0.00005	U	0.00005	U
PCB 066	32598100	ug/L		0.00010	U	0.00007	U	0.00007	U
(PCB 087)	38380028	ug/L		0.00013	U	0.00009	U	0.00009	U
PCB 101	37680732	ug/L		0.00016	U	0.00011	U	0.00011	U
PCB 105	32598144	ug/L		0.00011	U	0.00008	U	0.00008	U
PCB 118	31508006	ug/L		0.00009	U	0.00006	U	0.00006	U
PCB 128	38380073	ug/L		0.00011	U	0.00008	U	0.00008	U
PCB 138	35065282	ug/L		0.00008	U	0.00005	U	0.00005	U
PCB 153	35065271	ug/L		0.00009	*	0.00004	U	0.00004	U
PCB 170	35065306	ug/L		0.00012	U	0.00008	U	0.00008	U
PCB 180	35065293	ug/L		0.00010	U	0.00007	U	0.00007	U
(PCB 183)	52663691	ug/L		0.00011	U	0.00007	U	0.00007	U
(PCB 184)	74472483	ug/L		0.00010	U	0.00007	U	0.00007	U
PCB 187	52663680	ug/L		0.00007	U	0.00005	U	0.00005	U
PCB 195	52663782	ug/L		0.00006	U	0.00004	U	0.00004	U
PCB 206	40186729	ug/L		0.00013	U	0.00009	U	0.00009	U
PCB 209	2051243	ug/L		0.00006	U	0.00004	U	0.00004	U
Total PCBs	*SumNOAA18*	ug/L	0.03	0.00416		0.00243	U	0.00243	U

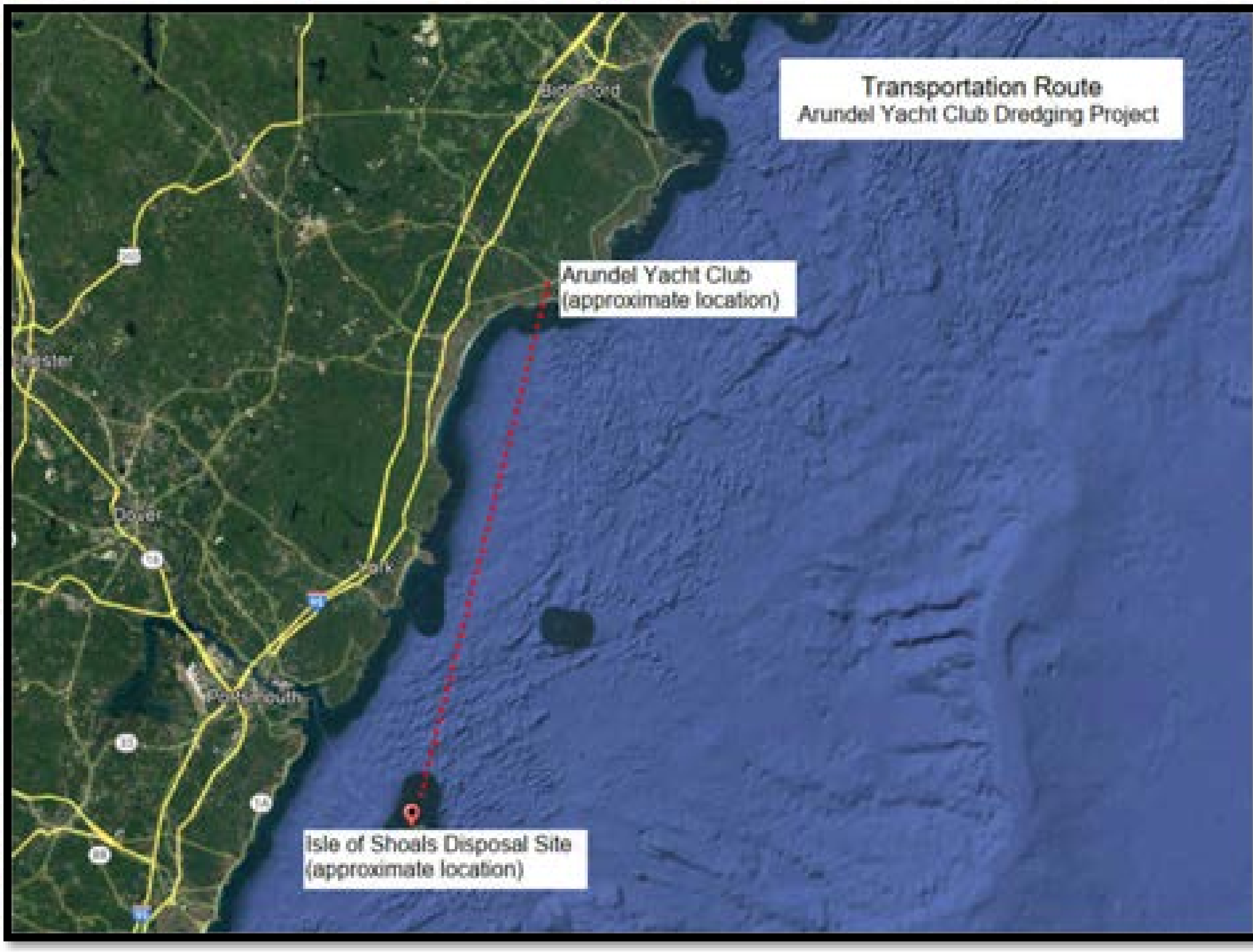
Notes

U: Compound was analyzed for but was not detected (non-detect)
J: Indicates an estimated value
* indicates average includes detects and non-detects
Non-detects are reported as 1/2 the MDL
Half the MDL was used for U-qualified values to calculate summary and average values
Yellow=exceedance of water quality criteria
Total PCBs were calculated using the NOAA 18 method
Total PCB WQC is for chronic exposure as no acute exposure value available

Attachment 15:

Disposal Site Transportation Route

15.0 Isle of Shoals North Disposal Site Transportation Route



Location: The Isle of Shoals North (IOSN) Disposal Site is located in the Gulf of Maine, approximately 20 km (10.8 nmi) east of Portsmouth, New Hampshire, 17.7 km (9.55 nmi) southeast of Kittery, Maine, and 11.2 km (6.04 nmi) north of Eastern Island, the closest within the Isle of Shoals. The site is defined as a 2,600 m (8,530 ft) diameter circle on the seafloor with its center located at 70° 26.995' W and 43° 1.142' N.

Route: From the Arundel Yacht Club (AYC), navigate in a southerly direction towards the mouth of the Kennebunk River, then in a southwestern direction through the Gulf of Maine to the IOSN Disposal Site. The total transportation route distance from the AYC to the IOSN Disposal Site is 23 nautical miles.

Estimated Number of Trips to IOSN: The estimated quantity of dredge material expected to be removed from the AYC is 8,031 cubic yards. It is estimated that the dredge scow that will be used to transport sediment to the IOSN Disposal Site will have between 500 and 600 cubic yards of capacity, which would result in 14 to 17 trips to the IOSN Disposal Site.

Attachment 16:

Notice to Fisherman

16.0 Notice to Fisherman

A notice to inform fishermen of the proposed route for transportation the dredged material will be published and appear in a newspaper of general circulation in the area of the route:

NOTICE TO FISHERMAN

The Arundel Yacht Club (AYC) proposes to dredge approximately 45,356 square feet of the Kennebunk River located offshore and southwest of the club. The proposed dredge depth will be -6.0, with about one foot of over-dig, with the total volume of proposed dredging to be 8,031cubic yards of sediment. The dredge will take place in and around the boat slips and is for maintenance and navigational safety.

Dredging of sediment will be completed by mechanical methods using a barge mounted excavator or crane with a clamshell bucket. Sediment will be loaded onto a scow barge and transported to the Isle of Shoals North Disposal Site (IOSN). The IOSN is located approximately 15 nautical miles east of Portsmouth, New Hampshire, in the Gulf of Maine. The suitability determination of the dredge spoils has been approved by the Army Corp of Engineers for open water disposal to the IOSN.

This operation would coincide with neighboring marinas performing dredging at the same approximate time. Dredging activity will occur between November and April in any given year.

Appendix A:

MDEP Visual Evaluation Field Survey Checklist

APPENDIX A: MDEP VISUAL EVALUATION
FIELD SURVEY CHECKLIST
(Natural Resources Protection Act, 38 M.R.S. §§ 480 A - Z)

Name of applicant: Arundel Yacht Club Phone: ____________

Application Type: NRPA Tier III

Activity Type: (brief activity description) Dredging approximately 8,031 cy of material

Activity Location: Town: Kennebunkport County: York

GIS Coordinates, if known: ____________ ____________

Date of Survey: 02/24/22 Observer: Randee McDonald Phone: 207 553-9898

	Distance Between the Proposed Visibility Activity and Resource (in Miles)		
1.Would the activity be visible from:	0-¼	¼-1	1+
A. A National Natural Landmark or other outstanding natural feature?	☐	☐	☒
B. A State or National Wildlife Refuge, Sanctuary, or Preserve or a State Game Refuge?	☐	☐	☒
C. A state or federal trail?	☐	☐	☒
D. A public site or structure listed on the National Register of Historic Places?	☐	☐	☒
E. A National or State Park?	☐	☐	☒
F. 1) A municipal park or public open space?	☒	☐	☐
2) A publicly owned land visited, in part, for the use, observation, enjoyment and appreciation of natural or man-made visual qualities?	☒	☐	☐
3) A public resource, such as the Atlantic Ocean, a great pond or a navigable river?	☒	☐	☐
2. What is the closest estimated distance to a similar activity?	☒	☐	☐
3. What is the closest distance to a public facility intended for a similar use?	☐	☒	☐

4. Is the visibility of the activity seasonal? ☐Yes ☒No
(i.e., screened by summer foliage, but visible during other seasons)

5. Are any of the resources checked in question 1 used by the public during the time of year during which the activity will be visible? ☒Yes ☐No

Appendix B:

MDEP Coastal Wetland Field Survey Checklist

APPENDIX B: MDEP COASTAL WETLAND CHARACTERIZATION: INTERTIDAL & SHALLOW SUBTIDAL FIELD SURVEY CHECKLIST

NAME OF APPLICANT: Arundel Yacht Club PHONE: ____________
APPLICATION TYPE: NRPA Tier III
ACTIVITY LOCATION: TOWN: Kennebunkport COUNTY: York

ACTIVITY DESCRIPTION: ☐ fill ☐ pier ☐ lobster pound ☐ shoreline stabilization
☒ dredge ☐ other: ____________

DATE OF SURVEY: January 26, 2022 OBSERVER: Randee McDonald

TIME OF SURVEY: 1:30 pm TIDE AT SURVEY: Low

SIZE OF DIRECT IMPACT OR FOOTPRINT (square feet):
Intertidal area: 0 Subtidal area: 45,356 sq ft

SIZE OF INDIRECT IMPACT, if known (square feet):_ ____________
Intertidal area: ____________ Subtidal area: ____________

HABITAT TYPES PRESENT (check all that apply):
☒ sand beach ☐ boulder/cobble beach ☐ sand flat ☒ mixed coarse & fines ☐ salt marsh
☐ ledge ☐ rocky shore ☒ mudflat (sediment depth, if known:____)

ENERGY: ☐ protected ☒ semi-protected ☐ partially exposed ☐ exposed

DRAINAGE: ☐ drains completely ☒ standing water ☐ pools ☐ stream or channel

SLOPE: ☐ >20% ☐ 10-20% ☐ 5-10% ☒ 0-5% ☒ variable

SHORELINE CHARACTER:
☐ bluff/bank (height from spring high tide:____) ☐ beach ☒ rocky ☐ vegetated

FRESHWATER SOURCES: ☐ stream ☒ river ☐ wetland ☒ stormwater

MARINE ORGANISMS PRESENT:

	absent	occasional	common	abundant
mussels	☐	☒	☐	☐
clams	☒	☐	☐	☐
marine worms	☒	☐	☐	☐
rockweed	☐	☒	☐	☐
eelgrass	☒	☐	☐	☐
lobsters	☒	☐	☐	☐
other	☐	☐	☐	☐

SIGNS OF SHORELINE OR INTERTIDAL EROSION? ☐ yes ☒ no

PREVIOUS ALTERATIONS? ☒ yes ☐ no

CURRENT USE OF SITE AND ADJACENT UPLAND:
☒ undeveloped ☒ residential ☐ commercial ☐ degraded ☒ recreational

PLEASE SUBMIT THE FOLLOWING:
☒ Photographs ☒ Overhead drawing (pink)

Appendix C:

Supplemental Information for Dredging Activities

APPENDIX C: APPLICATION FOR A NATURAL RESOURCES PROTECTION ACT PERMIT

SUPPLEMENTAL INFORMATION FOR DREDGING ACTIVITIES IN A COASTAL WETLAND, GREAT POND, RIVER, STREAM OR BROOK

(Discard this part if dredging is not proposed as part of your activity.)

The DEP and the Corps strongly recommend that applicants schedule a pre-application meeting prior to submitting an application for dredging.

Volume to be dredged:	8,031 cu. yds.		
Sq. ft. to be dredged: i	45,356 sq. ft.		
Max. depth of dredging below existing grade:	-6.0		
Type of material (example: sand, silt, clay, gravel. etc.) to be Dredged:	Silt and sand		
Describe what erosion and sediment control measures will be used during the dredging operation. (attach separate sheet if necessary):	Loading the dredge material directly onto the barge (scow) will allow it to be de-watered.		
Describe how and where the dredge spoils will be dewatered (attach separate sheet if necessary): **Show dewatering location and erosion control measures on activity drawings.**	Spoils will be loaded directly onto the barge (scow) where it will be de-watered prior to transport.		
What equipment will be used for the dredge?	The dredging will be conducted from a floating barge using a crane with a clam shell bucket and/or backhoe.		
Disposal Location: (Check one)	**Upland disposal:** ❑ On site ❑ Landfill ❑ Other_____________	**Ocean disposal:** Federal Disposal Site ❑ Arundel ❑ Portland ❑ Rockland ☒ Other Isle of Shoals	

(pink)

FOR UPLAND DISPOSAL:

Contact the Division of Solid Waste Management at (207) 822-6300:

Contacted: ☐ Yes ☐ No If yes, attach a copy of any correspondence.
Permitted: ☐ Yes ☐ No If yes, provide the permit number______________________.

FOR OCEAN DISPOSAL:

☒ Submit as **Attachment 15,** a copy of the test results performed in accordance with the U.S. Environmental Protection Agency and the Army Corps of Engineers' document entitled "Regional Implementation Manual for the Evaluation of Dredged Material Proposed for Disposal in New England Waters" (May 2002). This is available from the Army Corps of Engineers. (207) 623-8367 *Submitted as Attachment 14

NOTE: Applicants are STRONGLY recommended to contact the DEP prior to performing any sediment sampling. Improperly sampled or analyzed sediments may have to be retested.

☒ Submit as **Attachment 16,** a copy of a map showing the proposed transportation route to the disposal site.

List all municipalities adjacent to the proposed transportation site: *Submitted as Attachment 15

New Hampshire: Rye, New Castle

Maine: Kittery, Eliot, York, Ogunquit

A copy of the application must be submitted to all municipalities adjacent to the proposed transportation site.

☒ Submit as **Attachment 17,** a copy of the notice of the proposed transportation route. A copy of the proposed transportation route must be published in a newspaper of general circulation in the area of the proposed route. (The notice of the proposed route must include compass bearings or Loran coordinates). The notice must be published under the heading "NOTICE TO FISHERMEN". *Submitted as Attachment 16

(pink)

Appendix D:

Sediment Sampling Results

ECOTOXICOLOGICAL TESTING
WHOLE SEDIMENT BIOASSAYS

KENNEBUNKPORT, MAINE

Prepared for:

Eco-Analysts, Inc.
P.O. Box 224
Bath, Maine 04530

Prepared by:

EA Engineering, Science, and Technology, Inc., PBC
231 Schilling Circle
Hunt Valley, Maryland 21031
For questions concerning this report, please contact Michael Chanov
ph: 410-584-7000

Results relate only to the items tested or to the samples as received by the laboratory.

This report contains 18 pages plus 6 attachments.

27 April 2023

Michael K. Chanov II — Date
Laboratory Director

EA Project Number 70022.TOX

E87550

EA Report Number 9149

1. INTRODUCTION

In accordance with the US Army Corps of Engineers, New England District (CENAE), EA Engineering, Science, and Technology, Inc., PBC (EA) performed whole sediment toxicity testing on sediment samples collected from the area of dredging proposed for the marinas located on the Kennebunk River in Kennebunkport, Maine. Placement of dredge materials is proposed at the Isles of Shoals North (IOSN) Disposal Site. Samples were provided by Eco-Analysts, Inc., Bath, Maine The purpose of this study was to evaluate the toxicity of the sediment samples to benthic organisms.

The toxicity testing program consisted of 10-day whole sediment toxicity tests with *Americamysis bahia* (opossum shrimp) and *Leptocheirus plumulosus* (estuarine amphipod). The whole sediment toxicity tests evaluated the effects of exposure to the sediment samples on survival of the test organisms compared to a historical reference. All biological testing was completed at EA in Hunt Valley, Maryland.

2. MATERIALS AND METHODS

2.1 SAMPLE RECEIPT AND PREPARATION

Ten sediment samples were collected by Eco-Analysts personnel from locations in the dredge footprint identified in the Sampling and Analysis Plan. One sediment composite was created for the project and placed into five 5-gallon buckets. The samples were held at ≤4°C and were hand delivered by courier to EA's Ecotoxicology Laboratory in Hunt Valley, Maryland. The composited sediment sample was logged in and assigned an EA laboratory accession number and was stored in the dark in a secured walk-in cooler at ≤4°C until used for testing. Table 1 summarizes the sample identification, accession numbers, and collection and receipt information for the sediment sample. Chain-of-custody records are included in Attachment I.

2.2 TOXICITY TEST METHODS

All toxicity testing was conducted following EA's standard operating procedures (EA 2022) which are in accordance with the *Regional Implementation Manual for Evaluation of Dredged Material Proposed for Disposal in New England Waters* (USEPA, CENAE 2004), USEPA/USACE guidance (1991, 1998) and USEPA guidance (2002).

2.2.1 Whole Sediment Toxicity Testing

Whole sediment toxicity testing was conducted with two estuarine species, *Leptocherius plumulosus* (amphipod) and *Americamysis bahia* (opossum shrimp), both acquired from Aquatic Research Organisms (Hampton, New Hampshire) on 9 March 2023. The amphipods in Lot LP-181 were 2-4 mm and the mysids from Lot AB-1232 were 5 days old when used to initiate the toxicity test. Both assays were initiated on 10 March 2023. During the 24-hour holding period, the organisms were gradually acclimated to laboratory water at 20°C and to the appropriate test salinity.

Reference sediment was not collected from the IOSN. Rather, historic survival data from 2019 were provided by the CENAE for comparison purposes.

For solid phase testing, USEPA guidance (Davies, et. al. 1993) specifies the reduction of pore water total ammonia concentrations to ≤20 mg/L NH_3-N prior to testing. Pore water was extracted from each of the sediment samples by centrifugation. Initial interstitial total ammonia concentration in the sediment sample was 63.5 mg/L NH_3-N (Tables 2 and 3). The “thin layer” ammonia reduction procedure described by Ferretti (Ferretti, et.al., 2000) was utilized prior to initiating solid phase testing of the sediment sample. For this procedure, 2 L of sediment was spread evenly over the bottom of a high-density polyethylene tub (88 x 42 x 15 cm) to a depth of approximately 8 mm. A high density polyethylene plastic cover was placed over each sediment, and 12 L of artificial seawater was carefully added to the tub to minimize disturbance of the sediments. The overlying water was replaced twice daily until the pore water ammonia concentration was ≤ 20 mg/L NH_3-N. The interstitial ammonia value for the ammonia purged sediment are presented in Tables 2 and 3.

The whole sediment toxicity tests were conducted as static, non-renewal tests with ten days of exposure to the sediments and overlying water. Artificial seawater (Crystal Sea artificial sea salts) at 20 ppt salinity (*L. plumulosus*) and 30 ppt salinity (*A. bahia*) was used as the overlying water.

The *A. bahia* and *L. plumulosus* tests utilized 1-L beakers as the exposure chambers, with each beaker containing 175 ml of sediment and 800 ml of overlying water. There were five replicate chambers for both the composite sediment sample and laboratory control. Test organisms were randomly assigned to the test chambers, 20 per replicate, for a total of 100 organisms exposed per sample.

The tests were maintained at a target of 20±1°C, with a 16-hour light/8-hour dark (*A. bahia*) or 24-hour light (*L. plumulosus*) photoperiod. The test chambers were visually inspected daily for abnormal organism behavior or lack of burrowing.

The overlying water in each test chamber was gently aerated (100 bubbles per minute) for the duration of the tests. Water quality measurements of temperature, pH, dissolved oxygen, and salinity were recorded daily on one replicate of each sample and control. The water quality parameters measured during the *A. bahia* and *L. plumulosus* toxicity tests are summarized in Tables 4 and 5, respectively.

After ten days of exposure, the test organisms were retrieved from the samples and the number of live organisms per replicate was recorded. Copies of the original data sheets for the *A. bahia* and *L. plumulosus* toxicity testing are included as Attachments II and III, respectively.

2.2.2 Data Analysis

Statistical analyses were performed on the whole sediment test data according to USEPA/USACE (1998) guidance, using the CETIS® statistical software package (Comprehensive Environmental Toxicity Information System, Version 2.1.1.5). If survival in the sediment was greater than the allowable percent difference (20 percent) from the corresponding reference, then a t-test or Wilcoxon's Two-Sample Test (depending on normal or non-normal data distribution) was performed on the sediment sample. The statistical analyses were performed to determine if exposure to the sediment sample resulted in significantly lower survival (p=0.05) as compared to the organisms exposed to the corresponding control or historical reference sediment. The results of the *A. bahia* and *L. plumulosus* whole sediment bioassays are summarized in Tables 6 and 7, respectively. The statistical analyses for *A. bahia* and *L. plumulosus* are summarized in Tables 8 and 9, respectively.

2.2.3 Reference Toxicant Testing

In conformance with EA's quality assurance/quality control program requirements, reference toxicant testing was performed by EA on acquired lots of *A. bahia* and *L. plumulosus*. The reference toxicant tests consisted of a graded concentration series of a specific toxicant in water only tests, with no sediment present in the test chambers. The results of the reference toxicant tests were compared to established control chart limits. Table 10 presents the results of the reference toxicant testing.

2.3 ARCHIVES

Original data sheets, records, memoranda, notes, and computer printouts are archived at EA's Office in Hunt Valley, Maryland. These data will be retained for a period of 5 years unless a longer period of time is requested.

3. RESULTS AND DISCUSSION

This bioassay study using sediment collected from the Yachtsman Marina project area was designed and conducted to meet the requirements of the USEPA/USACE dredged material testing program. The results of these toxicity tests met the current NELAC standards, where applicable. Protocol requires 90 percent survival in the laboratory control, indicating that test organisms were healthy and that endpoints met or exceed requirements specified in the current version of the RIM.

3.1 WHOLE SEDIMENT TOXICITY TESTING

Tables 6 and 8 summarize the results and statistical analyses of the 10-day whole sediment toxicity testing with *A. bahia*. Survival in the composite sediment sample was 97 percent, while the laboratory control and historical IOSN reference data both had 98 percent survival. Statistical analyses demonstrated that there were no significant effects on *A. bahia* survival following exposure to the composite sediment sample as compared with the IOSN 2019 reference data, and results for the composite sample were within 20% of the reference data.

Tables 7 and 9 summarize the results and statistical analyses of the 10-day whole sediment toxicity testing with *L. plumulosus*. Survival in the composite sediment sample was 95 percent. The laboratory control had 98 percent survival, while the historical IOSN reference data had 93 percent survival. As such, the statistical analyses demonstrated that there were no significant effects on *L. plumulosus* survival following exposure to the composite sediment sample as compared with the IOSN 2019 reference data, and results for the composite sample were within 20% of the reference data.

3.2 REFERENCE TOXICANT TESTS

The results of the reference toxicant tests are summarized in Table 10. All of the reference toxicant test results fell within the established laboratory control chart limits.

4. REFERENCES CITED

Davies T., D. Davis, J. Elmore. 1993. Technical panel recommendations concerning use of acute amphipod tests in evaluation of dredged material. Technical Report. U.S. Environmental Protection Agency, Office of Water, Washington, D.C.

EA. 2022. EA Ecotoxicology Laboratory Quality Assurance and Standard Operating Procedures Manual. EA Manual ATS-102. Internal document prepared by EA's Ecotoxicology Laboratory, EA Engineering, Science, and Technology, Inc., PBC, Hunt Valley, Maryland.

Ferretti, J. A., D. F. Calesso and T. R. Hermon. 2000. Evaluation of Methods to Remove Ammonia Interference in Marine Sediment Toxicity Tests. Environ. Toxicol. Chem. 19:1935-1941.

USEPA. 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms. Fifth Edition. EPA-821-R-02-012. U.S. Environmental Protection Agency, Office of Water, Washington, D.C.

USEPA and USACE. 1991. Evaluation of Dredged Material Proposal for Ocean Disposal, Testing Manual (commonly called "The Green Book").

USEPA and USACE. 1998. Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S.-Inland Testing Manual. EPA/823/B-94/004. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. and Department of the Army, U.S. Army Corps of Engineers, Washington, D.C.

USEPA Region 1, CENAE. 2004. Regional Implementation Manual for Evaluation of Dredged Material Proposed for Disposal in New England Waters. September 2004.

TABLE 1 SUMMARY OF COLLECTION AND RECEIPT INFORMATION FOR SEDIMENT SAMPLES

Sample Identification	EA Accession Number	Collection		Receipt	
		Time	Date	Time	Date
10 Stations at 4 Marinas Mud	AT3-098	1300	8 February 2023	1630	9 February 2023

TABLE 2 AMMONIA CONCENTRATIONS MEASURED ON SEDIMENT PORE WATER AND OVERLYING WATER DURING SOLID PHASE TOXICITY TESTING WITH *Americamysis bahia*

		Pore Water Ammonia ($mg/L\ NH_3$-N)						
Sediment Identification	**EA Accession Number**	**Initial**	**Day 0**	**Day 2**	**Day 4**	**Day 6**	**Day 8**	**Day 10**
10 Stations at 4 Marinas Mud	AT3-098	63.5	15.9	15.3	15.2	6.6	3.7	7.4
SOLID PHASE CONTROL	AT3-152	N/A	3.8	3.6	1.7	1.0	<0.4	<0.4

		Overlying Water Ammonia ($mg/L\ NH_3$-N)					
Sediment Identification	**EA Accession Number**	**Day 0**	**Day 2**	**Day 4**	**Day 6**	**Day 8**	**Day 10**
10 Stations at 4 Marinas Mud	AT3-098	2.2	2.0	2.1	2.1	2.0	2.3
SOLID PHASE CONTROL	AT3-152	1.2	1.0	0.9	<0.1	<0.1	<0.1

TABLE 3 AMMONIA CONCENTRATIONS MEASURED ON SEDIMENT PORE WATER AND OVERLYING WATER DURING SOLID PHASE TOXICITY TESTING WITH *Leptocherius plumulosus*

		Pore Water Ammonia ($mg/L\ NH_3$-N)						
Sediment Identification	**EA Accession Number**	**Initial**	**Day 0**	**Day 2**	**Day 4**	**Day 6**	**Day 8**	**Day 10**
10 Stations at 4 Marinas Mud	AT3-098	63.5	19.0	18.3	19.1	10.6	3.9	---
SOLID PHASE CONTROL	AT3-152	N/A	2.8	2.4	2.8	1.5	1.3	<0.4

		Overlying Water Ammonia ($mg/L\ NH_3$-N)					
Sediment Identification	**EA Accession Number**	**Day 0**	**Day 2**	**Day 4**	**Day 6**	**Day 8**	**Day 10**
10 Stations at 4 Marinas Mud	AT3-098	2.6	2.6	2.4	4.0	3.1	3.0
SOLID PHASE CONTROL	AT3-152	0.6	0.9	0.8	<0.1	<0.1	<0.1

TABLE 4 SUMMARY OF WATER QUALITY PARAMETERS MEASURED DURING WHOLE SEDIMENT BIOASSAY TESTING WITH *Americamysis bahia*

Sediment Sample Identification	EA Accession Number	Range			
		Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Salinity (ppt)
10 Stations at 4 Marinas Mud	AT3-098	19.2 – 21.6 [a]	7.9 – 8.3	6.9 – 7.7	27.0 – 30.1
SOLID PHASE CONTROL	AT3-152	19.0 – 21.9 [a]	8.0 – 8.2	5.4 – 7.6	27.0 – 28.5

[a] Measurement is outside the target range but within limits allowed by the RIM.

TABLE 5 SUMMARY OF WATER QUALITY PARAMETERS MEASURED DURING WHOLE SEDIMENT BIOASSAY TESTING WITH *Leptocheirus plumulosus*

Sediment Sample Identification	EA Accession Number	Range			
		Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Salinity (ppt)
10 Stations at 4 Marinas Mud	AT3-098	19.0 – 21.7 [a]	7.7 – 8.5	7.4 – 8.1	19.5 – 22.0
SOLID PHASE CONTROL	AT3-152	19.0 – 22.0 [a]	7.7 – 8.4	7.2 – 8.1	19.6 – 22.0

[a] Measurement is outside the target range but within limits allowed by the RIM.

TABLE 6 RESULTS OF 10-DAY WHOLE SEDIMENT TOXICITY TESTING WITH *Americamysis bahia*

Test Number: TN-23-326
Testing Dates: 3/10/23 to 3/20/23

Sample Identification	EA Accession Number	No. Alive/No. Exposed	10-Day Mean Percent Survival
10 Stations at 4 Marinas Mud	AT3-098	97 / 100	97
IOSN REFERENCE	N/A	N/A	98
SOLID PHASE CONTROL	AT3-152	98 / 100	98

TABLE 7 RESULTS OF 10-DAY WHOLE SEDIMENT TOXICITY TESTING WITH *Leptocheirus plumulosus*

Test Number: TN-23-327
Testing Dates: 3/10/23 to 3/20/23

Sample Identification	EA Accession Number	No. Alive/No. Exposed	10-Day Mean Percent Survival
10 Stations at 4 Marinas Mud	AT3-098	95 / 100	95
IOSN REFERENCE	N/A	N/A	93
SOLID PHASE CONTROL	AT3-152	98 / 100	98

TABLE 8   STATISTICAL ANALYSIS OF 10-DAY WHOLE SEDIMENT TOXICITY TESTING WITH *Americamysis bahia*

Test Number: TN-23-326

Testing Dates: 3/10/23 to 3/20/23

Sample Identification	EA Accession Number	Mean Survival	Significantly Different as Compared to: IOSN 2019	Difference in Survival >20% as Compared to: IOSN 2019	
IOSN Reference	IOSN 2019	98%	-	-	-
10 Stations at 4 Marinas Mud	AT3-098	97%	No	No	1%

TABLE 9 STATISTICAL ANALYSIS OF 10-DAY WHOLE SEDIMENT TOXICITY TESTING WITH *Leptocheirus plumulosus*

Test Number: TN-23-327

Testing Dates: 3/10/23 to 3/20/23

Sample Identification	EA Accession Number	Mean Survival	Significantly Different as Compared to: IOSN 2019	Difference in Survival >20% as Compared to: IOSN 2019	
IOSN Reference	IOSN 2019	93%	-	-	-
10 Stations at 4 Marinas Mud	AT3-098	95%	No	No	-2%

TABLE 10 RESULTS OF REFERENCE TOXICANT TESTING ON ACQUIRED LOTS OF TEST ORGANISMS

Test Species	Reference Toxicant	Test Endpoint	Acceptable Control Chart Limits
Americamysis bahia	Potassium chloride (KCl)	48-Hour EC50: 493 mg/L KCl	413 – 604 mg/L KCl
Leptocheirus plumulosus	Cadmium chloride ($CdCl_2$)	48-Hour LC50: 9.3 mg/L Cd	2.6 – 25.1 mg/L Cd

ATTACHMENT I

Chain-of-Custody Records
(2 pages)

Chain-of-Custody Record

EA Engineering, Science, and Technology

EA Ecotoxicology Laboratory
231 Schilling Circle
Hunt Valley, Maryland 21031
Telephone: 410-584-7000
Fax: 410-584-1057

Sample Shipped By: (circle)

Fed. Ex. UPS **Other:** courier

Tracking #:

Client: ECO-ANALYSTS, INC. Project No.:

NPDES Number: Client Purchase Order Number:

City/State Collected: KENNEBUNK RIVER, MAINE

PLEASE READ SAMPLING INSTRUCTIONS ON BACK OF FORM

Accession Number (office use only)	Grab	Composite	Collection Start Date/Time	Collection End Date/Time	Sample Description (including Site, Station Number, and Outfall Number)	Number/Volume of Container
AT3-098		x	2/8/23 0900	02/8/23 1300	10 Stations at 4 Marinas Mud	5 Ten Gal Buckets
AT3-099	X		"	"	" Sitewater	"

Sampled By: Dustin Kach & Bud Brown	Date/Time 2/8/23 0900 - 1300	Received By: Dustin Kach	Date/Time 2/8/23 1300
Sampler's Printed Name: Dustin Kach & Bud Brown	Title: President	Relinquished By: [signature]	Date/Time 2/9/23 @ 11:37am
Relinquished By: [signature]	Date/Time 2/8/23 1132	Received By Laboratory: [signature]	Date/Time 2/9/23 1630

Was Sample Chilled During Collection? No

Comments:

Sample Collection Parameters

Visual Description:

Temperature (°C):

pH:

TRC (mg/L):

Other:

ATTACHMENT II

Americamysis bahia 10-Day Whole Sediment Test
Data Sheets and Statistical Analyses
(20 pages)

SEDIMENT TOXICITY TEST SET-UP BENCH SHEET

Project Number: EA.TOX

Client: Eco Analyst

QC Test Number: TN-23-326

TEST ORGANISM INFORMATION

Common Name: Opossum shrimp

Scientific Name: *A. bahia*

Lot Number: AB-1232

Source: ARO

Adults Isolated (Time, Date):

Neonates Pulled (Time, Date):

Acclimation: 24hrs Age: 5days

Culture Water (T/S): 20.1 °C 27.9 ppt

TEST INITIATION

Date	Time	Initials	Activity
3/9/23	1530	SC	Sediment Added to Chambers
↓	↓	↓	Overlying Water Added to Chambers
3/10/23	1530	TD	Organisms Transferred

TEST SET-UP

Sample Number(s): AT3-152(Control), AT3-098

Overlying Water: 30 ppt Crystal Sea (LD3-385)

Treatment	Volume Test Sediment	Volume Overlying Water
AT3-152 (Lab Control)	175 ml	800 ml
↓	↓	↓
AT3-098		

TOXICOLOGY LABORATORY BENCH SHEET - ORGANISM RECOVERY RECORD

Project Number: EA.TOX

Client: Eco Analyst

QC Test Number: TN-23-326

TEST ORGANISM

Common Name: Opossum shrimp

Scientific Name: *A. bahia*

Organisms Recovered (date, time, initials): 3/20/23 1500 [illegible]

Treatment	Replicate	Number of Organisms Loaded	Number of Organisms Recovered
AT3- 152	A	20	20
(Lab Control)	B	20	19
	C	20	19
	D	20	20
	E	20	20
AT3-098	A	20	20
	B	20	20
	C	20	19
	D	20	19
	E	20	19

EA

TOXICITY TEST WATER QUALITY DATA SHEET - NEW SOLUTIONS

Project Number: EA.TOX

Client: Eco Analyst

QC Test Number: TN-23-326

TEST ORGANISM

Common Name: Opossum shrimp

Scientific Name: *A. bahia*

Beginning Date: 3/10/23 Time: 1530

Ending Date: 3/24/23 Time: 1500

TARGET VALUES Temp: 20 °C pH: 6.0 - 9.0 DO: >4.0 mg/L Salinity: 30 ppt Photoperiod: 16 *l*, 8 *d* Light Intensity: 50 - 100 fc

		Temperature (°C)							pH							Dissolved Oxygen (mg/L)							Salinity (ppt)						
Sample #		0	1	2	3	4	5	6	0	1	2	3	4	5	6	0	1	2	3	4	5	6	0	1	2	3	4	5	6
AT3-152	Control	19.7							8.0							7.5							27.0						
AT3-098		19.0							8.0							7.4							27.5						
	Meter Number	682							682							682							682						
	Time	1332							1332							1332							1332						
	Initials	UMO							UMO							UMO							UMO						

ATS-T13
06/21/06

EA

TOXICITY TEST WATER QUALITY DATA SHEET - OLD SOLUTIONS

Project Number: EA.TOX
TEST ORGANISM
Beginning Date: 3/10/23 Time: 1530

Client: Eco Analyst
Common Name: Opossum shrimp
Ending Date: 3/20/23 Time: 1500

QC Test Number: TN-23-326
Scientific Name: *A. bahia*

TARGET VALUES Temp: 20 °C pH: 6.0 - 9.0 DO: >4.0 mg/L Salinity: 30 ppt Photoperiod: 16 *l*, 8 *d* Light Intensity: 50 - 100 fc

Sample #		Temperature (°C) 1	2	3	4	5	6	7
AT3-152	Control	21.0	20.8	21.6	21.0	20.9	20.5	20.4
AT3-098		21.0	21.0	21.9	21.0	21.0	19.9	20.6
	Meter Number	681	662	681	682	682	683	662
	Time	1025	1449	1210	0830	1312	1401	1606
	Initials	GC	JL	YG	TB	SL	LMO	HB

Sample #		pH 1	2	3	4	5	6	7
AT3-152	Control	8.2	8.3	7.9	8.1	8.1	8.1	8.1
AT3-098		8.2	8.2	8.0	8.2	8.1	8.3	8.1
	Meter Number	681	662	681	682	682	683	662
	Time	1025	1449	1210	0830	1312	1401	1606
	Initials	GC	JL	YG	TB	SL	LMO	HB

Sample #		Dissolved Oxygen (mg/L) 1	2	3	4	5	6	7
AT3-152	Control	7.3	7.5	7.6	7.5	6.9	7.5	7.7
AT3-098		7.3	7.1	7.5	7.2	5.4	7.6	7.4
	Meter Number	681	662	681	682	682	683	662
	Time	1025	1449	1210	0830	1312	1401	1606
	Initials	GC	JL	YG	TB	SL	LMO	AJO

Sample #		Salinity (ppt) 1	2	3	4	5	6	7
AT3-152	Control	27.0	27.0	27.0	27.8	28.9	28.5	29.9
AT3-098		27.0	27.0	27.0	28.1	27.9	28.0	28.5
	Meter Number	681	662	681	682	682	683	662
	Time	1025	1449	1210	0830	1312	1401	1606
	Initials	GC	JL	YG	TB	SL	LMO	AJO

(b) JR 3/12/23

ATS-T14
06/21/06

EA

TOXICITY TEST WATER QUALITY DATA SHEET - OLD SOLUTIONS

Project Number: EA.TOX TEST ORGANISM Beginning Date: 3/16/23 Time: 1530

Client: Eco Analyst Common Name: Opossum shrimp Ending Date: 3/10/23 Time: 1500

QC Test Number: TN-23-326 Scientific Name: *A. bahia*

TARGET VALUES Temp: 20 °C pH: 6.0 - 9.0 DO: >4.0 mg/L Salinity: 30 ppt Photoperiod: 16 *l*, 8 *d* Light Intensity: 50 - 100 fc

		Temperature (°C)							pH							Dissolved Oxygen (mg/L)							Salinity (ppt)						
Sample #		8	9	10	11	12	13	14	8	9	10	11	12	13	14	8	9	10	11	12	13	14	8	9	10	11	12	13	14
AT3-152	Control	19.9	19.9	20.5					8.0	8.1	8.0					7.6	7.5	7.4					28.2	30.1	27.4				
AT3-098		20.1	20.1	21.0					8.0	8.2	8.0					7.6	7.5	7.4					27.0	28.5	27.6				
	Meter Number	681	682	681					681	682	681					681	682	681					681	682	681				
	Time	0847	1310	0901					0847	1310	0901					0847	1310	0901					0847	1310	0901				
	Initials	KY	TB	TB					KY	TB	TB					KY	TB	TB					KY	TB	TB				

DTB 3/20/23

DTB 3/19/23

ATS-T14
06/21/06

EA®

TOXICOLOGY LABORATORY BENCH SHEET - AMMONIA RECORD - SEDIMENT

Client: Eco Analyst

QC Test Number: TN-23-326

EA Sample Number	Day 0 Overlying Water				Day 0 Pore Water			
	Ammonia (mg/L)	Salinity (ppt)	pH (su)	Temperature (°C)	Ammonia (mg/L)	Salinity (ppt)	pH (su)	Temperature (°C)
Control	1.22	31.9	7.9	19.2	3.84	31.2	7.6	19.0
AT3-098	2.19	31.2	7.9	19.2	15.85	31.0	7.6	19.0
Meter	VERSASTAR	682	682	682	VERSASTAR	682	682	682
Initials/Date/Time	3/15/23 MLL	3/10/23 1220	3/10/23 1220	3/10/23 1220	3/15/23 MLL	3/10/23 1220	3/10/23 1220	3/10/23 1220

EA®

TOXICOLOGY LABORATORY BENCH SHEET - AMMONIA RECORD - SEDIMENT

Client: Eco Analyst

QC Test Number: TN-23-326

EA Sample Number	Day 2 Overlying Water				Day 2 Pore Water			
	Ammonia (mg/L)	Salinity (ppt)	pH (su)	Temperature (°C)	Ammonia (mg/L)	Salinity (ppt)	pH (su)	Temperature (°C)
Control	0.96	31.9	7.9	19.1	3.56	30.0	7.5	19.0
AT3-098	2.02	30.6	8.0	19.1	15.30	29.4	7.3	19.0
Meter	VERSASTAR	602	602	602	VERSASTAR	602	602	602
Initials/Date/Time	3/15/23 MKC	3/14/23 1100	3/14/23 1100	3/14/23 1100	3/15/23 MKC	3/14/23 1100	3/14/23 1100	3/14/23 1100

TOXICOLOGY LABORATORY BENCH SHEET - AMMONIA RECORD - SEDIMENT

Client: Eco Analyst

QC Test Number: TN-23-326

EA Sample Number	Day 4 Overlying Water				Day 4 Pore Water			
	Ammonia (mg/L)	Salinity (ppt)	pH (su)	Temperature (°C)	Ammonia (mg/L)	Salinity (ppt)	pH (su)	Temperature (°C)
Control	0.89	33.0	7.8	18.7	1.68	33.0	7.9	18.9
AT3-098	2.09	33.0	7.9	18.9	15.20	33.0	7.6	18.9
Meter	VERSASTAR	682	682	682	VERSASTAR	682	682	682
Initials/Date/Time	3/15/23 MKL	3/14/23 1130 TP	3/14/23 1130 TP	3/14/23 1130 TP	3/15/23 MKL	3/14/23 1130 TP	3/14/23 1130 TP	3/14/23 1130 TP

TOXICOLOGY LABORATORY BENCH SHEET - AMMONIA RECORD - SEDIMENT

Client: Eco Analyst

QC Test Number: TN-23-326

EA Sample Number	Day 6 Overlying Water				Day 6 Pore Water			
	Ammonia (mg/L)	Salinity (ppt)	pH (su)	Temperature (°C)	Ammonia (mg/L)	Salinity (ppt)	pH (su)	Temperature (°C)
Control	<0.1	35.5	8.1	19.1	1.01	26.4	7.3	17.6
AT3-098	2.11	30.6	8.3	19.0	6.64	31.2	7.5	20.7
Meter	VERSASTAR	683	683	683	VERSASTAR	683	683	683
Initials/Date/ Time	3/28/23 MKL	UAO 3-16-23 1457	UAO 3-16-23 1459	UAO 3-16-23 1459	3/28/23 MKL	UAO 3-16-23 1601	UAO 3-16-23 1601	UAO 3-16-23 1601

TOXICOLOGY LABORATORY BENCH SHEET - AMMONIA RECORD - SEDIMENT

Client: Eco Analyst

QC Test Number: TN-23-326

(w) TP 3/18/23

EA Sample Number	Day 8 Overlying Water Ammonia (mg/L)	Salinity (ppt)	pH (su)	Temperature (°C) (w)	Day 8 Pore Water Ammonia (mg/L)	Salinity (ppt)	pH (su)	Temperature (°C)
Control	<0.1	~~27.9~~ 28.1	8.0 ~~7.9~~	21.8 ~~21.7~~	<0.4	28.0	7.9	21.5
AT3-098	2.0	27.4	7.9	21.7	3.70	27.3	7.7	21.8
Meter	VERSASTAR	681	681	681	VERSASTAR	681	681	681
Initials/Date/Time	3/26/23 LAO	3/18/23 1WWT	3/18/23 1WWT	3/18/23 1WWT	4/1/23 TP	3/18/23 1WWT	3/18/23 1WWT	3/18/23 1WWT

TOXICOLOGY LABORATORY BENCH SHEET - AMMONIA RECORD - SEDIMENT

Client: Eco Analyst

QC Test Number: TN-23-326

EA Sample Number	Day 10 Overlying Water				Day 10 Pore Water			
	Ammonia (mg/L)	Salinity (ppt)	pH (su)	Temperature (°C)	Ammonia (mg/L)	Salinity (ppt)	pH (su)	Temperature (°C)
Control	<0.1	33.5	7.8	20.4	<0.4	42.1	7.6	22.3
AT3-098	2.31	33.7	7.5	20.5	7.35	36.3	6.9	23.1
Meter	VERSASTAR	682	682	682	VERSASTAR	682	682	682
Initials/Date/Time	3/28/23 MLC	UAO 1644 3-20-23	UAO 3-20-23	UAO 1644 3-20-23	3/28/23 MLC	UAO 3-20-23 1650	UAO 3-20-23 1650	UAO 3-20-23 1650

TOXICOLOGY LABORATORY BENCH SHEET - FEEDING RECORD

Project Number: EA.TOX

Client: Eco Analyst

QC Test Number: TN-23-326

Food: (Day 0-10): 5 drops of *Artemia* 1x/day.

Day	Date	Time	Initials
0	3/10/23	1545	TO
1	3/11/23	0830	KY
2	3/12/23	0830	JL
3	3/13/23	0815	TG
4	3/14/23	0830	KY
5	3/15/23	0848	GL
6	3/16/23	0810	TO
7	3/17/23	0755	TO
8	3/18/23	0825	KY
9	3/19/23	0815	TG
10	3/20/23	0830	TG

TOXICOLOGY LABORATORY BENCH SHEET - TESTING LOCATION

Project Number: EA.TOX

Client: Eco Analyst

QC Test Number: TN-23-326

Day	Testing Location	Date	Time	Initials
0	29	3/10/23	1530	TP
1	29	3/11/23	0820	KY
2	29	3/12/23	1450	JL
3	29	3/13/23	1210	TB
4	29	3/14/23	0830	TP
5	29	3/15/23	1308	SC
6	29	3/16/23	1400	UN
7	29	3/17/23	1607	RJS
8	29	3/18/23	1105	TP
9	29	3/19/23	0815	TB
10	29	3/20/23	0830	TB
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

TOXICOLOGY LABORATORY BENCH SHEET

Project Number: EA.TOX

Client: Eco Analyst

QC Test Number: TN-23-326

Date/Time/Initials	Comments/Activity

TOXICOLOGY LABORATORY CORRECTION BENCH SHEET

Project Number: EA.TOX

Client: Eco Analyst

QC Test Number: TN-23-326

Correction Explanations

(a) Technician Error-Mathematical

(b) Technician Error-Manual Data Recording

(c) Technician Error-Head Count Observation

(d) Technician Error-Overwrite

(e) Technician Error-Missing Data

(f) Technician Error-Lost Organism

(g) Technician Error-Transcription Error

(h) Technician Error-Other:

(i) Meter Malfunction

CETIS Test Data Worksheet

Report Date: 07 Apr-23 16:32 (p 1 of 1)
Test Code/ID: TN-23-326Ab / 13-1892-8740

Americamysis bahia 10-Day Survival Sediment Test — **EA-EST, Inc. PBC**

Start Date: 10 Mar-23 15:30	**Species:** Americamysis bahia	**Sample Code:**	AT3-152
End Date: 20 Mar-23 15:00	**Protocol:** US ACE NED RIM (2004)	**Sample Source:**	Yachtsman Marina NAE-2004-00319
Sample Date: 09 Mar-23	**Material:** Laboratory Control Sediment	**Sample Station:**	Laboratory Control

Sample	Rep	Pos	# Exposed	# Survived	Notes
AT3-152	1	1	20	20	
AT3-152	2	4	20	19	
AT3-152	3	8	20	19	
AT3-152	4	11	20	20	
AT3-152	5	15	20	20	
IOSN 2019	1	3	20	19	
IOSN 2019	2	5	20	20	
IOSN 2019	3	9	20	20	
IOSN 2019	4	12	20	19	
IOSN 2019	5	13	20	20	
AT3-098	1	2	20	20	
AT3-098	2	6	20	20	
AT3-098	3	7	20	19	
AT3-098	4	10	20	19	
AT3-098	5	14	20	19	

Analyst: NM QA: SR

CETIS Summary Report

Report Date: 07 Apr-23 16:37 (p 1 of 1)
Test Code/ID: TN-23-326Ab / 13-1892-8740

Americamysis bahia 10-Day Survival Sediment Test — **EA-EST, Inc. PBC**

Batch ID:	12-9216-3705	**Test Type:**	Survival	**Analyst:**	Nancy Roka
Start Date:	10 Mar-23 15:30	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	20 Mar-23 15:00	**Species:**	Americamysis bahia	**Brine:**	Crystal Sea
Test Length:	9d 23h	**Taxon:**		**Source:**	ARO - Aquatic Research Or **Age:** 5 d

Sample ID:	14-3904-1293	**Code:**	AT3-152	**Project:**	Dredged Sediment Evaluation
Sample Date:	09 Mar-23	**Material:**	Laboratory Control Sediment	**Source:**	Yachtsman Marina NAE-2004-00319 (
Receipt Date:	09 Mar-23 15:30	**CAS (PC):**		**Station:**	Laboratory Control
Sample Age:	40h	**Client:**	Eco-Analysts, Inc.		

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
AT3-152	14-3904-1293	09 Mar-23	09 Mar-23 15:30	40h	Eco-Analysts, Inc.	Dredged Sediment Evalu
IOSN 2019	00-2071-8579	10 Mar-23	10 Mar-23	16h		
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	30d 3h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
AT3-152	Laboratory Control Sediment	Yachtsman Marina NAE-2004-00	Laboratory Control	
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Single Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
18-1122-5059	Survival Rate	Wilcoxon Rank Sum Two-Sample Test	0.7381	IOSN 2019 passed survival rate	1
18-2338-9679	Survival Rate	Equal Variance t Two-Sample Test	0.2898	AT3-098 passed survival rate	1

Survival Rate Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
AT3-152	LC	5	0.980	0.946	1.010	0.950	1.000	0.012	0.027	2.79%	0.00%
IOSN 2019	RS	5	0.980	0.946	1.010	0.950	1.000	0.012	0.027	2.79%	0.00%
AT3-098		5	0.970	0.936	1.000	0.950	1.000	0.012	0.027	2.82%	1.02%

Survival Rate Detail — MD5: 6DB39A6AF9FD0DD6C333D75C16513A7C

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
AT3-152	LC	1.000	0.950	0.950	1.000	1.000
IOSN 2019	RS	0.950	1.000	1.000	0.950	1.000
AT3-098		1.000	1.000	0.950	0.950	0.950

Americamysis bahia 10-Day Survival Sediment Test — **EA-EST, Inc. PBC**

Analysis ID:	18-1122-5059	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv2.1.1
Analyzed:	07 Apr-23 16:32	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1
Edit Date:	07 Apr-23 16:30	**MD5 Hash:**	CF0DC2D65B921694E75EDF509D2DB236	**Editor ID:**	005-341-210-5

Batch ID:	12-9216-3705	**Test Type:**	Survival	**Analyst:**	Nancy Roka
Start Date:	10 Mar-23 15:30	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	20 Mar-23 15:00	**Species:**	Americamysis bahia	**Brine:**	Crystal Sea
Test Length:	9d 23h	**Taxon:**		**Source:**	ARO - Aquatic Research Or **Age:** 5 d

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
AT3-152	14-3904-1293	09 Mar-23	09 Mar-23 15:30	40h	Eco-Analysts, Inc.	Dredged Sediment Evalu
IOSN 2019	00-2071-8579	10 Mar-23	10 Mar-23	16h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
AT3-152	Laboratory Control Sediment	Yachtsman Marina NAE-2004-00	Laboratory Control	
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	IOSN 2019 passed survival rate endpoint	3.29%

Wilcoxon Rank Sum Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	Ties	P-Type	P-Value	Decision(α:5%)
Lab Control Sedim	Reference Sed	8	27.5	---	2	Exact	0.7381	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.16	2.29	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0	0	1	0	1.0000	Non-Significant Effect
Error	0.0309042	0.0038630	8			
Total	0.0309042		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1	23.2	1.0000	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.64	0.741	0.0002	Non-Normal Distribution

Survival Rate Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
AT3-152	LC	5	0.980	0.946	1.000	1.000	0.950	1.000	0.012	2.79%	0.00%
IOSN 2019	RS	5	0.980	0.946	1.000	1.000	0.950	1.000	0.012	2.79%	0.00%

Angular (Corrected) Transformed Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
AT3-152	LC	5	1.410	1.340	1.490	1.460	1.350	1.460	0.028	4.40%	0.00%
IOSN 2019	RS	5	1.410	1.340	1.490	1.460	1.350	1.460	0.028	4.40%	0.00%

Survival Rate Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
AT3-152	LC	1.000	0.950	0.950	1.000	1.000
IOSN 2019	RS	0.950	1.000	1.000	0.950	1.000

Angular (Corrected) Transformed Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
AT3-152	LC	1.460	1.350	1.350	1.460	1.460
IOSN 2019	RS	1.350	1.460	1.460	1.350	1.460

Americamysis bahia 10-Day Survival Sediment Test — **EA-EST, Inc. PBC**

Analysis ID:	18-2338-9679	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv2.1.1
Analyzed:	07 Apr-23 16:32	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	07 Apr-23 16:30	**MD5 Hash:**	1E540BB82786F57113DA54C30799A1EC	**Editor ID:**	005-341-210-5

Batch ID:	12-9216-3705	**Test Type:**	Survival	**Analyst:**	Nancy Roka
Start Date:	10 Mar-23 15:30	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	20 Mar-23 15:00	**Species:**	Americamysis bahia	**Brine:**	Crystal Sea
Test Length:	9d 23h	**Taxon:**		**Source:**	ARO - Aquatic Research Or **Age:** 5 d

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	00-2071-8579	10 Mar-23	10 Mar-23	16h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	30d 3h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	AT3-098 passed survival rate endpoint	3.29%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	0.577	1.86	0.0731	CDF	0.2898	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.16	2.29	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0012877	0.0012877	1	0.333	0.5796	Non-Significant Effect
Error	0.0309042	0.0038630	8			
Total	0.0321919		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1	23.2	1.0000	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.799	0.741	0.0142	Normal Distribution

Survival Rate Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.980	0.946	1.000	1.000	0.950	1.000	0.012	2.79%	0.00%
AT3-098		5	0.970	0.936	1.000	0.950	0.950	1.000	0.012	2.82%	1.02%

Angular (Corrected) Transformed Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	1.410	1.340	1.490	1.460	1.350	1.460	0.028	4.40%	0.00%
AT3-098		5	1.390	1.310	1.470	1.350	1.350	1.460	0.028	4.47%	1.61%

Survival Rate Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.950	1.000	1.000	0.950	1.000
AT3-098		1.000	1.000	0.950	0.950	0.950

Angular (Corrected) Transformed Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	1.350	1.460	1.460	1.350	1.460
AT3-098		1.460	1.460	1.350	1.350	1.350

ATTACHMENT III

Leptocheirus plumulosus 10-Day Whole Sediment Test
Data Sheets and Statistical Analyses
(20 pages)

SEDIMENT TOXICITY TEST SET-UP BENCH SHEET

Project Number: EA.TOX

Client: Eco Analyst

QC Test Number: TN-23-327

TEST ORGANISM INFORMATION			
Common Name:	Amphipod	Adults Isolated (Time, Date):	
Scientific Name:	*Leptocheirus plumulosus*	Neonates Pulled (Time, Date):	
Lot Number:	LP-181	Acclimation:	24hrs Age: 2-4 mm
Source:	ARO	Culture Water (T/S):	20.0 °C 19.6 ppt

TEST INITIATION			
Date	Time	Initials	Activity
3/9/23	1530	SC	Sediment Added to Chambers
↓	↓	↓	Overlying Water Added to Chambers
3/10/23	1430	TB	Organisms Transferred

TEST SET-UP

Sample Number(s): AT3-152(Control), AT3-098

Overlying Water: 20 ppt Crystal Sea (LD3-259)

Treatment	Volume Test Sediment	Volume Overlying Water
AT3-152 (Lab Control)	175 ml	800 ml
↓	↓	↓
AT3-098		

ATS-T28
03/01/00

TOXICOLOGY LABORATORY BENCH SHEET - ORGANISM RECOVERY RECORD

Project Number: EA.TOX

Client: Eco Analyst

QC Test Number: TN-23-327

Organisms Recovered (date, time, initials): 3/20/25 1330

TEST ORGANISM

Common Name: Amphipod

Scientific Name: *Leptocheirus plumulosus*

Treatment	Replicate	Number of Organisms Loaded	Number of Organisms Recovered
AT3-157	A	20	19
(Lab Control)	B	20	20
	C	20	20
	D	20	20
	E	20	19
AT3-098	A	20	19
	B	20	19
	C	20	19
	D	20	18
	E	20	19

TOXICITY TEST WATER QUALITY DATA SHEET - NEW SOLUTIONS

Project Number: EA.TOX

Client: Eco Analyst

QC Test Number: TN-23-327

TEST ORGANISM

Common Name: Amphipod

Scientific Name: *Leptocheirus plumulosus*

Beginning Date: 3/10/23 Time: 1430

Ending Date: 3/16/23 Time: 1330

TARGET VALUES: Temp: 20 °C pH: 6.0 - 9.0 DO: ≥4.0 mg/L Salinity: 20 ppt Photoperiod: 24 hr light Light Intensity: 50 - 100 fc

		Temperature (°C)							pH							Dissolved Oxygen (mg/L)							Salinity (ppt)						
Sample #		0	1	2	3	4	5	6	0	1	2	3	4	5	6	0	1	2	3	4	5	6	0	1	2	3	4	5	6
AT3-157	Control	19.0							8.1							7.7							21.1						
AT3-098		19.0							8.1							7.7							21.2						
	Meter Number	683							683							683							683						
	Time	1133							1133							1133							1133						
	Initials	[illegible]							[illegible]							[illegible]							[illegible]						

TOXICITY TEST WATER QUALITY DATA SHEET - OLD SOLUTIONS

Project Number: EA.TOX
Client: Eco Analyst
QC Test Number: TN-23-327

TEST ORGANISM
Common Name: Amphipod
Scientific Name: *Leptocheirus plumulosus*

Beginning Date: 3/10/23 Time: 1430
Ending Date: 3/20/23 Time: 1330

TARGET VALUES: Temp: 20 °C pH: 6.0 - 9.0 DO: ≥4.0 mg/L Salinity: 20 ppt Photoperiod: 24 hr light Light Intensity: 50 - 100 fc

Sample #		Temperature (°C)							pH							Dissolved Oxygen (mg/L)							Salinity (ppt)						
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
AT3-192	Control	19.9	21.0	21.7	21.0	20.6	19.9	21.0	8.3	8.4	8.2	8.2	8.5	8.1	8.4	7.9	7.4	7.7	7.8	8.0	8.1	7.5	20.0	20.5	20.1	21.9	21.3	19.5	22.0
AT3-098		21.0	21.0	22.0	21.0	21.0	21.0	21.0	8.2	8.3	8.2	8.2	8.4	8.3	8.3	7.9	7.2	7.5	7.6	7.9	7.9	7.3	21.1	22.0	20.6	22.0	22.0	19.6	22.0
Meter Number		681	682	681	682	682	683	662	681	682	681	682	682	683	662	681	682	681	682	682	683	662	681	682	681	682	682	683	662
Time		1014	1455	1219	0841	1310	1343	1615	1014	1455	1219	0841	1310	1343	1615	1014	1455	1219	0841	1310	1343	1615	1014	1455	1219	0841	1310	1343	1615
Initials		GL	JL	TB	TP	SL	WD	AH	GL	JL	TB	TP	SL	WD	AH	GL	JL	TB	TP	SL	WD	AH	GL	JL	TB	TP	SL	WD	AH

EA

TOXICITY TEST WATER QUALITY DATA SHEET - OLD SOLUTIONS

Project Number: EA.TOX — TEST ORGANISM — Beginning Date: 3/10/23 Time: 1430

Client: Eco Analyst — Common Name: Amphipod — Ending Date: 3/16/23 Time: 1330

QC Test Number: TN-23-327 — Scientific Name: *Leptocheirus plumulosus*

TARGET VALUES: Temp: 20 °C pH: 6.0 - 9.0 DO: ≥4.0 mg/L Salinity: 20 ppt Photoperiod: 24 hr light Light Intensity: 50 - 100 fc

Sample #		Temperature (°C)							pH							Dissolved Oxygen (mg/L)							Salinity (ppt)						
		8	9	10	11	12	13	14	8	9	10	11	12	13	14	8	9	10	11	12	13	14	8	9	10	11	12	13	14
AT3-152	Control	20.1	20.9	21.0					7.9	8.2	7.7					8.1	7.4	7.9					21.0	22.0	21.7				
AT3-098		20.9	21.0	21.0					7.9	8.2	7.7					8.1	7.3	8.0					21.4	22.0	22.0				
Meter Number		681	682	681					681	682	681					681	682	681					681	682	681				
Time		0834	1318	0850					0834	1318	0850					0834	1318	0850					0835	1318	0850				
Initials		KY	JG	JG					KY	JG	JG					KY	JG	JG					KY	JG	JG				

EA®

TOXICOLOGY LABORATORY BENCH SHEET - AMMONIA RECORD - SEDIMENT

Client: Eco Analyst

QC Test Number: TN-23-327

EA Sample Number	Day 0 Overlying Water				Day 0 Pore Water			
	Ammonia (mg/L)	Salinity (ppt)	pH (su)	Temperature (°C)	Ammonia (mg/L)	Salinity (ppt)	pH (su)	Temperature (°C)
Control	0.59	21.3	8.0	19.1	2.76	20.7	8.0	19.1
AT3-098	2.86	21.6	8.0	19.0	18.95	20.9	7.9	19.3
Meter	VERSASTAR	662	662	662	VERSASTAR	662	662	662
Initials/Date/Time	3/15/23 MKL	3/10/23 1226	3/10/23 1226	3/10/23 1226	3/15/23 MKL	3/10/23 1226	3/10/23 1226	3/10/23 1226

TOXICOLOGY LABORATORY BENCH SHEET - AMMONIA RECORD - SEDIMENT

Client: Eco Analyst

QC Test Number: TN-23-327

EA Sample Number	Day 2 Overlying Water				Day 2 Pore Water			
	Ammonia (mg/L)	Salinity (ppt)	pH (su)	Temperature (°C)	Ammonia (mg/L)	Salinity (ppt)	pH (su)	Temperature (°C)
Control	0.91	20.9	8.0	19.0	2.36	23.1	7.6	19.3
AT3-098	2.60	20.7	8.1	19.0	18.30	22.2	7.7	19.2
Meter	VERSASTAR	682	682	682	VERSASTAR	682	682	682
Initials/Date/ Time	3/15/23 MKL	3/12/23 1112	3/12/23 1112	3/12/23 1112	3/15/23 MKL	3/12/23 1112	3/12/23 1112	3/12/23 1112

TOXICOLOGY LABORATORY BENCH SHEET - AMMONIA RECORD - SEDIMENT

Client: Eco Analyst

QC Test Number: TN-23-327

EA Sample Number	Day 4 Overlying Water				Day 4 Pore Water			
	Ammonia (mg/L)	Salinity (ppt)	pH (su)	Temperature (°C)	Ammonia (mg/L)	Salinity (ppt)	pH (su)	Temperature (°C)
Control	0.82	23.0	8.0	18.2	2.84	23.0	8.0	19.7
AT3-098	2.43	21.5	8.2	19.0	19.05	24.2	7.8	20.3
Meter	VERSASTAR	682	682	682	VERSASTAR	682	682	682
Initials/Date/ Time	3/15/23 MKL	3/14/23 1140 TP	3/14/23 1140 TP	3/14/23 1140 TP	3/15/23 MKL	3/14/23 1140 TP	3/14/23 1140 TP	3/14/23 1140 TP

TOXICOLOGY LABORATORY BENCH SHEET - AMMONIA RECORD - SEDIMENT

Client: Eco Analyst

QC Test Number: TN-23-327

EA Sample Number	Day 6 Overlying Water				Day 6 Pore Water			
	Ammonia (mg/L)	Salinity (ppt)	pH (su)	Temperature (°C)	Ammonia (mg/L)	Salinity (ppt)	pH (su)	Temperature (°C)
Control	<0.1	19.5	8.0	21.0	1.5	17.6	7.5	19.0
AT3-098	4.0	20.0	8.2	21.0	10.6	19.2	7.8	17.9
Meter	VERSASTAR	683	683	683	VERSASTAR	681	683	683
Initials/Date/ Time	3/20/23	3/16/23 1600	3/16/23 1606	3/16/23 1606	3/20/23	3/16/23 1606	3/16/23 1600	3/16/23 1600

TOXICOLOGY LABORATORY BENCH SHEET - AMMONIA RECORD - SEDIMENT

Client: Eco Analyst

QC Test Number: TN-23-327

EA Sample Number	Day 8 Overlying Water				Day 8 Pore Water			
	Ammonia (mg/L)	Salinity (ppt)	pH (su)	Temperature (°C)	Ammonia (mg/L)	Salinity (ppt)	pH (su)	Temperature (°C)
Control	3.10	20.4	7.8	21.0	1.30	20.6	7.8	22.0
AT3-098	~~3.11~~ <0.1	21.2	7.9	21.5	5.85	21.5	7.8	21.9
Meter	VERSASTAR	681	681	681	VERSASTAR	681	681	681
Initials/Date/Time	3/28/23 MKC	3/18/23 1110	3/18/23 1110	3/18/23 1110	~~3/18/23~~ ~~MKC~~ 3/28/23 MKC	3/18/23 1110	3/18/23 1110	3/18/23 1110

(3) 3/29/23

(b) 3/18/23

TOXICOLOGY LABORATORY BENCH SHEET - AMMONIA RECORD - SEDIMENT

Client: Eco Analyst

QC Test Number: TN-23-327

EA Sample Number	Day 10 Overlying Water				Day 10 Pore Water			
	Ammonia (mg/L)	Salinity (ppt)	pH (su)	Temperature (°C)	Ammonia (mg/L)	Salinity (ppt)	pH (su)	Temperature (°C)
Control	<0.1	22.5	7.6	22.5	<0.4	22.7	7.4	23.2
AT3-098	2.96	23.1	8.0	21.8				
Meter	VERSASTAR	682	682	682	VERSASTAR	682	682	682
Initials/Date/ Time	3/28/23 MKL	UAO 1715 3-20-23	1715 UAO 3-20-23	UAO 1715 3-20-23	3/28/23 MKL UAO 3-20	UAO 3-20-23 1729	UAO 3-20-23 1729	UAO 3-20-23 1729

(S) 3/20/23 JR for UAO

TOXICOLOGY LABORATORY CORRECTION BENCH SHEET

Project Number: EA.TOX

Client: Eco Analyst

QC Test Number: TN-23-327

Correction Explanations

(a) Technician Error-Mathematical

(b) Technician Error-Manual Data Recording

(c) Technician Error-Head Count Observation

(d) Technician Error-Overwrite

(e) Technician Error-Missing Data

(f) Technician Error-Lost Organism

(g) Technician Error-Transcription Error

(h) Technician Error-Other:

(i) Meter Malfunction

TOXICOLOGY LABORATORY BENCH SHEET

Project Number: EA.TOX

Client: Eco Analyst

QC Test Number: TN-23-327

Date/Time/Initials	Comments/Activity

TOXICOLOGY LABORATORY BENCH SHEET - TESTING LOCATION

Project Number: EA.TOX

Client: Eco Analyst

QC Test Number: TN-23-327

Day	Testing Location	Date	Time	Initials
0	25	3/10/23	1500	7
1	25	3/11/23	1022	GC
2	25	3/12/23	1456	JL
3	25	3/13/23	1219	Tb
4	25	3/14/23	0841	AP
5	25	3/15/23	1315	SC
6	25	3/16/23	1600	WO
7	25	3/17/23	0755	Tb
8	25	3/18/23	1105	Tb
9	25	3/19/23	1315	Tb
10	25	3/20/23	0850	Tb
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

CETIS Test Data Worksheet

Report Date: 07 Apr-23 16:34 (p 1 of 1)
Test Code/ID: TN-23-327Lp / 08-3039-3260

Leptocheirus 10-d Survival and Reburial Sediment Test — **EA-EST, Inc. PBC**

Start Date:	10 Mar-23 14:30	**Species:**	Leptocheirus plumulosus	**Sample Code:**	AT3-152
End Date:	20 Mar-23 13:30	**Protocol:**	EPA/600/R-94/025 (1994)	**Sample Source:**	Yachtsman Marina NAE-2004-00319
Sample Date:	09 Mar-23	**Material:**	Laboratory Control Sediment	**Sample Station:**	Laboratory Control

Sample	Rep	Pos	# Exposed	# Survived	# Reburied	Notes
AT3-152	1	1	20	19		
AT3-152	2	4	20	20		
AT3-152	3	8	20	20		
AT3-152	4	12	20	20		
AT3-152	5	13	20	19		
IOSN 2019	1	3	20	18		
IOSN 2019	2	6	20	18		
IOSN 2019	3	9	20	19		
IOSN 2019	4	11	20	19		
IOSN 2019	5	15	20	19		
AT3-098	1	2	20	19		
AT3-098	2	5	20	19		
AT3-098	3	7	20	19		
AT3-098	4	10	20	19		
AT3-098	5	14	20	19		

CETIS Summary Report

Report Date: 07 Apr-23 16:35 (p 1 of 1)
Test Code/ID: TN-23-327Lp / 08-3039-3260

Leptocheirus 10-d Survival and Reburial Sediment Test — EA-EST, Inc. PBC

Batch ID:	18-4074-9173	**Test Type:**	Survival-Reburial	**Analyst:**	Nancy Roka
Start Date:	10 Mar-23 14:30	**Protocol:**	EPA/600/R-94/025 (1994)	**Diluent:**	Not Applicable
Ending Date:	20 Mar-23 13:30	**Species:**	Leptocheirus plumulosus	**Brine:**	Crystal Sea
Test Length:	9d 23h	**Taxon:**	Malacostraca	**Source:**	ARO - Aquatic Research Or **Age:**

Sample ID:	14-3904-1293	**Code:**	AT3-152	**Project:**	Dredged Sediment Evaluation
Sample Date:	09 Mar-23	**Material:**	Laboratory Control Sediment	**Source:**	Yachtsman Marina NAE-2004-00319 (
Receipt Date:	09 Mar-23 15:30	**CAS (PC):**		**Station:**	Laboratory Control
Sample Age:	38h	**Client:**	Eco-Analysts, Inc.		

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
AT3-152	14-3904-1293	09 Mar-23	09 Mar-23 15:30	38h	Eco-Analysts, Inc.	Dredged Sediment Evalu
IOSN 2019	00-2071-8579	10 Mar-23	10 Mar-23	14h		
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	30d 2h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
AT3-152	Laboratory Control Sediment	Yachtsman Marina NAE-2004-00	Laboratory Control	
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Single Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
09-6242-9666	Survival Rate	Wilcoxon Rank Sum Two-Sample Test	0.0397	IOSN 2019 failed survival rate	1
07-0341-4086	Survival Rate	Unequal Variance t Two-Sample Test	0.9111	AT3-098 passed survival rate	1

Test Acceptability

Analysis ID	Endpoint	Attribute	Test Stat	TAC Limits Lower	TAC Limits Upper	Overlap	Decision
09-6242-9666	Survival Rate	Control Resp	0.98	0.9	<<	Yes	Passes Criteria

Survival Rate Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
AT3-152	LC	5	0.980	0.946	1.010	0.950	1.000	0.012	0.027	2.79%	0.00%
IOSN 2019	RS	5	0.930	0.896	0.964	0.900	0.950	0.012	0.027	2.94%	5.10%
AT3-098		5	0.950	0.950	0.950	0.950	0.950	0.000	0.000	0.00%	3.06%

Survival Rate Detail — MD5: A9FBF58A28141E827CEAD3E25AD5132A

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
AT3-152	LC	0.950	1.000	1.000	1.000	0.950
IOSN 2019	RS	0.900	0.900	0.950	0.950	0.950
AT3-098		0.950	0.950	0.950	0.950	0.950

Leptocheirus 10-d Survival and Reburial Sediment Test — **EA-EST, Inc. PBC**

Analysis ID:	09-6242-9666	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv2.1.1
Analyzed:	07 Apr-23 16:34	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1
Edit Date:	07 Apr-23 16:33	**MD5 Hash:**	BEE15B2ADFC4B9839C1A71D8F53EC313	**Editor ID:**	005-341-210-5

Batch ID:	18-4074-9173	**Test Type:**	Survival-Reburial	**Analyst:**	Nancy Roka
Start Date:	10 Mar-23 14:30	**Protocol:**	EPA/600/R-94/025 (1994)	**Diluent:**	Not Applicable
Ending Date:	20 Mar-23 13:30	**Species:**	Leptocheirus plumulosus	**Brine:**	Crystal Sea
Test Length:	9d 23h	**Taxon:**	Malacostraca	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
AT3-152	14-3904-1293	09 Mar-23	09 Mar-23 15:30	38h	Eco-Analysts, Inc.	Dredged Sediment Evalu
IOSN 2019	00-2071-8579	10 Mar-23	10 Mar-23	14h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
AT3-152	Laboratory Control Sediment	Yachtsman Marina NAE-2004-00	Laboratory Control	
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	IOSN 2019 failed survival rate endpoint	3.05%

Wilcoxon Rank Sum Two-Sample Test

Sample I	vs	Sample II	df	Test Stat	Critical	Ties	P-Type	P-Value	Decision(α:5%)
Lab Control Sedim		Reference Sed*	8	18	—	1	Exact	0.0397	Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits Lower	Upper	Overlap	Decision
Control Resp	0.98	0.9	<<	Yes	Passes Criteria

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.25	2.29	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0283984	0.0283984	1	8.55	0.0192	Significant Effect
Error	0.026566	0.0033208	8			
Total	0.0549644		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.39	23.2	0.7572	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.7	0.741	0.0009	Non-Normal Distribution

Survival Rate Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
AT3-152	LC	5	0.980	0.946	1.000	1.000	0.950	1.000	0.012	2.79%	0.00%
IOSN 2019	RS	5	0.930	0.896	0.964	0.950	0.900	0.950	0.012	2.94%	5.10%

Angular (Corrected) Transformed Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
AT3-152	LC	5	1.410	1.340	1.490	1.460	1.350	1.460	0.028	4.40%	0.00%
IOSN 2019	RS	5	1.310	1.240	1.370	1.350	1.250	1.350	0.024	4.03%	7.54%

Survival Rate Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
AT3-152	LC	0.950	1.000	1.000	1.000	0.950
IOSN 2019	RS	0.900	0.900	0.950	0.950	0.950

Leptocheirus 10-d Survival and Reburial Sediment Test — **EA-EST, Inc. PBC**

Analysis ID:	09-6242-9666	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv2.1.1
Analyzed:	07 Apr-23 16:34	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1
Edit Date:	07 Apr-23 16:33	**MD5 Hash:**	BEE15B2ADFC4B9839C1A71D8F53EC313	**Editor ID:**	005-341-210-5

Angular (Corrected) Transformed Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
AT3-152	LC	1.350	1.460	1.460	1.460	1.350
IOSN 2019	RS	1.250	1.250	1.350	1.350	1.350

Leptocheirus 10-d Survival and Reburial Sediment Test — **EA-EST, Inc. PBC**

Analysis ID:	07-0341-4086	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv2.1.1
Analyzed:	07 Apr-23 16:34	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	07 Apr-23 16:33	**MD5 Hash:**	2A42733776C7572A47EA36E264C4412B	**Editor ID:**	005-341-210-5

Batch ID:	18-4074-9173	**Test Type:**	Survival-Reburial	**Analyst:**	Nancy Roka
Start Date:	10 Mar-23 14:30	**Protocol:**	EPA/600/R-94/025 (1994)	**Diluent:**	Not Applicable
Ending Date:	20 Mar-23 13:30	**Species:**	Leptocheirus plumulosus	**Brine:**	Crystal Sea
Test Length:	9d 23h	**Taxon:**	Malacostraca	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	00-2071-8579	10 Mar-23	10 Mar-23	14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	30d 2h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	AT3-098 passed survival rate endpoint	2.75%

Unequal Variance t Two-Sample Test

Sample I	vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed		AT3-098	4	-1.63	2.13	0.0503	CDF	0.9111	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.64	2.29	0.8052	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0037046	0.0037046	1	2.67	0.1411	Non-Significant Effect
Error	0.0111139	0.0013892	8			
Total	0.0148185		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test				Indeterminate
Distribution	Shapiro-Wilk W Normality Test	0.814	0.741	0.0215	Normal Distribution

Survival Rate Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.930	0.896	0.964	0.950	0.900	0.950	0.012	2.94%	0.00%
AT3-098		5	0.950	0.950	0.950	0.950	0.950	0.950	0.000	0.00%	-2.15%

Angular (Corrected) Transformed Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	1.310	1.240	1.370	1.350	1.250	1.350	0.024	4.03%	0.00%
AT3-098		5	1.350	1.350	1.350	1.350	1.350	1.350	0.000	0.00%	-2.95%

Survival Rate Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.900	0.900	0.950	0.950	0.950
AT3-098		0.950	0.950	0.950	0.950	0.950

Angular (Corrected) Transformed Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	1.250	1.250	1.350	1.350	1.350
AT3-098		1.350	1.350	1.350	1.350	1.350

ATTACHMENT IV

Report Quality Assurance Record
(2 pages)

REPORT QUALITY ASSURANCE RECORD

Client: Eco-Analysts

Project Number: 70022.TOX

Author: M. Chanov

EA Report Number: 9179

REPORT CHECKLIST

QA/QC ITEM	REVIEWER	DATE
1. Samples collected, transported, and received according to study plan requirements.	[signature]	4/25/23
2. Samples prepared and processed according to study plan requirements.	[signature]	4/25/23
3. Data collected using calibrated instruments and equipment.	[signature]	4/25/23
4. Calculations checked:		
- Hand calculations checked	[signature]	4/25/23
- Documented and verified statistical procedure used.	[signature]	4/25/23
5. Data input/statistical analyses complete and correct.	[signature]	4/27/2023
6. Reported results and facts checked against original sources.	[signature]	4/27/2023
7. Data presented in figures and tables correct and in agreement with text.	[signature]	4/27/2023
8. Results reviewed for compliance with study plan requirements.	[signature]	4/25/23

	AUTHOR	DATE
9. Commentary reviewed and resolved.	[signature]	4/27/23

10. All study plan and quality assurance/control requirements have been met and the report is approved:

[signature]	4/27/23
PROJECT MANAGER	DATE
[signature]	4/27/2023
QUALITY CONTROL OFFICER	DATE
[signature]	4/27/23
SENIOR TECHNICAL REVIEWER	DATE

ATTACHMENT V

US Army Corps of Engineers Quality Assurance Checklist
(3 pages)

Table II-1: Completeness Checklist

Quality Assurance/Quality Control Questions	Yes/No? Comments?
1. Was the report signed by the responsible applicant approved representative?	Yes
2. Were the methods for sampling, chemical and biological testing described in the Sampling and Analysis Plan (SAP) and the Laboratory QA Plan (LQAP) followed?	Yes
3. If not, were deviations documented?	NA
4. Was the SAP approved by the New England District?	Yes
5. Did the applicant use a laboratory with a LQAP on file at the New England District?	Yes
6. Did the samples adequately represent the physical/chemical variability in the dredging area?	Yes
7. Were the correct stations sampled (include the precision of the navigation method used)?	Yes
8. Were the preservation and storage requirements in Chapter 8 of the EPA/Corps QA/QC Manual (EPA/USACE 1995) and EPA (2001d) followed?	Yes
9. Were the samples properly labeled?	Yes
10. Were all the requested data included?	Yes
11. Were the reporting limits met?	Yes
12. Were the chain-of-custody forms properly processed?	Yes
13. Were the method blanks run and were the concentration below the acceptance criteria?	NA
14. Was the MDL study performed on each matrix (with this data submission) or within the last 12 months?	NA
15. Were the SRM/CRM analyses within acceptance criteria?	NA
16. Were the matrix spike/matrix spike duplicates run at the required frequency and was the percent recovery/RPD within the acceptance criteria?	NA
17. Were the duplicate samples analyzed and were the RPDs within the required acceptance criteria?	NA
18. For each analytical fraction of organic compounds, were recoveries for the internal standard within the acceptance criteria?	NA
19. Were surrogate recoveries within the required acceptance criteria?	NA
20. Were corrective action forms provided for all non-conforming data?	NA
21. Were all the species-specific test conditions in Appendix V met?	Yes, except as noted for temperature
22. Were the test-specific age requirements met for each test species?	Yes
23. Was the bulk physical/chemical testing performed on the sediments/composites that were biologically tested?	No, bulk physical/chemical testing completed prior to biological testing
24. Were the mortality acceptance criteria met for the water column and sediment toxicity tests?	Yes
25. Were the test performance requirements in Table 11.3 of EPA (1994a) met?	Yes

Table II-8: Quality Control Summary for Biological Toxicity Testing only

Method Reference Numbers:

Quality Control (QC) Element	Acceptance Criteria*	Criteria Met? Yes/No	List results outside criteria (Cross-reference results table in data report)	Location of Results (Retained at Lab or in Data Package)
Test condition requirements for each species: Temperature, Salinity, pH, D.O., Ammonia (Total, Un-ionized)	Test conditions within the requirements specified for each species	Yes	Temperature in both assays higher than target range, but within RIM limits (Tables 4 and 5)	Data Package
Test species age	Age/health within guidelines for each species (Appendix V)	Yes		Data Package
Bulk physical/chemical analyses (If required by the Sampling plan)	Required? If so, performed? Yes or No	Yes		Data Package (separate cover)
Water column toxicity test: Control mortality Control abnormality	 ≤ 10% mean ≤ 30% mussel/oyster; < 40% clam larvae, < 30% sea urchin larvae	NA		
Sediment toxicity test: Control mortality Compliance with applicable test acceptability requirements in Table 11.3 (EPA 1994a)	 ≤ 10% mean (no chamber > 20%) See EPA (1994a) Section 9; Table 11.3	Yes		Data Package

* The Quality Control Acceptance Criteria are general guidelines. If alternate criteria are used, they must be documented in this table.

ATTACHMENT VI

Email Communications
(2 pages)

-----Original Message-----
From: Hopkins, Aaron D CIV USARMY CENAE (US) <Aaron.D.Hopkins@usace.army.mil>
Sent: Wednesday, March 11, 2020 16:41

Cc: Wolf, Steven H CIV USARMY CENAE (USA) <Steven.Wolf@usace.army.mil>
Subject: RE: 10-Day Solid Phase Assay (UNCLASSIFIED)

We are sticking with the 20% threshold for the 10 day toxicity tests. This is something we are reviewing though and may revise as part of the RIM update.

Thanks,
Aaron

Aaron Hopkins
US Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742
978.318.8973

-----Original Message-----
From: Wolf, Steven H CIV USARMY CENAE (USA)
Sent: Wednesday, March 11, 2020 1:45 PM
To: Hopkins, Aaron D CIV USARMY CENAE (US) <Aaron.D.Hopkins@usace.army.mil>
Subject: FW: 10-Day Solid Phase Assay (UNCLASSIFIED)

Sent: Wednesday, March 11, 2020 12:23 PM
To: Wolf, Steven H CIV USARMY CENAE (USA) <Steven.Wolf@usace.army.mil>
Cc: [redacted]
Subject: [Non-DoD Source] 10-Day Solid Phase Assay

Hi Steve,

The lab is working through the bioassays for the [redacted] project, and is beginning to draft the interim reports and provide data. In the reporting process a question regarding the comparson of the dredge site data to the reference site has come up. Historically including as recently as the last spring, all 10-day survival numbers were compared to the reference site to determine if they were significantly different and if so was the difference >20%, the lab has asked if they should continue to use 20% or should they use 10% as is stated in the ITM.

ECOTOXICOLOGICAL TESTING
BIOACCUMULATION ASSAYS

KENNEBUNKPORT, MAINE

Prepared for:

Eco-Analysts, Inc.
P.O. Box 224
Bath, Maine 04530

Prepared by:

EA Engineering, Science, and Technology, Inc., PBC
231 Schilling Circle
Hunt Valley, Maryland 21031
For questions concerning this report, please contact Michael Chanov
ph: 410-584-7000

Results relate only to the items tested or to the samples as received by the laboratory.

This report contains 23 pages plus 14 attachments.

6 September 2023

Michael K. Chanov II — Date
Laboratory Director

EA Project Number 70022.TOX

E87550

EA Report Number 9180

1. INTRODUCTION

In accordance with the US Army Corps of Engineers, New England District (CENAE), EA Engineering, Science, and Technology, Inc., PBC (EA) performed solid phase bioaccumulation testing on sediment samples collected from the area of dredging proposed the marinas located on the Kennebunk River in Kennebunkport, Maine. Placement of dredge materials is proposed at the Isles of Shoals North (IOSN) Disposal Site. Samples were provided by Eco-Analysts, Inc., Bath, Maine. The purpose of this study was to evaluate the toxicity and bioaccumulation potential of the sediment samples to benthic organisms.

The toxicity testing program consisted of 28-day bioaccumulation tests with *Nereis virens* (sand worm) and *Macoma nasuta* (blunt-nose clam). The bioaccumulation tests evaluated survival of the test organisms and bioaccumulative effects following exposure to the sediment samples. All biological testing was completed at EA, Hunt Valley, Maryland. At the completion of the 28-day exposure period, tissues from surviving organisms were couriered to Alpha Analytical, Mansfield, Massachusetts for chemical analysis.

2. MATERIALS AND METHODS

2.1 SAMPLE RECEIPT AND PREPARATION

Ten sediment cores were collected by Eco-Analysts personnel and/or their representatives from locations in the dredge footprint and composited in accordance with the Sampling and Analysis Plan. One sediment composite was created for the project and placed into five 5-gallon buckets. The samples were held at ≤4°C and were hand delivered to EA's Ecotoxicology Laboratory in Hunt Valley, Maryland. The composited sediment sample was logged in and assigned an EA laboratory accession number and was stored in the dark in a secured walk-in cooler at ≤4°C until used for testing. Table 1 summarizes the sample identification, accession number, and collection and receipt information for the sediment samples. A summary of the pore water ammonia measurements is included in Table 2. Chain-of-custody records are included in Attachment I.

Reference sediment was not collected from the IOSN. Rather, historic survival and body burden data from 2019 were provided by the CENAE for statistical comparison purposes.

2.2 TOXICITY TEST METHODS

All toxicity testing was conducted following EA's standard operating procedures (EA 2022) which are in accordance with the *Regional Implementation Manual for Evaluation of Dredged Material Proposed for Disposal in New England Waters* (USEPA, CENAE 2004), and USEPA/USACE guidance (1991, 1998).

2.2.1 Bioaccumulation Testing and Tissue Chemistry

Bioaccumulation testing was conducted using the sand worm (*Nereis virens*) and the blunt-nose clam (*Macoma nasuta*). The adult clams (lot number MA-080) and the adult worms (NV-088) were received from Aquatic Research Organisms (Hampton, New Hampshire) on 29 March 2023 and 7 March 2023, respectively. The organisms were placed in clean seawater and allowed to depurate accumulated waste products, prior to use in testing.

The sediment samples and overlying water were added to the test chambers a minimum of one day prior to test initiation to allow time for the suspended sediments to settle. The overlying water was 30 ppt artificial seawater (Crystal Sea artificial sea salts). Natural sediments from the organism collection sites were used as laboratory controls in the bioaccumulation testing. Control sediment used in the *N. virens* test was collected from the Damariscotta River, Booth Bay Harbor, Maine. Control sediment used in the clam bioaccumulation test was collected from Tomales Bay, California. The bioaccumulation tests were 28 days in duration and were conducted as static renewal assays. The overlying water was replaced three times a week by siphoning approximately 80 percent of the overlying water from the aquaria and replacing with new overlying water taking care not to disturb the sediment surface.

The bioaccumulation tests were conducted in 10-gallon aquaria with 5 L of sediment and 22 L of overlying water per aquarium. There were five replicates per test sediment, and three replicates per control sediment. Based on the analytical tissue biomass requirements, 30 organisms were randomly introduced into each replicate chamber for both species.

The bioaccumulation test for the sandworm was initiated on 8 March 2023 and completed on 5 April 2023. The clam assay was initiated on 29 March 2023 and completed on 26 April 2023. During the 28-day exposure periods, the test chambers were maintained at a target temperature of 20±1°C for *N. virens* and 12±1°C for *M. nasuta* with a 16-hour light/8-hour dark photoperiod. Gentle aeration was provided to each aquarium throughout the test period. Observations of mortality and abnormal organism behavior were recorded daily, and dead organisms were removed, as observed, from the test chambers. Measurements of temperature, pH, dissolved oxygen, and salinity of the overlying water were recorded on one replicate of each sample and control at test initiation, termination, and three times a week prior to replacement of the overlying water. The water quality measurements are summarized in Table 3 *(N. virens*) and Table 4 (*M. nasuta*). The organisms were not fed during the exposure period.

After 28 days of exposure, the organisms were recovered from the samples and placed into clean artificial sea water for 24 hours to purge their digestive tracts. After the depuration period, the organism tissues were collected and submitted to Alpha Analytical for chemical analyses. Copies of the original data sheets and tissue chains-of-custody from the *N. virens* and *M. nasuta* testing are included in Attachments II and III, respectively. Copies of tissue chemistry results used for the statistical analysis of body burden data for *N. virens* and *M. nasuta* are provided in Attachments IV through XI. The complete tissue chemistry and quality assurance analytical report is provided under separate cover by Alpha Analytical.

All tissue data qualified as "JB" or "P" were treated as J-qualified for purposes of assigning footnotes for the CENAE EDD.

The RLs for zinc and PCBs were higher than their respective RIM RLs, however all MDLs met RIM criteria.

2.2.2 Data Analysis

The statistical analyses of survival and body burden data were completed using CETIS® ver. 2.1.1.5 (Comprehensive Environmental Toxicity Information System) software to determine significant differences between the IOSN 2019 reference data and the site composite tissues. Data were evaluated to determine homogeneity of sample variances and normality of distribution using appropriate statistical analyses. Data sets were subsequently evaluated using the appropriate parametric or non-parametric Analysis of Variance (ANOVA) statistical tests. Statistical difference was evaluated at $\alpha = 0.05$. Per RIM guidelines and direction provided by the CENAE in an email dated March 30, 2018, one-half the MDL is used in instances when a compound of concern (COC) is not detected for purposes of calculating a mean tissue concentration and total concentrations for PAHs, PCBs, and pesticides. MDLs used in statistical computations may differ due to differences in tissue mass and final extract volumes used in the analysis for each sample. Statistical analyses of survival data are included in Attachments II and III for *N. virens* and *M. nasuta*, respectively. Statistical analyses of body burden data are included in Attachments IV through XI.

All mean body burden concentrations presented in the narrative report tables, CETIS® reports and the CENAE EDD spreadsheet are calculated from the same source of tissue chemistry data generated by Alpha. Concentrations are presented to a precision of 3 significant figures for all COCs. Slight differences in the concentrations may be attributable to the ability and limitations of each software package to capture and report significant figures. The values agree within reason by rounding and represent the magnitude of the average concentration of the COC detected in tissue.

The statistical analyses were completed for all COCs identified in the SAP, however following guidance from the CENAE in emails dated July 28, 2020 and October 9, 2020, COCs were excluded from the evaluation if they were not detected in both the reference site and composite tissue replicates. These COCs are “c” qualified accordingly. All email communications are included in Attachment XIV.

As mentioned in Section 2.1, IOSN reference data from 2019 were used for statistical comparisons against data generated from this study. The IOSN 2019 data were generated using a different lot of test organisms than the assays completed for this study. As such, a comparison between the pre-test tissue and site composite results provides added insight to the levels of COCs observed in site tissue samples because the test organisms are from the same lot. In addition, there may be slight differences in the MDLs between the IOSN 2019 reference data and the samples analyzed as part of this study.

2.2.3 Reference Toxicant Testing

In conformance with EA’s quality assurance/quality control program requirements, reference toxicant testing was performed by EA on the acquired lots of *N. virens* and *M. nasuta* utilized in the testing program. The reference toxicant tests consisted of a graded concentration series of a specific toxicant in water only tests, with no sediment present in the test chambers. Table 5 presents the results of the reference toxicant testing.

2.3 ARCHIVES

Original data sheets, records, memoranda, notes, and computer printouts are archived at EA’s Office in Hunt Valley, Maryland. These data will be retained for a period of 5 years unless a longer period of time is requested.

3. RESULTS AND DISCUSSION

This bioassay study using a sediment composite sample collected from the Yachtsman Marina project area was designed and conducted to meet the requirements of the USEPA/USACE dredged material testing program. The results of these toxicity tests met the current NELAC standards, where applicable. Protocol requires 90 percent survival in the laboratory control, indicating that test organisms were healthy and that endpoints met or exceed requirements specified in the current version of the RIM.

Tables 6 through 9 provide results of *N. virens* and *M. nasuta* survival summaries and statistical analyses. Tables 10 and 11 provide summaries of body burden data with findings of significance for *N. virens* and *M. nasuta*, respectively. Table 12 summarizes significant uptake and the magnitude of COC concentrations in worm and clam tissue versus IOSN 2019 and pre-test tissue. Table 13 summarizes project specific Reporting Limits (RLs) and Method Detection Limits (MDLs) used in this study. Summaries of the tissue chemistry results and the statistical analysis of body burden data for *N. virens* and *M. nasuta* are provided in Attachments IV through XI.

3.1 *Nereis virens* BIOACCUMULATION EVALUATION RESULTS

3.1.1 Survival

Mean *N. virens* survival in the laboratory control sediment was 93 percent. Surviving organisms from the site composite sample provided sufficient tissue for preparation and analysis of body burdens. Mean survival of worms was 93 percent in the composite sample, and 90 percent in the IOSN 2019 reference data. Statistical analyses demonstrated that there were no significant effects on *N. virens* survival following exposure to the composite sediment sample as compared with the IOSN 2019 reference data, and results were within 10 percent of the reference data.

3.1.2 Body Burden Analysis

There were significant increases in body burdens for worms maintained in site composite sediments for 5 metals, 9 PAHs, 2 PCB congeners and 4,4’-DDD as compared to IOSN 2019 reference data. Of these COCs, lead, nickel, anthracene, and naphthalene were detected in composite tissue at concentrations less than in pre-test tissue, suggesting that the presence of these COCs may not be attributable to site conditions or factor heavily in the suitability determination for sediment disposal. Likewise, although concentrations of chromium and 4,4’-DDD were 8 to 37 times higher in composite tissue than in IOSN 2019 reference tissue, they were detected at concentrations below pre-test tissue levels. Of the remaining COCs, concentrations of pyrene were more than 5 times higher and concentrations of 2 PAHs and PCB 105 were more than 1 order of magnitude higher in composite tissue than in IOSN 2019 tissue. The remaining COCs were only slightly higher in composite tissue than in pre-test or IOSN 2019 tissue.

3.2 *Macoma nasuta* BIOACCUMULATION EVALUATION RESULTS

3.2.1 Survival

Mean *M. nasuta* survival in the laboratory control sediment was 90 percent. Surviving organisms from the site composite sample provided sufficient tissue for preparation and analysis of body burdens. Mean survival of clams was 96 percent in the site composite sample and 94 percent in the IOSN 2019 reference data. Statistical analyses demonstrated that there were no significant effects on *M. nasuta* survival following exposure to the composite sediment sample as compared with the IOSN 2019 reference data, and results were within 10 percent of the reference data.

3.2.2 Body Burden Analysis

There were significant increases in body burdens for clams maintained in site composite sediments for 3 metals, 11 PAHs, 3 PCB congeners and 2 pesticides as compared to IOSN 2019 reference data. Of these COCs, copper, nickel, PCB 52 and naphthalene were detected in composite tissue at concentrations less than in pre-test tissue, suggesting that the presence of these COCs may not be attributable to site conditions or factor heavily in the suitability determination for sediment disposal. Likewise, fluorene was over 6 times higher in composite tissue than in IOSN 2019 reference tissue, they were detected at concentrations below pre-test tissue levels. Of the remaining COCs, concentrations of 4 PAHs were more than 5 times higher and concentrations of 2 PAHs and 4,4’-DDD were more than 1 order of magnitude higher in composite tissue than in IOSN 2019 tissue. The remaining COCs were only slightly higher in composite tissue than in pre-test or IOSN 2019 tissue.

3.3 REFERENCE TOXICANT TESTS

The results of the reference toxicant tests are summarized in Table 5. All of the reference toxicant test results fell within the established laboratory control chart limits.

4. REFERENCES CITED

EA. 2022. EA Ecotoxicology Laboratory Quality Assurance and Standard Operating Procedures Manual. EA Manual ATS-102. Internal document prepared by EA's Ecotoxicology Laboratory, EA Engineering, Science, and Technology, Inc., PBC, Hunt Valley, Maryland.

USEPA and USACE. 1991. Evaluation of Dredged Material Proposal for Ocean Disposal, Testing Manual (commonly called "The Green Book").

USEPA and USACE. 1998. Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S.-Inland Testing Manual. EPA/823/B-94/004. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. and Department of the Army, U.S. Army Corps of Engineers, Washington, D.C.

USEPA Region 1, CENAE. 2004. Regional Implementation Manual for Evaluation of Dredged Material Proposed for Disposal in New England Waters. September 2004

TABLE 1 SUMMARY OF COLLECTION AND RECEIPT INFORMATION FOR SEDIMENT SAMPLES

Sample Identification	**EA Accession Number**	**Collection**		**Receipt**	
		Time	**Date**	**Time**	**Date**
10 Stations at 4 Marinas Mud	AT3-098	0900-1300	8 February 2023	1630	9 February 2023

TABLE 2 AMMONIA CONCENTRATIONS MEASURED ON SEDIMENT PORE WATER PRIOR TO BIOACCUMULATION TOXICITY TESTING

Sediment Identification	EA Accession Number	Initial Ammonia (mg/L NH_3-N)	Purged Ammonia (mg/L NH_3-N)
10 Stations at 4 Marinas Mud	AT3-098	63.5	49.6

TABLE 3 SUMMARY OF WATER QUALITY PARAMETERS MEASURED DURING BIOACCUMULATION TESTING WITH *Nereis virens*

Test Number: **TN-23-302**
Testing Dates: **3/8/23 – 4/5/23**

Sediment Sample Identification	EA Accession Number	Range			
		Temperature (°C)	pH (SU)	Dissolved Oxygen (mg/L)	Salinity (ppt)
10 Stations at 4 Marinas Mud	AT3-098	19.3 – 20.3	7.8 – 8.2	6.8 – 8.4	27.0 – 31.4
LABORATORY CONTROL	AT3-152	19.0 – 20.2	7.8 – 8.1	7.0 – 8.7	27.0 – 31.7

TABLE 4 SUMMARY OF WATER QUALITY PARAMETERS MEASURED DURING BIOACCUMULATION TESTING WITH *Macoma nasuta*

Test Number: **TN-23-303**
Testing Dates: **3/29/23 – 4/26/23**

Sediment Sample Identification	**EA Accession Number**	**Range**			
		Temperature (°C)	**pH**	**Dissolved Oxygen (mg/L)**	**Salinity (ppt)**
10 Stations at 4 Marinas Mud	AT3-098	11.5 – 13.0	7.6 – 8.2	7.9 – 8.8	27.0 – 32.2
LABORATORY CONTROL	AT3-191	11.6 – 13.0	7.7 – 8.2	7.7 – 8.7	27.0 – 32.0

TABLE 5 RESULTS OF REFERENCE TOXICANT TESTING ON ACQUIRED LOTS OF TEST ORGANISMS

Test Species	Organism Lot Number	Reference Toxicant	Test Endpoint	Acceptable Control Chart Limits
Nereis virens	NV-088	Potassium chloride (KCl)	48-Hour LC50: 1,208 mg/L KCl	587-1,973 mg/L KCl
Macoma nasuta	MA-080	Potassium chloride (KCl)	48-Hour LC50: 1,439 mg/L KCl	929-1,762 mg/L KCl

TABLE 6 RESULTS OF 28-DAY BIOACCUMULATION TESTING WITH *Nereis virens*

Test Number: **TN-23-302**

Testing Dates: **3/8/23 - 4/5/23**

Sample Identification	EA Accession Number	No. Alive/No. Exposed[(a)]	28-Day Mean Percent Survival
LABORATORY CONTROL	AT3-152	72 / 75 [b]	93
IOSN REFERENCE	N/A	N/A	90
10 Stations at 4 Marinas Mud	AT3-098	140 / 150	93

(a) Total for five replicates of thirty organisms for all test sediments except for control, which had three replicates.
(b) Only 15 organisms were added to replicate B of the laboratory control due to technician error.

TABLE 7 STATISTICAL ANALYSIS OF 28-DAY BIOACCUMULATION TESTING WITH *Nereis virens*

Test Number: **TN-23-302**

Testing Dates: **3/8/23 - 4/5/23**

Sample Identification	**EA Accession Number**	**Mean Survival**	**Significantly Different as Compared to: IOSN 2019**	**Difference in Survival >10% as Compared to: IOSN 2019**	
IOSN REFERENCE	N/A	90%	-	-	-
10 Stations at 4 Marinas Mud	AT3-098	93%	No	No	-3%

TABLE 8   RESULTS OF 28-DAY BIOACCUMULATION TESTING WITH *Macoma nasuta*

Test Number: **TN-23-303**

Testing Dates: **3/29/23 - 4/26/23**

Sample Identification	**EA Accession Number**	**No. Alive/No. Exposed[(a)]**	**28-Day Mean Percent Survival**
LABORATORY CONTROL	AT3-191	81 / 90	90
IOSN REFERENCE	N/A	N/A	94
10 Stations at 4 Marinas Mud	AT3-098	144 / 150	96

(a) Total for five replicates of thirty organisms for all test sediments except for control, which had three replicates.

TABLE 9 STATISTICAL ANALYSIS OF 28-DAY BIOACCUMULATION TESTING WITH *Macoma nasuta*

Test Number: **TN-23-303**

Testing Dates: **3/29/23 - 4/26/23**

Sample Identification	**EA Accession Number**	**Mean Survival**	**Significantly Different as Compared to: IOSN 2019**	**Difference in Survival >10% as Compared to: IOSN 2019**	
IOSN REFERENCE	N/A	94%	-	-	-
10 Stations at 4 Marinas Mud	AT3-098	96%	No	No	-2%

TABLE 10 STATISTICAL COMPARISONS OF *N. virens* BODY BURDENS VS. IOSN 2019 REFERENCE DATA

Compound	Units	Pre-Test [d] Mean	Pre-Test [d] Qual	IOSN 2019 Mean	IOSN 2019 Qual	Composite Mean	Composite Qual
Trace Metals							
Arsenic, total	mg/Kg	2.00		2.25		2.02	NS
Cadmium, total	mg/Kg	0.0300	b	0.0252	b	0.0338	bS
Chromium, total	mg/Kg	0.620	b	0.0686	b	0.551	bS
Copper, total	mg/Kg	1.49		1.20		1.12	NS
Lead, total	mg/Kg	0.195		0.0744		0.191	S
Mercury, total	mg/Kg	0.0110	b	0.0156	b	0.00662	abNS
Nickel, total	mg/Kg	0.476		0.168		0.232	S
Zinc, total	mg/Kg	13.1		18.6		14.1	NS/S e
PAH Compounds							
Acenaphthene	µg/Kg	0.620	a	0.563	ab	0.883	abNS
Acenaphthylene	µg/Kg	0.381	a	0.286	a	4.22	aNS
Anthracene	µg/Kg	0.903	ab	0.310	a	0.610	abS
Benzo(a)anthracene	µg/Kg	0.775	a	0.581	a	0.766	ac
Benzo(a)pyrene	µg/Kg	0.813	a	0.610	a	0.805	ac
Benzo(b)fluoranthene	µg/Kg	1.08	a	0.807	a	2.43	aS
Benzo(k)fluoranthene	µg/Kg	0.493	a	0.371	a	6.45	aS
Benzo(g,h,i)perylene	µg/Kg	0.345	a	0.259	a	0.427	abS
Chrysene	µg/Kg	0.752	a	0.564	a	1.14	abS
Dibenz(a,h)anthracene	µg/Kg	0.400	a	0.300	a	0.396	ac
Fluoranthene	µg/Kg	0.610	a	0.569	ab	6.71	bS
Fluorene	µg/Kg	1.07	b	0.431	ab	2.05	bS
Indeno(1,2,3-cd)pyrene	µg/Kg	0.810	a	0.608	a	0.802	ac
Naphthalene	µg/Kg	1.64	b	0.651	ab	1.60	abS
Phenanthrene	µg/Kg	0.677	a	2.04	b	0.861	abNS
Pyrene	µg/Kg	0.898	a	0.674	a	6.23	bS
Total PAHs	µg/Kg	12.3		9.63		36.4	
PCB Congeners							
PCB 008	µg/Kg	0.0638	a	0.0480	a	0.0632	ac
PCB 018	µg/Kg	0.0465	a	0.0349	a	0.0460	ac
PCB 028	µg/Kg	0.0790	a	0.0593	a	0.0784	ac
PCB 044	µg/Kg	0.0880	a	0.0661	a	0.0873	ac
PCB 052	µg/Kg	0.0491	a	0.0369	a	0.136	abS
PCB 066	µg/Kg	0.0462	a	0.0347	a	0.0457	ac
PCB 101	µg/Kg	0.0752	a	0.0564	a	0.0745	ac
PCB 105	µg/Kg	0.0675	a	0.0506	a	0.810	aS
PCB 118	µg/Kg	0.0713	a	0.0534	a	0.0706	ac
PCB 128	µg/Kg	0.0842	a	0.0632	a	0.0834	ac
PCB 138	µg/Kg	0.305	ab	0.331	ab	0.462	aNS
PCB 153	µg/Kg	0.628	b	0.763		0.857	aNS
PCB 170	µg/Kg	0.0413	a	0.0310	a	0.0409	ac
PCB 180	µg/Kg	0.0423	a	0.0318	a	0.0419	ac
PCB 187	µg/Kg	0.256	a	0.0456	a	0.0601	ac
PCB 195	µg/Kg	0.0795	a	0.0596	a	0.0786	ac
PCB 206	µg/Kg	0.0810	a	0.0608	a	0.0802	ac
PCB 209	µg/Kg	0.0928	a	0.0697	a	0.0920	ac
Total PCBs	µg/Kg	4.39		3.79		6.42	
Pesticides							
Aldrin	µg/Kg	0.0404	a	0.0605	a	0.0400	ac
cis-Chlordane	µg/Kg	0.0870	a	0.131	a	0.0863	ac
trans-Chlordane	µg/Kg	0.0245	a	0.0369	a	0.0243	ac
cis-Nonachlor	µg/Kg	0.0117	a	0.0176	a	0.0116	ac
trans-Nonachlor	µg/Kg	0.0108	a	0.0161	a	0.0106	ac
Oxychlordane	µg/Kg	0.0501	a	0.0752	a	0.0495	ac
Total Chlordanes	µg/Kg	0.184		0.277		0.182	
4,4'-DDT	µg/Kg	0.0159	a	0.0238	a	0.0158	ac
4,4'-DDD	µg/Kg	3.29	ab	0.0182	a	0.665	S
4,4'-DDE	µg/Kg	0.00737	a	0.0111	a	0.00728	ac
Total DDT	µg/Kg	3.32		0.0531		0.688	
Dieldrin	µg/Kg	0.0243	a	0.0365	a	0.0241	ac
alpha-Endosulfan	µg/Kg	0.0222	a	0.0334	a	0.0220	ac
beta-Endosulfan	µg/Kg	0.0115	a	0.0173	a	0.0113	ac
Total Endosulfans	µg/Kg	0.0337		0.0507		0.0333	
Endrin	µg/Kg	0.0132	a	0.0199	a	0.0131	ac
Heptachlor	µg/Kg	0.0253	a	0.0379	a	0.0250	ac
Heptachlor epoxide	µg/Kg	0.0520	a	0.0780	a	0.0515	ac
Hexachlorobenzene	µg/Kg	0.217	a	0.326	a	0.215	ac
Lindane (gamma-BHC)	µg/Kg	0.0365	a	0.0548	a	0.0361	ac
Methoxychlor	µg/Kg	0.0575	a	0.843	a	0.0568	ac
Toxaphene	µg/Kg	1.05	a	1.58	a	1.04	ac

Notes:
Mean concentrations are reported to 3 significant figures.

a = COC not detected (below MDL) in at least one replicate; mean value was calculated using one-half of the project specific MDL for non-detected values.
b = COC concentration estimated (detected below RL but above MDL) in at least one replicate; mean value calculated using estimated value.
c = COC was not detected in either the dredge tissue replicates or in the historic reference tissue, therefore was eliminated from further evaluation.
[d] Pre-test tissue represents the mean of three replicates, whereas the reference and site composites represent a mean of 5 replicates.
[e] Analysis conducted after removal of a statistical outlier.

NS = Not Significant - mean tissue body burden was not statistically different from the associated reference site mean body burden. Statistical significance accepted at α=0.05.
S = Significant - mean tissue body burden was statistically different, greater than the associated reference site mean body burden. Statistical significance accepted at α=0.05.

TABLE 11 STATISTICAL COMPARISONS OF *M. nasuta* BODY BURDENS VS. IOSN 2019 REFERENCE DATA

Compound	Units	Pre-Test [d] Mean	Qual	IOSN 2019 Mean	Qual	Composite Mean	Qual
Trace Metals							
Arsenic, total	mg/Kg	2.59		3.49		2.54	NS
Cadmium, total	mg/Kg	0.0297	b	0.0290	b	0.0266	bNS
Chromium, total	mg/Kg	0.465		0.334	b	0.434	bNS
Copper, total	mg/Kg	3.10		1.77		2.71	S
Lead, total	mg/Kg	0.129		0.349		0.452	S
Mercury, total	mg/Kg	0.00185	a	0.00170	a	0.00208	ac
Nickel, total	mg/Kg	0.713		0.521		0.570	NS/S [e]
Zinc, total	mg/Kg	11.6		11.8		12.8	NS
PAH Compounds							
Acenaphthene	µg/Kg	1.07	ab	0.453	a	1.56	abNS
Acenaphthylene	µg/Kg	0.378	a	0.279	a	0.381	ac
Anthracene	µg/Kg	0.853	ab	0.302	a	2.69	bS
Benzo(a)anthracene	µg/Kg	1.32	ab	0.565	a	5.40	bS
Benzo(a)pyrene	µg/Kg	0.805	a	0.594	a	1.74	abS
Benzo(b)fluoranthene	µg/Kg	1.07	a	0.786	a	4.41	bS
Benzo(k)fluoranthene	µg/Kg	0.490	a	0.455	ab	1.25	abS
Benzo(g,h,i)perylene	µg/Kg	0.342	a	0.518	ab	0.820	abNS
Chrysene	µg/Kg	2.01	b	0.550	a	2.92	bS
Dibenz(a,h)anthracene	µg/Kg	0.559	ab	2.97	b	0.400	aNS
Fluoranthene	µg/Kg	2.57	b	2.12	b	26.6	S
Fluorene	µg/Kg	2.11	b	0.253	a	1.74	bS
Indeno(1,2,3-cd)pyrene	µg/Kg	0.803	a	3.54	b	0.985	abNS
Naphthalene	µg/Kg	3.78	b	0.390	a	1.77	bS
Phenanthrene	µg/Kg	4.09	b	1.97	b	6.92	bS
Pyrene	µg/Kg	2.86	b	1.63	b	20.8	S
Total PAHs	µg/Kg	25.1		17.4		80.4	
PCB Congeners							
PCB 008	µg/Kg	0.0633	a	0.0467	a	0.0639	ac
PCB 018	µg/Kg	0.0461	a	0.0340	a	0.0465	ac
PCB 028	µg/Kg	0.0783	a	0.0578	a	0.0791	ac
PCB 044	µg/Kg	0.0873	a	0.0644	a	0.0883	ac
PCB 052	µg/Kg	2.09		0.0359	a	0.172	aS
PCB 066	µg/Kg	0.0457	a	0.0338	a	0.0462	ac
PCB 101	µg/Kg	0.0745	a	0.0550	a	0.0754	ac
PCB 105	µg/Kg	0.0668	a	0.0493	a	0.0675	ac
PCB 118	µg/Kg	0.0708	a	0.0522	a	0.142	abS
PCB 128	µg/Kg	0.0835	a	0.0616	a	0.0843	ac
PCB 138	µg/Kg	0.392	a	0.0394	a	0.0539	ac
PCB 153	µg/Kg	0.111	a	0.0820	a	0.142	abS
PCB 170	µg/Kg	0.0410	a	0.0303	a	0.0414	ac
PCB 180	µg/Kg	0.0419	a	0.0309	a	0.0423	ac
PCB 187	µg/Kg	0.0603	a	0.0445	a	0.0607	ac
PCB 195	µg/Kg	0.0787	a	0.0580	a	0.0794	ac
PCB 206	µg/Kg	0.0803	a	0.0594	a	0.0810	ac
PCB 209	µg/Kg	0.0920	a	0.0680	a	0.0929	ac
Total PCBs	µg/Kg	7.22		1.81		2.92	
Pesticides							
Aldrin	µg/Kg	0.0200	a	0.0296	a	0.0202	ac
cis-Chlordane	µg/Kg	0.0432	a	0.0638	a	0.0436	ac
trans-Chlordane	µg/Kg	0.0122	a	0.0180	a	0.0123	ac
cis-Nonachlor	µg/Kg	0.00582	a	0.00870	a	0.00587	ac
trans-Nonachlor	µg/Kg	0.00533	a	0.00780	a	0.00538	ac
Oxychlordane	µg/Kg	0.0248	a	0.0366	a	0.0250	ac
Total Chlordanes	µg/Kg	0.0913		0.135		0.0922	
4,4'-DDT	µg/Kg	0.00788	a	0.0117	a	0.00796	ac
4,4'-DDD	µg/Kg	0.00598	a	0.00880	a	0.391	S
4,4'-DDE	µg/Kg	0.00365	a	0.219	b	0.499	S
Total DDT	µg/Kg	0.0175		0.240		0.898	
Dieldrin	µg/Kg	0.0121	a	0.0178	a	0.0122	ac
alpha-Endosulfan	µg/Kg	0.0110	a	0.0163	a	0.0111	ac
beta-Endosulfan	µg/Kg	0.00568	a	0.00840	a	0.00573	ac
Total Endosulfans	µg/Kg	0.0167		0.0247		0.0168	
Endrin	µg/Kg	0.00653	a	0.00970	a	0.00662	ac
Heptachlor	µg/Kg	0.0125	a	0.0186	a	0.0127	ac
Heptachlor epoxide	µg/Kg	0.0257	a	0.0381	a	0.0260	ac
Hexachlorobenzene	µg/Kg	0.108	a	0.159	a	0.109	ac
Lindane (gamma-BHC)	µg/Kg	0.0181	a	0.0267	a	0.0183	ac
Methoxychlor	µg/Kg	0.0285	a	0.411	a	0.0287	ac
Toxaphene	µg/Kg	0.518	a	0.767	a	0.524	ac

Notes:
Mean concentrations are reported to 3 significant figures.

a = COC not detected (below MDL) in at least one replicate; mean value was calculated using one-half of the project specific MDL for non-detected values.
b = COC concentration estimated (detected below RL but above MDL) in at least one replicate; mean value calculated using estimated value.
c = COC was not detected in either the dredge tissue replicates or in the historic reference tissue, therefore was eliminated from further evaluation.
[d] Pre-test tissue represents the mean of three replicates, whereas the reference and site composites represent a mean of 5 replicates.
[e] Analysis conducted after removal of a statistical outlier.

NS = Not Significant - mean tissue body burden was not statistically different from the associated reference site mean body burden. Statistical significance accepted at α=0.05.
S = Significant - mean tissue body burden was statistically different, greater than the associated reference site mean body burden. Statistical significance accepted at α=0.05.

TABLE 12 SUMMARY OF SIGNIFICANT UPTAKE AND MAGNITUDE OF CONCENTRATION IN TISSUE

	Nereis virens Composite	*Macoma nasuta* Composite
Metals (ug/g wet weight)		
Cadmium	S	
Chromium	S	
Copper		S
Lead	S	S
Nickel	S	S a
Zinc	S a	
PAHs (ng/g wet weight)		
Anthracene	S	S
Benzo(a)anthracene		S
Benzo(a)pyrene		S
Benzo(b)fluoranthene	S	S
Benzo(k)fluoranthene	S	S
Benzo(g,h,i)perylene	S	
Chrysene	S	S
Fluoranthene	S	S
Fluorene	S	S
Naphthalene	S	S
Phenanthrene		S
Pyrene	S	S
PCB Congeners (ng/g wet wt.)		
PCB 52	S	S
PCB 105	S	
PCB 118		S
PCB 153		S
Pesticides (ng/g wet weight)		
4,4'-DDD	S	S
4,4'-DDE		S

Summary of Significant Uptake:

"S" = Finding of significance.

" " = Finding of no significance.

Summary of Magnitude of Concentration:

Green shading = concentration in site tissue is equal to or lower than in pre-test tissue.

No shading = concentration in site tissue is <5 times higher than in historic reference tissue.

Orange shading/"S" = concentration in composite tissue is 5-10 times higher than in historic reference tissue.

Red shading/"S" = concentration in composite tissue is ≥10 times higher than in historic reference tissue.

Notes:

[a] Analysis conducted both with and without a statistical outlier, and the findings of significance were split.

TABLE 13 PROJECT SPECIFIC ANALYTICAL RLs AND MDLs

COC	Units	RLs		MDLs
		RIM	Alpha	
Trace Metals (6020B and 7474)				
Arsenic	mg/Kg	0.5	0.123	0.0423
Cadmium	mg/Kg	0.1	0.0490	0.0129
Chromium	mg/Kg	1	0.491	0.0442
Copper	mg/Kg	1	0.123	0.041
Lead	mg/Kg	1	0.0490	0.0072
Mercury	mg/Kg	0.02	0.0150	0.00444
Nickel	mg/Kg	1	0.123	0.0459
Zinc	mg/Kg	1	1.23 [a]	0.184
PCB Congeners (8270D-SIM/680(M))				
PCB 008	µg/Kg	0.5	0.66 [a]	0.13
PCB 018	µg/Kg	0.5	0.66 [a]	0.095
PCB 028	µg/Kg	0.5	0.66 [a]	0.162
PCB 044	µg/Kg	0.5	0.66 [a]	0.18
PCB 049	µg/Kg	-	0.66 [a]	0.176
PCB 052	µg/Kg	0.5	0.66 [a]	0.1
PCB 066	µg/Kg	0.5	0.66 [a]	0.0943
PCB 077	µg/Kg	-	-	-
PCB 087	µg/Kg	-	0.66 [a]	0.0765
PCB 101	µg/Kg	0.5	0.66 [a]	0.154
PCB 105	µg/Kg	0.5	0.66 [a]	0.138
PCB 118	µg/Kg	0.5	0.66 [a]	0.146
PCB 126	µg/Kg	0.5	-	-
PCB 128	µg/Kg	-	0.66 [a]	0.172
PCB 138	µg/Kg	0.5	0.66 [a]	0.11
PCB 153	µg/Kg	0.5	0.66 [a]	0.23
PCB 170	µg/Kg	0.5	0.66 [a]	0.0844
PCB 180	µg/Kg	0.5	0.66 [a]	0.086
PCB 183	µg/Kg	-	0.66 [a]	0.0465
PCB 184	µg/Kg	-	0.66 [a]	0.095
PCB 187	µg/Kg	0.5	0.66 [a]	0.124
PCB 195	µg/Kg	0.5	0.66 [a]	0.162
PCB 206	µg/Kg	0.5	0.66 [a]	0.166
PCB 209	µg/Kg	0.5	0.66 [a]	0.19

Notes: Reporting and Method Detection limits in this table are representative for this specific project. Individual reporting/Method Detection Limits used in statistical computations may be slightly different from these values as they are based on actual tissue mass, and final extract volumes for a specific analysis. The number of significant figures for values presented in tables and those used in the statistical analysis may also vary.

[a] RL is high but MDL meets RIM requirement.

COC	Units	RLs		MDLs
		RIM	Alpha	
PAH Compounds (8270D-SIM/680(M))				
Acenaphthene	µg/Kg	20	6.6	1.27
Acenaphthylene	µg/Kg	20	6.6	0.778
Anthracene	µg/Kg	20	6.6	0.844
Benzo(a)anthracene	µg/Kg	20	6.6	1.6
Benzo(a)pyrene	µg/Kg	20	6.6	1.7
Benzo(b)fluoranthene	µg/Kg	20	6.6	2.2
Benzo(k)fluoranthene	µg/Kg	20	6.6	1.01
Benzo(g,h,i)perylene	µg/Kg	20	6.6	0.706
Chrysene	µg/Kg	20	6.6	1.54
Dibenz(a,h)anthracene	µg/Kg	20	6.6	0.818
Fluoranthene	µg/Kg	20	6.6	1.25
Fluorene	µg/Kg	20	6.6	0.706
Indeno(1,2,3-c,d)pyrene	µg/Kg	20	6.6	1.66
Naphthalene	µg/Kg	20	6.6	1.09
Phenanthrene	µg/Kg	20	6.6	1.38
Pyrene	µg/Kg	20	6.6	1.83
Pesticides (8081B)				
4,4'-DDD	µg/Kg	1	0.33	0.0247
4,4'-DDE	µg/Kg	1	0.33	0.015
4,4'-DDT	µg/Kg	1	0.33	0.0325
Aldrin	µg/Kg	1	0.33	0.0824
Alpha-BHC	µg/Kg	-	0.33	0.0501
Alpha-Chlordane	µg/Kg	1	0.33	0.178
Beta-BHC	µg/Kg	-	0.33	0.0343
Chlorpyrifos	µg/Kg	-	-	-
cis-Nonachlor	µg/Kg	1	0.33	0.0239
Delta-BHC	µg/Kg	-	0.33	0.0392
Dieldrin	µg/Kg	1	0.33	0.0497
Endosulfan I	µg/Kg	1	0.33	0.0454
Endosulfan II	µg/Kg	1	0.33	0.0234
Endosulfan sulfate	µg/Kg	-	0.33	0.0135
Endrin	µg/Kg	1	0.33	0.027
Endrin Aldehyde	µg/Kg	-	-	-
Endrin ketone	µg/Kg	-	-	-
Gamma-BHC (Lindane)	µg/Kg	1	0.33	0.0745
Gamma-Chlordane	µg/Kg	1	0.33	0.0501
Heptachlor	µg/Kg	1	0.33	0.0516
Heptachlor epoxide	µg/Kg	1	0.66	0.106
Hexachlorobenzene	µg/Kg	1	0.66	0.444
Methoxychlor	µg/Kg	1	0.33	0.117
Oxychlordane	µg/Kg	-	0.66	0.102
Toxaphene	µg/Kg	50	16.6	2.14
Trans-Nonachlor	µg/Kg	1	0.33	0.022

ATTACHMENT I

Chain-of-Custody Records
(2 pages)

Chain-of-Custody Record

EA Engineering, Science, and Technology

EA Ecotoxicology Laboratory
231 Schilling Circle
Hunt Valley, Maryland 21031
Telephone: 410-584-7000
Fax: 410-584-1057

Sample Shipped By: (circle)
Fed. Ex. UPS Other: Courier
Tracking #:

Client: ECO-ANALYSTS, INC. Project No.:

NPDES Number: Client Purchase Order Number:

City/State Collected: KENNEBUNK RIVER, MAINE

PLEASE READ SAMPLING INSTRUCTIONS ON BACK OF FORM

Accession Number (office use only)	Grab	Composite	Collection Start Date/Time	Collection End Date/Time	Sample Description (including Site, Station Number, and Outfall Number)	Number/Volume of Container
AT3-018		x	2/8/23 0900	02/8/23 1300	10 Stations at 4 Marinas Mud	5 Ten Gal Buckets
AT3-019	x		"	"	" Sitewater	"

Sampled By: Dustin Kach & Bud Brown	Date/Time 2/8/23 0900 - 1300	Received By: Dustin Kach	Date/Time 2/8/23 1300
Sampler's Printed Name: Dustin Kach & Bud Brown	Title: President	Relinquished By: [signature]	Date/Time 2/9/23 @ 11:37 am
Relinquished By: [signature]	Date/Time 2/8/23 1137	Received By Laboratory: [signature]	Date/Time 2/9/23 1630

Was Sample Chilled During Collection? No

Comments:

Sample Collection Parameters

Visual Description:

Temperature (°C):

pH:

TRC (mg/L):

Other:

ATTACHMENT II

Nereis virens 28-Day Solid Phase Bioaccumulation Testing
Data Sheets and Survival Statistical Analyses
(19 pages)

SEDIMENT TOXICITY TEST SET-UP BENCH SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-302

TEST ORGANISM INFORMATION			
Common Name: Sand worm		Adults Isolated (Time, Date):	
Scientific Name: *Nereis virens*		Neonates Pulled (Time, Date):	
Lot Number: NV-088		Acclimation: 1 day	Age: Adult
Source: ARO		Culture Water (T/S): — °C	— ppt

TEST INITIATION

Date	Time	Initials	Activity
3/3/23	1230	CR	Sediment Added to Chambers
↓	↓	↓	Overlying Water Added to Chambers
3/8/23	1130	LAD/JG	Organisms Transferred

TEST SET-UP

Sample Number(s): AT3-152 (Lab Control), AT3-098

Overlying Water: 30 ppt Crystal Sea (LD3-266)

Treatment	Volume Test Sediment	Volume Overlying Water
AT3-152 (Lab Control)	5L	22L
AT3-098	↓	↓

TOXICOLOGY LABORATORY BENCH SHEET - ORGANISM LOADING RECORD

Project Number: EA.TOX

Client: EcoAnalysts

QC Test Number: TN-23-302

TEST ORGANISM

Common Name: Sand worm

Scientific Name: *Nereis virens*

Lot Number: NV- 088

Source: ARO

Acclimation: ~24 hour

Age: Adult

Organisms Transferred (date, time, initials): 3-8-23 1130 UAO / MG

Treatment	Replicate	Number of Organisms Loaded
AT3-152	A	30
(Control)	B	15*
	C	30
AT3-098	A	30
	B	
	C	
	D	
	E	

* 15 organisms loaded due to technician error

(S) 3/8/2023 SR

ATS-T30
03/01/00

TOXICOLOGY LABORATORY BENCH SHEET - ORGANISM RECOVERY RECORD

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-302

Organisms Recovered (date, time, initials): 4/5/23 1030 TO

TEST ORGANISM

Common Name: Sand worm

Scientific Name: *Nereis virens*

Treatment	Replicate	Number of Organisms Loaded	Number of Organisms Recovered
AT3-152	A	30	30
(Lab Control)	B	~~30~~ 15 *	12
	C	30	30
AT3-098	A	30	28
	B	30	28
	C	30	29
	D	30	29
	E	30	26

* 15 organisms loaded due to technician error.
S 3/8/2023 dR

TOXICITY TEST WATER QUALITY DATA SHEET - NEW SOLUTIONS

Project Number: EA.TOX
Client: EcoAnalysts
QC Test Number: TN-23-302

TEST ORGANISM
Common Name: Sand worm
Scientific Name: *Nereis virens*

Beginning Date: 3/8/23 Time: 1130
Ending Date: 4/5/23 Time: 1030

TARGET VALUES: Temp: 20 °C pH: 6.0 - 9.0 DO: ≥2.5 mg/L Salinity: 30 ppt Photoperiod: 16 *l*, 8 *d* Light Intensity: 50 - 100 fc

Sample #		Temperature (°C)							pH							Dissolved Oxygen (mg/L)							Salinity (ppt)						
		0	1	2	3	4	5	6	0	1	2	3	4	5	6	0	1	2	3	4	5	6	0	1	2	3	4	5	6
AT3-152	Lab Control	20.0							8.0							7.5							30.0						
AT3-098		19.9							8.2							7.4							30.6						
	Meter Number	1082							1082							1082							1080						
	Time	0924							0924							0924							0924						
	Initials	UAD							UAD							UAD							UAD						

ATS-T13
06/21/06

EA®

TOXICITY TEST WATER QUALITY DATA SHEET - OLD SOLUTIONS

Project Number: EA.TOX | TEST ORGANISM | Beginning Date: 3/8/23. Time: 1130

Client: Eco Analysts | Common Name: Sand worm | Ending Date: 4/5/23 Time: 1030

QC Test Number: TN-23-302 | Scientific Name: *Nereis virens*

TARGET VALUES Temp: 20 °C pH: 6.0 - 9.0 DO: >2.5 mg/L Salinity: 30 ppt Photoperiod: 16 *l*, 8 *d* Light Intensity: 50 - 100 fc

Sample #		Temperature (°C)							pH							Dissolved Oxygen (mg/L)							Salinity (ppt)						
		1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
AT3-157	Lab Control		19.8			19.0		19.6		7.9			8.0		8.1		7.4			7.0		7.3		28.7			27.9		30.6
AT3-098			19.8			20.1		19.7		7.8			7.9		8.1		7.0			6.8		7.3		30.4			27.7		30.6
Meter Number			682			683		682		682			683		682		682			683		682		682			683		682
Time			0846			0833		0840		0846			0833		0840		0846			0833		0840		0846			0833		0840
Initials			UAD			UAD		JL		UAD			UAD		JL		UAD			UAD		JL		UAD			UAD		JL

ATS-T14
06/21/06

EA®

TOXICITY TEST WATER QUALITY DATA SHEET - OLD SOLUTIONS

Project Number: EA.TOX
Client: Eco Analysts
QC Test Number: TN-23-302

TEST ORGANISM
Common Name: Sand worm
Scientific Name: *Nereis virens*

Beginning Date: 3/8/23 Time: 1130
Ending Date: 4/5/23 Time: 1030

TARGET VALUES Temp: 20 °C pH: 6.0 - 9.0 DO: >2.5 mg/L Salinity: 30 ppt Photoperiod: 16 *l*, 8 *d* Light Intensity: 50 - 100 fc

Sample #		Temperature (°C)							pH							Dissolved Oxygen (mg/L)							Salinity (ppt)						
		8	9	10	11	12	13	14	8	9	10	11	12	13	14	8	9	10	11	12	13	14	8	9	10	11	12	13	14
AT3-152	Lab Control		19.4			19.8		19.7		7.9			7.8		7.8		8.7			7.6		7.3		31.7			29.5		29.7
AT3-098			20.1			20.2		19.7		7.9			8.0		7.8		8.4			7.1		7.2		31.4			29.1		29.6
Meter Number			682			682		681		682			682		681		682			682		681		682			682		681
Time			1154			0845		1302		1154			0845		1302		1154			0845		1302		1154			0845		1302
Initials			UAD			UAD		UAD		UAD			UAD		UAD		UAD			UAD		UAD		UAD			UAD		UAD

ATS-T14
06/21/06

EA®

TOXICITY TEST WATER QUALITY DATA SHEET - OLD SOLUTIONS

Project Number: EA.TOX
Client: Eco Analysts
QC Test Number: TN-23-302

TEST ORGANISM
Common Name: Sand worm
Scientific Name: *Nereis virens*

Beginning Date: 3/8/23 Time: 1130
Ending Date: 4/5/23 Time: 1030

TARGET VALUES Temp: 20 °C pH: 6.0 - 9.0 DO: >2.5 mg/L Salinity: 30 ppt Photoperiod: 16 *l*, 8 *d* Light Intensity: 50 - 100 fc

Sample #		Temperature (°C) 15	16	17	18	19	20	21
AT3-152	Lab Control		20.2	18.0		19.0		19.4
AT3-098			20.2	17.9		19.3		19.5
Meter Number			682	~~683~~		683		682
Time			0851	~~0844~~		0844		1421
Initials			GL	~~JL~~		JL		GL

Sample #		pH 15	16	17	18	19	20	21
AT3-152	Lab Control		8.1	8.0		8.0		8.1
AT3-098			8.1	7.9		7.9		8.1
Meter Number			682	~~683~~		683		682
Time			0851	~~0844~~		0844		1421
Initials			GL	~~JL~~		JL		GL

Sample #		Dissolved Oxygen (mg/L) 15	16	17	18	19	20	21
AT3-152	Lab Control		7.3	7.9		7.7		7.3
AT3-098			7.1	7.7		7.1		7.3
Meter Number			682	~~683~~		683		682
Time			0851	~~0844~~		0844		1421
Initials			GL	~~JL~~		JL		GL

Sample #		Salinity (ppt) 15	16	17	18	19	20	21
AT3-152	Lab Control		29.8	28.9		29.4		29.6
AT3-098			29.6	29.2		29.2		29.6
Meter Number			682	~~683~~		683		682
Time			0851	~~0844~~		0844		1421
Initials			GL	~~JL~~		JL		GL

(b) JL 3/29/23

ATS-T14
06/21/06

EA®

TOXICITY TEST WATER QUALITY DATA SHEET - OLD SOLUTIONS

Project Number: EA.TOX
Client: Eco Analysts
QC Test Number: TN-23-302

TEST ORGANISM
Common Name: Sand worm
Scientific Name: *Nereis virens*

Beginning Date: 3/8/23 Time: 1130
Ending Date: 4/5/23 Time: 1030

TARGET VALUES Temp: 20 °C pH: 6.0 - 9.0 DO: >2.5 mg/L Salinity: 30 ppt Photoperiod: 16 *l*, 8 *d* Light Intensity: 50 - 100 fc

		Temperature (°C)							pH							Dissolved Oxygen (mg/L)							Salinity (ppt)						
Sample #		22	23	24	25	26	27	28	22	23	24	25	26	27	28	22	23	24	25	26	27	28	22	23	24	25	26	27	28
AT3-152	Lab Control		19.8			20.1		20.2		7.9			8.1		8.0		7.5			7.2		7.4		28.4			27.0		30.9
AT3-098			19.7			20.0		20.3		7.9			8.2		8.0		7.4			7.4		7.3		28.5			27.0		30.8
	Meter Number		681			683		682		681			683		682		681			683		682		681			683		682
	Time		0919			0851		0808		0919			0851		0808		0919			0851		0808		0919			0851		0808
	Initials		GL			MO		TB		GL			MO		TB		GL			MO		TB		GL			MO		TB

ATS-T14
06/21/06

SEDIMENT TOXICITY TEST OBSERVATION DATA SHEET

Project Number: EA.TOX
Client: Eco Analysts
QC Test Number: TN-23-302
Test Material(s): SEDIMENT
Accession Number(s): See set up
Overlying Water: 30 PPT Crystal Sea
Accession Number: LD3-266

TEST ORGANISM
Common Name: Sand Worm
Scientific Name: *Nereis virens*

TEST TYPE: **Static** / Flowthrough
Renewal / Non-renewal
Photoperiod: 16 *l*, 8 *d* Light Intensity: 50 - 100 fc

Beginning Date: 3/8/23 Time: 1130
Ending Date: 4/5/23 Time: 1030

Test Container: 10 gal aquarium
Test Volume: 5 L sed / 22 L water
Test Duration: 28 days

Treatment	Rep	Number Loaded	Number Removed												Total Removed	Total Recovered
		Day 0 Date 3/8	Day Date	Day Date	Day Date	Day Date	Day Date	Day Date	Day Date	Day Date	Day Date	Day Date	Day Date	Day Date	Day Date	Day Date
CONTROL	A	30														
AT3-152	B	30														
	C	30														
AT3-098	A	30														
	B	30														
	C	30														
	D	30														
	E	30														
Time / Initials		1130/JG/AO														

TOXICOLOGY LABORATORY BENCH SHEET - OVERLYING WATER PREPARATION / USAGE LOG

roject Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-302

Overlying Water: 30 ppt Crystal Sea Artificial Seawater

TEST ORGANISM

Common Name: Sand worm

Scientific Name: *Nereis virens*

Sample Number	Preparation Time, Date	Initials	Date of First Use	Date of Final Use
LD3-266	1600 3/4/23	TP	3/8/23	3/8/23
LD3 384	1300 3/8/23	JL	3/10/23	3/10/23
LD3-407	1154 3/11/23	JL	3/13/23	3/13/23
LD3-408	1100 3/14/23	TP	3/15/23	3/15/23
LD3-423	1235 3/15/23	GL	3/17/23	3/20/23
LD3-438	1700 3/17/23	LAO	3/~~23~~ 22/23	3/22/23
LD3-453	1430 3/22/23	JL	3/24/23	3/24/23
LD3-454	1430 3/22/23	JL	3/27/23	3/27/23
LD3-470	1340 3/26/23	GL	3/29/23	3/29/23
LD3-476	1630 3/28/23	GL	3/31/23	4/3/23

b TG 3/22/23

EA®

TOXICOLOGY LABORATORY BENCH SHEET - RENEWAL RECORD

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-302

Day	Overlying Water	Date	Time	Initials
0				
1				
2	AT3-384	3/10/23	11~~[illegible]~~	CL
3				
4				
5	LD3-402	3/13/23	0915	LAD
6				
7	LD3-404	3/15/23	0928	JL
8				
9	LD3-423	3/17/23	1630	LAD
10				
11				
12	LD3-423	3/20/23	1402	JL
13				
14	LD3-438	3/22/23	1400	[illegible]
15				
16	LD3-453	3/24/23	1115	JL
17				
18				
19	LD3-454	3/27/23	1129	JL
20				
21	LD3-470	3/29/23	1430	CL
22				
23	LD3-476	3/31/23	1500	CL
24				
25				
26	LD3-476	4/3/23	0930	LAD
27				
28				

ⓐ 3/10/23 [illegible]

ATS-T32
03/01/00

TOXICOLOGY LABORATORY BENCH SHEET - TESTING LOCATION

Project Number: EA.TOX

Client: EcoAnalysts

QC Test Number: TN-23-302

Day	Testing Location	Date	Time	Initials
0	7A, 13B	3/8/23	1245	UAD
1				
2	7A, 13B	3/10/23	0950	OR
3				
4				
5	7A, 13B	3/13/23	0915	UAD
6				
7	7A, 13B	3/15/23	0841	JL
8				
9	7A, 13B	3/17/23	1620	UAD
10				
11				
12	7A, 13B	3/20/23	0845	UAD
13				
14	7A, 13B	3/22/23	1400	[illegible]
15				
16	7A, 13B	3/24/23	0851	GL
17				
18				
19	7A, 13B	3/27/23	0845	JL
20				
21	7A, 13B	3/29/23	1429	GL
22				
23	7A, 13B	3/31/23	0919	GL
24				
25				
26	7A, 13B	4/3/23	0852	UAD
27				
28	7A, 13B	4/5/23	0808	[illegible]
29				
30				

TOXICOLOGY LABORATORY BENCH SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-302

Date/Time/Initials	Comments/Activity

TOXICOLOGY LABORATORY CORRECTION BENCH SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-302

Correction Explanations

(a) Technician Error-Mathematical

(b) Technician Error-Manual Data Recording

(c) Technician Error-Head Count Observation

(d) Technician Error-Overwrite

(e) Technician Error-Missing Data

(f) Technician Error-Lost Organism

(g) Technician Error-Transcription Error

(h) Technician Error-Other:

(i) Meter Malfunction

CETIS Test Data Worksheet

Report Date: 05 Sep-23 14:08 (p 1 of 1)
Test Code/ID: TN-23-302NvSurv / 08-9048-9728

Bioaccumulation Evaluation - Survival Endpoint — **EA-EST, Inc. PBC**

Start Date: 08 Mar-23 11:30 **Species:** Nereis virens **Sample Code:** AT3-152
End Date: 05 Apr-23 10:30 **Protocol:** US ACE NED RIM (2004) **Sample Source:** Yachtsman Marina NAE-2004-00319
Sample Date: 03 Mar-23 **Material:** Laboratory Control Sediment **Sample Station:** Laboratory Control

Sample	Rep	Pos	# Exposed	# Survived	Notes
AT3-152	1	3	30	30	
AT3-152	2	4	15	12	
AT3-152	3	7	30	30	
IOSN 2019	1	2	20	18	
IOSN 2019	2	5	20	16	
IOSN 2019	3	9	20	20	
IOSN 2019	4	11	20	19	
IOSN 2019	5	13	20	17	
AT3-098	1	1	30	28	
AT3-098	2	6	30	28	
AT3-098	3	8	30	29	
AT3-098	4	10	30	29	
AT3-098	5	12	30	26	

CETIS Summary Report

Bioaccumulation Evaluation - Survival Endpoint — **EA-EST, Inc. PBC**

Batch ID:	06-1174-0758	**Test Type:**	Survival	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:30	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:30	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample ID:	11-9755-1044	**Code:**	AT3-152	**Project:**	Dredged Sediment Evaluation
Sample Date:	03 Mar-23	**Material:**	Laboratory Control Sediment	**Source:**	Yachtsman Marina NAE-2004-00319 (
Receipt Date:	03 Mar-23 12:30	**CAS (PC):**		**Station:**	Laboratory Control
Sample Age:	5d 11h	**Client:**	Eco-Analysts, Inc.		

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
AT3-152	11-9755-1044	03 Mar-23	03 Mar-23 12:30	5d 11h	Eco-Analysts, Inc.	Dredged Sediment Evalu
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	11h		
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 22h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
AT3-152	Laboratory Control Sediment	Yachtsman Marina NAE-2004-00	Laboratory Control	
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Single Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
02-5654-4767	Survival Rate	Equal Variance t Two-Sample Test	0.2490	IOSN 2019 passed survival rate	1
12-2728-1176	Survival Rate	Equal Variance t Two-Sample Test	0.7542	AT3-098 passed survival rate	1

Survival Rate Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
AT3-152	LC	3	0.933	0.646	1.220	0.800	1.000	0.067	0.115	12.37%	0.00%
IOSN 2019	RS	5	0.900	0.802	0.998	0.800	1.000	0.035	0.079	8.78%	3.57%
AT3-098		5	0.933	0.883	0.984	0.867	0.967	0.018	0.041	4.37%	0.00%

Survival Rate Detail — MD5: 52371F4AC9B6ED2EB280407C07EF73DD

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
AT3-152	LC	1.000	0.800	1.000		
IOSN 2019	RS	0.900	0.800	1.000	0.950	0.850
AT3-098		0.933	0.933	0.967	0.967	0.867

CETIS Analytical Report

Bioaccumulation Evaluation - Survival Endpoint — **EA-EST, Inc. PBC**

Analysis ID:	02-5654-4767	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv2.1.1
Analyzed:	05 Sep-23 14:09	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	05 Sep-23 13:37	**MD5 Hash:**	2BE9266D39B4D289B00177DB674BBC8F	**Editor ID:**	005-341-210-5

Batch ID:	06-1174-0758	**Test Type:**	Survival	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:30	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:30	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
AT3-152	11-9755-1044	03 Mar-23	03 Mar-23 12:30	5d 11h	Eco-Analysts, Inc.	Dredged Sediment Evalu
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	11h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
AT3-152	Laboratory Control Sediment	Yachtsman Marina NAE-2004-00	Laboratory Control	
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	IOSN 2019 passed survival rate endpoint	13.49%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Lab Control Sedim	Reference Sed	6	0.721	1.94	0.239	CDF	0.2490	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.59	2.13	0.6812	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0147312	0.0147312	1	0.52	0.4980	Non-Significant Effect
Error	0.169963	0.0283272	6			
Total	0.184695		7			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.38	26.3	0.4168	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.94	0.645	0.6074	Normal Distribution

Survival Rate Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
AT3-152	LC	3	0.933	0.646	1.000	1.000	0.800	1.000	0.067	12.37%	0.00%
IOSN 2019	RS	5	0.900	0.802	0.998	0.900	0.800	1.000	0.035	8.78%	3.57%

Angular (Corrected) Transformed Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
AT3-152	LC	3	1.360	0.821	1.890	1.480	1.110	1.480	0.124	15.86%	0.00%
IOSN 2019	RS	5	1.270	1.090	1.440	1.250	1.110	1.460	0.062	11.00%	6.54%

Survival Rate Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
AT3-152	LC	1.000	0.800	1.000		
IOSN 2019	RS	0.900	0.800	1.000	0.950	0.850

Angular (Corrected) Transformed Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
AT3-152	LC	1.480	1.110	1.480		
IOSN 2019	RS	1.250	1.110	1.460	1.350	1.170

Analyst: NR QA: JR

Bioaccumulation Evaluation - Survival Endpoint — EA-EST, Inc. PBC

Analysis ID:	12-2728-1176	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv2.1.1
Analyzed:	05 Sep-23 14:09	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	05 Sep-23 13:37	**MD5 Hash:**	97E2AE4963EA6A03812B029A11B133ED	**Editor ID:**	005-341-210-5

Batch ID:	06-1174-0758	**Test Type:**	Survival	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:30	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:30	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	11h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 22h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	AT3-098 passed survival rate endpoint	8.78%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-0.721	1.86	0.133	CDF	0.7542	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.8	2.29	0.4893	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0066221	0.0066221	1	0.52	0.4915	Non-Significant Effect
Error	0.101947	0.0127433	8			
Total	0.108569		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	3.19	23.2	0.2879	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.961	0.741	0.7927	Normal Distribution

Survival Rate Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.900	0.802	0.998	0.900	0.800	1.000	0.035	8.78%	0.00%
AT3-098		5	0.933	0.883	0.984	0.933	0.867	0.967	0.018	4.37%	-3.70%

Angular (Corrected) Transformed Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	1.270	1.090	1.440	1.250	1.110	1.460	0.062	11.00%	0.00%
AT3-098		5	1.320	1.220	1.420	1.310	1.200	1.390	0.035	5.92%	-4.06%

Survival Rate Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.900	0.800	1.000	0.950	0.850
AT3-098		0.933	0.933	0.967	0.967	0.867

Angular (Corrected) Transformed Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	1.250	1.110	1.460	1.350	1.170
AT3-098		1.310	1.310	1.390	1.390	1.200

ATTACHMENT III

Macoma nasuta 28-Day Solid Phase Bioaccumulation Testing
Data Sheets and Survival Statistical Analyses
(18 pages)

SEDIMENT TOXICITY TEST SET-UP BENCH SHEET

Project Number: EA.TOX
Client: EcoAnalysts
QC Test Number: TN-23-303

TEST ORGANISM INFORMATION

Common Name: Blunt nose clam
Scientific Name: *Macoma nasuta*
Lot Number: MA- 080
Source: ARO

Adults Isolated (Time, Date):
Neonates Pulled (Time, Date):
Acclimation: <24hrs Age: Adult
Culture Water (T/S): — °C — ppt

TEST INITIATION

Date	Time	Initials	Activity
3/20/23	1600	TB	Sediment Added to Chambers
↓	↓	↓	Overlying Water Added to Chambers
3/29/23	1345	UTO	Organisms Transferred

TEST SET-UP

Sample Number(s): AT3-191 (Lab Control), AT3-098
Overlying Water: 30 ppt Crystal Sea (LD3-966)

Treatment	Volume Test Sediment	Volume Overlying Water
AT3-191 (Lab Control)	5L	22L
↓	↓	↓
AT3-098		

ATS-T28
03/01/00

TOXICOLOGY LABORATORY BENCH SHEET - ORGANISM LOADING RECORD

Project Number: EA.TOX
Client: Eco Analysts
QC Test Number: TN-23-303

TEST ORGANISM
Common Name: Blunt nose Clam
Scientific Name: *Macoma nasuta*
Lot Number: MA- 080 Source: ARO
Acclimation: <24-hour Age: Adult

Organisms Transferred (date, time, initials): 3-29-23 1345 UD

Treatment	Replicate	Number of Organisms Loaded
AT3-191	A	30
(Control)	B	↓
	C	↓
AT3-098	A	30
	B	↓
	C	↓
	D	↓
	E	↓

TOXICOLOGY LABORATORY BENCH SHEET - ORGANISM RECOVERY RECORD

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-303

TEST ORGANISM

Common Name: Blunt nose clam

Scientific Name: *Macoma nasuta*

Organisms Recovered (date, time, initials): 4/26/23 1245 TG

Treatment	Replicate	Number of Organisms Loaded	Number of Organisms Recovered
AT3- 191	A	30	28
(Lab Control)	B	30	26
	C	30	27
AT3-098	A	30	30
	B	30	30
	C	30	26
	D	30	29
	E	30	29

TOXICITY TEST WATER QUALITY DATA SHEET - NEW SOLUTIONS

Project Number: EA.TOX
Client: Eco Analysts
QC Test Number: TN-23-303

TEST ORGANISM
Common Name: Blunt nose clam
Scientific Name: *Macoma nasuta*

Beginning Date: 3/29/23 Time: 1345
Ending Date: 4/26/23 Time: 1245

TARGET VALUES: Temp: 12 °C pH: 6.0 - 9.0 DO: ≥2.5 mg/L Salinity: 30 ppt Photoperiod: 16 *l*, 8 *d* Light Intensity: 50 - 100 fc

		Temperature (°C)							pH							Dissolved Oxygen (mg/L)							Salinity (ppt)						
Sample #		0	1	2	3	4	5	6	0	1	2	3	4	5	6	0	1	2	3	4	5	6	0	1	2	3	4	5	6
AT3-191	Lab Control	12.8							8.2							8.6							29.1						
AT3-098		12.9							8.2							8.6							29.3						
	Meter Number	682							682							682							682						
	Time	1400							1400							1400							1400						
	Initials	GL							GL							GL							GL						

EA®

TOXICITY TEST WATER QUALITY DATA SHEET - OLD SOLUTIONS

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-303

TEST ORGANISM

Common Name: Blunt nose clam

Scientific Name: *Macoma nasuta*

Beginning Date: 3/29/23 Time: 1345

Ending Date: 4/26/23 Time: 1245

TARGET VALUES: Temp: 12 °C pH: 6.0 - 9.0 DO: ≥2.5 mg/L Salinity: 30 ppt Photoperiod: 16 *l*, 8 *d* Light Intensity: 50 - 100 fc

		Temperature (°C)							pH							Dissolved Oxygen (mg/L)							Salinity (ppt)						
Sample #		1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
AT3-191	Lab Control		13.0		13.0	~~23.5~~		13.0		8.0			8.1		8.0		8.3			8.0		8.2		27.5			27.0		32.0
AT3-098			13.0			13.0		13.0		8.1			8.2		8.1		8.3			8.5		8.4		27.9			27.0		32.2
Meter Number			681			683		682		681			683		682		681			683		682		681			683		682
Time			0934			0934		0911		0934			0934		0911		0934			0934		0911		0934			0934		0911
Initials			GL			UAO		GL		GL			UAO		GL		GL			UAO		GL		GL			UAO		GL

6 UAO 4/3/23

ATS-T14
06/21/06

TOXICITY TEST WATER QUALITY DATA SHEET - OLD SOLUTIONS

Project Number: EA.TOX
Client: Eco Analysts
QC Test Number: TN-23-303

TEST ORGANISM
Common Name: Blunt nose clam
Scientific Name: *Macoma nasuta*

Beginning Date: 3/29/23 Time: 1345
Ending Date: 4/26/23 Time: 1245

TARGET VALUES: Temp: 12 °C pH: 6.0 - 9.0 DO: ≥2.5 mg/L Salinity: 30 ppt Photoperiod: 16 *l*, 8 *d* Light Intensity: 50 - 100 fc

		Temperature (°C)							pH							Dissolved Oxygen (mg/L)							Salinity (ppt)						
Sample #		8	9	10	11	12	13	14	8	9	10	11	12	13	14	8	9	10	11	12	13	14	8	9	10	11	12	13	14
AT3-191	Lab Control		13.0		13.0	~~13.0~~		13.0		8.0			8.2		7.7		7.7			8.7		8.5		31.4			29.8		30.5
AT3-098			13.0			13.0		13.0		8.1			8.2		7.6		7.9			8.7		8.5		32.2			30.0		31.6
Meter Number			680			680		680		680			680		680		680			680		680		680		~~680~~	1008		680
Time			0941			1008		1020		0941			1008		1020		0941			1008		1020		0941			1008		1020
Initials			UAD			JL		KY		UAD			JL		KY		UAD			JL		KY		UAD			JL		KY

6 JL 4/16/23

ATS-T14
06/21/06

EA®

TOXICITY TEST WATER QUALITY DATA SHEET - OLD SOLUTIONS

Project Number: EA.TOX
Client: Eco Analysts
QC Test Number: TN-23-303

TEST ORGANISM
Common Name: Blunt nose clam
Scientific Name: *Macoma nasuta*

Beginning Date: 3/29/23 Time: 1345
Ending Date: 4/26/23 Time: 1245

TARGET VALUES: Temp: 12 °C pH: 6.0 - 9.0 DO: ≥2.5 mg/L Salinity: 30 ppt Photoperiod: 16 *l*, 8 *d* Light Intensity: 50 - 100 fc

Sample #		Temperature (°C) 15	16	17	18	19	20	21
AT3-091	Lab Control		13.0			13.0		13.0
AT3-098			13.0			13.0		13.0
	Meter Number		683			683		683
	Time		0901			0947		0842
	Initials		GL			UMD		GL

Sample #		pH 15	16	17	18	19	20	21
AT3-091	Lab Control		8.0			8.0		8.0
AT3-098			8.1			8.0		8.1
	Meter Number		683			683		683
	Time		0901			0947		0842
	Initials		GL			UMD		GL

Sample #		Dissolved Oxygen (mg/L) 15	16	17	18	19	20	21
AT3-091	Lab Control		8.1			8.1		8.0
AT3-098			8.2			8.1		8.1
	Meter Number		683			683		683
	Time		0901			0947		0842
	Initials		GL			UMD		GL

Sample #		Salinity (ppt) 15	16	17	18	19	20	21
AT3-091	Lab Control		29.5			29.3		30.7
AT3-098			29.6			29.6		31.0
	Meter Number		683			683		683
	Time		0901			0947		0842
	Initials		GL			UMD		GL

EA®

TOXICITY TEST WATER QUALITY DATA SHEET - OLD SOLUTIONS

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-303

TEST ORGANISM

Common Name: Blunt nose clam

Scientific Name: *Macoma nasuta*

Beginning Date: 3/29/23 Time: 1345

Ending Date: 4/26/23 Time: 1245

TARGET VALUES: Temp: 12 °C pH: 6.0 - 9.0 DO: ≥2.5 mg/L Salinity: 30 ppt Photoperiod: 16 *l*, 8 *d* Light Intensity: 50 - 100 fc

Sample #		Temperature (°C) 22	23	24	25	26	27	28	pH 22	23	24	25	26	27	28	Dissolved Oxygen (mg/L) 22	23	24	25	26	27	28	Salinity (ppt) 22	23	24	25	26	27	28
AT3-191	Lab Control		13.0			11.6		11.9		8.0			7.9		7.9		8.4			8.7		8.7		27.0			27.4		30.0
AT3-098			13.0			11.5		11.7		8.0			8.0		7.8		8.3			8.8		8.6		27.0			27.7		30.1
	Meter Number		682			682		681		682			682		681		682			682		681		682			682		681
	Time		0907			0932		0814		0907			0932		0814		0907			0932		0814		0907			0932		0814
	Initials		KY			CAO		TB		KY			CAO		TB		KY			CAO		TB		KY			CAO		TB

TOXICOLOGY LABORATORY BENCH SHEET - RENEWAL RECORD

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-303

Day	Overlying Water	Date	Time	Initials
0				
1				
2	LD3-471	3/31/23	1600	CR
3				
4				
5	LD3-471	4/3/23	1020	LAD
6				
7	LD3-485	4/5/23	1001	GL
8				
9	LD3-508	4/7/23	1300	CR
10				
11				
12	LD3-501	4/10/23	1011	JL
13				
14	LD3-501	4/12/23	1100	KY
15				
16	LD3-502	4/14/23	1024	GL
17				
18				
19	LD3-513	4/17/23	1415	LAD
20				
21	LD3-532 / LD3-539	4/19/23	1105	KY
22				
23	LD3-540	4/21/23	0910	KY
24				
25				
26	LD3-548	4/24/23	1035	LAD
27				
28				

TOXICOLOGY LABORATORY BENCH SHEET - OVERLYING WATER PREPARATION / USAGE LOG

Project Number: EA.TOX

TEST ORGANISM

Client: Eco Analysts

Common Name: Blunt nose clam

QC Test Number: TN-23-303

Scientific Name: *Macoma nasuta*

Overlying Water: 30 ppt Crystal Sea Artificial Seawater

Sample Number	Preparation Time, Date	Initials	Date of First Use	Date of Final Use
LD3-466	1620, 3/26/23	JN	3/28/23	3/28/23
LD3-471	1530, 3/28/23	DT	3/31/23	4/3/23
LD3-485	1520, 3/28/23	JG	4/5/23	4/5/23
LD3-508	1630 4/5/23	SL	4/7/23	4/10/23
LD3-501	1630 4/5/23	~~JL~~ SL/KY	4/10/23	~~4/10/23~~ ~~4/12/23~~ 4/17/23 ⑥ JL 4/14/23
~~LD3-501~~	~~1100~~ 1630 ~~4/5/23~~	~~SL/KY~~	~~4/~~	
LD3-502	1635 3/29/23	GL	4/14/23	4/14/23
LD3-513	1615 4/6/23	GL	4/17/23	4/17/23
LD3-532	~~1037~~ 1000 4/17/23	KY/JG	4/19/23	4/19/23
LD3-539	1430 4/18/23	KY	4/19/23	4/19/23
LD3-540	1000 4/19/23	KY	4/21/23	4/21/23
LD3-548	1331 4/20/23	GL	4/24/23	4/24/23

⑨ 4/12/23 KY

TOXICOLOGY LABORATORY BENCH SHEET - TESTING LOCATION

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-303

Day	Testing Location	Date	Time	Initials
0	19B, 20B	3/29/23	1600	JR
1				
2	19B, 20B	3/31/23	0936	GL
3				
4				
5	19B, 20B	4/3/23	0937	LAD
6				
7	19B, 20B	4/5/23	0911	GL
8				
9	19B, 20B	4/7/23	0940	LAD
10				
11				
12	19B, 20B	4/10/23	1540	JR
13				
14	19B, 20B	4/12/23	1020	KY
15				
16	19B, 20B	4/14/23	1001	GL
17				
18				
19	19B, 20B	4/17/23	1430	LAD
20				
21	19B, 20B	4/19/23	0846	GL
22				
23	19B, 20B	4/21/23	0908	KY
24				
25				
26	19B, 20B	4/24/23	0933	LAD
27				
28	19B, 20B	4/26/23	1245	[illegible]
29				
30				

TOXICOLOGY LABORATORY CORRECTION BENCH SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-303

Correction Explanations

(a) Technician Error-Mathematical

(b) Technician Error-Manual Data Recording

(c) Technician Error-Head Count Observation

(d) Technician Error-Overwrite

(e) Technician Error-Missing Data

(f) Technician Error-Lost Organism

(g) Technician Error-Transcription Error

(h) Technician Error-Other:

(i) Meter Malfunction

TOXICOLOGY LABORATORY BENCH SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-303

Date/Time/Initials	Comments/Activity

CETIS Test Data Worksheet

Bioaccumulation Evaluation - Survival Endpoint — **EA-EST, Inc. PBC**

Start Date:	29 Mar-23 13:45	**Species:**	Macoma nasuta	**Sample Code:**	AT3-191
End Date:	26 Apr-23 12:45	**Protocol:**	US ACE NED RIM (2004)	**Sample Source:**	Yachtsman Marina NAE-2004-00319
Sample Date:	20 Mar-23	**Material:**	Laboratory Control Sediment	**Sample Station:**	Laboratory Control

Sample	Rep	Pos	# Exposed	# Survived	Notes
AT3-191	1	1	30	28	
AT3-191	2	6	30	26	
AT3-191	3	8	30	27	
IOSN 2019	1	2	20	19	
IOSN 2019	2	5	20	18	
IOSN 2019	3	7	20	20	
IOSN 2019	4	10	20	18	
IOSN 2019	5	12	20	19	
AT3-098	1	3	30	30	
AT3-098	2	4	30	30	
AT3-098	3	9	30	26	
AT3-098	4	11	30	29	
AT3-098	5	13	30	29	

CETIS Summary Report

Report Date:	08 May-23 23:13 (p 1 of 1)
Test Code/ID:	TN-23-303MnSurv / 05-1648-0077

Bioaccumulation Evaluation - Survival Endpoint **EA-EST, Inc. PBC**

Batch ID:	03-8883-4534	**Test Type:**	Survival	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:45	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:45	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample ID:	10-1907-8970	**Code:**	AT3-191	**Project:**	Dredged Sediment Evaluation
Sample Date:	20 Mar-23	**Material:**	Laboratory Control Sediment	**Source:**	Yachtsman Marina NAE-2004-00319 (
Receipt Date:	20 Mar-23 16:00	**CAS (PC):**		**Station:**	Laboratory Control
Sample Age:	9d 14h	**Client:**	Eco-Analysts, Inc.		

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
AT3-191	10-1907-8970	20 Mar-23	20 Mar-23 16:00	9d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h		
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
AT3-191	Laboratory Control Sediment	Yachtsman Marina NAE-2004-00	Laboratory Control	
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Single Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
06-3628-8518	Survival Rate	Equal Variance t Two-Sample Test	0.8889	IOSN 2019 passed survival rate	1
15-9977-3478	Survival Rate	Equal Variance t Two-Sample Test	0.7968	AT3-098 passed survival rate	1

Survival Rate Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
AT3-191	LC	3	0.900	0.817	0.983	0.867	0.933	0.019	0.033	3.70%	0.00%
IOSN 2019	RS	5	0.940	0.888	0.992	0.900	1.000	0.019	0.042	4.45%	-4.44%
AT3-098		5	0.960	0.892	1.030	0.867	1.000	0.025	0.055	5.71%	-6.67%

Survival Rate Detail MD5: 9962839BD8282B8BBFF87A881CBEBCC1

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
AT3-191	LC	0.933	0.867	0.900		
IOSN 2019	RS	0.950	0.900	1.000	0.900	0.950
AT3-098		1.000	1.000	0.867	0.967	0.967

CETIS Analytical Report

Report Date: 08 May-23 23:12 (p 1 of 2)
Test Code/ID: TN-23-303MnSurv / 05-1648-0077

Bioaccumulation Evaluation - Survival Endpoint — **EA-EST, Inc. PBC**

Analysis ID:	06-3628-8518	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv2.1.1
Analyzed:	08 May-23 23:12	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 23:09	**MD5 Hash:**	3AB31F1E28D613C7BA7B01DCD2B4A574	**Editor ID:**	005-341-210-5

Batch ID:	03-8883-4534	**Test Type:**	Survival	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:45	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:45	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or Age:

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
AT3-191	10-1907-8970	20 Mar-23	20 Mar-23 16:00	9d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
AT3-191	Laboratory Control Sediment	Yachtsman Marina NAE-2004-00	Laboratory Control	
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	IOSN 2019 passed survival rate endpoint	8.16%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Lab Control Sedim	Reference Sed	6	-1.36	1.94	0.111	CDF	0.8889	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.79	2.13	0.3406	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.011287	0.011287	1	1.86	0.2221	Non-Significant Effect
Error	0.0365073	0.0060845	6			
Total	0.0477943		7			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.37	199	0.6357	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.928	0.645	0.4950	Normal Distribution

Survival Rate Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
AT3-191	LC	3	0.900	0.817	0.983	0.900	0.867	0.933	0.019	3.70%	0.00%
IOSN 2019	RS	5	0.940	0.888	0.992	0.950	0.900	1.000	0.019	4.45%	-4.44%

Angular (Corrected) Transformed Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
AT3-191	LC	3	1.250	1.110	1.390	1.250	1.200	1.310	0.033	4.50%	0.00%
IOSN 2019	RS	5	1.330	1.220	1.440	1.350	1.250	1.460	0.039	6.53%	-6.20%

Survival Rate Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
AT3-191	LC	0.933	0.867	0.900		
IOSN 2019	RS	0.950	0.900	1.000	0.900	0.950

Angular (Corrected) Transformed Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
AT3-191	LC	1.310	1.200	1.250		
IOSN 2019	RS	1.350	1.250	1.460	1.250	1.350

Bioaccumulation Evaluation - Survival Endpoint

EA-EST, Inc. PBC

Analysis ID:	15-9977-3478	**Endpoint:**	Survival Rate	**CETIS Version:**	CETISv2.1.1
Analyzed:	08 May-23 23:12	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 23:09	**MD5 Hash:**	ED41FF2F03C95AC3423E56D60D13F732	**Editor ID:**	005-341-210-5

Batch ID:	03-8883-4534	**Test Type:**	Survival	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:45	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:45	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Angular (Corrected)	C > T	AT3-098 passed survival rate endpoint	6.91%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-0.876	1.86	0.12	CDF	0.7968	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.96	2.29	0.2713	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.007994	0.007994	1	0.768	0.4065	Non-Significant Effect
Error	0.0833144	0.0104143	8			
Total	0.0913084		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.76	23.2	0.5962	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.937	0.741	0.5215	Normal Distribution

Survival Rate Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.940	0.888	0.992	0.950	0.900	1.000	0.019	4.45%	0.00%
AT3-098		5	0.960	0.892	1.000	0.967	0.867	1.000	0.025	5.71%	-2.13%

Angular (Corrected) Transformed Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	1.330	1.220	1.440	1.350	1.250	1.460	0.039	6.53%	0.00%
AT3-098		5	1.390	1.240	1.530	1.390	1.200	1.480	0.052	8.32%	-4.25%

Survival Rate Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.950	0.900	1.000	0.900	0.950
AT3-098		1.000	1.000	0.867	0.967	0.967

Angular (Corrected) Transformed Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	1.350	1.250	1.460	1.250	1.350
AT3-098		1.480	1.480	1.200	1.390	1.390

ATTACHMENT IV

Nereis virens 28-Day Solid Phase Bioaccumulation Testing
Tissue Chemistry and Body Burden Statistical Analyses

Metals

(17 pages)

Yachtsman Marina
NAE-2004-00319

APPENDIX A. CONCENTRATIONS OF COCs IN THE WORM (*N. virens*)

			Pre-Assay		
CONTAMINANT	REP1	REP2	REP3	REP4 *	REP5 *
Metals (ug/g wet weight)					
Arsenic	1.94	2.40	1.66		
Cadmium	0.0270 J	0.0420 J	0.0210 J		
Chromium	0.389 J	1.10	0.372 J		
Copper	1.13	2.28	1.05		
Lead	0.171	0.247	0.167		
Mercury	0.0100 J	0.0180	0.00500 J		
Nickel	0.344	0.784	0.299		
Zinc	14.9	16.6	7.73		

* = Qualifiers
U Analyte not detected; below Method Detection Limit; value is one-half the Method Detection Limit
J Analyte estimated; detection below Reporting Limit but above Method Detection Limit
NA Not Analyzed

Yachtsman Marina
NAE-2004-00319

APPENDIX A. CONCENTRATIONS OF COCs IN THE WORM (*N. virens*)

	IOSN Reference				
CONTAMINANT	REP1	REP2	REP3	REP4	REP5
Metals (ug/g wet weight)					
Arsenic	2.26	1.92	1.93	2.63	2.51
Cadmium	0.0250 J	0.0220 J	0.0180 J	0.0320 J	0.0290 J
Chromium	0.0730 J	0.0630 J	0.0550 J	0.0880 J	0.0640 J
Copper	1.16	1.12	0.996	1.40	1.31
Lead	0.0700	0.0740	0.0580	0.0710	0.0990
Mercury	0.0180	0.0160	0.0120	0.0180	0.0140 J
Nickel	0.154	0.130	0.118	0.191	0.246
Zinc	7.15	11.8	6.63	8.38	58.9

* = Qualifiers
U Analyte not detected; belo
J Analyte estimated; detectio
NA Not Analyzed

Yachtsman Marina
NAE-2004-00319

APPENDIX A. CONCENTRATIONS OF COCs IN THE WORM (*N. virens*)

10 Stations at 4 Marinas Mud

CONTAMINANT	REP1		REP2		REP3		REP4		REP5	
Metals (ug/g wet weight)										
Arsenic	1.65		1.96		2.21		2.16		2.12	
Cadmium	0.0300	J	0.0370	J	0.0330	J	0.0340	J	0.0350	J
Chromium	0.232	J	0.507		0.459	J	0.997		0.561	
Copper	0.901		1.08		1.04		1.41		1.19	
Lead	0.196		0.225		0.180		0.179		0.173	
Mercury	0.00195	U	0.00400	J	0.00213	U	0.0160		0.00900	J
Nickel	0.203		0.239		0.278		0.262		0.179	
Zinc	18.6		12.0		16.7		14.5		8.61	

* = Qualifiers
U Analyte not detected; belo
J Analyte estimated; detectio
NA Not Analyzed

CETIS Test Data Worksheet

Bioaccumulation Evaluation - Metals - Nereis virens — **EA-EST, Inc. PBC**

Start Date:	08 Mar-23 11:31	**Species:**	Nereis virens	**Sample Code:**	AT3-152
End Date:	05 Apr-23 10:31	**Protocol:**	US ACE NED RIM (2004)	**Sample Source:**	Yachtsman Marina NAE-2004-00319
Sample Date:	03 Mar-23	**Material:**	Laboratory Control Sediment	**Sample Station:**	Laboratory Control

Sample	Rep	Pos	Body Burden	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Silver
IOSN 2019	1	2		2.26	0.025	0.073	1.16	0.07	0.018	0.154	7.15	
IOSN 2019	2	3		1.92	0.022	0.063	1.12	0.074	0.016	0.13	11.8	
IOSN 2019	3	6		1.93	0.018	0.055	0.996	0.058	0.012	0.118	6.63	
IOSN 2019	4	8		2.63	0.032	0.088	1.4	0.071	0.018	0.191	8.38	
IOSN 2019	5	10		2.51	0.029	0.064	1.31	0.099	0.014	0.246	58.9	
AT3-098	1	1		1.65	0.03	0.232	0.901	0.196	0.001945	0.203	18.6	
AT3-098	2	4		1.96	0.037	0.507	1.08	0.225	0.004	0.239	12	
AT3-098	3	5		2.21	0.033	0.459	1.04	0.18	0.00213	0.278	16.7	
AT3-098	4	7		2.16	0.034	0.997	1.41	0.179	0.016	0.262	14.5	
AT3-098	5	9		2.12	0.035	0.561	1.19	0.173	0.009	0.179	8.61	

Bioaccumulation Evaluation - Metals - Nereis virens **EA-EST, Inc. PBC**

Batch ID:	13-8417-6872	**Test Type:**	Bioaccumulation - Metals	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:31	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:31	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample ID:	11-9755-1044	**Code:**	AT3-152	**Project:**	Dredged Sediment Evaluation
Sample Date:	03 Mar-23	**Material:**	Laboratory Control Sediment	**Source:**	Yachtsman Marina NAE-2004-00319 (
Receipt Date:	03 Mar-23 12:30	**CAS (PC):**		**Station:**	Laboratory Control
Sample Age:	5d 12h	**Client:**	Eco-Analysts, Inc.		

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
14-3802-6235	Arsenic	Equal Variance t Two-Sample Test	0.8845	AT3-098 passed arsenic	1
14-9372-2871	Cadmium	Equal Variance t Two-Sample Test	0.0069	AT3-098 failed cadmium	1
16-2542-8047	Chromium	Unequal Variance t Two-Sample Test	0.0072	AT3-098 failed chromium	1
02-4210-0599	Chromium	Wilcoxon Rank Sum Two-Sample Test	0.0040	AT3-098 failed chromium	1
13-8883-2132	Copper	Equal Variance t Two-Sample Test	0.7353	AT3-098 passed copper	1
06-0350-2940	Lead	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed lead	1
12-6341-4781	Mercury	Equal Variance t Two-Sample Test	0.9925	AT3-098 passed mercury	1
20-0017-5455	Nickel	Equal Variance t Two-Sample Test	0.0305	AT3-098 failed nickel	1
13-3955-6427	Zinc	Equal Variance t Two-Sample Test	0.0206	AT3-098 failed zinc	1
04-4295-9523	Zinc	Wilcoxon Rank Sum Two-Sample Test	0.1111	AT3-098 passed zinc	1

Bioaccumulation Evaluation - Metals - Nereis virens **EA-EST, Inc. PBC**

Arsenic Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	2.25	1.85	2.65	1.92	2.63	0.145	0.325	14.46%	0.00%
AT3-098		5	2.02	1.74	2.3	1.65	2.21	0.102	0.227	11.24%	10.22%

Cadmium Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0252	0.0183	0.0321	0.018	0.032	0.00248	0.00554	21.99%	0.00%
AT3-098		5	0.0338	0.0306	0.037	0.03	0.037	0.00116	0.00259	7.66%	-34.13%

Chromium Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0686	0.053	0.0842	0.055	0.088	0.00563	0.0126	18.34%	0.00%
AT3-098		5	0.551	0.205	0.898	0.232	0.997	0.125	0.279	50.60%	-703.50%

Copper Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	1.2	0.999	1.4	0.996	1.4	0.0713	0.159	13.32%	0.00%
AT3-098		5	1.12	0.888	1.36	0.901	1.41	0.0851	0.19	16.93%	6.10%

Lead Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0744	0.0557	0.0931	0.058	0.099	0.00673	0.015	20.22%	0.00%
AT3-098		5	0.191	0.164	0.217	0.173	0.225	0.00941	0.021	11.03%	-156.18%

Mercury Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0156	0.0124	0.0188	0.012	0.018	0.00117	0.00261	16.72%	0.00%
AT3-098		5	0.00662	-0.000797	0.014	0.00195	0.016	0.00267	0.00597	90.24%	57.60%

Nickel Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.168	0.103	0.232	0.118	0.246	0.0232	0.0518	30.90%	0.00%
AT3-098		5	0.232	0.181	0.283	0.179	0.278	0.0183	0.041	17.65%	-38.38%

Zinc Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	18.6	-9.53	46.7	6.63	58.9	10.1	22.6	121.87%	0.00%
AT3-098		5	14.1	9.2	19	8.61	18.6	1.76	3.93	27.89%	24.18%

Arsenic Detail MD5: 48E122A42250FF85911F835BB2714057

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	2.26	1.92	1.93	2.63	2.51
AT3-098		1.65	1.96	2.21	2.16	2.12

Cadmium Detail MD5: 49D3145D3123EE99E93E8679CCD08CA8

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.025	0.022	0.018	0.032	0.029
AT3-098		0.03	0.037	0.033	0.034	0.035

Chromium Detail MD5: 33A4BA1F273B8C646B085A0939A25926

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.073	0.063	0.055	0.088	0.064
AT3-098		0.232	0.507	0.459	0.997	0.561

Copper Detail MD5: 53E4A07891BFC6AE9553271C0EAE2C41

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	1.16	1.12	0.996	1.4	1.31
AT3-098		0.901	1.08	1.04	1.41	1.19

Lead Detail MD5: 08B1B33DD308F1D4D30CFFD0662A5930

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.07	0.074	0.058	0.071	0.099
AT3-098		0.196	0.225	0.18	0.179	0.173

Mercury Detail MD5: C833F844DB2CF941F2FCB24EBADA1402

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.018	0.016	0.012	0.018	0.014
AT3-098		0.00195	0.004	0.00213	0.016	0.009

Nickel Detail MD5: BAF4DBD486C3A66235EB865EB550BEBC

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.154	0.13	0.118	0.191	0.246
AT3-098		0.203	0.239	0.278	0.262	0.179

Zinc Detail MD5: 7821CD915E3E53C736EE0C85DE1DE09D

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	7.15	11.8	6.63	8.38	58.9
AT3-098		18.6	12	16.7	14.5	8.61

STUDY: TN-23-302
CLIENT: Eco-Analysts, Inc.
PROJECT: Yachtsman Marina, Kennebunkport, ME NAE-2004-00319
ASSAY: ***N. virens*** **28-day Bioaccumulation Evaluation**
TASK: Statistical Analysis of Body Burden Metals

Endpoint	Method	C	<	T	Statistic	Critical	P Level	Alpha	Reject Null	MSD	DF	Ties	P-Type
Arsenic	Equal Variance t Two-Sample Test	IOSN	<	Comp	-1.296315	1.859548	0.8844953	0.05	FALSE	0.3299323	8		C
Cadmium	Equal Variance t Two-Sample Test	IOSN	<	Comp	3.144471	1.859548	0.006856192	0.05	TRUE	0.005085788	8		C
Chromium	Unequal Variance t Two-Sample Test	IOSN	<	Comp	5.11689	2.353364	0.00722293	0.05	TRUE	0.1706995	3		C
Chromium	Wilcoxon Rank Sum Two-Sample Test	IOSN	<	Comp	15		0.003968254	0.05	TRUE		8	0	E
Copper	Equal Variance t Two-Sample Test	IOSN	<	Comp	-0.6574845	1.859548	0.7353358	0.05	FALSE	0.2064641	8		C
Lead	Equal Variance t Two-Sample Test	IOSN	<	Comp	10.04866	1.859548	4.093E-06	0.05	TRUE	0.02150332	8		C
Mercury	Equal Variance t Two-Sample Test	IOSN	<	Comp	-3.084291	1.859548	0.9924905	0.05	FALSE	0.005417142	8		C
Nickel	Equal Variance t Two-Sample Test	IOSN	<	Comp	2.179135	1.859548	0.03047227	0.05	TRUE	0.05495523	8		C
Zinc	Equal Variance t Two-Sample Test	IOSN	<	Comp	2.498184	1.894579	0.02055064	0.05	TRUE	4.240874	7		C
Zinc	Wilcoxon Rank Sum Two-Sample Test	IOSN	<	Comp	21		0.1111111	0.05	FALSE		8	0	E

CETIS Analytical Report

Report Date:	19 Aug-23 06:54 (p 1 of 8)
Test Code/ID:	TN-23-302NvMet / 07-8839-3412

Bioaccumulation Evaluation - Metals - Nereis virens — **EA-EST, Inc. PBC**

Analysis ID:	14-3802-6235	**Endpoint:**	Arsenic	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:54	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:49	**MD5 Hash:**	DF2BDA9EB0E0632414FC98407CF1225E	**Editor ID:**	

Batch ID:	13-8417-6872	**Test Type:**	Bioaccumulation - Metals	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:31	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:31	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed arsenic endpoint	14.66%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-1.3	1.86	0.33	CDF	0.8845	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.44	2.29	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.13225	0.13225	1	1.68	0.2310	Non-Significant Effect
Error	0.6296	0.0787	8			
Total	0.76185		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.05	23.2	0.5031	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.922	0.741	0.3732	Normal Distribution

Arsenic Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	2.25	1.85	2.65	2.26	1.92	2.63	0.145	14.46%	0.00%
AT3-098		5	2.02	1.74	2.3	2.12	1.65	2.21	0.102	11.24%	10.22%

Arsenic Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	2.26	1.92	1.93	2.63	2.51
AT3-098		1.65	1.96	2.21	2.16	2.12

Bioaccumulation Evaluation - Metals - Nereis virens | **EA-EST, Inc. PBC**

Analysis ID:	14-9372-2871	**Endpoint:**	Cadmium	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:54	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:49	**MD5 Hash:**	B96EBCBC73516D3013B78FD7B5D1F854	**Editor ID:**	

Batch ID:	13-8417-6872	**Test Type:**	Bioaccumulation - Metals	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:31	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:31	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed cadmium endpoint	20.18%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	3.14	1.86	0.00509	CDF	0.0069	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.77	2.29	0.5560	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0001849	0.0001849	1	9.89	0.0137	Significant Effect
Error	0.0001496	0.0000187	8			
Total	0.0003345		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	4.58	23.2	0.1696	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.989	0.741	0.9959	Normal Distribution

Cadmium Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0252	0.0183	0.0321	0.025	0.018	0.032	0.00248	21.99%	0.00%
AT3-098		5	0.0338	0.0306	0.037	0.034	0.03	0.037	0.00116	7.66%	-34.13%

Cadmium Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.025	0.022	0.018	0.032	0.029
AT3-098		0.03	0.037	0.033	0.034	0.035

Bioaccumulation Evaluation - Metals - Nereis virens			**EA-EST, Inc. PBC**

Analysis ID:	16-2542-8047	**Endpoint:**	Chromium	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:54	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:49	**MD5 Hash:**	53A2BA2A09713E0DC71DD20E75BCA127	**Editor ID:**	

Batch ID:	13-8417-6872	**Test Type:**	Bioaccumulation - Metals	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:31	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:31	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed chromium endpoint	248.83%

Unequal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	3	5.12	2.35	0.171	CDF	0.0072	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.306116	0.306116	1	33.8	0.0007	Significant Effect
Error	0.063388	0.0090554	7			
Total	0.369504		8			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	132	24.3	0.0004	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.814	0.701	0.0293	Normal Distribution

Chromium Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0686	0.053	0.0842	0.064	0.055	0.088	0.00563	18.34%	0.00%
AT3-098		4	0.44	0.21	0.67	0.459	0.232	0.561	0.0723	32.89%	-541.03%

Chromium Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.073	0.063	0.055	0.088	0.064
AT3-098		0.232	0.507	0.459	---	0.561

Bioaccumulation Evaluation - Metals - Nereis virens — **EA-EST, Inc. PBC**

Analysis ID:	13-8883-2132	**Endpoint:**	Copper	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:54	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:49	**MD5 Hash:**	F85C5A6258CB4ED4B31ACE29920B57DF	**Editor ID:**	

Batch ID:	13-8417-6872	**Test Type:**	Bioaccumulation - Metals	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:31	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:31	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed copper endpoint	17.25%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-0.657	1.86	0.206	CDF	0.7353	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.73	2.29	0.6291	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0133225	0.0133225	1	0.432	0.5293	Non-Significant Effect
Error	0.24655	0.0308187	8			
Total	0.259872		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.42	23.2	0.7399	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.954	0.741	0.7163	Normal Distribution

Copper Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	1.2	0.999	1.4	1.16	0.996	1.4	0.0713	13.32%	0.00%
AT3-098		5	1.12	0.888	1.36	1.08	0.901	1.41	0.0851	16.93%	6.10%

Copper Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	1.16	1.12	0.996	1.4	1.31
AT3-098		0.901	1.08	1.04	1.41	1.19

Bioaccumulation Evaluation - Metals - Nereis virens — **EA-EST, Inc. PBC**

Analysis ID:	06-0350-2940	**Endpoint:**	Lead	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:54	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:49	**MD5 Hash:**	486E86376DD112B2B637D9FCC3831C6A	**Editor ID:**	

Batch ID:	13-8417-6872	**Test Type:**	Bioaccumulation - Metals	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:31	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:31	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed lead endpoint	28.90%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	10	1.86	0.0215	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2	2.29	0.2387	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0337561	0.0337561	1	101	<1.0E-05	Significant Effect
Error	0.0026744	0.0003343	8			
Total	0.0364305		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.95	23.2	0.5323	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.871	0.741	0.1020	Normal Distribution

Lead Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0744	0.0557	0.0931	0.071	0.058	0.099	0.00673	20.22%	0.00%
AT3-098		5	0.191	0.164	0.217	0.18	0.173	0.225	0.00941	11.03%	-156.18%

Lead Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.07	0.074	0.058	0.071	0.099
AT3-098		0.196	0.225	0.18	0.179	0.173

Bioaccumulation Evaluation - Metals - Nereis virens | **EA-EST, Inc. PBC**

Analysis ID:	12-6341-4781	**Endpoint:**	Mercury	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:54	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:49	**MD5 Hash:**	B14DF90D09FFB249BD776DE339A125CE	**Editor ID:**	

Batch ID:	13-8417-6872	**Test Type:**	Bioaccumulation - Metals	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:31	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:31	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed mercury endpoint	34.73%

Equal Variance t Two-Sample Test

Sample I	vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed		AT3-098	8	-3.08	1.86	0.00542	CDF	0.9925	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.16	2.29	0.1085	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0002018	0.0002018	1	9.51	0.0150	Significant Effect
Error	0.0001697	2.122E-05	8			
Total	0.0003716		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	5.24	23.2	0.1376	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.893	0.741	0.1815	Normal Distribution

Mercury Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0156	0.0124	0.0188	0.016	0.012	0.018	0.00117	16.72%	0.00%
AT3-098		5	0.00662	-0.000797	0.014	0.004	0.00195	0.016	0.00267	90.24%	57.60%

Mercury Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.018	0.016	0.012	0.018	0.014
AT3-098		0.00195	0.004	0.00213	0.016	0.009

Bioaccumulation Evaluation - Metals - Nereis virens **EA-EST, Inc. PBC**

Analysis ID:	20-0017-5455	**Endpoint:**	Nickel	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:54	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:49	**MD5 Hash:**	D31D6166FB89BC529979C5AC2D07EA33	**Editor ID:**	

Batch ID:	13-8417-6872	**Test Type:**	Bioaccumulation - Metals	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:31	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:31	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed nickel endpoint	32.75%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	2.18	1.86	0.055	CDF	0.0305	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.78	2.29	0.5399	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0103684	0.0103684	1	4.75	0.0609	Non-Significant Effect
Error	0.0174676	0.0021835	8			
Total	0.027836		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.6	23.2	0.6594	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.947	0.741	0.6281	Normal Distribution

Nickel Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.168	0.103	0.232	0.154	0.118	0.246	0.0232	30.90%	0.00%
AT3-098		5	0.232	0.181	0.283	0.239	0.179	0.278	0.0183	17.65%	-38.38%

Nickel Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.154	0.13	0.118	0.191	0.246
AT3-098		0.203	0.239	0.278	0.262	0.179

Bioaccumulation Evaluation - Metals - Nereis virens — **EA-EST, Inc. PBC**

Analysis ID:	13-3955-6427	**Endpoint:**	Zinc	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:54	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:49	**MD5 Hash:**	0273BB7FF8A9CB03C86DC48774CE1DE	**Editor ID:**	

Batch ID:	13-8417-6872	**Test Type:**	Bioaccumulation - Metals	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:31	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:31	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed zinc endpoint	49.95%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	7	2.5	1.89	4.24	CDF	0.0206	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	69.4899	69.4899	1	6.24	0.0411	Significant Effect
Error	77.9419	11.1346	7			
Total	147.432		8			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.85	46.2	0.4155	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.968	0.701	0.8726	Normal Distribution

Zinc Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	4	8.49	4.79	12.2	7.15	6.63	11.8	1.16	27.39%	0.00%
AT3-098		5	14.1	9.2	19	14.5	8.61	18.6	1.76	27.89%	-65.87%

Zinc Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	7.15	11.8	6.63	8.38	---
AT3-098		18.6	12	16.7	14.5	8.61

ATTACHMENT V

Nereis virens 28-Day Solid Phase Bioaccumulation Testing
Tissue Chemistry and Body Burden Statistical Analyses

PAHs

(27 pages)

Yachtsman Marina
NAE-2004-00319

APPENDIX A. CONCENTRATIONS OF COCs IN THE WORM (*N. virens*)

CONTAMINANT	REP1	REP2	Pre-Assay REP3	REP4 *	REP5 *
PAHs (ng/g wet weight)					
Acenaphthene	0.615 U	0.630 U	0.615 U		
Acenaphthylene	0.377 U	0.388 U	0.378 U		
Anthracene	0.409 U	0.421 U	1.88 J		
Benzo(a)anthracene	0.765 U	0.790 U	0.770 U		
Benzo(a)pyrene	0.805 U	0.830 U	0.805 U		
Benzo(b)fluoranthene	1.07 U	1.10 U	1.07 U		
Benzo(k)fluoranthene	0.489 U	0.500 U	0.490 U		
Benzo(g,h,i)perylene	0.342 U	0.352 U	0.343 U		
Chrysene	0.745 U	0.765 U	0.745 U		
Dibenzo(a,h)anthracene	0.396 U	0.408 U	0.397 U		
Fluoranthene	0.605 U	0.620 U	0.605 U		
Fluorene	1.34 J	1.18 J	0.693 J		
Indeno(1,2,3-c,d)pyrene	0.800 U	0.825 U	0.805 U		
Naphthalene	1.54 JB	2.19 JB	1.20 JB		
Phenanthrene	0.670 U	0.690 U	0.670 U		
Pyrene	0.890 U	0.915 U	0.890 U		
PAH Total	11.9	12.6	12.4		

* = Qualifiers
U Analyte not detected; below Method Detection Limit; value is one-half the Method Detection Limit
J Analyte estimated; detection below Reporting Limit but above Method Detection Limit
NA Not Analyzed

Yachtsman Marina
NAE-2004-00319

APPENDIX A. CONCENTRATIONS OF COCs IN THE WORM (*N. virens*)

	IOSN Reference									
CONTAMINANT	REP1		REP2		REP3		REP4		REP5	
PAHs (ng/g wet weight)										
Acenaphthene	0.462	U	0.458	U	0.460	U	0.954	J	0.480	U
Acenaphthylene	0.284	U	0.282	U	0.283	U	0.287	U	0.295	U
Anthracene	0.308	U	0.306	U	0.307	U	0.311	U	0.320	U
Benzo(a)anthracene	0.575	U	0.570	U	0.575	U	0.585	U	0.600	U
Benzo(a)pyrene	0.605	U	0.600	U	0.605	U	0.610	U	0.630	U
Benzo(b)fluoranthene	0.800	U	0.795	U	0.800	U	0.810	U	0.830	U
Benzo(k)fluoranthene	0.368	U	0.365	U	0.367	U	0.372	U	0.382	U
Benzo(g,h,i)perylene	0.258	U	0.255	U	0.257	U	0.260	U	0.267	U
Chrysene	0.560	U	0.555	U	0.560	U	0.565	U	0.580	U
Dibenzo(a,h)anthracene	0.299	U	0.296	U	0.297	U	0.301	U	0.310	U
Fluoranthene	1.01	J	0.451	U	0.453	U	0.459	U	0.472	U
Fluorene	0.258	U	0.255	U	0.543	J	0.832	J	0.267	U
Indeno(1,2,3-c,d)pyrene	0.605	U	0.600	U	0.600	U	0.610	U	0.625	U
Naphthalene	0.812	J	0.394	U	0.396	U	1.24	J	0.412	U
Phenanthrene	2.12	J	1.76	J	2.01	J	3.10	J	1.23	J
Pyrene	0.670	U	0.665	U	0.665	U	0.675	U	0.695	U
PAH Total	9.99		8.61		9.18		12.0		8.39	

* = Qualifiers
U Analyte not detected; belo
J Analyte estimated; detectio
NA Not Analyzed

Yachtsman Marina
NAE-2004-00319

APPENDIX A. CONCENTRATIONS OF COCs IN THE WORM (*N. virens*)

10 Stations at 4 Marinas Mud

CONTAMINANT	REP1	REP2	REP3	REP4	REP5
PAHs (ng/g wet weight)					
Acenaphthene	0.620 U	1.31 J	0.610 U	1.24 J	0.635 U
Acenaphthylene	0.380 U	0.371 U	0.374 U	12.2	7.79
Anthracene	0.412 U	0.845 J	0.965 J	0.404 U	0.422 U
Benzo(a)anthracene	0.770 U	0.755 U	0.760 U	0.755 U	0.790 U
Benzo(a)pyrene	0.810 U	0.790 U	0.800 U	0.795 U	0.830 U
Benzo(b)fluoranthene	1.07 U	1.05 U	7.90	1.05 U	1.10 U
Benzo(k)fluoranthene	0.492 U	0.481 U	30.3	0.483 U	0.505 U
Benzo(g,h,i)perylene	0.344 U	0.337 U	0.339 U	0.338 U	0.776 J
Chrysene	1.82 J	1.63 J	0.740 U	0.735 U	0.770 U
Dibenzo(a,h)anthracene	0.399 U	0.390 U	0.393 U	0.391 U	0.409 U
Fluoranthene	7.81	8.46	10.7	2.77 J	3.83 J
Fluorene	1.73 J	1.31 J	1.13 J	3.78 J	2.30 J
Indeno(1,2,3-c,d)pyrene	0.805 U	0.790 U	0.795 U	0.790 U	0.830 U
Naphthalene	1.65 JB	2.32 JB	2.29 JB	0.520 U	1.20 JB
Phenanthrene	0.675 U	0.660 U	1.62 J	0.660 U	0.690 U
Pyrene	8.04	6.62	7.73	4.83 J	3.92 J
PAH Total	27.8	28.1	67.4	31.7	26.8

* = Qualifiers
U Analyte not detected; belo
J Analyte estimated; detectio
NA Not Analyzed

CETIS Test Data Worksheet

Report Date: 19 Aug-23 06:55 (p 1 of 1)
Test Code/ID: TN-23-302NvPAH / 17-1765-7444

Bioaccumulation Evaluation - PAHs - Nereis — **EA-EST, Inc. PBC**

Start Date:	08 Mar-23 11:32	**Species:**	Nereis virens	**Sample Code:**	AT3-152
End Date:	05 Apr-23 10:32	**Protocol:**	US ACE NED RIM (2004)	**Sample Source:**	Yachtsman Marina NAE-2004-00319
Sample Date:	03 Mar-23	**Material:**	Laboratory Control Sediment	**Sample Station:**	Laboratory Control

Sample	Rep	Pos	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene	1,4-Dichlorobenze	Total PAHs
IOSN 2019	1	2	0.462	0.284	0.308	0.575	0.605	0.8	0.2575	0.368	0.56	0.2985	1.01	0.2575	0.605	0.812	2.12	0.67		
IOSN 2019	2	4	0.458	0.2815	0.3055	0.57	0.6	0.795	0.255	0.365	0.555	0.296	0.451	0.255	0.6	0.3935	1.76	0.665		
IOSN 2019	3	5	0.46	0.283	0.307	0.575	0.605	0.8	0.2565	0.3665	0.56	0.297	0.453	0.543	0.6	0.3955	2.01	0.665		
IOSN 2019	4	8	0.954	0.2865	0.311	0.585	0.61	0.81	0.26	0.3715	0.565	0.301	0.459	0.832	0.61	1.24	3.1	0.675		
IOSN 2019	5	9	0.4795	0.2945	0.3195	0.6	0.63	0.83	0.267	0.382	0.58	0.3095	0.472	0.267	0.625	0.412	1.23	0.695		
AT3-098	1	1	0.62	0.3795	0.4115	0.77	0.81	1.07	0.344	0.492	1.82	0.399	7.81	1.73	0.805	1.65	0.675	8.04		
AT3-098	2	3	1.31	0.371	0.845	0.755	0.79	1.045	0.3365	0.481	1.63	0.39	8.46	1.31	0.79	2.32	0.66	6.62		
AT3-098	3	6	0.61	0.374	0.965	0.76	0.8	7.9	0.339	30.3	0.74	0.393	10.7	1.13	0.795	2.29	1.62	7.73		
AT3-098	4	7	1.24	12.2	0.404	0.755	0.795	1.05	0.3375	0.483	0.735	0.391	2.77	3.78	0.79	0.52	0.66	4.83		
AT3-098	5	10	0.635	7.79	0.422	0.79	0.83	1.1	0.776	0.505	0.77	0.409	3.83	2.3	0.83	1.2	0.69	3.92		

Analyst: NR QA: JR

Bioaccumulation Evaluation - PAHs - Nereis | **EA-EST, Inc. PBC**

Batch ID:	16-7806-7369	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:32	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:32	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample ID:	11-9755-1044	**Code:**	AT3-152	**Project:**	Dredged Sediment Evaluation
Sample Date:	03 Mar-23	**Material:**	Laboratory Control Sediment	**Source:**	Yachtsman Marina NAE-2004-00319 (
Receipt Date:	03 Mar-23 12:30	**CAS (PC):**		**Station:**	Laboratory Control
Sample Age:	5d 12h	**Client:**	Eco-Analysts, Inc.		

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
09-6281-0431	Acenaphthene	Equal Variance t Two-Sample Test	0.0634	AT3-098 passed acenaphthene	1
10-1846-2388	Acenaphthylene	Unequal Variance t Two-Sample Test	0.0922	AT3-098 passed acenaphthylene	1
14-8405-4060	Anthracene	Unequal Variance t Two-Sample Test	0.0352	AT3-098 failed anthracene	1
02-1204-0422	Benzo(a)anthracene	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed benzo(a)anthracene	1
10-8756-9954	Benzo(a)pyrene	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed benzo(a)pyrene	1
09-2700-3438	Benzo(b)fluoranthene	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed benzo(b)fluoranthene	1
18-4472-6594	Benzo(b)fluoranthene	Wilcoxon Rank Sum Two-Sample Test	0.0040	AT3-098 failed benzo(b)fluoranthene	1
13-4397-7733	Benzo(g,h,i)perylene	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed benzo(g,h,i)perylene	1
15-5949-4399	Benzo(g,h,i)perylene	Wilcoxon Rank Sum Two-Sample Test	0.0040	AT3-098 failed benzo(g,h,i)perylene	1
11-9752-3554	Benzo(k)fluoranthene	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed benzo(k)fluoranthene	1
21-1524-6710	Benzo(k)fluoranthene	Wilcoxon Rank Sum Two-Sample Test	0.0040	AT3-098 failed benzo(k)fluoranthene	1
14-6869-2556	Chrysene	Unequal Variance t Two-Sample Test	0.0378	AT3-098 failed chrysene	1
19-8988-8883	Dibenz(a,h)anthracene	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed dibenz(a,h)anthracene	1
16-7604-1580	Fluoranthene	Unequal Variance t Two-Sample Test	0.0072	AT3-098 failed fluoranthene	1
02-3007-9915	Fluorene	Equal Variance t Two-Sample Test	0.0014	AT3-098 failed fluorene	1
14-8100-8905	Fluorene	Equal Variance t Two-Sample Test	0.0054	AT3-098 failed fluorene	1
08-3442-7926	Indeno(1,2,3-cd)pyrene	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed indeno(1,2,3-cd)pyrene	1
12-1685-5860	Naphthalene	Equal Variance t Two-Sample Test	0.0188	AT3-098 failed naphthalene	1
01-9493-0851	Phenanthrene	Equal Variance t Two-Sample Test	0.9945	AT3-098 passed phenanthrene	1
13-2043-1908	Pyrene	Unequal Variance t Two-Sample Test	0.0012	AT3-098 failed pyrene	1

Acenaphthene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.563	0.291	0.835	0.458	0.954	0.0979	0.219	38.90%	0.00%
AT3-098		5	0.883	0.437	1.33	0.61	1.31	0.16	0.359	40.64%	-56.92%

Acenaphthylene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.286	0.28	0.292	0.282	0.294	0.0023	0.00514	1.80%	0.00%
AT3-098		5	4.22	-2.6	11	0.371	12.2	2.46	5.5	130.12%	-1377.05

Anthracene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.31	0.303	0.317	0.306	0.319	0.00249	0.00557	1.80%	0.00%
AT3-098		5	0.61	0.27	0.949	0.404	0.965	0.122	0.273	44.81%	-96.49%

Benzo(a)anthracene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.581	0.566	0.596	0.57	0.6	0.00534	0.0119	2.05%	0.00%
AT3-098		5	0.766	0.748	0.784	0.755	0.79	0.0066	0.0147	1.93%	-31.84%

Benzo(a)pyrene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.61	0.595	0.625	0.6	0.63	0.00524	0.0117	1.92%	0.00%
AT3-098		5	0.805	0.785	0.825	0.79	0.83	0.00707	0.0158	1.96%	-31.97%

Benzo(b)fluoranthene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.807	0.79	0.824	0.795	0.83	0.00624	0.014	1.73%	0.00%
AT3-098		5	2.43	-1.36	6.23	1.04	7.9	1.37	3.06	125.62%	-201.49%

Benzo(g,h,i)perylene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.259	0.253	0.265	0.255	0.267	0.00211	0.00472	1.82%	0.00%
AT3-098		5	0.427	0.184	0.669	0.336	0.776	0.0874	0.195	45.79%	-64.58%

Benzo(k)fluoranthene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.371	0.362	0.379	0.365	0.382	0.00305	0.00681	1.84%	0.00%
AT3-098		5	6.45	-10.1	23	0.481	30.3	5.96	13.3	206.62%	-1641.01

Chrysene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.564	0.552	0.576	0.555	0.58	0.0043	0.00962	1.71%	0.00%
AT3-098		5	1.14	0.469	1.81	0.735	1.82	0.241	0.539	47.35%	-101.95%

Dibenz(a,h)anthracene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.3	0.294	0.307	0.296	0.31	0.00243	0.00542	1.81%	0.00%
AT3-098		5	0.396	0.387	0.406	0.39	0.409	0.00352	0.00786	1.98%	-31.96%

Fluoranthene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.569	0.263	0.875	0.451	1.01	0.11	0.247	43.35%	0.00%
AT3-098		5	6.71	2.6	10.8	2.77	10.7	1.48	3.32	49.40%	-1079.96

Fluorene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.431	0.114	0.748	0.255	0.832	0.114	0.256	59.32%	0.00%
AT3-098		5	2.05	0.725	3.37	1.13	3.78	0.477	1.07	52.04%	-375.75%

Indeno(1,2,3-cd)pyrene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.608	0.595	0.621	0.6	0.625	0.00464	0.0104	1.71%	0.00%
AT3-098		5	0.802	0.781	0.823	0.79	0.83	0.00752	0.0168	2.10%	-31.91%

Naphthalene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.651	0.185	1.12	0.394	1.24	0.168	0.375	57.59%	0.00%
AT3-098		5	1.6	0.65	2.54	0.52	2.32	0.341	0.762	47.75%	-145.31%

Phenanthrene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	2.04	1.2	2.89	1.23	3.1	0.305	0.683	33.41%	0.00%
AT3-098		5	0.861	0.334	1.39	0.66	1.62	0.19	0.424	49.30%	57.88%

Pyrene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.674	0.659	0.689	0.665	0.695	0.00557	0.0124	1.85%	0.00%
AT3-098		5	6.23	3.99	8.46	3.92	8.04	0.805	1.8	28.92%	-824.04%

Acenaphthene Detail MD5: 28B59F3CDBB3583514093D0F338B80B5

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.462	0.458	0.46	0.954	0.479
AT3-098		0.62	1.31	0.61	1.24	0.635

Acenaphthylene Detail MD5: 299524FB48C3129698F11873019E882B

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.284	0.282	0.283	0.287	0.294
AT3-098		0.38	0.371	0.374	12.2	7.79

Anthracene Detail MD5: A34DB90A0D84147410AFDC111A084513

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.308	0.306	0.307	0.311	0.319
AT3-098		0.412	0.845	0.965	0.404	0.422

Benzo(a)anthracene Detail MD5: F21062880BC25FB0106842311D450EF9

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.575	0.57	0.575	0.585	0.6
AT3-098		0.77	0.755	0.76	0.755	0.79

Benzo(a)pyrene Detail MD5: 3E33BFA4FFA8A2EA09CE125D593F1F9E

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.605	0.6	0.605	0.61	0.63
AT3-098		0.81	0.79	0.8	0.795	0.83

Benzo(b)fluoranthene Detail MD5: B9DBFEDE27A858016CB5293AEE0B8C7B

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.8	0.795	0.8	0.81	0.83
AT3-098		1.07	1.04	7.9	1.05	1.1

Benzo(g,h,i)perylene Detail MD5: 97E05B58C7062EF6512E109593DA9630

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.257	0.255	0.257	0.26	0.267
AT3-098		0.344	0.336	0.339	0.338	0.776

Benzo(k)fluoranthene Detail MD5: 5AC16B10241B3E60E75B2811EC01D1A9

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.368	0.365	0.366	0.371	0.382
AT3-098		0.492	0.481	30.3	0.483	0.505

Chrysene Detail MD5: 1E6F3DE2491E3F1E8BB58E2E184DE3BB

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.56	0.555	0.56	0.565	0.58
AT3-098		1.82	1.63	0.74	0.735	0.77

Dibenz(a,h)anthracene Detail MD5: 98BDEA55C64E5C7EF57253E78848B905

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.299	0.296	0.297	0.301	0.31
AT3-098		0.399	0.39	0.393	0.391	0.409

Fluoranthene Detail MD5: B46293A567C77CBA338763CB86CD1614

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	1.01	0.451	0.453	0.459	0.472
AT3-098		7.81	8.46	10.7	2.77	3.83

Fluorene Detail MD5: 3FA5D56A13943E3E44387FC58EED93C8

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.257	0.255	0.543	0.832	0.267
AT3-098		1.73	1.31	1.13	3.78	2.3

Indeno(1,2,3-cd)pyrene Detail MD5: 4B1EBBEADD85F99B8C5A7EE9812EE167

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.605	0.6	0.6	0.61	0.625
AT3-098		0.805	0.79	0.795	0.79	0.83

Naphthalene Detail MD5: CD3D20716F571D79A1152AFA9AD5B270

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.812	0.394	0.396	1.24	0.412
AT3-098		1.65	2.32	2.29	0.52	1.2

Phenanthrene Detail MD5: C87FB68D06FB6E8BD23935F2E5F05A70

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	2.12	1.76	2.01	3.1	1.23
AT3-098		0.675	0.66	1.62	0.66	0.69

Pyrene Detail MD5: 1B7ED20057A7949857964C82BD3C8A93

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.67	0.665	0.665	0.675	0.695
AT3-098		8.04	6.62	7.73	4.83	3.92

STUDY: TN-23-302
CLIENT: Eco-Analysts, Inc.
PROJECT: Yachtsman Marina, Kennebunkport, ME NAE-2004-00319
ASSAY: *N. virens* 28-day Bioaccumulation Evaluation
TASK: Statistical Analysis of Body Burden PAHs

Endpoint	Method	C	<	T	Statistic	Critical	P Level	Alpha	Reject Null	MSD	DF	Ties	P-Type
Acenaphthene	Equal Variance t Two-Sample Test	IOSN	<	Comp	1.703979	1.859548	0.06339341	0.05	FALSE	0.3495425	8		C
Acenaphthylene	Unequal Variance t Two-Sample Test	IOSN	<	Comp	1.602066	2.131847	0.09219988	0.05	FALSE	5.238909	4		C
Anthracene	Unequal Variance t Two-Sample Test	IOSN	<	Comp	2.44968	2.131847	0.03523478	0.05	TRUE	0.2604674	4		C
Benzo(a)anthracene	Equal Variance t Two-Sample Test	IOSN	<	Comp	21.80244	1.859548	0	0.05	TRUE	0.0157788	8		C
Benzo(a)pyrene	Equal Variance t Two-Sample Test	IOSN	<	Comp	22.15053	1.859548	0	0.05	TRUE	0.01637034	8		C
Benzo(b)fluoranthene	Wilcoxon Rank Sum Two-Sample Test	IOSN	<	Comp	15		0.003968254	0.05	TRUE		8	0	E
Benzo(b)fluoranthene	Equal Variance t Two-Sample Test	IOSN	<	Comp	19.86739	1.894579	0	0.05	TRUE	0.0247224	7		C
Benzo(g,h,i)perylene	Equal Variance t Two-Sample Test	IOSN	<	Comp	28.51986	1.894579	0	0.05	TRUE	0.005317733	7		C
Benzo(g,h,i)perylene	Wilcoxon Rank Sum Two-Sample Test	IOSN	<	Comp	15		0.003968254	0.05	TRUE		8	0	E
Benzo(k)fluoranthene	Equal Variance t Two-Sample Test	IOSN	<	Comp	20.22445	1.894579	0	0.05	TRUE	0.01120853	7		C
Benzo(k)fluoranthene	Wilcoxon Rank Sum Two-Sample Test	IOSN	<	Comp	15		0.003968254	0.05	TRUE		8	0	E
Chrysene	Unequal Variance t Two-Sample Test	IOSN	<	Comp	2.383667	2.131847	0.03784344	0.05	TRUE	0.5142547	4		C
Dibenz(a,h)anthracene	Equal Variance t Two-Sample Test	IOSN	<	Comp	22.47496	1.859548	0	0.05	TRUE	0.007942909	8		C
Fluoranthene	Unequal Variance t Two-Sample Test	IOSN	<	Comp	4.131057	2.131847	0.007240722	0.05	TRUE	3.171149	4		C
Fluorene	Equal Variance t Two-Sample Test	IOSN	<	Comp	3.300467	1.859548	0.005425649	0.05	TRUE	0.9122329	8		C
Fluorene	Equal Variance t Two-Sample Test	IOSN	<	Comp	4.52013	1.894579	0.001365866	0.05	TRUE	0.4973545	7		C
Indeno(1,2,3-cd)pyrene	Equal Variance t Two-Sample Test	IOSN	<	Comp	21.96619	1.859548	0	0.05	TRUE	0.01642307	8		C
Naphthalene	Equal Variance t Two-Sample Test	IOSN	<	Comp	2.489245	1.859548	0.01878322	0.05	TRUE	0.7062451	8		C
Phenanthrene	Equal Variance t Two-Sample Test	IOSN	<	Comp	-3.289896	1.859548	0.9944881	0.05	FALSE	0.6686671	8		C
Pyrene	Unequal Variance t Two-Sample Test	IOSN	<	Comp	6.895549	2.131847	0.00115953	0.05	TRUE	1.71709	4		C

Bioaccumulation Evaluation - PAHs - Nereis — **EA-EST, Inc. PBC**

Analysis ID:	09-6281-0431	**Endpoint:**	Acenaphthene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:55	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:50	**MD5 Hash:**	4E533CF8084BFBF14A4043A9C963E506	**Editor ID:**	

Batch ID:	16-7806-7369	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:32	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:32	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed acenaphthene endpoint	62.12%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	1.7	1.86	0.35	CDF	0.0634	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.52	2.29	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.25648	0.25648	1	2.9	0.1268	Non-Significant Effect
Error	0.706668	0.0883335	8			
Total	0.963148		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.69	23.2	0.3616	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.794	0.741	0.0124	Normal Distribution

Acenaphthene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.563	0.291	0.835	0.462	0.458	0.954	0.0979	38.90%	0.00%
AT3-098		5	0.883	0.437	1.33	0.635	0.61	1.31	0.16	40.64%	-56.92%

Acenaphthene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.462	0.458	0.46	0.954	0.48
AT3-098		0.62	1.31	0.61	1.24	0.635

Bioaccumulation Evaluation - PAHs - Nereis	**EA-EST, Inc. PBC**

Analysis ID:	10-1846-2388	**Endpoint:**	Acenaphthylene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:55	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:50	**MD5 Hash:**	9C40152BD86A2B90D4C2F1257F4FC61E	**Editor ID:**	

Batch ID:	16-7806-7369	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:32	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:32	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed acenaphthylene endpoint	1832.43%

Unequal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	4	1.6	2.13	5.24	CDF	0.0922	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.18	2.29	0.0992	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	38.7499	38.7499	1	2.57	0.1478	Non-Significant Effect
Error	120.781	15.0977	8			
Total	159.531		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1140000	23.2	<1.0E-05	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.837	0.741	0.0402	Normal Distribution

Acenaphthylene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.286	0.28	0.292	0.284	0.282	0.295	0.0023	1.80%	0.00%
AT3-098		5	4.22	-2.6	11	0.38	0.371	12.2	2.46	130.12%	-1377.05%

Acenaphthylene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.284	0.282	0.283	0.287	0.295
AT3-098		0.38	0.371	0.374	12.2	7.79

Bioaccumulation Evaluation - PAHs - Nereis — **EA-EST, Inc. PBC**

Analysis ID:	14-8405-4060	**Endpoint:**	Anthracene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:55	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:50	**MD5 Hash:**	0EE18B9183090C120935F3897FAFFD1A	**Editor ID:**	

Batch ID:	16-7806-7369	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:32	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:32	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed anthracene endpoint	83.97%

Unequal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	4	2.45	2.13	0.26	CDF	0.0352	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.95	2.29	0.2857	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.223951	0.223951	1	6	0.0400	Significant Effect
Error	0.298555	0.0373194	8			
Total	0.522507		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2400	23.2	<1.0E-05	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.862	0.741	0.0810	Normal Distribution

Anthracene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.31	0.303	0.317	0.308	0.306	0.32	0.00249	1.80%	0.00%
AT3-098		5	0.61	0.27	0.949	0.422	0.404	0.965	0.122	44.81%	-96.49%

Anthracene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.308	0.306	0.307	0.311	0.32
AT3-098		0.412	0.845	0.965	0.404	0.422

Bioaccumulation Evaluation - PAHs - Nereis — **EA-EST, Inc. PBC**

Analysis ID:	02-1204-0422	**Endpoint:**	Benzo(a)anthracene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:55	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:50	**MD5 Hash:**	BFC429358BDF8F36ED709B3AD11983F1	**Editor ID:**	

Batch ID:	16-7806-7369	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:32	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:32	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed benzo(a)anthracene endpoint	2.72%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	21.8	1.86	0.0158	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.9	2.29	0.3527	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0855625	0.0855625	1	475	<1.0E-05	Significant Effect
Error	0.00144	0.00018	8			
Total	0.0870025		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.53	23.2	0.6920	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.821	0.741	0.0264	Normal Distribution

Benzo(a)anthracene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.581	0.566	0.596	0.575	0.57	0.6	0.00534	2.05%	0.00%
AT3-098		5	0.766	0.748	0.784	0.76	0.755	0.79	0.0066	1.93%	-31.84%

Benzo(a)anthracene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.575	0.57	0.575	0.585	0.6
AT3-098		0.77	0.755	0.76	0.755	0.79

Bioaccumulation Evaluation - PAHs - Nereis — **EA-EST, Inc. PBC**

Analysis ID:	10-8756-9954	**Endpoint:**	Benzo(a)pyrene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:55	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:50	**MD5 Hash:**	5106A0BC1B1562C92F3CA08067BE0DDC	**Editor ID:**	

Batch ID:	16-7806-7369	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:32	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:32	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed benzo(a)pyrene endpoint	2.68%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	22.2	1.86	0.0164	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.91	2.29	0.3427	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0950625	0.0950625	1	491	<1.0E-05	Significant Effect
Error	0.00155	0.0001938	8			
Total	0.0966125		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.82	23.2	0.5768	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.866	0.741	0.0909	Normal Distribution

Benzo(a)pyrene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.61	0.595	0.625	0.605	0.6	0.63	0.00524	1.92%	0.00%
AT3-098		5	0.805	0.785	0.825	0.8	0.79	0.83	0.00707	1.96%	-31.97%

Benzo(a)pyrene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.605	0.6	0.605	0.61	0.63
AT3-098		0.81	0.79	0.8	0.795	0.83

Bioaccumulation Evaluation - PAHs - Nereis — **EA-EST, Inc. PBC**

Analysis ID:	18-4472-6594	**Endpoint:**	Benzo(b)fluoranthene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:55	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:50	**MD5 Hash:**	6B7B6407C4040E1F952714F1179164B5	**Editor ID:**	

Batch ID:	16-7806-7369	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:32	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:32	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed benzo(b)fluoranthene endpoint	314.95%

Wilcoxon Rank Sum Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	Ties	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	15	---	0	Exact	0.0040	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.68	2.29	0.0004	Outlier Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	6.60969	6.60969	1	1.42	0.2683	Non-Significant Effect
Error	37.3628	4.67035	8			
Total	43.9725		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	47900	23.2	<1.0E-05	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.63	0.741	0.0001	Non-Normal Distribution

Benzo(b)fluoranthene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.807	0.79	0.824	0.8	0.795	0.83	0.00625	1.73%	0.00%
AT3-098		5	2.43	-1.36	6.23	1.07	1.05	7.9	1.37	125.62%	-201.49%

Benzo(b)fluoranthene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.8	0.795	0.8	0.81	0.83
AT3-098		1.07	1.05	7.9	1.05	1.1

Bioaccumulation Evaluation - PAHs - Nereis					EA-EST, Inc. PBC
Analysis ID:	13-4397-7733	**Endpoint:**	Benzo(g,h,i)perylene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:55	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:50	**MD5 Hash:**	5FE12096E6564B4DA61A02296512A837	**Editor ID:**	

Batch ID:	16-7806-7369	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:32	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:32	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed benzo(g,h,i)perylene endpoint	2.05%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	7	28.5	1.89	0.00532	CDF	<1.0E-05	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.01424	0.01424	1	813	<1.0E-05	Significant Effect
Error	0.0001226	1.751E-05	7			
Total	0.0143626		8			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.01	46.2	0.5916	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.871	0.701	0.1264	Normal Distribution

Benzo(g,h,i)perylene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.259	0.253	0.265	0.258	0.255	0.267	0.00211	1.82%	0.00%
AT3-098		4	0.339	0.334	0.345	0.338	0.337	0.344	0.00166	0.98%	-30.88%

Benzo(g,h,i)perylene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.258	0.255	0.257	0.26	0.267
AT3-098		0.344	0.337	0.339	0.338	---

Bioaccumulation Evaluation - PAHs - Nereis — **EA-EST, Inc. PBC**

Analysis ID:	11-9752-3554	**Endpoint:**	Benzo(k)fluoranthene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:55	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:50	**MD5 Hash:**	6855E33D32DC66D489FF8ABC8834DAED	**Editor ID:**	

Batch ID:	16-7806-7369	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:32	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:32	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed benzo(k)fluoranthene endpoint	3.02%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	7	20.2	1.89	0.0112	CDF	<1.0E-05	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0318136	0.0318136	1	409	<1.0E-05	Significant Effect
Error	0.0005445	7.778E-05	7			
Total	0.0323581		8			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.58	24.3	0.3830	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.898	0.701	0.2390	Normal Distribution

Benzo(k)fluoranthene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.371	0.362	0.379	0.368	0.365	0.382	0.00305	1.84%	0.00%
AT3-098		4	0.49	0.473	0.508	0.483	0.481	0.505	0.00547	2.23%	-32.29%

Benzo(k)fluoranthene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.368	0.365	0.367	0.372	0.382
AT3-098		0.492	0.481	---	0.483	0.505

Bioaccumulation Evaluation - PAHs - Nereis — **EA-EST, Inc. PBC**

Analysis ID:	14-6869-2556	**Endpoint:**	Chrysene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:55	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:50	**MD5 Hash:**	F213485DA4637EE3A64C893711A0B1BC	**Editor ID:**	

Batch ID:	16-7806-7369	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:32	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:32	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed chrysene endpoint	91.18%

Unequal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	4	2.38	2.13	0.514	CDF	0.0378	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.89	2.29	0.3574	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.826563	0.826563	1	5.68	0.0443	Significant Effect
Error	1.16379	0.145474	8			
Total	1.99035		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	3140	23.2	<1.0E-05	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.858	0.741	0.0714	Normal Distribution

Chrysene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.564	0.552	0.576	0.56	0.555	0.58	0.0043	1.71%	0.00%
AT3-098		5	1.14	0.469	1.81	0.77	0.735	1.82	0.241	47.35%	-101.95%

Chrysene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.56	0.555	0.56	0.565	0.58
AT3-098		1.82	1.63	0.74	0.735	0.77

Bioaccumulation Evaluation - PAHs - Nereis	**EA-EST, Inc. PBC**

Analysis ID:	19-8988-8883	**Endpoint:**	Dibenz(a,h)anthracene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:55	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:50	**MD5 Hash:**	E03DE0113FD71AD272230D47ABC1E90C	**Editor ID:**	

Batch ID:	16-7806-7369	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:32	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:32	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed dibenz(a,h)anthracene endpoint	2.64%

Equal Variance t Two-Sample Test

Sample I	vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed		AT3-098*	8	22.5	1.86	0.00794	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.98	2.29	0.2560	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.02304	0.02304	1	505	<1.0E-05	Significant Effect
Error	0.0003649	4.561E-05	8			
Total	0.0234049		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.1	23.2	0.4900	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.861	0.741	0.0779	Normal Distribution

Dibenz(a,h)anthracene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.3	0.294	0.307	0.299	0.296	0.31	0.00243	1.81%	0.00%
AT3-098		5	0.396	0.387	0.406	0.393	0.39	0.409	0.00352	1.98%	-31.96%

Dibenz(a,h)anthracene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.299	0.296	0.297	0.301	0.31
AT3-098		0.399	0.39	0.393	0.391	0.409

CETIS Analytical Report

Bioaccumulation Evaluation - PAHs - Nereis					EA-EST, Inc. PBC
Analysis ID:	16-7604-1580	**Endpoint:**	Fluoranthene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:55	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:50	**MD5 Hash:**	58EFA4925F3AA65DCE08F4A9811ED2F7	**Editor ID:**	

Batch ID:	16-7806-7369	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:32	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:32	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed fluoranthene endpoint	557.32%

Unequal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	4	4.13	2.13	3.17	CDF	0.0072	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.8	2.29	0.5014	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	94.4026	94.4026	1	17.1	0.0033	Significant Effect
Error	44.2539	5.53174	8			
Total	138.656		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	181	23.2	0.0002	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.926	0.741	0.4106	Normal Distribution

Fluoranthene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.569	0.263	0.875	0.459	0.451	1.01	0.11	43.35%	0.00%
AT3-098		5	6.71	2.6	10.8	7.81	2.77	10.7	1.48	49.40%	-1079.96%

Fluoranthene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	1.01	0.451	0.453	0.459	0.472
AT3-098		7.81	8.46	10.7	2.77	3.83

CETIS Analytical Report

Bioaccumulation Evaluation - PAHs - Nereis | **EA-EST, Inc. PBC**

Analysis ID:	14-8100-8905	**Endpoint:**	Fluorene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:56	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:50	**MD5 Hash:**	9AEDD73F70540F039F24B66E57CB36BD	**Editor ID:**	

Batch ID:	16-7806-7369	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:32	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:32	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed fluorene endpoint	211.70%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	3.3	1.86	0.912	CDF	0.0054	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.37	2.29	0.0288	Outlier Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	6.55371	6.55371	1	10.9	0.0109	Significant Effect
Error	4.81312	0.60164	8			
Total	11.3668		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	17.4	23.2	0.0170	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.876	0.741	0.1181	Normal Distribution

Fluorene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.431	0.114	0.748	0.267	0.255	0.832	0.114	59.32%	0.00%
AT3-098		5	2.05	0.725	3.37	1.73	1.13	3.78	0.477	52.04%	-375.75%

Fluorene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.258	0.255	0.543	0.832	0.267
AT3-098		1.73	1.31	1.13	3.78	2.3

Bioaccumulation Evaluation - PAHs - Nereis — **EA-EST, Inc. PBC**

Analysis ID:	08-3442-7926	**Endpoint:**	Indeno(1,2,3-cd)pyrene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:56	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:50	**MD5 Hash:**	E499F098C84D34DED30A0B8134DDA060	**Editor ID:**	

Batch ID:	16-7806-7369	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:32	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:32	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed indeno(1,2,3-cd)pyrene endpoint	2.70%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	22	1.86	0.0164	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.13	2.29	0.1299	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.09409	0.09409	1	483	<1.0E-05	Significant Effect
Error	0.00156	0.000195	8			
Total	0.09565		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.63	23.2	0.3721	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.842	0.741	0.0462	Normal Distribution

Indeno(1,2,3-cd)pyrene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.608	0.595	0.621	0.605	0.6	0.625	0.00464	1.71%	0.00%
AT3-098		5	0.802	0.781	0.823	0.795	0.79	0.83	0.00752	2.10%	-31.91%

Indeno(1,2,3-cd)pyrene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.605	0.6	0.6	0.61	0.625
AT3-098		0.805	0.79	0.795	0.79	0.83

Bioaccumulation Evaluation - PAHs - Nereis			**EA-EST, Inc. PBC**

Analysis ID:	12-1685-5860	**Endpoint:**	Naphthalene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:56	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:50	**MD5 Hash:**	0AA9FD9E0C176677B37305CC020F17AD	**Editor ID:**	

Batch ID:	16-7806-7369	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:32	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:32	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed naphthalene endpoint	108.55%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	2.49	1.86	0.706	CDF	0.0188	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.9	2.29	0.3485	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.23445	2.23445	1	6.2	0.0376	Significant Effect
Error	2.88487	0.360609	8			
Total	5.11932		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	4.14	23.2	0.1978	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.927	0.741	0.4218	Normal Distribution

Naphthalene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.651	0.185	1.12	0.412	0.394	1.24	0.168	57.59%	0.00%
AT3-098		5	1.6	0.65	2.54	1.65	0.52	2.32	0.341	47.75%	-145.31%

Naphthalene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.812	0.394	0.396	1.24	0.412
AT3-098		1.65	2.32	2.29	0.52	1.2

Bioaccumulation Evaluation - PAHs - Nereis — **EA-EST, Inc. PBC**

Analysis ID:	01-9493-0851	**Endpoint:**	Phenanthrene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:56	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:50	**MD5 Hash:**	7AB24DD7125ABEB7E2AB615F6438C2A1	**Editor ID:**	

Batch ID:	16-7806-7369	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:32	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:32	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed phenanthrene endpoint	32.71%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-3.29	1.86	0.669	CDF	0.9945	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.97	2.29	0.2655	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.49872	3.49872	1	10.8	0.0110	Significant Effect
Error	2.58604	0.323255	8			
Total	6.08476		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.59	23.2	0.3794	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.866	0.741	0.0896	Normal Distribution

Phenanthrene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	2.04	1.2	2.89	2.01	1.23	3.1	0.305	33.41%	0.00%
AT3-098		5	0.861	0.334	1.39	0.675	0.66	1.62	0.19	49.30%	57.88%

Phenanthrene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	2.12	1.76	2.01	3.1	1.23
AT3-098		0.675	0.66	1.62	0.66	0.69

CETIS Analytical Report

Bioaccumulation Evaluation - PAHs - Nereis | **EA-EST, Inc. PBC**

Analysis ID:	13-2043-1908	**Endpoint:**	Pyrene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:56	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:50	**MD5 Hash:**	05FB8E6A71FC61834386F3A2DF12E9E0	**Editor ID:**	

Batch ID:	16-7806-7369	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:32	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:32	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pyrene endpoint	254.76%

Unequal Variance t Two-Sample Test

Sample I	vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed		AT3-098*	4	6.9	2.13	1.72	CDF	0.0012	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.92	2.29	0.3209	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	77.1173	77.1173	1	47.5	0.0001	Significant Effect
Error	12.9749	1.62186	8			
Total	90.0922		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	20900	23.2	<1.0E-05	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.895	0.741	0.1925	Normal Distribution

Pyrene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.674	0.659	0.689	0.67	0.665	0.695	0.00557	1.85%	0.00%
AT3-098		5	6.23	3.99	8.46	6.62	3.92	8.04	0.805	28.92%	-824.04%

Pyrene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.67	0.665	0.665	0.675	0.695
AT3-098		8.04	6.62	7.73	4.83	3.92

ATTACHMENT VI

Nereis virens 28-Day Solid Phase Bioaccumulation Testing
Tissue Chemistry and Body Burden Statistical Analyses

PCBs

(29 pages)

Yachtsman Marina
NAE-2004-00319

APPENDIX A. CONCENTRATIONS OF COCs IN THE WORM (*N. virens*)

CONTAMINANT	REP1		REP2		REP3 (Pre-Assay)		REP4 *	REP5 *
PCB Congeners (ng/g wet wt.)								
PCB 8	0.0630	U	0.0650	U	0.0635	U		
PCB 18	0.0460	U	0.0473	U	0.0461	U		
PCB 28	0.0780	U	0.0805	U	0.0785	U		
PCB 44	0.0870	U	0.0895	U	0.0875	U		
PCB 52	0.0486	U	0.0500	U	0.0487	U		
PCB 66	0.0457	U	0.0470	U	0.0458	U		
PCB 101	0.0745	U	0.0765	U	0.0745	U		
PCB 105	0.0670	U	0.0685	U	0.0670	U		
PCB 118	0.0705	U	0.0725	U	0.0710	U		
PCB 128	0.0835	U	0.0855	U	0.0835	U		
PCB 138	0.267	J	0.594	J	0.0535	U		
PCB 153	0.454	J	0.651	J	0.780			
PCB 170	0.0409	U	0.0421	U	0.0410	U		
PCB 180	0.0419	U	0.0431	U	0.0420	U		
PCB 187	0.646		0.0620	U	0.0600	U		
PCB 195	0.0785	U	0.0810	U	0.0790	U		
PCB 206	0.0800	U	0.0825	U	0.0805	U		
PCB 209	0.0920	U	0.0945	U	0.0920	U		
Total PCBs	4.73		4.66		3.79			

* = Qualifiers
U Analyte not detected; below Method Detection Limit; value is one-half the Method Detection Limit
J Analyte estimated; detection below Reporting Limit but above Method Detection Limit
NA Not Analyzed

Yachtsman Marina
NAE-2004-00319

APPENDIX A. CONCENTRATIONS OF COCs IN THE WORM (*N. virens*)

	IOSN Reference									
CONTAMINANT	REP1		REP2		REP3		REP4		REP5	
PCB Congeners (ng/g wet wt										
PCB 8	0.0475	U	0.0475	U	0.0475	U	0.0480	U	0.0495	U
PCB 18	0.0345	U	0.0345	U	0.0345	U	0.0350	U	0.0360	U
PCB 28	0.0590	U	0.0585	U	0.0585	U	0.0595	U	0.0610	U
PCB 44	0.0655	U	0.0650	U	0.0655	U	0.0665	U	0.0680	U
PCB 52	0.0365	U	0.0365	U	0.0365	U	0.0370	U	0.0380	U
PCB 66	0.0345	U	0.0340	U	0.0345	U	0.0350	U	0.0355	U
PCB 101	0.0560	U	0.0555	U	0.0560	U	0.0565	U	0.0580	U
PCB 105	0.0500	U	0.0500	U	0.0500	U	0.0510	U	0.0520	U
PCB 118	0.0530	U	0.0525	U	0.0530	U	0.0535	U	0.0550	U
PCB 128	0.0630	U	0.0620	U	0.0625	U	0.0635	U	0.0650	U
PCB 138	0.714		0.498		0.0400	U	0.0405	U	0.361	J
PCB 153	0.862		0.621		0.687		1.01		0.636	
PCB 170	0.0310	U	0.0305	U	0.0305	U	0.0310	U	0.0320	U
PCB 180	0.0315	U	0.0315	U	0.0315	U	0.0320	U	0.0325	U
PCB 187	0.0455	U	0.0450	U	0.0450	U	0.0455	U	0.0470	U
PCB 195	0.0590	U	0.0585	U	0.0590	U	0.0600	U	0.0615	U
PCB 206	0.0605	U	0.0600	U	0.0600	U	0.0610	U	0.0625	U
PCB 209	0.0690	U	0.0685	U	0.0690	U	0.0700	U	0.0720	U
Total PCBs	4.74		3.82		3.04		3.71		3.65	

* = Qualifiers
U Analyte not detected; belo
J Analyte estimated; detectio
NA Not Analyzed

Yachtsman Marina
NAE-2004-00319

APPENDIX A. CONCENTRATIONS OF COCs IN THE WORM (*N. virens*)

10 Stations at 4 Marinas Mud

CONTAMINANT	REP1		REP2		REP3		REP4		REP5	
PCB Congeners (ng/g wet wt										
PCB 8	0.0635	U	0.0620	U	0.0630	U	0.0625	U	0.0650	U
PCB 18	0.0463	U	0.0453	U	0.0457	U	0.0455	U	0.0475	U
PCB 28	0.0790	U	0.0770	U	0.0775	U	0.0775	U	0.0810	U
PCB 44	0.0880	U	0.0860	U	0.0865	U	0.0860	U	0.0900	U
PCB 52	0.0489	U	0.0478	U	0.0482	U	0.485	J	0.0500	U
PCB 66	0.0460	U	0.0450	U	0.0453	U	0.0451	U	0.0472	U
PCB 101	0.0750	U	0.0730	U	0.0740	U	0.0735	U	0.0770	U
PCB 105	0.0670	U	0.0655	U	3.78		0.0660	U	0.0690	U
PCB 118	0.0710	U	0.0695	U	0.0700	U	0.0695	U	0.0730	U
PCB 128	0.0840	U	0.0820	U	0.0825	U	0.0825	U	0.0860	U
PCB 138	1.00		1.15		0.0530	U	0.0525	U	0.0550	U
PCB 153	1.04		1.48		0.843		0.110	U	0.814	
PCB 170	0.0412	U	0.0403	U	0.0406	U	0.0404	U	0.0422	U
PCB 180	0.0422	U	0.0412	U	0.0415	U	0.0414	U	0.0432	U
PCB 187	0.0605	U	0.0590	U	0.0595	U	0.0595	U	0.0620	U
PCB 195	0.0790	U	0.0775	U	0.0780	U	0.0775	U	0.0810	U
PCB 206	0.0805	U	0.0790	U	0.0795	U	0.0790	U	0.0830	U
PCB 209	0.0925	U	0.0905	U	0.0910	U	0.0910	U	0.0950	U
Total PCBs	6.21		7.34		11.3		3.29		3.92	

* = Qualifiers
U Analyte not detected; belo
J Analyte estimated; detectio
NA Not Analyzed

CETIS Test Data Worksheet

Report Date: 19 Aug-23 06:57 (p 1 of 1)
Test Code/ID: TN-23-302NvPCB / 04-0924-3837

Bioaccumulation Evaluation - PCB Congeners - Nereis — **EA-EST, Inc. PBC**

Start Date: 08 Mar-23 11:33 **Species:** Nereis virens **Sample Code:** AT3-152
End Date: 05 Apr-23 10:33 **Protocol:** US ACE NED RIM (2004) **Sample Source:** Yachtsman Marina NAE-2004-00319
Sample Date: 03 Mar-23 **Material:** Laboratory Control Sediment **Sample Station:** Laboratory Control

Sample	Rep	Pos	PCB 008	PCB 018	PCB 028	PCB 044	PCB 052	PCB 066	PCB 101	PCB 105	PCB 118	PCB 128	PCB 138	PCB 153	PCB 170	PCB 180	PCB 187	PCB 195	PCB 206	PCB 209	PCB 087	PCB 049	PCB 183	PCB 184	Total PCBs
IOSN 2019	1	2	0.048	0.035	0.059	0.066	0.037	0.035	0.056	0.05	0.053	0.063	0.714	0.862	0.031	0.032	0.046	0.059	0.061	0.069	0.028	0.064	0.017	0.035	
IOSN 2019	2	3	0.048	0.035	0.059	0.065	0.037	0.034	0.056	0.05	0.053	0.062	0.498	0.621	0.031	0.032	0.045	0.059	0.06	0.069	0.028	0.064	0.017	0.035	
IOSN 2019	3	5	0.048	0.035	0.059	0.066	0.037	0.035	0.056	0.05	0.053	0.063	0.04	0.687	0.031	0.032	0.045	0.059	0.06	0.069	0.028	0.064	0.017	0.035	
IOSN 2019	4	8	0.048	0.035	0.06	0.067	0.037	0.035	0.057	0.051	0.054	0.064	0.041	1.01	0.031	0.032	0.046	0.06	0.061	0.07	0.028	0.065	0.017	0.035	
IOSN 2019	5	10	0.05	0.036	0.061	0.068	0.038	0.036	0.058	0.052	0.055	0.065	0.361	0.636	0.032	0.033	0.047	0.062	0.063	0.072	0.029	0.067	0.018	0.036	
AT3-098	1	1	0.064	0.046	0.079	0.088	0.049	0.046	0.075	0.067	0.071	0.084	1	1.04	0.041	0.042	0.061	0.079	0.081	0.093	0.037	0.086	0.023	0.046	
AT3-098	2	4	0.062	0.045	0.077	0.086	0.048	0.045	0.073	0.066	0.07	0.082	1.15	1.48	0.040	0.041	0.059	0.078	0.079	0.091	0.037	0.084	0.022	0.045	
AT3-098	3	6	0.063	0.046	0.078	0.087	0.048	0.045	0.074	3.78	0.07	0.083	0.053	0.843	0.041	0.042	0.06	0.078	0.08	0.091	0.037	0.085	0.022	0.046	
AT3-098	4	7	0.063	0.045	0.078	0.086	0.485	0.045	0.074	0.066	0.07	0.083	0.053	0.11	0.040	0.041	0.06	0.078	0.079	0.091	0.037	0.084	0.022	0.045	
AT3-098	5	9	0.065	0.048	0.081	0.09	0.05	0.047	0.077	0.069	0.073	0.086	0.055	0.814	0.042	0.043	0.062	0.081	0.083	0.095	0.038	0.088	0.023	0.048	

Bioaccumulation Evaluation - PCB Congeners - Nereis **EA-EST, Inc. PBC**

Batch ID:	16-3825-9393	**Test Type:**	Bioaccumlation - PCBs - Nv	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:33	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:33	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample ID:	11-9755-1044	**Code:**	AT3-152	**Project:**	Dredged Sediment Evaluation
Sample Date:	03 Mar-23	**Material:**	Laboratory Control Sediment	**Source:**	Yachtsman Marina NAE-2004-00319 (
Receipt Date:	03 Mar-23 12:30	**CAS (PC):**		**Station:**	Laboratory Control
Sample Age:	5d 12h	**Client:**	Eco-Analysts, Inc.		

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
02-9121-2104	PCB 008	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 008	1
13-8217-6257	PCB 018	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 018	1
11-4561-0244	PCB 028	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 028	1
16-1112-5112	PCB 044	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 044	1
09-0192-7086	PCB 052	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 052	1
13-3296-8099	PCB 052	Wilcoxon Rank Sum Two-Sample Test	0.0040	AT3-098 failed pcb 052	1
11-5197-6838	PCB 066	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 066	1
18-8869-0510	PCB 101	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 101	1
16-3802-4478	PCB 105	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 105	1
07-4136-0669	PCB 105	Wilcoxon Rank Sum Two-Sample Test	0.0040	AT3-098 failed pcb 105	1
00-9484-6417	PCB 118	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 118	1
13-1827-6879	PCB 128	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 128	1
11-3728-5619	PCB 138	Equal Variance t Two-Sample Test	0.3277	AT3-098 passed pcb 138	1
20-6837-7661	PCB 153	Equal Variance t Two-Sample Test	0.3489	AT3-098 passed pcb 153	1
12-6194-5314	PCB 170	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 170	1
05-3230-0024	PCB 180	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 180	1
05-4569-7612	PCB 187	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 187	1
02-2598-3391	PCB 195	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 195	1
03-1612-5429	PCB 206	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 206	1
15-1840-5518	PCB 209	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 209	1

PCB 008 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.048	0.0469	0.0491	0.0475	0.0495	0.000387	0.000866	1.80%	0.00%
AT3-098		5	0.0632	0.0618	0.0646	0.062	0.065	0.000515	0.00115	1.82%	-31.67%

PCB 018 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0349	0.0341	0.0357	0.0345	0.036	0.000292	0.000652	1.87%	0.00%
AT3-098		5	0.046	0.0449	0.0472	0.0453	0.0475	0.000403	0.000901	1.96%	-31.92%

PCB 028 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0593	0.058	0.0606	0.0585	0.061	0.000464	0.00104	1.75%	0.00%
AT3-098		5	0.0784	0.0764	0.0804	0.077	0.081	0.000731	0.00164	2.09%	-32.21%

PCB 044 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0661	0.0646	0.0676	0.065	0.068	0.000534	0.00119	1.81%	0.00%
AT3-098		5	0.0873	0.0852	0.0894	0.086	0.09	0.000768	0.00172	1.97%	-32.07%

PCB 052 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0369	0.0361	0.0377	0.0365	0.038	0.000292	0.000652	1.77%	0.00%
AT3-098		5	0.136	-0.106	0.378	0.0478	0.485	0.0873	0.195	143.48%	-268.51%

PCB 066 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0347	0.034	0.0354	0.034	0.0355	0.000255	0.00057	1.64%	0.00%
AT3-098		5	0.0457	0.0446	0.0468	0.045	0.0472	0.000405	0.000905	1.98%	-31.70%

PCB 101 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0564	0.0552	0.0576	0.0555	0.058	0.00043	0.000962	1.71%	0.00%
AT3-098		5	0.0745	0.0725	0.0765	0.073	0.077	0.000707	0.00158	2.12%	-32.09%

PCB 105 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0506	0.0495	0.0517	0.05	0.052	0.0004	0.000894	1.77%	0.00%
AT3-098		5	0.809	-1.25	2.87	0.0655	3.78	0.743	1.66	205.13%	-1499.80

PCB 118 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0534	0.0522	0.0546	0.0525	0.055	0.00043	0.000962	1.80%	0.00%
AT3-098		5	0.0706	0.0688	0.0724	0.0695	0.073	0.00066	0.00147	2.09%	-32.21%

PCB 128 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0632	0.0618	0.0646	0.062	0.065	0.000515	0.00115	1.82%	0.00%
AT3-098		5	0.0834	0.0814	0.0854	0.082	0.086	0.000731	0.00164	1.96%	-31.96%

PCB 138 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.331	-0.0337	0.695	0.04	0.714	0.131	0.293	88.75%	0.00%
AT3-098		5	0.462	-0.236	1.16	0.0525	1.15	0.251	0.562	121.62%	-39.73%

PCB 153 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.763	0.555	0.972	0.621	1.01	0.0751	0.168	22.01%	0.00%
AT3-098		5	0.857	0.242	1.47	0.11	1.48	0.222	0.495	57.78%	-12.34%

PCB 170 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.031	0.0302	0.0318	0.0305	0.032	0.000274	0.000612	1.98%	0.00%
AT3-098		5	0.0409	0.0399	0.0419	0.0402	0.0422	0.000357	0.000798	1.95%	-31.97%

PCB 180 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0318	0.0312	0.0324	0.0315	0.0325	0.0002	0.000447	1.41%	0.00%
AT3-098		5	0.0419	0.0409	0.0429	0.0412	0.0432	0.000368	0.000822	1.96%	-31.70%

PCB 187 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0456	0.0446	0.0466	0.045	0.047	0.000367	0.000822	1.80%	0.00%
AT3-098		5	0.0601	0.0586	0.0616	0.059	0.062	0.000534	0.00119	1.99%	-31.80%

PCB 195 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0596	0.0581	0.0611	0.0585	0.0615	0.000534	0.00119	2.00%	0.00%
AT3-098		5	0.0786	0.0768	0.0804	0.0775	0.081	0.00066	0.00147	1.88%	-31.88%

PCB 206 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0608	0.0595	0.0621	0.06	0.0625	0.000464	0.00104	1.71%	0.00%
AT3-098		5	0.0802	0.0781	0.0823	0.079	0.083	0.000752	0.00168	2.10%	-31.91%

PCB 209 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0697	0.068	0.0714	0.0685	0.072	0.000624	0.0014	2.00%	0.00%
AT3-098		5	0.092	0.0897	0.0943	0.0905	0.095	0.000822	0.00184	2.00%	-31.99%

Bioaccumulation Evaluation - PCB Congeners - Nereis **EA-EST, Inc. PBC**

PCB 008 Detail MD5: B6CD15DC1443B921495F7DFEACB92387

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0475	0.0475	0.0475	0.048	0.0495
AT3-098		0.0635	0.062	0.063	0.0625	0.065

PCB 018 Detail MD5: 0A8FA30BC4B1B12BC4E49675F270B3A8

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0345	0.0345	0.0345	0.035	0.036
AT3-098		0.0463	0.0453	0.0457	0.0454	0.0475

PCB 028 Detail MD5: 6FBFC0FADFAA4B848CA74B7F828197E2

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.059	0.0585	0.0585	0.0595	0.061
AT3-098		0.079	0.077	0.0775	0.0775	0.081

PCB 044 Detail MD5: 1C1D1CB6B4C2ADEFF1E79CE2C642DB23

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0655	0.065	0.0655	0.0665	0.068
AT3-098		0.088	0.086	0.0865	0.086	0.09

PCB 052 Detail MD5: 3920C127A4BDA389DA0F319C5F8AFCEB

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0365	0.0365	0.0365	0.037	0.038
AT3-098		0.0489	0.0478	0.0482	0.485	0.05

PCB 066 Detail MD5: 4EE269D0EA41A6E9E9823C291BDE5535

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0345	0.034	0.0345	0.035	0.0355
AT3-098		0.046	0.045	0.0453	0.0451	0.0472

PCB 101 Detail MD5: B20C9DAA8B6E4F50398B841B80DA6C21

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.056	0.0555	0.056	0.0565	0.058
AT3-098		0.075	0.073	0.074	0.0735	0.077

PCB 105 Detail MD5: 4E29C9426F5B6AA09DB8A3D99E3FD1F6

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.05	0.05	0.05	0.051	0.052
AT3-098		0.067	0.0655	3.78	0.066	0.069

PCB 118 Detail MD5: 1B5869B575FE2659921098AB6726212A

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.053	0.0525	0.053	0.0535	0.055
AT3-098		0.071	0.0695	0.07	0.0695	0.073

PCB 128 Detail MD5: 0803864E2A529E2E5537574498EE36A7

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.063	0.062	0.0625	0.0635	0.065
AT3-098		0.084	0.082	0.0825	0.0825	0.086

PCB 138 Detail MD5: F6533DA9A7F279C17F5EED8E45DF3AB9

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.714	0.498	0.04	0.0405	0.361
AT3-098		1	1.15	0.053	0.0525	0.055

PCB 153 Detail MD5: F3D0988551B15E211EEF7D3467C18071

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.862	0.621	0.687	1.01	0.636
AT3-098		1.04	1.48	0.843	0.11	0.814

PCB 170 Detail MD5: 23C6B5B239CEFCFA428787F92E620FE3

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.031	0.0305	0.0305	0.031	0.032
AT3-098		0.0411	0.0402	0.0406	0.0404	0.0422

PCB 180 Detail MD5: 470506518B2F2F8E005B0E35E4536EB0

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0315	0.0315	0.0315	0.032	0.0325
AT3-098		0.0421	0.0412	0.0415	0.0413	0.0432

PCB 187 Detail MD5: 4EBDDEB24063208E6681206C01A3F2F5

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0455	0.045	0.045	0.0455	0.047
AT3-098		0.0605	0.059	0.0595	0.0595	0.062

PCB 195 Detail MD5: CA8DC931CC03C1416788B6DD2F3BD47E

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.059	0.0585	0.059	0.06	0.0615
AT3-098		0.079	0.0775	0.078	0.0775	0.081

PCB 206 Detail MD5: 1F069A22AD4D1FA756C1F37E04C63A59

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0605	0.06	0.06	0.061	0.0625
AT3-098		0.0805	0.079	0.0795	0.079	0.083

PCB 209 Detail MD5: FAAA6B62B98D4AE5FBE056DA1E916DAC

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.069	0.0685	0.069	0.07	0.072
AT3-098		0.0925	0.0905	0.091	0.091	0.095

STUDY: TN-23-302
CLIENT: Eco-Analysts, Inc.
PROJECT: Yachtsman Marina, Kennebunkport, ME NAE-2004-00319
ASSAY: *N. virens* 28-day Bioaccumulation Evaluation
TASK: Statistical Analysis of Body Burden PCBs

Endpoint	Method	C	<	T	Statistic	Critical	P Level	Alpha	Reject Null	MSD	DF	Ties	P-Type
PCB 008	Equal Variance t Two-Sample Test	IOSN	<	Comp	23.59498	1.859548	0	0.05	TRUE	0.00119793	8		C
PCB 018	Equal Variance t Two-Sample Test	IOSN	<	Comp	22.39903	1.859548	0	0.05	TRUE	0.000924833	8		C
PCB 028	Equal Variance t Two-Sample Test	IOSN	<	Comp	22.05477	1.859548	0	0.05	TRUE	0.001610416	8		C
PCB 044	Equal Variance t Two-Sample Test	IOSN	<	Comp	22.66373	1.859548	0	0.05	TRUE	0.001739449	8		C
PCB 052	Wilcoxon Rank Sum Two-Sample Test	IOSN	<	Comp	15		0.003968254	0.05	TRUE		8	0	E
PCB 052	Equal Variance t Two-Sample Test	IOSN	<	Comp	22.01617	1.894579	0	0.05	TRUE	0.001017588	7		C
PCB 066	Equal Variance t Two-Sample Test	IOSN	<	Comp	22.99916	1.859548	0	0.05	TRUE	0.000889381	8		C
PCB 101	Equal Variance t Two-Sample Test	IOSN	<	Comp	21.86922	1.859548	0	0.05	TRUE	0.001539049	8		C
PCB 105	Equal Variance t Two-Sample Test	IOSN	<	Comp	19.91628	1.894579	0	0.05	TRUE	0.001548194	7		C
PCB 105	Wilcoxon Rank Sum Two-Sample Test	IOSN	<	Comp	15		0.003968254	0.05	TRUE		8	0	E
PCB 118	Equal Variance t Two-Sample Test	IOSN	<	Comp	21.84402	1.859548	0	0.05	TRUE	0.00146421	8		C
PCB 128	Equal Variance t Two-Sample Test	IOSN	<	Comp	22.5843	1.859548	0	0.05	TRUE	0.00166323	8		C
PCB 138	Equal Variance t Two-Sample Test	IOSN	<	Comp	0.4634183	1.859548	0.3277057	0.05	FALSE	0.5272658	8		C
PCB 153	Equal Variance t Two-Sample Test	IOSN	<	Comp	0.402669	1.859548	0.3488687	0.05	FALSE	0.435021	8		C
PCB 170	Equal Variance t Two-Sample Test	IOSN	<	Comp	22.03038	1.859548	0	0.05	TRUE	0.000836487	8		C
PCB 180	Equal Variance t Two-Sample Test	IOSN	<	Comp	24.08549	1.859548	0	0.05	TRUE	0.000778238	8		C
PCB 187	Equal Variance t Two-Sample Test	IOSN	<	Comp	22.37401	1.859548	0	0.05	TRUE	0.001205124	8		C
PCB 195	Equal Variance t Two-Sample Test	IOSN	<	Comp	22.39171	1.859548	0	0.05	TRUE	0.001577879	8		C
PCB 206	Equal Variance t Two-Sample Test	IOSN	<	Comp	21.96619	1.859548	0	0.05	TRUE	0.001642307	8		C
PCB 209	Equal Variance t Two-Sample Test	IOSN	<	Comp	21.60877	1.859548	0	0.05	TRUE	0.001919032	8		C

Bioaccumulation Evaluation - PCB Congeners - Nereis — **EA-EST, Inc. PBC**

Analysis ID:	02-9121-2104	**Endpoint:**	PCB 008	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:57	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:52	**MD5 Hash:**	61B6A6446B6F829C5A69B721843C7316	**Editor ID:**	

Batch ID:	16-3825-9393	**Test Type:**	Bioaccumlation - PCBs - Nv	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:33	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:33	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 008 endpoint	2.50%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	23.6	1.86	0.0012	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.87	2.29	0.3839	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0005776	0.0005776	1	557	<1.0E-05	Significant Effect
Error	0.0000083	1.038E-06	8			
Total	0.0005859		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.77	23.2	0.5950	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.872	0.741	0.1046	Normal Distribution

PCB 008 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.048	0.0469	0.0491	0.0475	0.0475	0.0495	0.000387	1.80%	0.00%
AT3-098		5	0.0632	0.0618	0.0646	0.063	0.062	0.065	0.000515	1.82%	-31.67%

PCB 008 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0475	0.0475	0.0475	0.048	0.0495
AT3-098		0.0635	0.062	0.063	0.0625	0.065

Bioaccumulation Evaluation - PCB Congeners - Nereis — **EA-EST, Inc. PBC**

Analysis ID:	13-8217-6257	**Endpoint:**	PCB 018	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:57	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:52	**MD5 Hash:**	B6DA257F039B072D56B781E2EB20402F	**Editor ID:**	

Batch ID:	16-3825-9393	**Test Type:**	Bioaccumlation - PCBs - Nv	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:33	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:33	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 018 endpoint	2.65%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	22.4	1.86	0.000925	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.97	2.29	0.2663	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0003102	0.0003102	1	502	<1.0E-05	Significant Effect
Error	4.947E-06	6.184E-07	8			
Total	0.0003152		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.91	23.2	0.5462	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.826	0.741	0.0299	Normal Distribution

PCB 018 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0349	0.0341	0.0357	0.0345	0.0345	0.036	0.000292	1.87%	0.00%
AT3-098		5	0.046	0.0449	0.0472	0.0457	0.0453	0.0475	0.000403	1.96%	-31.92%

PCB 018 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0345	0.0345	0.0345	0.035	0.036
AT3-098		0.0463	0.0453	0.0457	0.0455	0.0475

Bioaccumulation Evaluation - PCB Congeners - Nereis	**EA-EST, Inc. PBC**

Analysis ID:	11-4561-0244	**Endpoint:**	PCB 028	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:57	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:52	**MD5 Hash:**	13664154466A20434E89A621986E9962	**Editor ID:**	

Batch ID:	16-3825-9393	**Test Type:**	Bioaccumlation - PCBs - Nv	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:33	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:33	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 028 endpoint	2.72%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	22.1	1.86	0.00161	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.01	2.29	0.2206	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0009120	0.0009120	1	486	<1.0E-05	Significant Effect
Error	0.000015	1.875E-06	8			
Total	0.0009270		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.49	23.2	0.3988	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.871	0.741	0.1027	Normal Distribution

PCB 028 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0593	0.058	0.0606	0.059	0.0585	0.061	0.000464	1.75%	0.00%
AT3-098		5	0.0784	0.0764	0.0804	0.0775	0.077	0.081	0.000731	2.09%	-32.21%

PCB 028 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.059	0.0585	0.0585	0.0595	0.061
AT3-098		0.079	0.077	0.0775	0.0775	0.081

Bioaccumulation Evaluation - PCB Congeners - Nereis	**EA-EST, Inc. PBC**

Analysis ID:	16-1112-5112	**Endpoint:**	PCB 044	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:57	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:52	**MD5 Hash:**	DAC288685AFDD8669A3AD481C61CFF0A	**Editor ID:**	

Batch ID:	16-3825-9393	**Test Type:**	Bioaccumlation - PCBs - Nv	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:33	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:33	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 044 endpoint	2.63%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	22.7	1.86	0.00174	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.94	2.29	0.3039	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0011236	0.0011236	1	514	<1.0E-05	Significant Effect
Error	0.0000175	2.188E-06	8			
Total	0.0011411		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.07	23.2	0.4983	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.861	0.741	0.0775	Normal Distribution

PCB 044 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0661	0.0646	0.0676	0.0655	0.065	0.068	0.000534	1.81%	0.00%
AT3-098		5	0.0873	0.0852	0.0894	0.0865	0.086	0.09	0.000768	1.97%	-32.07%

PCB 044 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0655	0.065	0.0655	0.0665	0.068
AT3-098		0.088	0.086	0.0865	0.086	0.09

Bioaccumulation Evaluation - PCB Congeners - Nereis					**EA-EST, Inc. PBC**
Analysis ID:	13-3296-8099	**Endpoint:**	PCB 052	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:57	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:52	**MD5 Hash:**	4F06858ACDBF3FEBC8FB08A155CDB556	**Editor ID:**	

Batch ID:	16-3825-9393	**Test Type:**	Bioaccumlation - PCBs - Nv	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:33	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:33	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 052 endpoint	439.72%

Wilcoxon Rank Sum Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	Ties	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	15	---	0	Exact	0.0040	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.68	2.29	0.0004	Outlier Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0245421	0.0245421	1	1.29	0.2890	Non-Significant Effect
Error	0.152273	0.0190342	8			
Total	0.176815		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	89600	23.2	<1.0E-05	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.628	0.741	0.0001	Non-Normal Distribution

PCB 052 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0369	0.0361	0.0377	0.0365	0.0365	0.038	0.000292	1.77%	0.00%
AT3-098		5	0.136	-0.106	0.378	0.0489	0.0478	0.485	0.0873	143.48%	-268.51%

PCB 052 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0365	0.0365	0.0365	0.037	0.038
AT3-098		0.0489	0.0478	0.0482	0.485	0.05

Bioaccumulation Evaluation - PCB Congeners - Nereis					EA-EST, Inc. PBC
Analysis ID:	11-5197-6838	**Endpoint:**	PCB 066	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:57	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:52	**MD5 Hash:**	2771CE0EBE3C5FC800050268051CE78A	**Editor ID:**	

Batch ID:	16-3825-9393	**Test Type:**	Bioaccumlation - PCBs - Nv	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:33	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:33	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 066 endpoint	2.56%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	23	1.86	0.000889	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.03	2.29	0.2022	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0003025	0.0003025	1	529	<1.0E-05	Significant Effect
Error	4.575E-06	5.719E-07	8			
Total	0.0003071		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.52	23.2	0.3927	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.905	0.741	0.2468	Normal Distribution

PCB 066 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0347	0.034	0.0354	0.0345	0.034	0.0355	0.000255	1.64%	0.00%
AT3-098		5	0.0457	0.0446	0.0468	0.0453	0.045	0.0472	0.000405	1.98%	-31.70%

PCB 066 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0345	0.034	0.0345	0.035	0.0355
AT3-098		0.046	0.045	0.0453	0.0451	0.0472

Bioaccumulation Evaluation - PCB Congeners - Nereis					EA-EST, Inc. PBC
Analysis ID:	18-8869-0510	**Endpoint:**	PCB 101	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:57	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:52	**MD5 Hash:**	C0B3241FC036EA10A26D5C76708DBA23	**Editor ID:**	

Batch ID:	16-3825-9393	**Test Type:**	Bioaccumlation - PCBs - Nv	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:33	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:33	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 101 endpoint	2.73%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	21.9	1.86	0.00154	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.03	2.29	0.2090	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0008190	0.0008190	1	478	<1.0E-05	Significant Effect
Error	0.0000137	1.713E-06	8			
Total	0.0008327		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.7	23.2	0.3588	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.906	0.741	0.2574	Normal Distribution

PCB 101 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0564	0.0552	0.0576	0.056	0.0555	0.058	0.00043	1.71%	0.00%
AT3-098		5	0.0745	0.0725	0.0765	0.074	0.073	0.077	0.000707	2.12%	-32.09%

PCB 101 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.056	0.0555	0.056	0.0565	0.058
AT3-098		0.075	0.073	0.074	0.0735	0.077

Bioaccumulation Evaluation - PCB Congeners - Nereis — **EA-EST, Inc. PBC**

Analysis ID:	16-3802-4478	**Endpoint:**	PCB 105	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:57	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:52	**MD5 Hash:**	1C1EFD20B2ADE9BFADCF7730003EED4	**Editor ID:**	

Batch ID:	16-3825-9393	**Test Type:**	Bioaccumlation - PCBs - Nv	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:33	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:33	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 105 endpoint	3.06%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	7	19.9	1.89	0.00155	CDF	<1.0E-05	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0005886	0.0005886	1	397	<1.0E-05	Significant Effect
Error	1.039E-05	1.484E-06	7			
Total	0.000599		8			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.99	24.3	0.3169	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.904	0.701	0.2792	Normal Distribution

PCB 105 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0506	0.0495	0.0517	0.05	0.05	0.052	0.0004	1.77%	0.00%
AT3-098		4	0.0669	0.0644	0.0693	0.066	0.0655	0.069	0.000774	2.31%	-32.16%

PCB 105 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.05	0.05	0.05	0.051	0.052
AT3-098		0.067	0.0655	---	0.066	0.069

Bioaccumulation Evaluation - PCB Congeners - Nereis	**EA-EST, Inc. PBC**

Analysis ID:	00-9484-6417	**Endpoint:**	PCB 118	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:57	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:52	**MD5 Hash:**	67AB8F66D4D401A34EA90AE797230695	**Editor ID:**	

Batch ID:	16-3825-9393	**Test Type:**	Bioaccumlation - PCBs - Nv	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:33	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:33	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 118 endpoint	2.74%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	21.8	1.86	0.00146	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.04	2.29	0.1926	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0007396	0.0007396	1	477	<1.0E-05	Significant Effect
Error	0.0000124	1.55E-06	8			
Total	0.000752		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.35	23.2	0.4279	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.858	0.741	0.0713	Normal Distribution

PCB 118 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0534	0.0522	0.0546	0.053	0.0525	0.055	0.00043	1.80%	0.00%
AT3-098		5	0.0706	0.0688	0.0724	0.07	0.0695	0.073	0.00066	2.09%	-32.21%

PCB 118 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.053	0.0525	0.053	0.0535	0.055
AT3-098		0.071	0.0695	0.07	0.0695	0.073

CETIS Analytical Report

Bioaccumulation Evaluation - PCB Congeners - Nereis — **EA-EST, Inc. PBC**

Analysis ID:	13-1827-6879	**Endpoint:**	PCB 128	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:57	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:52	**MD5 Hash:**	C3C4DC1056F0EFDEE07C5586D6C8947A	**Editor ID:**	

Batch ID:	16-3825-9393	**Test Type:**	Bioaccumlation - PCBs - Nv	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:33	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:33	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 128 endpoint	2.63%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	22.6	1.86	0.00166	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.95	2.29	0.2878	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0010201	0.0010201	1	510	<1.0E-05	Significant Effect
Error	0.000016	0.000002	8			
Total	0.0010361		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.02	23.2	0.5130	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.889	0.741	0.1636	Normal Distribution

PCB 128 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0632	0.0618	0.0646	0.063	0.062	0.065	0.000515	1.82%	0.00%
AT3-098		5	0.0834	0.0814	0.0854	0.0825	0.082	0.086	0.000731	1.96%	-31.96%

PCB 128 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.063	0.062	0.0625	0.0635	0.065
AT3-098		0.084	0.082	0.0825	0.0825	0.086

Bioaccumulation Evaluation - PCB Congeners - Nereis — **EA-EST, Inc. PBC**

Analysis ID:	11-3728-5619	**Endpoint:**	PCB 138	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:57	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:52	**MD5 Hash:**	399A7E177AF191AB1A826ABF483B5A30	**Editor ID:**	

Batch ID:	16-3825-9393	**Test Type:**	Bioaccumlation - PCBs - Nv	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:33	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:33	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed pcb 138 endpoint	159.44%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	0.463	1.86	0.527	CDF	0.3277	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.63	2.29	0.8415	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0431649	0.0431649	1	0.215	0.6554	Non-Significant Effect
Error	1.60796	0.200995	8			
Total	1.65112		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	3.67	23.2	0.2361	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.865	0.741	0.0886	Normal Distribution

PCB 138 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.331	-0.0337	0.695	0.361	0.04	0.714	0.131	88.75%	0.00%
AT3-098		5	0.462	-0.236	1.16	0.055	0.0525	1.15	0.251	121.62%	-39.73%

PCB 138 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.714	0.498	0.04	0.0405	0.361
AT3-098		1	1.15	0.053	0.0525	0.055

Bioaccumulation Evaluation - PCB Congeners - Nereis — **EA-EST, Inc. PBC**

Analysis ID:	20-6837-7661	**Endpoint:**	PCB 153	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:57	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:52	**MD5 Hash:**	3A012973E699D509F4E0717A8201D7EA	**Editor ID:**	

Batch ID:	16-3825-9393	**Test Type:**	Bioaccumlation - PCBs - Nv	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:33	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:33	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed pcb 153 endpoint	57.00%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	0.403	1.86	0.435	CDF	0.3489	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.14	2.29	0.1193	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0221841	0.0221841	1	0.162	0.6977	Non-Significant Effect
Error	1.09455	0.136819	8			
Total	1.11673		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	8.7	23.2	0.0594	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.919	0.741	0.3498	Normal Distribution

PCB 153 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.763	0.555	0.972	0.687	0.621	1.01	0.0751	22.01%	0.00%
AT3-098		5	0.857	0.242	1.47	0.843	0.11	1.48	0.222	57.78%	-12.34%

PCB 153 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.862	0.621	0.687	1.01	0.636
AT3-098		1.04	1.48	0.843	0.11	0.814

Bioaccumulation Evaluation - PCB Congeners - Nereis EA-EST, Inc. PBC

Analysis ID:	12-6194-5314	**Endpoint:**	PCB 170	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:57	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:52	**MD5 Hash:**	593B2980E4B846DF34D8D0F06EC55ED6	**Editor ID:**	

Batch ID:	16-3825-9393	**Test Type:**	Bioaccumlation - PCBs - Nv	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:33	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:33	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 170 endpoint	2.70%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	22	1.86	0.000836	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.92	2.29	0.3191	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0002455	0.0002455	1	485	<1.0E-05	Significant Effect
Error	4.047E-06	5.059E-07	8			
Total	0.0002496		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.7	23.2	0.6206	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.846	0.741	0.0515	Normal Distribution

PCB 170 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.031	0.0302	0.0318	0.031	0.0305	0.032	0.000274	1.98%	0.00%
AT3-098		5	0.0409	0.0399	0.0419	0.0406	0.0403	0.0422	0.000357	1.95%	-31.97%

PCB 170 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.031	0.0305	0.0305	0.031	0.032
AT3-098		0.0412	0.0403	0.0406	0.0404	0.0422

CETIS Analytical Report

Bioaccumulation Evaluation - PCB Congeners - Nereis — **EA-EST, Inc. PBC**

Analysis ID:	05-3230-0024	**Endpoint:**	PCB 180	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:57	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:52	**MD5 Hash:**	A9C9E9D4AAD109F4274B61083402572B	**Editor ID:**	

Batch ID:	16-3825-9393	**Test Type:**	Bioaccumlation - PCBs - Nv	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:33	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:33	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 180 endpoint	2.45%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	24.1	1.86	0.000778	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.12	2.29	0.1372	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0002540	0.0002540	1	580	<1.0E-05	Significant Effect
Error	3.503E-06	4.379E-07	8			
Total	0.0002575		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	3.38	23.2	0.2653	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.877	0.741	0.1206	Normal Distribution

PCB 180 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0318	0.0312	0.0324	0.0315	0.0315	0.0325	0.0002	1.41%	0.00%
AT3-098		5	0.0419	0.0409	0.0429	0.0415	0.0412	0.0432	0.000368	1.96%	-31.70%

PCB 180 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0315	0.0315	0.0315	0.032	0.0325
AT3-098		0.0422	0.0412	0.0415	0.0414	0.0432

Bioaccumulation Evaluation - PCB Congeners - Nereis | **EA-EST, Inc. PBC**

Analysis ID:	05-4569-7612	**Endpoint:**	PCB 187	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:57	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:52	**MD5 Hash:**	6C8EB23E4DC7562EB7EC3DE2C74B3B7	**Editor ID:**	

Batch ID:	16-3825-9393	**Test Type:**	Bioaccumlation - PCBs - Nv	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:33	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:33	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 187 endpoint	2.64%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	22.4	1.86	0.00121	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.97	2.29	0.2691	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0005256	0.0005256	1	501	<1.0E-05	Significant Effect
Error	8.4E-06	1.05E-06	8			
Total	0.0005340		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.11	23.2	0.4871	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.852	0.741	0.0610	Normal Distribution

PCB 187 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0456	0.0446	0.0466	0.0455	0.045	0.047	0.000367	1.80%	0.00%
AT3-098		5	0.0601	0.0586	0.0616	0.0595	0.059	0.062	0.000534	1.99%	-31.80%

PCB 187 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0455	0.045	0.045	0.0455	0.047
AT3-098		0.0605	0.059	0.0595	0.0595	0.062

Bioaccumulation Evaluation - PCB Congeners - Nereis	**EA-EST, Inc. PBC**

Analysis ID:	02-2598-3391	**Endpoint:**	PCB 195	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:57	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:52	**MD5 Hash:**	98A1F3574672923967E356CB32D52988	**Editor ID:**	

Batch ID:	16-3825-9393	**Test Type:**	Bioaccumlation - PCBs - Nv	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:33	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:33	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 195 endpoint	2.65%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	22.4	1.86	0.00158	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.9	2.29	0.3527	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0009025	0.0009025	1	501	<1.0E-05	Significant Effect
Error	0.0000144	0.0000018	8			
Total	0.0009169		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.53	23.2	0.6920	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.821	0.741	0.0264	Normal Distribution

PCB 195 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0596	0.0581	0.0611	0.059	0.0585	0.0615	0.000534	2.00%	0.00%
AT3-098		5	0.0786	0.0768	0.0804	0.078	0.0775	0.081	0.00066	1.88%	-31.88%

PCB 195 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.059	0.0585	0.059	0.06	0.0615
AT3-098		0.079	0.0775	0.078	0.0775	0.081

Bioaccumulation Evaluation - PCB Congeners - Nereis			EA-EST, Inc. PBC

Analysis ID:	03-1612-5429	**Endpoint:**	PCB 206	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:57	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:52	**MD5 Hash:**	03526FED9E2B52E4C0A46B32B1EECFC	**Editor ID:**	

Batch ID:	16-3825-9393	**Test Type:**	Bioaccumlation - PCBs - Nv	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:33	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:33	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 206 endpoint	2.70%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	22	1.86	0.00164	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.13	2.29	0.1299	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0009409	0.0009409	1	483	<1.0E-05	Significant Effect
Error	0.0000156	1.95E-06	8			
Total	0.0009565		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.63	23.2	0.3721	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.842	0.741	0.0462	Normal Distribution

PCB 206 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0608	0.0595	0.0621	0.0605	0.06	0.0625	0.000464	1.71%	0.00%
AT3-098		5	0.0802	0.0781	0.0823	0.0795	0.079	0.083	0.000752	2.10%	-31.91%

PCB 206 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0605	0.06	0.06	0.061	0.0625
AT3-098		0.0805	0.079	0.0795	0.079	0.083

Bioaccumulation Evaluation - PCB Congeners - Nereis — **EA-EST, Inc. PBC**

Analysis ID:	15-1840-5518	**Endpoint:**	PCB 209	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:57	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:52	**MD5 Hash:**	B776423FBBBE4078D8289235BEA0F104	**Editor ID:**	

Batch ID:	16-3825-9393	**Test Type:**	Bioaccumlation - PCBs - Nv	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:33	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:33	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 209 endpoint	2.75%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	21.6	1.86	0.00192	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.95	2.29	0.2877	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0012432	0.0012432	1	467	<1.0E-05	Significant Effect
Error	0.0000213	2.663E-06	8			
Total	0.0012645		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.73	23.2	0.6082	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.834	0.741	0.0372	Normal Distribution

PCB 209 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0697	0.068	0.0714	0.069	0.0685	0.072	0.000624	2.00%	0.00%
AT3-098		5	0.092	0.0897	0.0943	0.091	0.0905	0.095	0.000822	2.00%	-31.99%

PCB 209 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.069	0.0685	0.069	0.07	0.072
AT3-098		0.0925	0.0905	0.091	0.091	0.095

ATTACHMENT VII

Nereis virens 28-Day Solid Phase Bioaccumulation Testing
Tissue Chemistry and Body Burden Statistical Analyses

Pesticides

(30 pages)

Yachtsman Marina
NAE-2004-00319

APPENDIX A. CONCENTRATIONS OF COCs IN THE WORM (*N. virens*)

	Pre-Assay				
CONTAMINANT	REP1	REP2	REP3	REP4 *	REP5 *
Pesticides (ng/g wet weight)					
Aldrin	0.0400 U	0.0411 U	0.0401 U		
cis-Chlordane	0.0860 U	0.0885 U	0.0865 U		
trans-Chlordane	0.0243 U	0.0250 U	0.0244 U		
cis-Nonachlor	0.0116 U	0.0119 U	0.0116 U		
trans-Nonachlor	0.0107 U	0.0110 U	0.0107 U		
Oxychlordane	0.0495 U	0.0510 U	0.0497 U		
Total Chlordanes	0.182	0.187	0.183		
4,4'-DDT	0.0158 U	0.0162 U	0.0158 U		
4,4'-DDD	6.38 P	3.49 P	0.0120 U		
4,4'-DDE	0.00730 U	0.00750 U	0.00730 U		
Total DDT	6.40	3.51	0.0351		
Dieldrin	0.0241 U	0.0248 U	0.0241 U		
alpha-Endosulfan	0.0220 U	0.0226 U	0.0221 U		
beta-Endosulfan	0.0114 U	0.0117 U	0.0114 U		
Endosulfans	0.0334	0.0343	0.0334		
Endrin	0.0131 U	0.0135 U	0.0132 U		
Heptachlor	0.0250 U	0.0257 U	0.0251 U		
Heptachlor epoxide	0.0515 U	0.0530 U	0.0515 U		
Hexachlorobenzene	0.215 U	0.221 U	0.216 U		
Lindane	0.0361 U	0.0371 U	0.0362 U		
Methoxychlor	0.0570 U	0.0585 U	0.0570 U		
Toxaphene	1.04 U	1.07 U	1.04 U		

* = Qualifiers
U   Analyte not detected; below Method Detection Limit; value is one-half the Method Detection Limit
J   Analyte estimated; detection below Reporting Limit but above Method Detection Limit
NA   Not Analyzed

Yachtsman Marina
NAE-2004-00319

APPENDIX A. CONCENTRATIONS OF COCs IN THE WORM (*N. virens*)

CONTAMINANT	REP1		REP2		REP3		REP4		REP5	
					IOSN Reference					
Pesticides (ng/g wet weight)										
Aldrin	0.0600	U	0.0595	U	0.0600	U	0.0605	U	0.0625	U
cis-Chlordane	0.130	U	0.129	U	0.130	U	0.131	U	0.135	U
trans-Chlordane	0.0365	U	0.0365	U	0.0365	U	0.0370	U	0.0380	U
cis-Nonachlor	0.0175	U	0.0175	U	0.0175	U	0.0175	U	0.0180	U
trans-Nonachlor	0.0160	U	0.0160	U	0.0160	U	0.0160	U	0.0165	U
Oxychlordane	0.0745	U	0.0740	U	0.0745	U	0.0755	U	0.0775	U
Total Chlordanes	0.275		0.273		0.274		0.277		0.285	
4,4'-DDT	0.0235	U	0.0235	U	0.0235	U	0.0240	U	0.0245	U
4,4'-DDD	0.0180	U	0.0180	U	0.0180	U	0.0180	U	0.0190	U
4,4'-DDE	0.0110	U	0.0110	U	0.0110	U	0.0110	U	0.0115	U
Total DDT	0.0525		0.0525		0.0525		0.0530		0.0550	
Dieldrin	0.0365	U	0.0360	U	0.0360	U	0.0365	U	0.0375	U
alpha-Endosulfan	0.0330	U	0.0330	U	0.0330	U	0.0335	U	0.0345	U
beta-Endosulfan	0.0170	U	0.0170	U	0.0170	U	0.0175	U	0.0180	U
Endosulfans	0.0500		0.0500		0.0500		0.0510		0.0525	
Endrin	0.0200	U	0.0195	U	0.0195	U	0.0200	U	0.0205	U
Heptachlor	0.0375	U	0.0375	U	0.0375	U	0.0380	U	0.0390	U
Heptachlor epoxide	0.0775	U	0.0770	U	0.0770	U	0.0780	U	0.0805	U
Hexachlorobenzene	0.324	U	0.321	U	0.323	U	0.327	U	0.336	U
Lindane	0.0545	U	0.0540	U	0.0540	U	0.0550	U	0.0565	U
Methoxychlor	0.835	U	0.830	U	0.835	U	0.845	U	0.870	U
Toxaphene	1.57	U	1.55	U	1.56	U	1.58	U	1.63	U

* = Qualifiers
U Analyte not detected; belo
J Analyte estimated; detectio
NA Not Analyzed

Yachtsman Marina
NAE-2004-00319

APPENDIX A. CONCENTRATIONS OF COCs IN THE WORM (*N. virens*)

10 Stations at 4 Marinas Mud

CONTAMINANT	REP1		REP2		REP3		REP4		REP5	
Pesticides (ng/g wet weight)										
Aldrin	0.0402	U	0.0393	U	0.0396	U	0.0395	U	0.0412	U
cis-Chlordane	0.0870	U	0.0850	U	0.0855	U	0.0850	U	0.0890	U
trans-Chlordane	0.0245	U	0.0239	U	0.0241	U	0.0240	U	0.0251	U
cis-Nonachlor	0.0117	U	0.0114	U	0.0115	U	0.0115	U	0.0120	U
trans-Nonachlor	0.0107	U	0.0105	U	0.0106	U	0.0105	U	0.0110	U
Oxychlordane	0.0499	U	0.0488	U	0.0491	U	0.0489	U	0.0510	U
Total Chlordanes	0.184		0.180		0.181		0.180		0.188	
4,4'-DDT	0.0159	U	0.0155	U	0.0156	U	0.0156	U	0.0163	U
4,4'-DDD	0.545		1.02		0.934		0.488		0.336	
4,4'-DDE	0.00735	U	0.00715	U	0.00720	U	0.00720	U	0.00750	U
Total DDT	0.568		1.04		0.957		0.511		0.360	
Dieldrin	0.0242	U	0.0237	U	0.0239	U	0.0238	U	0.0249	U
alpha-Endosulfan	0.0221	U	0.0217	U	0.0218	U	0.0217	U	0.0227	U
beta-Endosulfan	0.0114	U	0.0112	U	0.0113	U	0.0112	U	0.0117	U
Endosulfans	0.0335		0.0328		0.0331		0.0329		0.0344	
Endrin	0.0132	U	0.0129	U	0.0130	U	0.0130	U	0.0135	U
Heptachlor	0.0252	U	0.0246	U	0.0248	U	0.0247	U	0.0258	U
Heptachlor epoxide	0.0520	U	0.0505	U	0.0510	U	0.0510	U	0.0530	U
Hexachlorobenzene	0.217	U	0.212	U	0.214	U	0.213	U	0.222	U
Lindane	0.0364	U	0.0356	U	0.0358	U	0.0357	U	0.0373	U
Methoxychlor	0.0570	U	0.0560	U	0.0565	U	0.0560	U	0.0585	U
Toxaphene	1.05	U	1.02	U	1.03	U	1.03	U	1.07	U

* = Qualifiers
U Analyte not detected; belo
J Analyte estimated; detectio
NA Not Analyzed

CETIS Test Data Worksheet

Report Date: 19 Aug-23 07:00 (p 1 of 1)
Test Code/ID: TN-23-302NvPest / 04-3042-6729

Bioaccumulation Evaluation - Pesticides - Nereis — **EA-EST, Inc. PBC**

Start Date:	08 Mar-23 11:34	**Species:**	Nereis virens	**Sample Code:**	AT3-152
End Date:	05 Apr-23 10:34	**Protocol:**	US ACE NED RIM (2004)	**Sample Source:**	Yachtsman Marina NAE-2004-00319
Sample Date:	03 Mar-23	**Material:**	Laboratory Control Sediment	**Sample Station:**	Laboratory Control

Sample	Rep	Pos	4-4'-DDD	4-4'-DDE	4-4'-DDT	aldrin	alpha chlordane	alpha-BHC	beta-BHC	cis-Nonachlor	delta-BHC	Dieldrin	endosulfan I	endosulfan II	endrin	gamma-BHC (Lindane)	gamma-chlordane	heptachlor	heptachlor epoxide	hexachlorobenzene	Methoxychlor	oxychlordane	toxaphene	trans-nonachlor	2-4'-DDD	2-4'-DDE	2-4'-DDT	endosulfan sulfate	Total DDTs
IOSN 2019	1	1	0.02	0.01	0.02	0.06	0.13			0.02		0.04	0.03	0.02	0.02	0.05	0.04	0.04	0.08	0.32	0.84	0.07	1.57	0.02					
IOSN 2019	2	3	0.02	0.01	0.02	0.06	0.13			0.02		0.04	0.03	0.02	0.02	0.05	0.04	0.04	0.08	0.32	0.83	0.07	1.55	0.02					
IOSN 2019	3	6	0.02	0.01	0.02	0.06	0.13			0.02		0.04	0.03	0.02	0.02	0.05	0.04	0.04	0.08	0.32	0.84	0.07	1.56	0.02					
IOSN 2019	4	8	0.02	0.01	0.02	0.06	0.13			0.02		0.04	0.03	0.02	0.02	0.06	0.04	0.04	0.08	0.33	0.85	0.08	1.58	0.02					
IOSN 2019	5	10	0.02	0.01	0.02	0.06	0.14			0.02		0.04	0.03	0.02	0.02	0.06	0.04	0.04	0.08	0.34	0.87	0.08	1.63	0.02					
AT3-098	1	2	0.55	0.007	0.02	0.04	0.09	0.02	0.02	0.01	0.02	0.02	0.02	0.01	0.01	0.04	0.02	0.03	0.05	0.22	0.06	0.05	1.05	0.01					
AT3-098	2	4	1.02	0.007	0.02	0.04	0.09	0.02	0.02	0.01	0.02	0.02	0.02	0.01	0.01	0.04	0.02	0.02	0.05	0.21	0.06	0.05	1.02	0.01					
AT3-098	3	5	0.93	0.007	0.02	0.04	0.09	0.02	0.02	0.01	0.02	0.02	0.02	0.01	0.01	0.04	0.02	0.02	0.05	0.21	0.06	0.05	1.03	0.01					
AT3-098	4	7	0.49	0.007	0.02	0.04	0.09	0.02	0.02	0.01	0.02	0.02	0.02	0.01	0.01	0.04	0.02	0.02	0.05	0.21	0.06	0.05	1.03	0.01					
AT3-098	5	9	0.34	0.008	0.02	0.04	0.09	0.03	0.02	0.01	0.02	0.02	0.02	0.01	0.01	0.04	0.03	0.03	0.05	0.22	0.06	0.05	1.07	0.01					

Bioaccumulation Evaluation - Pesticides - Nereis **EA-EST, Inc. PBC**

Batch ID:	08-2970-4074	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:34	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:34	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample ID:	11-9755-1044	**Code:**	AT3-152	**Project:**	Dredged Sediment Evaluation
Sample Date:	03 Mar-23	**Material:**	Laboratory Control Sediment	**Source:**	Yachtsman Marina NAE-2004-00319 (
Receipt Date:	03 Mar-23 12:30	**CAS (PC):**		**Station:**	Laboratory Control
Sample Age:	5d 12h	**Client:**	Eco-Analysts, Inc.		

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
14-0552-7923	4-4'-DDD	Unequal Variance t Two-Sample Test	0.0041	AT3-098 failed 4-4'-ddd	1
14-6121-4079	4-4'-DDE	Wilcoxon Rank Sum Two-Sample Test	1.0000	AT3-098 passed 4-4'-dde	1
19-2680-5750	4-4'-DDT	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed 4-4'-ddt	1
13-5698-3625	aldrin	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed aldrin	1
11-2031-6586	alpha chlordane	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed alpha chlordane	1
13-9152-9887	cis-Nonachlor	Wilcoxon Rank Sum Two-Sample Test	1.0000	AT3-098 passed cis-nonachlor	1
06-0623-3039	Dieldrin	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed dieldrin	1
02-3083-2662	endosulfan I	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed endosulfan i	1
02-6532-5065	endosulfan II	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed endosulfan ii	1
07-0975-2842	endrin	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed endrin	1
19-3319-1425	gamma-BHC (Lindane)	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed gamma-bhc (lindane)	1
06-4006-7514	gamma-chlordane	Wilcoxon Rank Sum Two-Sample Test	1.0000	AT3-098 passed gamma-chlordane	1
11-6127-2344	heptachlor	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed heptachlor	1
03-5485-6177	heptachlor epoxide	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed heptachlor epoxide	1
02-5060-6268	hexachlorobenzene	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed hexachlorobenzene	1
19-5233-4682	Methoxychlor	Unequal Variance t Two-Sample Test	1.0000	AT3-098 passed methoxychlor	1
17-5795-8568	Methoxychlor	Wilcoxon Rank Sum Two-Sample Test	1.0000	AT3-098 passed methoxychlor	1
05-2281-2806	oxychlordane	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed oxychlordane	1
01-2624-1676	toxaphene	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed toxaphene	1
02-9910-1821	trans-nonachlor	Wilcoxon Rank Sum Two-Sample Test	1.0000	AT3-098 passed trans-nonachlor	1

4-4'-DDD Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0182	0.0176	0.0188	0.018	0.019	0.0002	0.000447	2.46%	0.00%
AT3-098		5	0.665	0.296	1.03	0.336	1.02	0.133	0.297	44.66%	-3551.65

4-4'-DDE Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0111	0.0108	0.0114	0.011	0.0115	0.0001	0.000224	2.01%	0.00%
AT3-098		5	0.00728	0.0071	0.00746	0.00715	0.0075	0.0000644	0.000144	1.98%	34.41%

4-4'-DDT Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0238	0.0232	0.0244	0.0235	0.0245	0.0002	0.000447	1.88%	0.00%
AT3-098		5	0.0157	0.0154	0.0161	0.0155	0.0162	0.000139	0.00031	1.97%	33.82%

aldrin Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0605	0.059	0.062	0.0595	0.0625	0.000524	0.00117	1.94%	0.00%
AT3-098		5	0.0399	0.039	0.0409	0.0393	0.0412	0.000348	0.000778	1.95%	33.97%

alpha chlordane Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.131	0.128	0.134	0.129	0.135	0.00108	0.00241	1.84%	0.00%
AT3-098		5	0.0863	0.0842	0.0884	0.085	0.089	0.000768	0.00172	1.99%	34.07%

cis-Nonachlor Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0176	0.0173	0.0179	0.0175	0.018	0.0001	0.000224	1.27%	0.00%
AT3-098		5	0.0116	0.0113	0.0119	0.0114	0.012	0.000101	0.000226	1.95%	34.09%

Dieldrin Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0365	0.0357	0.0373	0.036	0.0375	0.000274	0.000612	1.68%	0.00%
AT3-098		5	0.0241	0.0235	0.0247	0.0237	0.0248	0.000214	0.000478	1.98%	34.05%

endosulfan I Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0334	0.0326	0.0342	0.033	0.0345	0.000292	0.000652	1.95%	0.00%
AT3-098		5	0.022	0.0215	0.0225	0.0216	0.0227	0.000194	0.000434	1.97%	34.16%

endosulfan II Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0173	0.0167	0.0179	0.017	0.018	0.0002	0.000447	2.59%	0.00%
AT3-098		5	0.0113	0.0111	0.0116	0.0111	0.0117	0.0000992	0.000222	1.96%	34.45%

endrin Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0199	0.0194	0.0204	0.0195	0.0205	0.000187	0.000418	2.10%	0.00%
AT3-098		5	0.0131	0.0128	0.0134	0.0129	0.0135	0.00011	0.000246	1.88%	34.12%

gamma-BHC (Lindane) Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0548	0.0535	0.0561	0.054	0.0565	0.000464	0.00104	1.89%	5.20%
AT3-098		5	0.0361	0.0352	0.037	0.0355	0.0373	0.000314	0.000703	1.95%	3.49%

Bioaccumulation Evaluation - Pesticides - Nereis **EA-EST, Inc. PBC**

gamma-chlordane Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0369	0.0361	0.0377	0.0365	0.038	0.000292	0.000652	1.77%	3.56%
AT3-098		5	0.0243	0.0237	0.0249	0.0239	0.025	0.000209	0.000468	1.92%	2.37%

heptachlor Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0379	0.0371	0.0387	0.0375	0.039	0.000292	0.000652	1.72%	0.00%
AT3-098		5	0.025	0.0244	0.0256	0.0246	0.0258	0.00022	0.000492	1.97%	33.98%

heptachlor epoxide Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.078	0.0762	0.0798	0.077	0.0805	0.000652	0.00146	1.87%	0.00%
AT3-098		5	0.0515	0.0503	0.0527	0.0505	0.053	0.000447	0.001	1.94%	33.97%

hexachlorobenzene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.326	0.319	0.334	0.321	0.336	0.00267	0.00596	1.83%	0.00%
AT3-098		5	0.215	0.21	0.22	0.212	0.222	0.00189	0.00424	1.97%	34.01%

Methoxychlor Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.843	0.823	0.863	0.83	0.87	0.00718	0.016	1.90%	0.00%
AT3-098		5	0.0568	0.0555	0.0581	0.056	0.0585	0.000464	0.00104	1.83%	93.26%

oxychlordane Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0752	0.0735	0.0769	0.074	0.0775	0.000624	0.0014	1.86%	0.00%
AT3-098		5	0.0495	0.0484	0.0507	0.0487	0.051	0.000416	0.000929	1.88%	34.15%

toxaphene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	1.58	1.54	1.61	1.55	1.63	0.0132	0.0295	1.87%	0.00%
AT3-098		5	1.04	1.01	1.06	1.02	1.07	0.00903	0.0202	1.94%	34.14%

trans-nonachlor Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0161	0.0158	0.0164	0.016	0.0165	0.0001	0.000224	1.39%	0.00%
AT3-098		5	0.0106	0.0104	0.0109	0.0104	0.011	0.0000992	0.000222	2.09%	33.91%

4-4'-DDD Detail MD5: 3AC2F24637BB4B91C14DF8039C1C2CD6

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.018	0.018	0.018	0.018	0.019
AT3-098		0.545	1.02	0.934	0.488	0.336

4-4'-DDE Detail MD5: 84E3C18EA1D182D890C2937CB78D64AB

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.011	0.011	0.011	0.011	0.0115
AT3-098		0.00735	0.00715	0.0072	0.0072	0.0075

4-4'-DDT Detail MD5: B6AB72835EA8F5FD1C1DB81ACC073EDB

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0235	0.0235	0.0235	0.024	0.0245
AT3-098		0.0159	0.0155	0.0156	0.0155	0.0162

aldrin Detail MD5: 4679F2E9C684641004BB74E92D0F039E

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.06	0.0595	0.06	0.0605	0.0625
AT3-098		0.0402	0.0393	0.0396	0.0395	0.0412

alpha chlordane Detail MD5: CC2ADF7117E500C15BD9DA5DD158D663

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.13	0.129	0.13	0.131	0.135
AT3-098		0.087	0.085	0.0855	0.085	0.089

cis-Nonachlor Detail MD5: F48BAD9D55CDAFA5A98435658706EC3E

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0175	0.0175	0.0175	0.0175	0.018
AT3-098		0.0117	0.0114	0.0115	0.0115	0.012

Dieldrin Detail MD5: 100664800AE1E04003B6578BDFD32221

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0365	0.036	0.036	0.0365	0.0375
AT3-098		0.0242	0.0237	0.0238	0.0237	0.0248

endosulfan I Detail MD5: 6F87B91E6641DEEFABEB5CD93E1AC3A4

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.033	0.033	0.033	0.0335	0.0345
AT3-098		0.0221	0.0216	0.0218	0.0217	0.0227

endosulfan II Detail MD5: 3239C6E4B7D89C5811C9339447AF03BD

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.017	0.017	0.017	0.0175	0.018
AT3-098		0.0114	0.0111	0.0113	0.0112	0.0117

endrin Detail MD5: A0D2C6B4F9ECDCA13F956098900D5B9E

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.02	0.0195	0.0195	0.02	0.0205
AT3-098		0.0132	0.0129	0.013	0.013	0.0135

gamma-BHC (Lindane) Detail MD5: 614F84BF6F415E980BF132BF85F8F69F

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0545	0.054	0.054	0.055	0.0565
AT3-098		0.0364	0.0355	0.0358	0.0356	0.0373

gamma-chlordane Detail MD5: 3034683ECBB3B1BCF6404B54278E622E

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0365	0.0365	0.0365	0.037	0.038
AT3-098		0.0245	0.0239	0.0241	0.024	0.025

heptachlor Detail MD5: 3B9E0CBD8C081E007766E0A2EC3C44A5

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0375	0.0375	0.0375	0.038	0.039
AT3-098		0.0252	0.0246	0.0248	0.0247	0.0258

heptachlor epoxide Detail MD5: 13E302DC0DDE68B162D75B92B20650EF

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0775	0.077	0.077	0.078	0.0805
AT3-098		0.052	0.0505	0.051	0.051	0.053

hexachlorobenzene Detail MD5: E1BBBA742E57DE5AD07AD219A57FDBF8

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.324	0.321	0.322	0.327	0.336
AT3-098		0.216	0.212	0.213	0.213	0.222

Methoxychlor Detail MD5: 955BF3943188CA3B8CA50ED459DEDBD1

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.835	0.83	0.835	0.845	0.87
AT3-098		0.057	0.056	0.0565	0.056	0.0585

oxychlordane Detail MD5: E6FB14D92CF4B671D06426A3C27C4B4E

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0745	0.074	0.0745	0.0755	0.0775
AT3-098		0.0498	0.0487	0.0491	0.0489	0.051

toxaphene Detail MD5: C865FEEA96D68486D2D8D5F0A836A757

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	1.57	1.55	1.56	1.58	1.63
AT3-098		1.04	1.02	1.03	1.02	1.07

trans-nonachlor Detail MD5: 794A571E5B6F9708107F5CDABCC8729A

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.016	0.016	0.016	0.016	0.0165
AT3-098		0.0107	0.0104	0.0105	0.0105	0.011

STUDY: TN-23-302
CLIENT: Eco-Analysts, Inc.
PROJECT: Yachtsman Marina, Kennebunkport, ME NAE-2004-00319
ASSAY: *N. virens* 28-day Bioaccumulation Evaluation
TASK: Statistical Analysis of Body Burden Pesticides

Endpoint	Method	C	<	T	Statistic	Critical	P Level	Alpha	Reject Null	MSD	DF	Ties	P-Type
4-4'-DDD	Unequal Variance t Two-Sample Test	IOSN	<	Comp	4.869961	2.131847	0.00410996	0.05	TRUE	0.2829644	4		C
4-4'-DDE	Wilcoxon Rank Sum Two-Sample Test	IOSN	<	Comp	40		1	0.05	FALSE		8	0	E
4-4'-DDT	Equal Variance t Two-Sample Test	IOSN	<	Comp	-33.07133	1.859548	1	0.05	FALSE	0.000452639	8		C
aldrin	Equal Variance t Two-Sample Test	IOSN	<	Comp	-32.65609	1.859548	1	0.05	FALSE	0.001170186	8		C
alpha chlordane	Equal Variance t Two-Sample Test	IOSN	<	Comp	-33.7144	1.859548	1	0.05	FALSE	0.002459953	8		C
cis-Nonachlor	Wilcoxon Rank Sum Two-Sample Test	IOSN	<	Comp	40		1	0.05	FALSE		8	0	E
Dieldrin	Equal Variance t Two-Sample Test	IOSN	<	Comp	-35.78549	1.859548	1	0.05	FALSE	0.000645909	8		C
endosulfan I	Equal Variance t Two-Sample Test	IOSN	<	Comp	-32.5867	1.859548	1	0.05	FALSE	0.000651107	8		C
endosulfan II	Equal Variance t Two-Sample Test	IOSN	<	Comp	-26.69404	1.859548	1	0.05	FALSE	0.000415183	8		C
endrin	Equal Variance t Two-Sample Test	IOSN	<	Comp	-31.28667	1.859548	1	0.05	FALSE	0.000403569	8		C
gamma-BHC (Lindane)	Equal Variance t Two-Sample Test	IOSN	<	Comp	-33.34121	1.859548	1	0.05	FALSE	0.001041845	8		C
gamma-chlordane	Wilcoxon Rank Sum Two-Sample Test	IOSN	<	Comp	40		1	0.05	FALSE		8	0	E
heptachlor	Equal Variance t Two-Sample Test	IOSN	<	Comp	-35.26453	1.859548	1	0.05	FALSE	0.000679181	8		C
heptachlor epoxide	Equal Variance t Two-Sample Test	IOSN	<	Comp	-33.52015	1.859548	1	0.05	FALSE	0.001470102	8		C
hexachlorobenzene	Equal Variance t Two-Sample Test	IOSN	<	Comp	-33.90313	1.859548	1	0.05	FALSE	0.006082738	8		C
Methoxychlor	Wilcoxon Rank Sum Two-Sample Test	IOSN	<	Comp	40		1	0.05	FALSE		8	0	E
Methoxychlor	Unequal Variance t Two-Sample Test	IOSN	<	Comp	-245.1282	2.353364	1	0.05	FALSE	0.007483141	3		C
oxychlordane	Equal Variance t Two-Sample Test	IOSN	<	Comp	-34.23545	1.859548	1	0.05	FALSE	0.001394846	8		C
toxaphene	Equal Variance t Two-Sample Test	IOSN	<	Comp	-33.69084	1.859548	1	0.05	FALSE	0.02969462	8		C
trans-nonachlor	Wilcoxon Rank Sum Two-Sample Test	IOSN	<	Comp	40		1	0.05	FALSE		8	0	E

Bioaccumulation Evaluation - Pesticides - Nereis **EA-EST, Inc. PBC**

Analysis ID:	14-0552-7923	**Endpoint:**	4-4'-DDD	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:59	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:53	**MD5 Hash:**	8C3CE0F0C4CCA1BDD1003605E13CEE5	**Editor ID:**	

Batch ID:	08-2970-4074	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:34	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:34	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed 4-4'-ddd endpoint	1554.75%

Unequal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	4	4.87	2.13	0.283	CDF	0.0041	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.8	2.29	0.5037	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.04458	1.04458	1	23.7	0.0012	Significant Effect
Error	0.352356	0.0440445	8			
Total	1.39694		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	440000	23.2	<1.0E-05	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.906	0.741	0.2534	Normal Distribution

4-4'-DDD Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0182	0.0176	0.0188	0.018	0.018	0.019	0.0002	2.46%	0.00%
AT3-098		5	0.665	0.296	1.03	0.545	0.336	1.02	0.133	44.66%	-3551.65%

4-4'-DDD Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.018	0.018	0.018	0.018	0.019
AT3-098		0.545	1.02	0.934	0.488	0.336

Bioaccumulation Evaluation - Pesticides - Nereis — **EA-EST, Inc. PBC**

Analysis ID:	14-6121-4079	**Endpoint:**	4-4'-DDE	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:59	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:53	**MD5 Hash:**	23EEA41834C09139D6F093DA3ED4CFA2	**Editor ID:**	

Batch ID:	08-2970-4074	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:34	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:34	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed 4-4'-dde endpoint	1.99%

Wilcoxon Rank Sum Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	Ties	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	40	---	0	Exact	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.26	2.29	0.0625	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.648E-05	3.648E-05	1	1030	<1.0E-05	Significant Effect
Error	2.83E-07	3.538E-08	8			
Total	3.676E-05		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.41	23.2	0.4152	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.712	0.741	0.0012	Non-Normal Distribution

4-4'-DDE Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0111	0.0108	0.0114	0.011	0.011	0.0115	0.0001	2.01%	0.00%
AT3-098		5	0.00728	0.0071	0.00746	0.0072	0.00715	0.0075	0.0000644	1.98%	34.41%

4-4'-DDE Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.011	0.011	0.011	0.011	0.0115
AT3-098		0.00735	0.00715	0.0072	0.0072	0.0075

Bioaccumulation Evaluation - Pesticides - Nereis | **EA-EST, Inc. PBC**

Analysis ID:	19-2680-5750	**Endpoint:**	4-4'-DDT	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:59	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:53	**MD5 Hash:**	9D8A85229143661C7BED30254A154562	**Editor ID:**	

Batch ID:	08-2970-4074	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:34	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:34	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed 4-4'-ddt endpoint	1.90%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-33.1	1.86	0.000453	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.93	2.29	0.3125	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0001620	0.0001620	1	1090	<1.0E-05	Significant Effect
Error	1.185E-06	1.481E-07	8			
Total	0.0001632		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.08	23.2	0.4962	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.825	0.741	0.0295	Normal Distribution

4-4'-DDT Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0238	0.0232	0.0244	0.0235	0.0235	0.0245	0.0002	1.88%	0.00%
AT3-098		5	0.0157	0.0154	0.0161	0.0156	0.0155	0.0163	0.000139	1.97%	33.82%

4-4'-DDT Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0235	0.0235	0.0235	0.024	0.0245
AT3-098		0.0159	0.0155	0.0156	0.0156	0.0163

Bioaccumulation Evaluation - Pesticides - Nereis	**EA-EST, Inc. PBC**

Analysis ID:	13-5698-3625	**Endpoint:**	aldrin	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:59	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:53	**MD5 Hash:**	6ED9C12523B01552897D499768FD1B54	**Editor ID:**	

Batch ID:	08-2970-4074	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:34	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:34	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed aldrin endpoint	1.93%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-32.7	1.86	0.00117	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.13	2.29	0.1264	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0010558	0.0010558	1	1070	<1.0E-05	Significant Effect
Error	7.92E-06	9.9E-07	8			
Total	0.0010637		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.27	23.2	0.4461	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.837	0.741	0.0404	Normal Distribution

aldrin Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0605	0.059	0.062	0.06	0.0595	0.0625	0.000524	1.94%	0.00%
AT3-098		5	0.0399	0.039	0.0409	0.0396	0.0393	0.0412	0.000348	1.95%	33.97%

aldrin Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.06	0.0595	0.06	0.0605	0.0625
AT3-098		0.0402	0.0393	0.0396	0.0395	0.0412

Bioaccumulation Evaluation - Pesticides - Nereis					**EA-EST, Inc. PBC**
Analysis ID:	11-2031-6586	**Endpoint:**	alpha chlordane	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:59	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:53	**MD5 Hash:**	6CF43D826CA35FAC795C430CBAF6E77B	**Editor ID:**	

Batch ID:	08-2970-4074	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:34	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:34	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed alpha chlordane endpoint	1.88%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-33.7	1.86	0.00246	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.08	2.29	0.1642	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0049729	0.0049729	1	1140	<1.0E-05	Significant Effect
Error	3.500E-05	4.375E-06	8			
Total	0.0050079		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.97	23.2	0.5287	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.832	0.741	0.0352	Normal Distribution

alpha chlordane Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.131	0.128	0.134	0.13	0.129	0.135	0.00108	1.84%	0.00%
AT3-098		5	0.0863	0.0842	0.0884	0.0855	0.085	0.089	0.000768	1.99%	34.07%

alpha chlordane Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.13	0.129	0.13	0.131	0.135
AT3-098		0.087	0.085	0.0855	0.085	0.089

Bioaccumulation Evaluation - Pesticides - Nereis **EA-EST, Inc. PBC**

Analysis ID:	13-9152-9887	**Endpoint:**	cis-Nonachlor	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:59	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:53	**MD5 Hash:**	9365490B4EADE5D4DD63B353AD2D36FC	**Editor ID:**	

Batch ID:	08-2970-4074	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:34	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:34	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed cis-nonachlor endpoint	1.50%

Wilcoxon Rank Sum Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	Ties	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	40	---	0	Exact	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.89	2.29	0.3684	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.00009	0.00009	1	1780	<1.0E-05	Significant Effect
Error	4.05E-07	5.062E-08	8			
Total	9.041E-05		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.03	23.2	0.9815	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.751	0.741	0.0037	Non-Normal Distribution

cis-Nonachlor Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0176	0.0173	0.0179	0.0175	0.0175	0.018	0.0001	1.27%	0.00%
AT3-098		5	0.0116	0.0113	0.0119	0.0115	0.0114	0.012	0.000101	1.95%	34.09%

cis-Nonachlor Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0175	0.0175	0.0175	0.0175	0.018
AT3-098		0.0117	0.0114	0.0115	0.0115	0.012

Bioaccumulation Evaluation - Pesticides - Nereis — **EA-EST, Inc. PBC**

Analysis ID:	06-0623-3039	**Endpoint:**	Dieldrin	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:59	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:53	**MD5 Hash:**	EFDBEC3403EDF502938D0D611892227E	**Editor ID:**	

Batch ID:	08-2970-4074	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:34	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:34	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed dieldrin endpoint	1.77%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-35.8	1.86	0.000646	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.93	2.29	0.3099	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0003863	0.0003863	1	1280	<1.0E-05	Significant Effect
Error	2.413E-06	3.016E-07	8			
Total	0.0003887		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.64	23.2	0.6423	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.856	0.741	0.0679	Normal Distribution

Dieldrin Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0365	0.0357	0.0373	0.0365	0.036	0.0375	0.000274	1.68%	0.00%
AT3-098		5	0.0241	0.0235	0.0247	0.0239	0.0237	0.0249	0.000214	1.98%	34.05%

Dieldrin Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0365	0.036	0.036	0.0365	0.0375
AT3-098		0.0242	0.0237	0.0239	0.0238	0.0249

Bioaccumulation Evaluation - Pesticides - Nereis — **EA-EST, Inc. PBC**

Analysis ID:	02-3083-2662	**Endpoint:**	endosulfan I	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:59	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:53	**MD5 Hash:**	3C4B97B68CF3AFAB4CC93CC593BED15	**Editor ID:**	

Batch ID:	08-2970-4074	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:34	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:34	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed endosulfan i endpoint	1.95%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-32.6	1.86	0.000651	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.11	2.29	0.1431	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0003255	0.0003255	1	1060	<1.0E-05	Significant Effect
Error	2.452E-06	3.065E-07	8			
Total	0.0003279		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.26	23.2	0.4490	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.791	0.741	0.0114	Normal Distribution

endosulfan I Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0334	0.0326	0.0342	0.033	0.033	0.0345	0.000292	1.95%	0.00%
AT3-098		5	0.022	0.0215	0.0225	0.0218	0.0217	0.0227	0.000194	1.97%	34.16%

endosulfan I Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.033	0.033	0.033	0.0335	0.0345
AT3-098		0.0221	0.0217	0.0218	0.0217	0.0227

Bioaccumulation Evaluation - Pesticides - Nereis — **EA-EST, Inc. PBC**

Analysis ID:	02-6532-5065	**Endpoint:**	endosulfan II	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:59	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:53	**MD5 Hash:**	6B36FC0525BD64452BBAF680016AD88A	**Editor ID:**	

Batch ID:	08-2970-4074	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:34	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:34	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed endosulfan ii endpoint	2.40%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-26.7	1.86	0.000415	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.1	2.29	0.1461	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	8.880E-05	8.880E-05	1	713	<1.0E-05	Significant Effect
Error	9.97E-07	1.246E-07	8			
Total	8.980E-05		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	4.06	23.2	0.2034	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.869	0.741	0.0969	Normal Distribution

endosulfan II Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0173	0.0167	0.0179	0.017	0.017	0.018	0.0002	2.58%	0.00%
AT3-098		5	0.0113	0.0111	0.0116	0.0113	0.0112	0.0117	0.0000992	1.96%	34.45%

endosulfan II Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.017	0.017	0.017	0.0175	0.018
AT3-098		0.0114	0.0112	0.0113	0.0112	0.0117

Bioaccumulation Evaluation - Pesticides - Nereis — **EA-EST, Inc. PBC**

Analysis ID:	07-0975-2842	**Endpoint:**	endrin	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:59	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:53	**MD5 Hash:**	DD2B453810318B599B9112113D055D16	**Editor ID:**	

Batch ID:	08-2970-4074	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:34	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:34	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed endrin endpoint	2.03%

Equal Variance t Two-Sample Test

Sample I	vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed		AT3-098	8	-31.3	1.86	0.000404	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.85	2.29	0.4121	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0001153	0.0001153	1	979	<1.0E-05	Significant Effect
Error	9.42E-07	1.178E-07	8			
Total	0.0001162		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.89	23.2	0.3282	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.938	0.741	0.5309	Normal Distribution

endrin Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0199	0.0194	0.0204	0.02	0.0195	0.0205	0.000187	2.10%	0.00%
AT3-098		5	0.0131	0.0128	0.0134	0.013	0.0129	0.0135	0.00011	1.88%	34.12%

endrin Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.02	0.0195	0.0195	0.02	0.0205
AT3-098		0.0132	0.0129	0.013	0.013	0.0135

Bioaccumulation Evaluation - Pesticides - Nereis — **EA-EST, Inc. PBC**

Analysis ID:	19-3319-1425	**Endpoint:**	gamma-BHC (Lindane)	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:59	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:53	**MD5 Hash:**	83FF9521D24657BBB17A2BEF9E2053FA	**Editor ID:**	

Batch ID:	08-2970-4074	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:34	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:34	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed gamma-bhc (lindane) endpoint	1.90%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-33.3	1.86	0.00104	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.04	2.29	0.2007	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0008724	0.0008724	1	1110	<1.0E-05	Significant Effect
Error	6.278E-06	7.848E-07	8			
Total	0.0008786		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.17	23.2	0.4705	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.86	0.741	0.0765	Normal Distribution

gamma-BHC (Lindane) Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0548	0.0535	0.0561	0.0545	0.054	0.0565	0.000464	1.89%	5.20%
AT3-098		5	0.0361	0.0352	0.037	0.0358	0.0356	0.0373	0.000314	1.95%	3.49%

gamma-BHC (Lindane) Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0545	0.054	0.054	0.055	0.0565
AT3-098		0.0364	0.0356	0.0358	0.0357	0.0373

Bioaccumulation Evaluation - Pesticides - Nereis — **EA-EST, Inc. PBC**

Analysis ID:	06-4006-7514	**Endpoint:**	gamma-chlordane	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:59	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:53	**MD5 Hash:**	594FFD0E40779F1FE9A9ECD526C8E2AF	**Editor ID:**	

Batch ID:	08-2970-4074	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:34	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:34	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed gamma-chlordane endpoint	1.81%

Wilcoxon Rank Sum Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	Ties	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	40	---	0	Exact	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.06	2.29	0.1825	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0003969	0.0003969	1	1230	<1.0E-05	Significant Effect
Error	2.575E-06	3.219E-07	8			
Total	0.0003995		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.94	23.2	0.5359	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.785	0.741	0.0097	Non-Normal Distribution

gamma-chlordane Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0369	0.0361	0.0377	0.0365	0.0365	0.038	0.000292	1.77%	3.56%
AT3-098		5	0.0243	0.0237	0.0249	0.0241	0.0239	0.0251	0.000209	1.92%	2.37%

gamma-chlordane Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0365	0.0365	0.0365	0.037	0.038
AT3-098		0.0245	0.0239	0.0241	0.024	0.0251

Bioaccumulation Evaluation - Pesticides - Nereis — **EA-EST, Inc. PBC**

Analysis ID:	03-5485-6177	**Endpoint:**	heptachlor epoxide	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:59	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:53	**MD5 Hash:**	C7680CECAFD5671B3F20DD3C7F796E20	**Editor ID:**	

Batch ID:	08-2970-4074	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:34	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:34	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed heptachlor epoxide endpoint	1.88%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-33.5	1.86	0.00147	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.12	2.29	0.1335	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0017556	0.0017556	1	1120	<1.0E-05	Significant Effect
Error	0.0000125	1.563E-06	8			
Total	0.0017681		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.13	23.2	0.4833	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.826	0.741	0.0300	Normal Distribution

heptachlor epoxide Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.078	0.0762	0.0798	0.0775	0.077	0.0805	0.000652	1.87%	0.00%
AT3-098		5	0.0515	0.0503	0.0527	0.051	0.0505	0.053	0.000447	1.94%	33.97%

heptachlor epoxide Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0775	0.077	0.077	0.078	0.0805
AT3-098		0.052	0.0505	0.051	0.051	0.053

Bioaccumulation Evaluation - Pesticides - Nereis — **EA-EST, Inc. PBC**

Analysis ID:	11-6127-2344	**Endpoint:**	heptachlor	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:59	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:53	**MD5 Hash:**	B23F09EECF1AE81697FD4B63712DD573	**Editor ID:**	

Batch ID:	08-2970-4074	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:34	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:34	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed heptachlor endpoint	1.79%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-35.3	1.86	0.000679	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.02	2.29	0.2146	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0004147	0.0004147	1	1240	<1.0E-05	Significant Effect
Error	2.668E-06	3.335E-07	8			
Total	0.0004174		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.76	23.2	0.5988	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.788	0.741	0.0104	Normal Distribution

heptachlor Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0379	0.0371	0.0387	0.0375	0.0375	0.039	0.000292	1.72%	0.00%
AT3-098		5	0.025	0.0244	0.0256	0.0248	0.0246	0.0258	0.00022	1.97%	33.98%

heptachlor Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0375	0.0375	0.0375	0.038	0.039
AT3-098		0.0252	0.0246	0.0248	0.0247	0.0258

Bioaccumulation Evaluation - Pesticides - Nereis	**EA-EST, Inc. PBC**

Analysis ID:	02-5060-6268	**Endpoint:**	hexachlorobenzene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:59	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:53	**MD5 Hash:**	1ED096EED56D66A99022756438884E2A	**Editor ID:**	

Batch ID:	08-2970-4074	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:34	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:34	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed hexachlorobenzene endpoint	1.87%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-33.9	1.86	0.00608	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.03	2.29	0.2054	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.030747	0.030747	1	1150	<1.0E-05	Significant Effect
Error	0.000214	2.675E-05	8			
Total	0.030961		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.98	23.2	0.5243	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.86	0.741	0.0769	Normal Distribution

hexachlorobenzene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.326	0.319	0.334	0.324	0.321	0.336	0.00267	1.83%	0.00%
AT3-098		5	0.215	0.21	0.22	0.214	0.212	0.222	0.00189	1.97%	34.01%

hexachlorobenzene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.324	0.321	0.323	0.327	0.336
AT3-098		0.217	0.212	0.214	0.213	0.222

Bioaccumulation Evaluation - Pesticides - Nereis					EA-EST, Inc. PBC
Analysis ID:	17-5795-8568	**Endpoint:**	Methoxychlor	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:59	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:53	**MD5 Hash:**	1BF0DC5558AB8A5E68602667CBF3ADAE	**Editor ID:**	

Batch ID:	08-2970-4074	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:34	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:34	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed methoxychlor endpoint	1.59%

Wilcoxon Rank Sum Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	Ties	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	40	---	0	Exact	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.52	2.29	0.0067	Outlier Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.54528	1.54528	1	12000	<1.0E-05	Significant Effect
Error	0.0010343	0.0001293	8			
Total	1.54631		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	240	23.2	0.0001	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.783	0.741	0.0090	Non-Normal Distribution

Methoxychlor Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.843	0.823	0.863	0.835	0.83	0.87	0.00718	1.90%	0.00%
AT3-098		5	0.0568	0.0555	0.0581	0.0565	0.056	0.0585	0.000464	1.83%	93.26%

Methoxychlor Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.835	0.83	0.835	0.845	0.87
AT3-098		0.057	0.056	0.0565	0.056	0.0585

Bioaccumulation Evaluation - Pesticides - Nereis — **EA-EST, Inc. PBC**

Analysis ID:	05-2281-2806	**Endpoint:**	oxychlordane	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:59	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:53	**MD5 Hash:**	865DF939E6D4B28903EE27C11A10CEE1	**Editor ID:**	

Batch ID:	08-2970-4074	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:34	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:34	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed oxychlordane endpoint	1.85%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-34.2	1.86	0.00139	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.06	2.29	0.1821	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0016487	0.0016487	1	1170	<1.0E-05	Significant Effect
Error	1.125E-05	1.407E-06	8			
Total	0.0016599		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.26	23.2	0.4494	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.854	0.741	0.0646	Normal Distribution

oxychlordane Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0752	0.0735	0.0769	0.0745	0.074	0.0775	0.000625	1.86%	0.00%
AT3-098		5	0.0495	0.0484	0.0507	0.0491	0.0488	0.051	0.000416	1.88%	34.15%

oxychlordane Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0745	0.074	0.0745	0.0755	0.0775
AT3-098		0.0499	0.0488	0.0491	0.0489	0.051

Bioaccumulation Evaluation - Pesticides - Nereis — **EA-EST, Inc. PBC**

Analysis ID:	01-2624-1676	**Endpoint:**	toxaphene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:59	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:53	**MD5 Hash:**	04A9935CB031727A1521931703F25D5D	**Editor ID:**	

Batch ID:	08-2970-4074	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:34	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:34	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed toxaphene endpoint	1.88%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-33.7	1.86	0.0297	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.06	2.29	0.1808	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.72361	0.72361	1	1140	<1.0E-05	Significant Effect
Error	0.0051000	0.0006375	8			
Total	0.72871		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.13	23.2	0.4823	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.87	0.741	0.1002	Normal Distribution

toxaphene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	1.58	1.54	1.61	1.57	1.55	1.63	0.0132	1.87%	0.00%
AT3-098		5	1.04	1.01	1.06	1.03	1.02	1.07	0.00903	1.94%	34.14%

toxaphene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	1.57	1.55	1.56	1.58	1.63
AT3-098		1.05	1.02	1.03	1.03	1.07

Bioaccumulation Evaluation - Pesticides - Nereis			**EA-EST, Inc. PBC**

Analysis ID:	02-9910-1821	**Endpoint:**	trans-nonachlor	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:59	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:53	**MD5 Hash:**	41665718E1BF27DB31610050171D2A19	**Editor ID:**	

Batch ID:	08-2970-4074	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	08 Mar-23 11:34	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	05 Apr-23 10:34	**Species:**	Nereis virens	**Brine:**	Crystal Sea
Test Length:	27d 23h	**Taxon:**	Polychaeta	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	12h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	27d 23h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed trans-nonachlor endpoint	1.63%

Wilcoxon Rank Sum Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	Ties	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	40	---	0	Exact	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.9	2.29	0.3433	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	7.453E-05	7.453E-05	1	1500	<1.0E-05	Significant Effect
Error	3.97E-07	4.962E-08	8			
Total	7.493E-05		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.02	23.2	0.9887	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.73	0.741	0.0021	Non-Normal Distribution

trans-nonachlor Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0161	0.0158	0.0164	0.016	0.016	0.0165	0.0001	1.39%	0.00%
AT3-098		5	0.0106	0.0104	0.0109	0.0106	0.0105	0.011	0.0000992	2.09%	33.91%

trans-nonachlor Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.016	0.016	0.016	0.016	0.0165
AT3-098		0.0107	0.0105	0.0106	0.0105	0.011

ATTACHMENT VIII

Macoma nasuta 28-Day Solid Phase Bioaccumulation Testing
Tissue Chemistry and Body Burden Statistical Analyses

Metals

(17 pages)

Yachtsman Marina
NAE-2004-00319

APPENDIX A. CONCENTRATIONS OF COCs IN THE CLAM (*M. nasuta*)

	Pre-Assay				
CONTAMINANT	REP1	REP2	REP3	REP4 *	REP5 *
Metals (ug/g wet weight)					
Arsenic	2.57	2.47	2.72		
Cadmium	0.0290 J	0.0260 J	0.0340 J		
Chromium	0.387	0.552	0.455		
Copper	3.72	2.98	2.60		
Lead	0.121	0.121	0.144		
Mercury	0.00173 U	0.00208 U	0.00175 U		
Nickel	0.636	0.769	0.733		
Zinc	11.5	11.1	12.3		

* = Qualifiers
U Analyte not detected; below Method Detection Limit; value is one-half the Method Detection Limit
J Analyte estimated; detection below Reporting Limit but above Method Detection Limit
NA Not Analyzed

Yachtsman Marina
NAE-2004-00319

APPENDIX A. CONCENTRATIONS OF COCs IN THE CLAM (*M. nasuta*)

	IOSN Reference									
CONTAMINANT	REP1		REP2		REP3		REP4		REP5	
Metals (ug/g wet weight)										
Arsenic	2.70		3.55		3.52		4.39		3.28	
Cadmium	0.0220	J	0.0300	J	0.0210	J	0.0350	J	0.0370	
Chromium	0.305	J	0.381	J	0.252	J	0.497		0.234	J
Copper	1.48		1.72		1.52		2.49		1.65	
Lead	0.319		0.347		0.327		0.420		0.332	
Mercury	0.00200	U	0.00150	U	0.00150	U	0.00200	U	0.00150	U
Nickel	0.394		0.499		0.450		0.844		0.416	
Zinc	9.76		12.2		10.9		15.9		10.0	

* = Qualifiers
U Analyte not detected; belo
J Analyte estimated; detectio
NA Not Analyzed

Yachtsman Marina
NAE-2004-00319

APPENDIX A. CONCENTRATIONS OF COCs IN THE CLAM (*M. nasuta*)

10 Stations at 4 Marinas Mud

CONTAMINANT	REP1		REP2		REP3		REP4		REP5	
Metals (ug/g wet weight)										
Arsenic	2.59		2.83		2.49		2.50		2.31	
Cadmium	0.0250	J	0.0300	J	0.0250	J	0.0250	J	0.0280	J
Chromium	0.501		0.393	J	0.510		0.395	J	0.371	J
Copper	2.33		2.78		3.23		2.65		2.54	
Lead	0.506		0.446		0.489		0.361		0.456	
Mercury	0.00201	U	0.00213	U	0.00210	U	0.00215	U	0.00201	U
Nickel	0.608		0.563		0.610		0.519		0.549	
Zinc	12.0		14.3		12.4		13.5		11.7	

* = Qualifiers
U Analyte not detected; belo
J Analyte estimated; detectio
NA Not Analyzed

CETIS Test Data Worksheet

Report Date: 19 Aug-23 06:44 (p 1 of 1)
Test Code/ID: TN-23-303MnMet / 11-3134-1920

Bioaccumulation Evaluation - Metals - Macoma | **EA-EST, Inc. PBC**

Start Date:	29 Mar-23 13:46	**Species:**	Macoma nasuta	**Sample Code:**	AT3-191
End Date:	26 Apr-23 12:46	**Protocol:**	US ACE NED RIM (2004)	**Sample Source:**	Yachtsman Marina NAE-2004-00319
Sample Date:	20 Mar-23	**Material:**	Laboratory Control Sediment	**Sample Station:**	Laboratory Control

Sample	Rep	Pos	Body Burden	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Silver
IOSN 2019	1	2		2.7	0.022	0.305	1.48	0.319	0.002	0.394	9.76	
IOSN 2019	2	3		3.55	0.03	0.381	1.72	0.347	0.0015	0.499	12.2	
IOSN 2019	3	6		3.52	0.021	0.252	1.52	0.327	0.0015	0.45	10.9	
IOSN 2019	4	7		4.39	0.035	0.497	2.49	0.42	0.002	0.844	15.9	
IOSN 2019	5	10		3.28	0.037	0.234	1.65	0.332	0.0015	0.416	10	
AT3-098	1	1		2.59	0.025	0.501	2.33	0.506	0.00201	0.608	12	
AT3-098	2	4		2.83	0.03	0.393	2.78	0.446	0.002125	0.563	14.3	
AT3-098	3	5		2.49	0.025	0.51	3.23	0.489	0.002095	0.61	12.4	
AT3-098	4	8		2.5	0.025	0.395	2.65	0.361	0.002145	0.519	13.5	
AT3-098	5	9		2.31	0.028	0.371	2.54	0.456	0.002005	0.549	11.7	

Bioaccumulation Evaluation - Metals - Macoma **EA-EST, Inc. PBC**

Batch ID:	09-1240-8281	**Test Type:**	Bioaccumulation - Metals	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:46	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:46	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample ID:	10-1907-8970	**Code:**	AT3-191	**Project:**	Dredged Sediment Evaluation
Sample Date:	20 Mar-23	**Material:**	Laboratory Control Sediment	**Source:**	Yachtsman Marina NAE-2004-00319 (
Receipt Date:	20 Mar-23 16:00	**CAS (PC):**		**Station:**	Laboratory Control
Sample Age:	9d 14h	**Client:**	Eco-Analysts, Inc.		

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
03-4962-0856	Arsenic	Equal Variance t Two-Sample Test	0.9947	AT3-098 passed arsenic	1
18-5050-5224	Cadmium	Equal Variance t Two-Sample Test	0.7481	AT3-098 passed cadmium	1
08-7081-7384	Chromium	Equal Variance t Two-Sample Test	0.0570	AT3-098 passed chromium	1
13-3639-8676	Copper	Equal Variance t Two-Sample Test	0.0022	AT3-098 failed copper	1
00-6439-9040	Lead	Equal Variance t Two-Sample Test	0.0054	AT3-098 failed lead	1
03-3555-2818	Mercury	Equal Variance t Two-Sample Test	0.0087	AT3-098 failed mercury	1
11-4066-2552	Nickel	Equal Variance t Two-Sample Test	0.0012	AT3-098 failed nickel	1
02-4404-1166	Nickel	Wilcoxon Rank Sum Two-Sample Test	0.0754	AT3-098 passed nickel	1
02-9970-4423	Zinc	Equal Variance t Two-Sample Test	0.2125	AT3-098 passed zinc	1

Arsenic Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	3.49	2.73	4.24	2.7	4.39	0.272	0.609	17.45%	0.00%
AT3-098		5	2.54	2.31	2.78	2.31	2.83	0.0847	0.189	7.45%	27.06%

Cadmium Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.029	0.0199	0.0381	0.021	0.037	0.00327	0.00731	25.22%	0.00%
AT3-098		5	0.0266	0.0237	0.0295	0.025	0.03	0.00103	0.0023	8.65%	8.28%

Chromium Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.334	0.2	0.467	0.234	0.497	0.0481	0.108	32.25%	0.00%
AT3-098		5	0.434	0.352	0.516	0.371	0.51	0.0295	0.066	15.21%	-30.02%

Copper Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	1.77	1.26	2.28	1.48	2.49	0.185	0.413	23.30%	0.00%
AT3-098		5	2.71	2.29	3.12	2.33	3.23	0.15	0.336	12.42%	-52.71%

Lead Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.349	0.298	0.4	0.319	0.42	0.0183	0.041	11.74%	0.00%
AT3-098		5	0.452	0.382	0.521	0.361	0.506	0.0251	0.0562	12.44%	-29.40%

Mercury Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0017	0.00136	0.00204	0.0015	0.002	0.000122	0.000274	16.11%	0.00%
AT3-098		5	0.00208	0.002	0.00216	0.002	0.00215	0.0000291	0.000065	3.13%	-22.12%

Nickel Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.521	0.291	0.75	0.394	0.844	0.0828	0.185	35.55%	0.00%
AT3-098		5	0.57	0.521	0.618	0.519	0.61	0.0175	0.0392	6.87%	-9.45%

Zinc Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	11.8	8.64	14.9	9.76	15.9	1.12	2.51	21.35%	0.00%
AT3-098		5	12.8	11.4	14.1	11.7	14.3	0.487	1.09	8.53%	-8.75%

Arsenic Detail MD5: 7EE39F07D07100E28C7AE8E2EAAEFA0E

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	2.7	3.55	3.52	4.39	3.28
AT3-098		2.59	2.83	2.49	2.5	2.31

Cadmium Detail MD5: 2151DA575B01797147656629E9B604EA

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.022	0.03	0.021	0.035	0.037
AT3-098		0.025	0.03	0.025	0.025	0.028

Chromium Detail MD5: 6C665E15D73B8FEF4A2BC28E229F0580

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.305	0.381	0.252	0.497	0.234
AT3-098		0.501	0.393	0.51	0.395	0.371

Copper Detail MD5: C4B152C21884FD0CC6558BA2092E22D3

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	1.48	1.72	1.52	2.49	1.65
AT3-098		2.33	2.78	3.23	2.65	2.54

Lead Detail MD5: 68ED2BA3FF8B3966BB42B7A580898625

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.319	0.347	0.327	0.42	0.332
AT3-098		0.506	0.446	0.489	0.361	0.456

Mercury Detail MD5: E1F90783EFA78EC21865622AA6184D54

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.002	0.0015	0.0015	0.002	0.0015
AT3-098		0.00201	0.00213	0.00209	0.00215	0.002

Nickel Detail MD5: FBFBFF68498CBDC1593DDF95B8A7AA56

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.394	0.499	0.45	0.844	0.416
AT3-098		0.608	0.563	0.61	0.519	0.549

Zinc Detail MD5: 5294BF2F64ACAF262C1DD0EFF03D3C5D

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	9.76	12.2	10.9	15.9	10
AT3-098		12	14.3	12.4	13.5	11.7

STUDY: TN-23-303
CLIENT: Eco-Analysts, Inc.
PROJECT: Yachtsman Marina, Kennebunkport, ME NAE-2004-00319
ASSAY: *M. nasuta* 28-day Bioaccumulation Evaluation
TASK: Statistical Analysis of Body Burden Metals

Endpoint	Method	C	<	T	Statistic	Critical	P Level	Alpha	Reject Null	MSD	DF	Ties	P-Type
Arsenic	Equal Variance t Two-Sample Test	IOSN	<	Comp	-3.310549	1.859548	0.9946553	0.05	FALSE	0.5302483	8		C
Cadmium	Equal Variance t Two-Sample Test	IOSN	<	Comp	-0.6998541	1.859548	0.7480713	0.05	FALSE	0.006376922	8		C
Chromium	Equal Variance t Two-Sample Test	IOSN	<	Comp	1.774371	1.859548	0.05696218	0.05	FALSE	0.10501	8		C
Copper	Equal Variance t Two-Sample Test	IOSN	<	Comp	3.922431	1.859548	0.002201654	0.05	TRUE	0.4427912	8		C
Lead	Equal Variance t Two-Sample Test	IOSN	<	Comp	3.299803	1.859548	0.005431016	0.05	TRUE	0.05781848	8		C
Mercury	Equal Variance t Two-Sample Test	IOSN	<	Comp	2.986949	1.859548	0.008707395	0.05	TRUE	0.000234082	8		C
Nickel	Equal Variance t Two-Sample Test	IOSN	<	Comp	4.604793	1.894579	0.001235069	0.05	TRUE	0.05350728	7		C
Nickel	Wilcoxon Rank Sum Two-Sample Test	IOSN	<	Comp	20		0.07539683	0.05	FALSE		8	0	E
Zinc	Equal Variance t Two-Sample Test	IOSN	<	Comp	0.8405069	1.859548	0.2125153	0.05	FALSE	2.27436	8		C

Bioaccumulation Evaluation - Metals - Macoma — **EA-EST, Inc. PBC**

Analysis ID:	03-4962-0856	**Endpoint:**	Arsenic	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:42	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:42	**MD5 Hash:**	FA1CA36C1E9D61BEE8C73B2C1B8A79B	**Editor ID:**	

Batch ID:	09-1240-8281	**Test Type:**	Bioaccumulation - Metals	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:46	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:46	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed arsenic endpoint	15.20%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-3.31	1.86	0.53	CDF	0.9947	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.12	2.29	0.1330	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.22784	2.22784	1	11	0.0107	Significant Effect
Error	1.6262	0.203275	8			
Total	3.85404		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	10.3	23.2	0.0440	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.906	0.741	0.2549	Normal Distribution

Arsenic Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	3.49	2.73	4.24	3.52	2.7	4.39	0.272	17.45%	0.00%
AT3-098		5	2.54	2.31	2.78	2.5	2.31	2.83	0.0847	7.45%	27.06%

Arsenic Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	2.7	3.55	3.52	4.39	3.28
AT3-098		2.59	2.83	2.49	2.5	2.31

Bioaccumulation Evaluation - Metals - Macoma **EA-EST, Inc. PBC**

Analysis ID:	18-5050-5224	**Endpoint:**	Cadmium	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:42	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:42	**MD5 Hash:**	2864B7DF258976A1EE19C7F4BEDDBE20	**Editor ID:**	

Batch ID:	09-1240-8281	**Test Type:**	Bioaccumulation - Metals	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:46	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:46	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed cadmium endpoint	21.99%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-0.7	1.86	0.00638	CDF	0.7481	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.56	2.29	0.9963	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0000144	0.0000144	1	0.49	0.5039	Non-Significant Effect
Error	0.0002352	0.0000294	8			
Total	0.0002496		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	10.1	23.2	0.0458	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.957	0.741	0.7475	Normal Distribution

Cadmium Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.029	0.0199	0.0381	0.03	0.021	0.037	0.00327	25.22%	0.00%
AT3-098		5	0.0266	0.0237	0.0295	0.025	0.025	0.03	0.00103	8.65%	8.28%

Cadmium Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.022	0.03	0.021	0.035	0.037
AT3-098		0.025	0.03	0.025	0.025	0.028

Bioaccumulation Evaluation - Metals - Macoma					EA-EST, Inc. PBC
Analysis ID:	08-7081-7384	**Endpoint:**	Chromium	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:42	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:42	**MD5 Hash:**	953EFD18FFDD369122AE9FE41C4211C0	**Editor ID:**	

Batch ID:	09-1240-8281	**Test Type:**	Bioaccumulation - Metals	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:46	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:46	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed chromium endpoint	31.46%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	1.77	1.86	0.105	CDF	0.0570	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.94	2.29	0.3010	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0251001	0.0251001	1	3.15	0.1139	Non-Significant Effect
Error	0.0637788	0.0079724	8			
Total	0.0888789		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.66	23.2	0.3667	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.917	0.741	0.3366	Normal Distribution

Chromium Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.334	0.2	0.467	0.305	0.234	0.497	0.0481	32.25%	0.00%
AT3-098		5	0.434	0.352	0.516	0.395	0.371	0.51	0.0295	15.21%	-30.02%

Chromium Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.305	0.381	0.252	0.497	0.234
AT3-098		0.501	0.393	0.51	0.395	0.371

Bioaccumulation Evaluation - Metals - Macoma					**EA-EST, Inc. PBC**
Analysis ID:	13-3639-8676	**Endpoint:**	Copper	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:42	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:42	**MD5 Hash:**	C5F9F1B65D65EF9A525FA03996B28F54	**Editor ID:**	

Batch ID:	09-1240-8281	**Test Type:**	Bioaccumulation - Metals	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:46	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:46	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed copper endpoint	24.99%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	3.92	1.86	0.443	CDF	0.0022	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.02	2.29	0.2123	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.18089	2.18089	1	15.4	0.0044	Significant Effect
Error	1.134	0.14175	8			
Total	3.31489		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.51	23.2	0.7002	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.851	0.741	0.0604	Normal Distribution

Copper Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	1.77	1.26	2.28	1.65	1.48	2.49	0.185	23.30%	0.00%
AT3-098		5	2.71	2.29	3.12	2.65	2.33	3.23	0.15	12.42%	-52.71%

Copper Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	1.48	1.72	1.52	2.49	1.65
AT3-098		2.33	2.78	3.23	2.65	2.54

CETIS Analytical Report

Bioaccumulation Evaluation - Metals - Macoma			**EA-EST, Inc. PBC**

Analysis ID:	00-6439-9040	**Endpoint:**	Lead	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:42	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:42	**MD5 Hash:**	1FAB2E86236F30570FE1342E97FBBD67	**Editor ID:**	

Batch ID:	09-1240-8281	**Test Type:**	Bioaccumulation - Metals	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:46	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:46	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed lead endpoint	16.57%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	3.3	1.86	0.0578	CDF	0.0054	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.95	2.29	0.2825	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0263169	0.0263169	1	10.9	0.0109	Significant Effect
Error	0.0193352	0.0024169	8			
Total	0.0456521		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.88	23.2	0.5565	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.956	0.741	0.7435	Normal Distribution

Lead Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.349	0.298	0.4	0.332	0.319	0.42	0.0183	11.74%	0.00%
AT3-098		5	0.452	0.382	0.521	0.456	0.361	0.506	0.0251	12.44%	-29.40%

Lead Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.319	0.347	0.327	0.42	0.332
AT3-098		0.506	0.446	0.489	0.361	0.456

Bioaccumulation Evaluation - Metals - Macoma — **EA-EST, Inc. PBC**

Analysis ID:	03-3555-2818	**Endpoint:**	Mercury	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:42	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:42	**MD5 Hash:**	8041063A2B35188FB8639C0502C3F00B	**Editor ID:**	

Batch ID:	09-1240-8281	**Test Type:**	Bioaccumulation - Metals	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:46	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:46	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed mercury endpoint	13.77%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	2.99	1.86	0.000234	CDF	0.0087	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.6	2.29	0.9106	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.534E-07	3.534E-07	1	8.92	0.0174	Significant Effect
Error	3.169E-07	3.962E-08	8			
Total	6.704E-07		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	17.7	23.2	0.0165	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.877	0.741	0.1199	Normal Distribution

Mercury Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0017	0.00136	0.00204	0.0015	0.0015	0.002	0.000122	16.11%	0.00%
AT3-098		5	0.00208	0.002	0.00216	0.0021	0.00201	0.00215	0.0000291	3.13%	-22.12%

Mercury Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.002	0.0015	0.0015	0.002	0.0015
AT3-098		0.00201	0.00213	0.0021	0.00215	0.00201

Bioaccumulation Evaluation - Metals - Macoma — **EA-EST, Inc. PBC**

Analysis ID:	11-4066-2552	**Endpoint:**	Nickel	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:42	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:42	**MD5 Hash:**	DD1542AADFC689A7E4B54A4604AC8D91	**Editor ID:**	

Batch ID:	09-1240-8281	**Test Type:**	Bioaccumulation - Metals	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:46	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:46	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed nickel endpoint	12.17%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	7	4.6	1.89	0.0535	CDF	0.0012	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0375845	0.0375845	1	21.2	0.0025	Significant Effect
Error	0.0124076	0.0017725	7			
Total	0.049992		8			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.36	24.3	0.7479	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.938	0.701	0.5616	Normal Distribution

Nickel Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	4	0.44	0.367	0.513	0.416	0.394	0.499	0.0229	10.40%	0.00%
AT3-098		5	0.57	0.521	0.618	0.563	0.519	0.61	0.0175	6.87%	-29.57%

Nickel Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.394	0.499	0.45	---	0.416
AT3-098		0.608	0.563	0.61	0.519	0.549

Bioaccumulation Evaluation - Metals - Macoma					EA-EST, Inc. PBC
Analysis ID:	02-9970-4423	**Endpoint:**	Zinc	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:42	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:42	**MD5 Hash:**	DAE55172D5F58B259B6FDFE024ABC7D	**Editor ID:**	

Batch ID:	09-1240-8281	**Test Type:**	Bioaccumulation - Metals	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:46	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:46	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed zinc endpoint	19.35%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	0.841	1.86	2.27	CDF	0.2125	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.28	2.29	0.0552	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.64196	2.64196	1	0.706	0.4250	Non-Significant Effect
Error	29.9181	3.73976	8			
Total	32.56		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	5.3	23.2	0.1351	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.89	0.741	0.1701	Normal Distribution

Zinc Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	11.8	8.64	14.9	10.9	9.76	15.9	1.12	21.35%	0.00%
AT3-098		5	12.8	11.4	14.1	12.4	11.7	14.3	0.487	8.53%	-8.75%

Zinc Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	9.76	12.2	10.9	15.9	10
AT3-098		12	14.3	12.4	13.5	11.7

ATTACHMENT IX

Macoma nasuta 28-Day Solid Phase Bioaccumulation Testing
Tissue Chemistry and Body Burden Statistical Analyses

PAHs

(27 pages)

Yachtsman Marina
NAE-2004-00319

APPENDIX A. CONCENTRATIONS OF COCs IN THE CLAM (*M. nasuta*)

	Pre-Assay				
CONTAMINANT	REP1	REP2	REP3	REP4 *	REP5 *
PAHs (ng/g wet weight)					
Acenaphthene	0.610 U	0.620 U	1.98 J		
Acenaphthylene	0.376 U	0.382 U	0.376 U		
Anthracene	0.408 U	0.922 J	1.23 J		
Benzo(a)anthracene	0.765 U	1.57 J	1.61 J		
Benzo(a)pyrene	0.800 U	0.815 U	0.800 U		
Benzo(b)fluoranthene	1.06 U	1.08 U	1.06 U		
Benzo(k)fluoranthene	0.487 U	0.495 U	0.487 U		
Benzo(g,h,i)perylene	0.341 U	0.346 U	0.341 U		
Chrysene	2.25 J	1.82 J	1.96 J		
Dibenzo(a,h)anthracene	0.395 U	0.401 U	0.883 J		
Fluoranthene	2.40 J	2.50 J	2.81 J		
Fluorene	1.82 J	2.38 J	2.14 J		
Indeno(1,2,3-c,d)pyrene	0.800 U	0.810 U	0.800 U		
Naphthalene	4.11 J	3.64 J	3.59 J		
Phenanthrene	3.64 J	4.23 J	4.40 J		
Pyrene	2.82 J	2.99 J	2.77 J		
PAH Total	23.1	25.0	27.2		

* = Qualifiers
U Analyte not detected; below Method Detection Limit; value is one-half the Method Detection Limit
J Analyte estimated; detection below Reporting Limit but above Method Detection Limit
NA Not Analyzed

Yachtsman Marina
NAE-2004-00319

APPENDIX A. CONCENTRATIONS OF COCs IN THE CLAM (*M. nasuta*)

	IOSN Reference									
CONTAMINANT	REP1		REP2		REP3		REP4		REP5	
PAHs (ng/g wet weight)										
Acenaphthene	0.450	U	0.462	U	0.443	U	0.473	U	0.440	U
Acenaphthylene	0.277	U	0.284	U	0.272	U	0.291	U	0.271	U
Anthracene	0.300	U	0.308	U	0.295	U	0.315	U	0.294	U
Benzo(a)anthracene	0.560	U	0.575	U	0.550	U	0.590	U	0.550	U
Benzo(a)pyrene	0.590	U	0.605	U	0.580	U	0.620	U	0.575	U
Benzo(b)fluoranthene	0.780	U	0.800	U	0.765	U	0.820	U	0.765	U
Benzo(k)fluoranthene	0.359	U	0.368	U	0.353	U	0.844	J	0.351	U
Benzo(g,h,i)perylene	0.527	J	0.536	J	0.614	J	0.670	J	0.245	U
Chrysene	0.545	U	0.560	U	0.535	U	0.575	U	0.535	U
Dibenzo(a,h)anthracene	2.95	J	3.00	J	2.91	J	3.11	J	2.86	J
Fluoranthene	2.09	J	2.23	J	2.41	J	2.48	J	1.38	J
Fluorene	0.251	U	0.258	U	0.247	U	0.263	U	0.245	U
Indeno(1,2,3-c,d)pyrene	3.35	J	3.57	J	3.46	J	3.93	J	3.40	J
Naphthalene	0.387	U	0.397	U	0.380	U	0.406	U	0.378	U
Phenanthrene	1.73	J	2.30	J	2.31	J	2.23	J	1.30	J
Pyrene	1.50	J	1.62	J	1.69	J	1.90	J	1.45	J
PAH Total	16.6		17.9		17.8		19.5		15.0	

* = Qualifiers
U Analyte not detected; belo
J Analyte estimated; detectio
NA Not Analyzed

Yachtsman Marina
NAE-2004-00319

APPENDIX A. CONCENTRATIONS OF COCs IN THE CLAM (*M. nasuta*)

10 Stations at 4 Marinas Mud

CONTAMINANT	REP1		REP2		REP3		REP4		REP5	
PAHs (ng/g wet weight)										
Acenaphthene	0.605	U	0.620	U	2.99	J	2.93	J	0.630	U
Acenaphthylene	0.372	U	0.382	U	0.384	U	0.380	U	0.389	U
Anthracene	2.36	J	2.61	J	3.40	J	3.39	J	1.69	J
Benzo(a)anthracene	6.45		4.37	J	5.43	J	5.14	J	5.60	J
Benzo(a)pyrene	2.42	J	0.815	U	1.64	J	1.71	J	2.10	J
Benzo(b)fluoranthene	5.53	J	3.32	J	4.04	J	3.64	J	5.52	J
Benzo(k)fluoranthene	2.14	J	0.496	U	1.08	J	1.04	J	1.48	J
Benzo(g,h,i)perylene	1.66	J	0.347	U	0.348	U	0.345	U	1.40	J
Chrysene	4.22	J	2.49	J	2.36	J	3.09	J	2.42	J
Dibenzo(a,h)anthracene	0.390	U	0.402	U	0.403	U	0.399	U	0.409	U
Fluoranthene	26.1		19.6		35.9		36.8		14.8	
Fluorene	0.935	J	1.27	J	2.60	J	3.00	J	0.882	J
Indeno(1,2,3-c,d)pyrene	0.790	U	0.810	U	0.815	U	0.810	U	1.70	J
Naphthalene	2.00	J	1.66	J	1.91	J	1.81	J	1.45	J
Phenanthrene	4.86	J	4.73	J	10.7		10.1		4.23	J
Pyrene	23.4		13.0		23.0		22.5		22.0	
PAH Total	84.2		56.9		97.0		97.1		66.7	

* = Qualifiers
U   Analyte not detected; belo
J   Analyte estimated; detectio
NA   Not Analyzed

CETIS Test Data Worksheet

Report Date: 19 Aug-23 06:44 (p 1 of 1)
Test Code/ID: TN-23-303MnPAH / 13-3685-4237

Bioaccumulation Evaluation - PAHs - Macoma | **EA-EST, Inc. PBC**

Start Date:	29 Mar-23 13:47	**Species:**	Macoma nasuta	**Sample Code:**	AT3-191
End Date:	26 Apr-23 12:47	**Protocol:**	US ACE NED RIM (2004)	**Sample Source:**	Yachtsman Marina NAE-2004-00319
Sample Date:	20 Mar-23	**Material:**	Laboratory Control Sediment	**Sample Station:**	Laboratory Control

Sample	Rep	Pos	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,l)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene	1,4-Dichlorobenze	Total PAHs
IOSN 2019	1	2	0.45	0.2765	0.3	0.56	0.59	0.78	0.527	0.359	0.545	2.95	2.09	0.251	3.35	0.387	1.73	1.5		
IOSN 2019	2	3	0.462	0.284	0.308	0.575	0.605	0.8	0.536	0.368	0.56	3	2.23	0.2575	3.57	0.397	2.3	1.62		
IOSN 2019	3	5	0.4425	0.272	0.295	0.55	0.58	0.765	0.614	0.3525	0.535	2.91	2.41	0.2465	3.46	0.38	2.31	1.69		
IOSN 2019	4	7	0.4725	0.2905	0.315	0.59	0.62	0.82	0.67	0.844	0.575	3.11	2.48	0.263	3.93	0.406	2.23	1.9		
IOSN 2019	5	9	0.44	0.2705	0.2935	0.55	0.575	0.765	0.245	0.3505	0.535	2.86	1.38	0.245	3.4	0.378	1.3	1.45		
AT3-098	1	1	0.605	0.3715	2.36	6.45	2.42	5.53	1.66	2.14	4.22	0.39	26.1	0.935	0.79	2	4.86	23.4		
AT3-098	2	4	0.62	0.382	2.61	4.37	0.815	3.32	0.3465	0.4955	2.49	0.4015	19.6	1.27	0.81	1.66	4.73	13		
AT3-098	3	6	2.99	0.384	3.4	5.43	1.64	4.04	0.348	1.08	2.36	0.403	35.9	2.6	0.815	1.91	10.7	23		
AT3-098	4	8	2.93	0.3795	3.39	5.14	1.71	3.64	0.3445	1.04	3.09	0.399	36.8	3	0.81	1.81	10.1	22.5		
AT3-098	5	10	0.63	0.389	1.69	5.6	2.1	5.52	1.4	1.48	2.42	0.4085	14.8	0.882	1.7	1.45	4.23	22		

Bioaccumulation Evaluation - PAHs - Macoma **EA-EST, Inc. PBC**

Batch ID:	07-2064-6975	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:47	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:47	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample ID:	10-1907-8970	**Code:**	AT3-191	**Project:**	Dredged Sediment Evaluation
Sample Date:	20 Mar-23	**Material:**	Laboratory Control Sediment	**Source:**	Yachtsman Marina NAE-2004-00319 (
Receipt Date:	20 Mar-23 16:00	**CAS (PC):**		**Station:**	Laboratory Control
Sample Age:	9d 14h	**Client:**	Eco-Analysts, Inc.		

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
07-7538-5618	Acenaphthene	Unequal Variance t Two-Sample Test	0.0636	AT3-098 passed acenaphthene	1
11-6416-3760	Acenaphthylene	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed acenaphthylene	1
05-9439-4057	Anthracene	Unequal Variance t Two-Sample Test	0.0009	AT3-098 failed anthracene	1
14-6989-9668	Benzo(a)anthracene	Unequal Variance t Two-Sample Test	6.9E-05	AT3-098 failed benzo(a)anthracene	1
01-9784-4906	Benzo(a)pyrene	Unequal Variance t Two-Sample Test	0.0067	AT3-098 failed benzo(a)pyrene	1
15-8115-7379	Benzo(b)fluoranthene	Unequal Variance t Two-Sample Test	0.0008	AT3-098 failed benzo(b)fluoranthene	1
11-2901-4695	Benzo(g,h,i)perylene	Equal Variance t Two-Sample Test	0.1736	AT3-098 passed benzo(g,h,i)perylene	1
18-6572-8367	Benzo(k)fluoranthene	Equal Variance t Two-Sample Test	0.0128	AT3-098 failed benzo(k)fluoranthene	1
19-9439-8456	Chrysene	Unequal Variance t Two-Sample Test	0.0006	AT3-098 failed chrysene	1
10-9778-7549	Chrysene	Wilcoxon Rank Sum Two-Sample Test	0.0040	AT3-098 failed chrysene	1
04-5124-3396	Dibenz(a,h)anthracene	Unequal Variance t Two-Sample Test	1.0000	AT3-098 passed dibenz(a,h)anthracene	1
05-6250-1207	Fluoranthene	Unequal Variance t Two-Sample Test	0.0025	AT3-098 failed fluoranthene	1
14-9364-0252	Fluorene	Unequal Variance t Two-Sample Test	0.0143	AT3-098 failed fluorene	1
09-5016-7764	Indeno(1,2,3-cd)pyrene	Unequal Variance t Two-Sample Test	1.0000	AT3-098 passed indeno(1,2,3-cd)pyrene	1
07-5576-6393	Indeno(1,2,3-cd)pyrene	Wilcoxon Rank Sum Two-Sample Test	1.0000	AT3-098 passed indeno(1,2,3-cd)pyrene	1
12-2133-3190	Naphthalene	Unequal Variance t Two-Sample Test	7.2E-05	AT3-098 failed naphthalene	1
04-1490-0844	Phenanthrene	Unequal Variance t Two-Sample Test	0.0132	AT3-098 failed phenanthrene	1
04-1423-2436	Pyrene	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pyrene	1
02-1982-1065	Pyrene	Wilcoxon Rank Sum Two-Sample Test	0.0040	AT3-098 failed pyrene	1

Acenaphthene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.453	0.436	0.47	0.44	0.472	0.00612	0.0137	3.02%	0.00%
AT3-098		5	1.56	-0.0378	3.15	0.605	2.99	0.574	1.28	82.49%	-242.96%

Acenaphthylene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.279	0.268	0.289	0.271	0.29	0.00377	0.00843	3.02%	0.00%
AT3-098		5	0.381	0.373	0.389	0.371	0.389	0.00288	0.00645	1.69%	-36.78%

Anthracene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.302	0.291	0.314	0.294	0.315	0.00406	0.00908	3.00%	0.00%
AT3-098		5	2.69	1.79	3.59	1.69	3.4	0.325	0.726	27.00%	-789.84%

Benzo(a)anthracene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.565	0.543	0.587	0.55	0.59	0.00775	0.0173	3.07%	0.00%
AT3-098		5	5.4	4.46	6.33	4.37	6.45	0.337	0.754	13.96%	-855.40%

Benzo(a)pyrene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.594	0.571	0.617	0.575	0.62	0.00828	0.0185	3.12%	0.00%
AT3-098		5	1.74	0.987	2.49	0.815	2.42	0.27	0.604	34.76%	-192.42%

Benzo(b)fluoranthene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.786	0.756	0.816	0.765	0.82	0.0107	0.0238	3.03%	0.00%
AT3-098		5	4.41	3.11	5.71	3.32	5.53	0.469	1.05	23.79%	-461.07%

Benzo(g,h,i)perylene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.518	0.315	0.722	0.245	0.67	0.0732	0.164	31.59%	0.00%
AT3-098		5	0.82	0.00675	1.63	0.345	1.66	0.293	0.655	79.87%	-58.14%

Benzo(k)fluoranthene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.455	0.185	0.725	0.35	0.844	0.0973	0.218	47.86%	0.00%
AT3-098		5	1.25	0.49	2	0.495	2.14	0.273	0.61	48.89%	-174.21%

Chrysene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.55	0.528	0.572	0.535	0.575	0.00775	0.0173	3.15%	0.00%
AT3-098		5	2.92	1.94	3.89	2.36	4.22	0.351	0.785	26.93%	-430.18%

Dibenz(a,h)anthracene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	2.97	2.85	3.08	2.86	3.11	0.0427	0.0956	3.22%	0.00%
AT3-098		5	0.4	0.392	0.409	0.39	0.408	0.00303	0.00678	1.69%	86.50%

Fluoranthene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	2.12	1.57	2.66	1.38	2.48	0.197	0.44	20.77%	0.00%
AT3-098		5	26.6	14.6	38.7	14.8	36.8	4.35	9.73	36.54%	-1157.79

Bioaccumulation Evaluation - PAHs - Macoma **EA-EST, Inc. PBC**

Fluorene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.253	0.243	0.262	0.245	0.263	0.00339	0.00758	3.00%	0.00%
AT3-098		5	1.74	0.506	2.97	0.882	3	0.443	0.991	57.07%	-587.81%

Indeno(1,2,3-cd)pyrene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	3.54	3.25	3.83	3.35	3.93	0.104	0.232	6.55%	0.00%
AT3-098		5	0.985	0.489	1.48	0.79	1.7	0.179	0.4	40.59%	72.19%

Naphthalene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.39	0.375	0.404	0.378	0.406	0.00528	0.0118	3.03%	0.00%
AT3-098		5	1.77	1.5	2.04	1.45	2	0.0971	0.217	12.29%	-353.29%

Phenanthrene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	1.97	1.42	2.53	1.3	2.31	0.2	0.447	22.63%	0.00%
AT3-098		5	6.92	2.96	10.9	4.23	10.7	1.43	3.19	46.06%	-250.76%

Pyrene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	1.63	1.41	1.85	1.45	1.9	0.0793	0.177	10.87%	0.00%
AT3-098		5	20.8	15.3	26.2	13	23.4	1.96	4.38	21.08%	-1173.28

Acenaphthene Detail MD5: E5B5D58470B8911B03E3A444CD72A835

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.45	0.462	0.442	0.472	0.44
AT3-098		0.605	0.62	2.99	2.93	0.63

Acenaphthylene Detail MD5: B126413E64AFB02AA98C384725F0DFA2

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.276	0.284	0.272	0.29	0.271
AT3-098		0.371	0.382	0.384	0.38	0.389

Anthracene Detail MD5: 60426D23768D2C28728EDBAC9882B215

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.3	0.308	0.295	0.315	0.294
AT3-098		2.36	2.61	3.4	3.39	1.69

Benzo(a)anthracene Detail MD5: 1951C02D07B040E6EE2D0CF93503F4CB

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.56	0.575	0.55	0.59	0.55
AT3-098		6.45	4.37	5.43	5.14	5.6

Benzo(a)pyrene Detail MD5: 2581DF2E71E7F8C3E6B9B596CC98B34D

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.59	0.605	0.58	0.62	0.575
AT3-098		2.42	0.815	1.64	1.71	2.1

Benzo(b)fluoranthene Detail MD5: 184AC37F45B688263B5D502E21B35F91

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.78	0.8	0.765	0.82	0.765
AT3-098		5.53	3.32	4.04	3.64	5.52

Benzo(g,h,i)perylene Detail MD5: C795931A73D2727BC941E8445CFD11FB

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.527	0.536	0.614	0.67	0.245
AT3-098		1.66	0.347	0.348	0.345	1.4

Benzo(k)fluoranthene Detail MD5: EA1BCC3872760ADB5077234B1A27DAD9

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.359	0.368	0.352	0.844	0.35
AT3-098		2.14	0.495	1.08	1.04	1.48

Chrysene Detail MD5: 51ACA5FD98A49CB3999C452E5009FD95

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.545	0.56	0.535	0.575	0.535
AT3-098		4.22	2.49	2.36	3.09	2.42

Dibenz(a,h)anthracene Detail MD5: FD1BF8DB86033846450D484A5E121790

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	2.95	3	2.91	3.11	2.86
AT3-098		0.39	0.401	0.403	0.399	0.408

Fluoranthene Detail MD5: 02FE249E2ED2D91DEAEAA82D9706D753

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	2.09	2.23	2.41	2.48	1.38
AT3-098		26.1	19.6	35.9	36.8	14.8

Fluorene Detail MD5: ADB7E3D32CDAFFED1BF3E0C1F4B318D

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.251	0.257	0.247	0.263	0.245
AT3-098		0.935	1.27	2.6	3	0.882

Indeno(1,2,3-cd)pyrene Detail MD5: 04EF0FDA4072F35B041FA8C366C6C059

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	3.35	3.57	3.46	3.93	3.4
AT3-098		0.79	0.81	0.815	0.81	1.7

Naphthalene Detail MD5: A25DF7EFF98F86EA33A59A892C25ED5E

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.387	0.397	0.38	0.406	0.378
AT3-098		2	1.66	1.91	1.81	1.45

Phenanthrene Detail MD5: C9F4DC5579DCB046DD6F1DF1A33B7C36

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	1.73	2.3	2.31	2.23	1.3
AT3-098		4.86	4.73	10.7	10.1	4.23

Pyrene Detail MD5: E41EFCCD8E706B9E9AABDEC3CCEBC5A

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	1.5	1.62	1.69	1.9	1.45
AT3-098		23.4	13	23	22.5	22

STUDY: TN-23-303
CLIENT: Eco-Analysts, Inc.
PROJECT: Yachtsman Marina, Kennebunkport, ME NAE-2004-00319
ASSAY: *M. nasuta* 28-day Bioaccumulation Evaluation
TASK: Statistical Analysis of Body Burden PAHs

Endpoint	Method	C	<	T	Statistic	Critical	P Level	Alpha	Reject Null	MSD	DF	Ties	P-Type
Acenaphthene	Unequal Variance t Two-Sample Test	IOSN	<	Comp	1.920121	2.131847	0.06362686	0.05	FALSE	1.22307	4		C
Acenaphthylene	Equal Variance t Two-Sample Test	IOSN	<	Comp	21.59451	1.859548	0	0.05	TRUE	0.008826488	8		C
Anthracene	Unequal Variance t Two-Sample Test	IOSN	<	Comp	7.351591	2.131847	0.00091167	0.05	TRUE	0.6923958	4		C
Benzo(a)anthracene	Unequal Variance t Two-Sample Test	IOSN	<	Comp	14.33588	2.131847	6.87805E-05	0.05	TRUE	0.7187011	4		C
Benzo(a)pyrene	Unequal Variance t Two-Sample Test	IOSN	<	Comp	4.23065	2.131847	0.00668155	0.05	TRUE	0.5759637	4		C
Benzo(b)fluoranthene	Unequal Variance t Two-Sample Test	IOSN	<	Comp	7.720544	2.131847	0.000757623	0.05	TRUE	1.000682	4		C
Benzo(g,h,i)perylene	Equal Variance t Two-Sample Test	IOSN	<	Comp	0.9984897	1.859548	0.1736408	0.05	FALSE	0.5613155	8		C
Benzo(k)fluoranthene	Equal Variance t Two-Sample Test	IOSN	<	Comp	2.736334	1.859548	0.01279694	0.05	TRUE	0.5384284	8		C
Chrysene	Unequal Variance t Two-Sample Test	IOSN	<	Comp	12.07474	2.353364	0.000611206	0.05	TRUE	0.3975953	3		C
Chrysene	Wilcoxon Rank Sum Two-Sample Test	IOSN	<	Comp	15		0.003968254	0.05	TRUE		8	0	E
Dibenz(a,h)anthracene	Unequal Variance t Two-Sample Test	IOSN	<	Comp	-59.88929	2.131847	0.9999998	0.05	FALSE	0.09132629	4		C
Fluoranthene	Unequal Variance t Two-Sample Test	IOSN	<	Comp	5.627316	2.131847	0.002452458	0.05	TRUE	9.289891	4		C
Fluorene	Unequal Variance t Two-Sample Test	IOSN	<	Comp	3.348493	2.131847	0.01430444	0.05	TRUE	0.9453106	4		C
Indeno(1,2,3-cd)pyrene	Wilcoxon Rank Sum Two-Sample Test	IOSN	<	Comp	40		1	0.05	FALSE		8	0	E
Indeno(1,2,3-cd)pyrene	Unequal Variance t Two-Sample Test	IOSN	<	Comp	-26.3434	2.131847	0.9999938	0.05	FALSE	0.2213914	4		C
Naphthalene	Unequal Variance t Two-Sample Test	IOSN	<	Comp	14.15599	2.131847	7.22851E-05	0.05	TRUE	0.2072815	4		C
Phenanthrene	Unequal Variance t Two-Sample Test	IOSN	<	Comp	3.437374	2.131847	0.01317851	0.05	TRUE	3.069972	4		C
Pyrene	Equal Variance t Two-Sample Test	IOSN	<	Comp	74.90878	1.894579	0	0.05	TRUE	0.5334801	7		C
Pyrene	Wilcoxon Rank Sum Two-Sample Test	IOSN	<	Comp	15		0.003968254	0.05	TRUE		8	0	E

Bioaccumulation Evaluation - PAHs - Macoma	**EA-EST, Inc. PBC**

Analysis ID:	07-7538-5618	**Endpoint:**	Acenaphthene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:45	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:44	**MD5 Hash:**	D2ED3F048BC1A568A37D9F572F6C7946	**Editor ID:**	

Batch ID:	07-2064-6975	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:47	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:47	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed acenaphthene endpoint	269.76%

Unequal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	4	1.92	2.13	1.22	CDF	0.0636	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.68	2.29	0.7286	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.03381	3.03381	1	3.69	0.0911	Non-Significant Effect
Error	6.58295	0.822869	8			
Total	9.61676		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	8790	23.2	<1.0E-05	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.827	0.741	0.0310	Normal Distribution

Acenaphthene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.453	0.436	0.47	0.45	0.44	0.473	0.00612	3.02%	0.00%
AT3-098		5	1.56	-0.0378	3.15	0.63	0.605	2.99	0.574	82.49%	-242.96%

Acenaphthene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.45	0.462	0.443	0.473	0.44
AT3-098		0.605	0.62	2.99	2.93	0.63

Bioaccumulation Evaluation - PAHs - Macoma					**EA-EST, Inc. PBC**
Analysis ID:	11-6416-3760	**Endpoint:**	Acenaphthylene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:45	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:44	**MD5 Hash:**	5C3DB5F62B559D82EAE0FE53CB0C21E2	**Editor ID:**	

Batch ID:	07-2064-6975	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:47	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:47	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed acenaphthylene endpoint	3.17%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	21.6	1.86	0.00883	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.67	2.29	0.7506	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0262656	0.0262656	1	466	<1.0E-05	Significant Effect
Error	0.0004506	5.633E-05	8			
Total	0.0267162		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.71	23.2	0.6162	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.968	0.741	0.8715	Normal Distribution

Acenaphthylene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.279	0.268	0.289	0.277	0.271	0.291	0.00377	3.02%	0.00%
AT3-098		5	0.381	0.373	0.389	0.382	0.372	0.389	0.00288	1.69%	-36.78%

Acenaphthylene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.277	0.284	0.272	0.291	0.271
AT3-098		0.372	0.382	0.384	0.38	0.389

Bioaccumulation Evaluation - PAHs - Macoma — **EA-EST, Inc. PBC**

Analysis ID:	05-9439-4057	**Endpoint:**	Anthracene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:45	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:44	**MD5 Hash:**	042322FA3115DECF606B32A76349129B	**Editor ID:**	

Batch ID:	07-2064-6975	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:47	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:47	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed anthracene endpoint	229.04%

Unequal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	4	7.35	2.13	0.692	CDF	0.0009	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.07	2.29	0.1751	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	14.2528	14.2528	1	54	8.0E-05	Significant Effect
Error	2.10973	0.263716	8			
Total	16.3625		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	6400	23.2	<1.0E-05	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.853	0.741	0.0636	Normal Distribution

Anthracene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.302	0.291	0.314	0.3	0.294	0.315	0.00406	3.00%	0.00%
AT3-098		5	2.69	1.79	3.59	2.61	1.69	3.4	0.325	27.00%	-789.84%

Anthracene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.3	0.308	0.295	0.315	0.294
AT3-098		2.36	2.61	3.4	3.39	1.69

Bioaccumulation Evaluation - PAHs - Macoma					EA-EST, Inc. PBC
Analysis ID:	14-6989-9668	**Endpoint:**	Benzo(a)anthracene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:45	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:44	**MD5 Hash:**	1CD720C83E6122B474A72A1DF292B2EF	**Editor ID:**	

Batch ID:	07-2064-6975	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:47	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:47	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed benzo(a)anthracene endpoint	127.20%

Unequal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	4	14.3	2.13	0.719	CDF	6.9E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.09	2.29	0.1534	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	58.3947	58.3947	1	206	<1.0E-05	Significant Effect
Error	2.27308	0.284135	8			
Total	60.6678		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1890	23.2	<1.0E-05	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.814	0.741	0.0214	Normal Distribution

Benzo(a)anthracene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.565	0.543	0.587	0.56	0.55	0.59	0.00775	3.07%	0.00%
AT3-098		5	5.4	4.46	6.33	5.43	4.37	6.45	0.337	13.96%	-855.40%

Benzo(a)anthracene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.56	0.575	0.55	0.59	0.55
AT3-098		6.45	4.37	5.43	5.14	5.6

Bioaccumulation Evaluation - PAHs - Macoma — **EA-EST, Inc. PBC**

Analysis ID:	01-9784-4906	**Endpoint:**	Benzo(a)pyrene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:45	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:44	**MD5 Hash:**	07D0CC872CB4E0C372BEC64FFC492DF	**Editor ID:**	

Batch ID:	07-2064-6975	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:47	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:47	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed benzo(a)pyrene endpoint	96.96%

Unequal Variance t Two-Sample Test

Sample I	vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed		AT3-098*	4	4.23	2.13	0.576	CDF	0.0067	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.29	2.29	0.0502	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.26612	3.26612	1	17.9	0.0029	Significant Effect
Error	1.45985	0.182481	8			
Total	4.72597		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1060	23.2	<1.0E-05	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.81	0.741	0.0193	Normal Distribution

Benzo(a)pyrene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.594	0.571	0.617	0.59	0.575	0.62	0.00828	3.12%	0.00%
AT3-098		5	1.74	0.987	2.49	1.71	0.815	2.42	0.27	34.76%	-192.42%

Benzo(a)pyrene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.59	0.605	0.58	0.62	0.575
AT3-098		2.42	0.815	1.64	1.71	2.1

Bioaccumulation Evaluation - PAHs - Macoma					**EA-EST, Inc. PBC**
Analysis ID:	15-8115-7379	**Endpoint:**	Benzo(b)fluoranthene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:45	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:44	**MD5 Hash:**	12547D065D7BFDF89C5D32437B23B6B5	**Editor ID:**	

Batch ID:	07-2064-6975	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:47	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:47	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed benzo(b)fluoranthene endpoint	127.31%

Unequal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	4	7.72	2.13	1	CDF	0.0008	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.6	2.29	0.9059	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	32.8334	32.8334	1	59.6	5.6E-05	Significant Effect
Error	4.40667	0.550834	8			
Total	37.2401		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1940	23.2	<1.0E-05	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.888	0.741	0.1599	Normal Distribution

Benzo(b)fluoranthene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.786	0.756	0.816	0.78	0.765	0.82	0.0107	3.03%	0.00%
AT3-098		5	4.41	3.11	5.71	4.04	3.32	5.53	0.469	23.79%	-461.07%

Benzo(b)fluoranthene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.78	0.8	0.765	0.82	0.765
AT3-098		5.53	3.32	4.04	3.64	5.52

Bioaccumulation Evaluation - PAHs - Macoma — **EA-EST, Inc. PBC**

Analysis ID:	11-2901-4695	**Endpoint:**	Benzo(g,h,i)perylene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:45	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:44	**MD5 Hash:**	523DFF6E6369E963329CFCD3E8F54598	**Editor ID:**	

Batch ID:	07-2064-6975	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:47	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:47	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed benzo(g,h,i)perylene endpoint	108.28%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	0.998	1.86	0.561	CDF	0.1736	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.87	2.29	0.3940	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.227105	0.227105	1	0.997	0.3473	Non-Significant Effect
Error	1.82234	0.227792	8			
Total	2.04944		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	16	23.2	0.0200	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.9	0.741	0.2185	Normal Distribution

Benzo(g,h,i)perylene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.518	0.315	0.722	0.536	0.245	0.67	0.0732	31.59%	0.00%
AT3-098		5	0.82	0.00675	1.63	0.348	0.345	1.66	0.293	79.87%	-58.14%

Benzo(g,h,i)perylene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.527	0.536	0.614	0.67	0.245
AT3-098		1.66	0.347	0.348	0.345	1.4

Bioaccumulation Evaluation - PAHs - Macoma					EA-EST, Inc. PBC
Analysis ID:	18-6572-8367	**Endpoint:**	Benzo(k)fluoranthene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:45	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:44	**MD5 Hash:**	5C2EE81F8C8B0F2DD96F2421269DB368	**Editor ID:**	

Batch ID:	07-2064-6975	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:47	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:47	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed benzo(k)fluoranthene endpoint	118.39%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	2.74	1.86	0.538	CDF	0.0128	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.07	2.29	0.1724	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.56935	1.56935	1	7.49	0.0256	Significant Effect
Error	1.67676	0.209595	8			
Total	3.24611		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	7.85	23.2	0.0709	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.899	0.741	0.2138	Normal Distribution

Benzo(k)fluoranthene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.455	0.185	0.725	0.359	0.351	0.844	0.0973	47.86%	0.00%
AT3-098		5	1.25	0.49	2	1.08	0.496	2.14	0.273	48.89%	-174.21%

Benzo(k)fluoranthene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.359	0.368	0.353	0.844	0.351
AT3-098		2.14	0.496	1.08	1.04	1.48

Bioaccumulation Evaluation - PAHs - Macoma					EA-EST, Inc. PBC
Analysis ID:	19-9439-8456	**Endpoint:**	Chrysene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:45	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:44	**MD5 Hash:**	B1108F814D754F82887339DD0B743FF4	**Editor ID:**	

Batch ID:	07-2064-6975	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:47	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:47	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed chrysene endpoint	72.29%

Unequal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	3	12.1	2.35	0.398	CDF	0.0006	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	9.248	9.248	1	189	<1.0E-05	Significant Effect
Error	0.343	0.049	7			
Total	9.591		8			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	380	24.3	4.6E-05	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.775	0.701	0.0107	Normal Distribution

Chrysene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.55	0.528	0.572	0.545	0.535	0.575	0.00775	3.15%	0.00%
AT3-098		4	2.59	2.05	3.13	2.42	2.36	3.09	0.169	13.03%	-370.91%

Chrysene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.545	0.56	0.535	0.575	0.535
AT3-098		---	2.49	2.36	3.09	2.42

Bioaccumulation Evaluation - PAHs - Macoma					**EA-EST, Inc. PBC**
Analysis ID:	04-5124-3396	**Endpoint:**	Dibenz(a,h)anthracene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:45	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:44	**MD5 Hash:**	2095720A7786D968BC7EBB4D69170523	**Editor ID:**	

Batch ID:	07-2064-6975	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:47	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:47	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed dibenz(a,h)anthracene endpoint	3.08%

Unequal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	4	-59.9	2.13	0.0913	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.25	2.29	0.0628	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	16.4558	16.4558	1	3590	<1.0E-05	Significant Effect
Error	0.0367037	0.004588	8			
Total	16.4925		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	199	23.2	0.0001	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.882	0.741	0.1367	Normal Distribution

Dibenz(a,h)anthracene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	2.97	2.85	3.08	2.95	2.86	3.11	0.0427	3.22%	0.00%
AT3-098		5	0.4	0.392	0.409	0.402	0.39	0.409	0.00303	1.69%	86.50%

Dibenz(a,h)anthracene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	2.95	3	2.91	3.11	2.86
AT3-098		0.39	0.402	0.403	0.399	0.409

Bioaccumulation Evaluation - PAHs - Macoma					**EA-EST, Inc. PBC**
Analysis ID:	05-6250-1207	**Endpoint:**	Fluoranthene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:45	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:44	**MD5 Hash:**	C656B55B4D6FA492965B4472C7B4590E	**Editor ID:**	

Batch ID:	07-2064-6975	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:47	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:47	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed fluoranthene endpoint	438.62%

Unequal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	4	5.63	2.13	9.29	CDF	0.0025	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.82	2.29	0.4607	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1503.32	1503.32	1	31.7	0.0005	Significant Effect
Error	379.786	47.4733	8			
Total	1883.11		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	490	23.2	2.5E-05	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.884	0.741	0.1467	Normal Distribution

Fluoranthene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	2.12	1.57	2.66	2.23	1.38	2.48	0.197	20.77%	0.00%
AT3-098		5	26.6	14.6	38.7	26.1	14.8	36.8	4.35	36.54%	-1157.79%

Fluoranthene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	2.09	2.23	2.41	2.48	1.38
AT3-098		26.1	19.6	35.9	36.8	14.8

Bioaccumulation Evaluation - PAHs - Macoma — **EA-EST, Inc. PBC**

Analysis ID:	14-9364-0252	**Endpoint:**	Fluorene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:45	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:44	**MD5 Hash:**	50355D2D13938BB1E1552D52468F309A	**Editor ID:**	

Batch ID:	07-2064-6975	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:47	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:47	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed fluorene endpoint	374.23%

Unequal Variance t Two-Sample Test

Sample I	vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed		AT3-098*	4	3.35	2.13	0.945	CDF	0.0143	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.91	2.29	0.3362	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	5.51158	5.51158	1	11.2	0.0101	Significant Effect
Error	3.93249	0.491561	8			
Total	9.44406		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	17100	23.2	<1.0E-05	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.886	0.741	0.1543	Normal Distribution

Fluorene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.253	0.243	0.262	0.251	0.245	0.263	0.00339	3.00%	0.00%
AT3-098		5	1.74	0.506	2.97	1.27	0.882	3	0.443	57.07%	-587.81%

Fluorene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.251	0.258	0.247	0.263	0.245
AT3-098		0.935	1.27	2.6	3	0.882

Bioaccumulation Evaluation - PAHs - Macoma | **EA-EST, Inc. PBC**

Analysis ID:	07-5576-6393	**Endpoint:**	Indeno(1,2,3-cd)pyrene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:45	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:44	**MD5 Hash:**	6E4371FDEEA6BDEEBBFD7C28EF82A93	**Editor ID:**	

Batch ID:	07-2064-6975	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:47	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:47	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed indeno(1,2,3-cd)pyrene endpoint	10.85%

Wilcoxon Rank Sum Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	Ties	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	40	---	0	Exact	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.32	2.29	0.0405	Outlier Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	16.3456	16.3456	1	153	<1.0E-05	Significant Effect
Error	0.85448	0.10681	8			
Total	17.2001		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.97	23.2	0.3164	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.692	0.741	0.0007	Non-Normal Distribution

Indeno(1,2,3-cd)pyrene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	3.54	3.25	3.83	3.46	3.35	3.93	0.104	6.55%	0.00%
AT3-098		5	0.985	0.489	1.48	0.81	0.79	1.7	0.179	40.59%	72.19%

Indeno(1,2,3-cd)pyrene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	3.35	3.57	3.46	3.93	3.4
AT3-098		0.79	0.81	0.815	0.81	1.7

Bioaccumulation Evaluation - PAHs - Macoma					**EA-EST, Inc. PBC**
Analysis ID:	12-2133-3190	**Endpoint:**	Naphthalene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:45	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:44	**MD5 Hash:**	18048F756F904A0CF0BB10D204271968	**Editor ID:**	

Batch ID:	07-2064-6975	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:47	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:47	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed naphthalene endpoint	53.20%

Unequal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	4	14.2	2.13	0.207	CDF	7.2E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.18	2.29	0.0978	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	4.73619	4.73619	1	200	<1.0E-05	Significant Effect
Error	0.189077	0.0236347	8			
Total	4.92527		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	338	23.2	5.2E-05	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.903	0.741	0.2387	Normal Distribution

Naphthalene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.39	0.375	0.404	0.387	0.378	0.406	0.00528	3.03%	0.00%
AT3-098		5	1.77	1.5	2.04	1.81	1.45	2	0.0971	12.29%	-353.29%

Naphthalene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.387	0.397	0.38	0.406	0.378
AT3-098		2	1.66	1.91	1.81	1.45

Bioaccumulation Evaluation - PAHs - Macoma			**EA-EST, Inc. PBC**

Analysis ID:	04-1490-0844	**Endpoint:**	Phenanthrene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:45	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:44	**MD5 Hash:**	5AB9E6A0C2E5AB41C2FAA05D78AA4D2	**Editor ID:**	

Batch ID:	07-2064-6975	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:47	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:47	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed phenanthrene endpoint	155.52%

Unequal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	4	3.44	2.13	3.07	CDF	0.0132	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.76	2.29	0.5686	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	61.2563	61.2563	1	11.8	0.0089	Significant Effect
Error	41.475	5.18438	8			
Total	102.731		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	50.9	23.2	0.0022	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.908	0.741	0.2657	Normal Distribution

Phenanthrene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	1.97	1.42	2.53	2.23	1.3	2.31	0.2	22.63%	0.00%
AT3-098		5	6.92	2.96	10.9	4.86	4.23	10.7	1.43	46.06%	-250.76%

Phenanthrene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	1.73	2.3	2.31	2.23	1.3
AT3-098		4.86	4.73	10.7	10.1	4.23

Bioaccumulation Evaluation - PAHs - Macoma — **EA-EST, Inc. PBC**

Analysis ID:	04-1423-2436	**Endpoint:**	Pyrene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:45	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:44	**MD5 Hash:**	08C81C009542A76C78DFD918D23F22FA	**Editor ID:**	

Batch ID:	07-2064-6975	**Test Type:**	Bioaccumulation - PAHs	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:47	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:47	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pyrene endpoint	32.69%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	7	74.9	1.89	0.533	CDF	<1.0E-05	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	988.699	988.699	1	5610	<1.0E-05	Significant Effect
Error	1.23338	0.176197	7			
Total	989.933		8			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	11.7	24.3	0.0377	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.97	0.701	0.8905	Normal Distribution

Pyrene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	1.63	1.41	1.85	1.62	1.45	1.9	0.0793	10.87%	0.00%
AT3-098		4	22.7	21.8	23.7	22.5	22	23.4	0.304	2.67%	-1292.46%

Pyrene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	1.5	1.62	1.69	1.9	1.45
AT3-098		23.4	---	23	22.5	22

ATTACHMENT X

Macoma nasuta 28-Day Solid Phase Bioaccumulation Testing
Tissue Chemistry and Body Burden Statistical Analyses

PCBs

(29 pages)

Yachtsman Marina
NAE-2004-00319

APPENDIX A. CONCENTRATIONS OF COCs IN THE CLAM (*M. nasuta*)

		Pre-Assay			
CONTAMINANT	REP1	REP2	REP3	REP4 *	REP5 *
PCB Congeners (ng/g wet wt.)					
PCB 8	0.0630 U	0.0640 U	0.0630 U		
PCB 18	0.0459 U	0.0466 U	0.0458 U		
PCB 28	0.0780 U	0.0790 U	0.0780 U		
PCB 44	0.0870 U	0.0880 U	0.0870 U		
PCB 52	1.83	2.74	1.71		
PCB 66	0.0455 U	0.0462 U	0.0455 U		
PCB 101	0.0740 U	0.0755 U	0.0740 U		
PCB 105	0.0665 U	0.0675 U	0.0665 U		
PCB 118	0.0705 U	0.0715 U	0.0705 U		
PCB 128	0.0830 U	0.0845 U	0.0830 U		
PCB 138	1.07	0.0540 U	0.0530 U		
PCB 153	0.111 U	0.113 U	0.111 U		
PCB 170	0.0408 U	0.0414 U	0.0408 U		
PCB 180	0.0417 U	0.0424 U	0.0417 U		
PCB 187	0.0600 U	0.0610 U	0.0600 U		
PCB 195	0.0785 U	0.0795 U	0.0780 U		
PCB 206	0.0800 U	0.0810 U	0.0800 U		
PCB 209	0.0915 U	0.0930 U	0.0915 U		
Total PCBs	8.03	7.85	5.76		

* = Qualifiers
U Analyte not detected; below Method Detection Limit; value is one-half the Method Detection Limit
J Analyte estimated; detection below Reporting Limit but above Method Detection Limit
NA Not Analyzed

Yachtsman Marina
NAE-2004-00319

APPENDIX A. CONCENTRATIONS OF COCs IN THE CLAM (*M. nasuta*)

CONTAMINANT	IOSN Reference REP1		REP2		REP3		REP4		REP5	
PCB Congeners (ng/g wet wt										
PCB 8	0.0465	U	0.0475	U	0.0455	U	0.0485	U	0.0455	U
PCB 18	0.0340	U	0.0345	U	0.0330	U	0.0355	U	0.0330	U
PCB 28	0.0575	U	0.0590	U	0.0565	U	0.0600	U	0.0560	U
PCB 44	0.0640	U	0.0655	U	0.0630	U	0.0670	U	0.0625	U
PCB 52	0.0355	U	0.0365	U	0.0350	U	0.0375	U	0.0350	U
PCB 66	0.0335	U	0.0345	U	0.0330	U	0.0350	U	0.0330	U
PCB 101	0.0545	U	0.0560	U	0.0535	U	0.0575	U	0.0535	U
PCB 105	0.0490	U	0.0500	U	0.0480	U	0.0515	U	0.0480	U
PCB 118	0.0520	U	0.0530	U	0.0510	U	0.0545	U	0.0505	U
PCB 128	0.0610	U	0.0630	U	0.0600	U	0.0640	U	0.0600	U
PCB 138	0.0390	U	0.0400	U	0.0385	U	0.0410	U	0.0385	U
PCB 153	0.0815	U	0.0835	U	0.0800	U	0.0855	U	0.0795	U
PCB 170	0.0300	U	0.0310	U	0.0295	U	0.0315	U	0.0295	U
PCB 180	0.0305	U	0.0315	U	0.0300	U	0.0325	U	0.0300	U
PCB 187	0.0440	U	0.0455	U	0.0435	U	0.0465	U	0.0430	U
PCB 195	0.0575	U	0.0590	U	0.0565	U	0.0605	U	0.0565	U
PCB 206	0.0590	U	0.0605	U	0.0580	U	0.0620	U	0.0575	U
PCB 209	0.0675	U	0.0690	U	0.0665	U	0.0710	U	0.0660	U
Total PCBs	1.79		1.84		1.76		1.88		1.76	

* = Qualifiers
U Analyte not detected; belo
J Analyte estimated; detectio
NA Not Analyzed

Yachtsman Marina
NAE-2004-00319

APPENDIX A. CONCENTRATIONS OF COCs IN THE CLAM (*M. nasuta*)

10 Stations at 4 Marinas Mud

CONTAMINANT	REP1		REP2		REP3		REP4		REP5	
PCB Congeners (ng/g wet wt										
PCB 8	0.0625	U	0.0640	U	0.0645	U	0.0635	U	0.0650	U
PCB 18	0.0453	U	0.0467	U	0.0469	U	0.0464	U	0.0475	U
PCB 28	0.0770	U	0.0795	U	0.0795	U	0.0790	U	0.0805	U
PCB 44	0.0860	U	0.0885	U	0.0890	U	0.0880	U	0.0900	U
PCB 52	0.0479	U	0.0492	U	0.0495	U	0.662		0.0500	U
PCB 66	0.0450	U	0.0463	U	0.0465	U	0.0460	U	0.0471	U
PCB 101	0.0735	U	0.0755	U	0.0760	U	0.0750	U	0.0770	U
PCB 105	0.0660	U	0.0675	U	0.0680	U	0.0670	U	0.0690	U
PCB 118	0.0695	U	0.423	J	0.0720	U	0.0710	U	0.0730	U
PCB 128	0.0820	U	0.0845	U	0.0850	U	0.0840	U	0.0860	U
PCB 138	0.0525	U	0.0540	U	0.0545	U	0.0535	U	0.0550	U
PCB 153	0.110	U	0.113	U	0.113	U	0.260	J	0.115	U
PCB 170	0.0403	U	0.0415	U	0.0416	U	0.0412	U	0.0422	U
PCB 180	0.0412	U	0.0424	U	0.0426	U	0.0422	U	0.0432	U
PCB 187	0.0590	U	0.0610	U	0.0610	U	0.0605	U	0.0620	U
PCB 195	0.0775	U	0.0795	U	0.0800	U	0.0790	U	0.0810	U
PCB 206	0.0790	U	0.0810	U	0.0815	U	0.0810	U	0.0825	U
PCB 209	0.0905	U	0.0930	U	0.0935	U	0.0925	U	0.0950	U
Total PCBs	2.41		3.18		2.49		3.98		2.52	

* = Qualifiers
U Analyte not detected; belo
J Analyte estimated; detectio
NA Not Analyzed

CETIS Test Data Worksheet

Report Date: 19 Aug-23 06:47 (p 1 of 1)
Test Code/ID: TN-23-303MnPCB / 17-0778-2871

Bioaccumulation Evaluation - PCB Congeners - Macoma **EA-EST, Inc. PBC**

Start Date:	29 Mar-23 13:48	**Species:**	Macoma nasuta	**Sample Code:**	AT3-191
End Date:	26 Apr-23 12:48	**Protocol:**	US ACE NED RIM (2004)	**Sample Source:**	Yachtsman Marina NAE-2004-00319
Sample Date:	20 Mar-23	**Material:**	Laboratory Control Sediment	**Sample Station:**	Laboratory Control

Sample	Rep	Pos	PBC 008	PCB 018	PCB 028	PCB 044	PCB 052	PCB 066	PCB 101	PCB 105	PCB 118	PCB 128	PCB 138	PCB 153	PCB 170	PCB 180	PCB 187	PCB 195	PCB 206	PCB 209	PCB 087	PCB 049	PCB 183	PCB 184	Total PCBs
IOSN 2019	1	2	0.047	0.034	0.058	0.064	0.036	0.034	0.055	0.049	0.052	0.061	0.039	0.082	0.03	0.031	0.044	0.058	0.059	0.068	0.027	0.063	0.017	0.034	
IOSN 2019	2	3	0.048	0.035	0.059	0.066	0.037	0.035	0.056	0.05	0.053	0.063	0.04	0.084	0.031	0.032	0.046	0.059	0.061	0.069	0.028	0.064	0.017	0.035	
IOSN 2019	3	6	0.046	0.033	0.057	0.063	0.035	0.033	0.054	0.048	0.051	0.06	0.039	0.08	0.03	0.03	0.044	0.057	0.058	0.067	0.027	0.062	0.017	0.033	
IOSN 2019	4	7	0.049	0.036	0.06	0.067	0.038	0.035	0.058	0.052	0.055	0.064	0.041	0.086	0.032	0.033	0.047	0.061	0.062	0.071	0.029	0.066	0.018	0.036	
IOSN 2019	5	10	0.046	0.033	0.056	0.063	0.035	0.033	0.054	0.048	0.051	0.06	0.039	0.08	0.03	0.03	0.043	0.057	0.058	0.066	0.027	0.061	0.016	0.033	
AT3-098	1	1	0.063	0.045	0.077	0.086	0.048	0.045	0.074	0.066	0.07	0.082	0.053	0.11	0.040	0.041	0.059	0.078	0.079	0.091	0.037	0.084	0.022	0.045	
AT3-098	2	4	0.064	0.047	0.08	0.089	0.049	0.046	0.076	0.068	0.423	0.085	0.054	0.113	0.041	0.042	0.061	0.08	0.081	0.093	0.038	0.087	0.023	0.047	
AT3-098	3	5	0.065	0.047	0.08	0.089	0.049	0.047	0.076	0.068	0.072	0.085	0.055	0.113	0.042	0.043	0.061	0.08	0.082	0.094	0.038	0.087	0.023	0.047	
AT3-098	4	8	0.064	0.046	0.079	0.088	0.662	0.046	0.075	0.067	0.071	0.084	0.054	0.26	0.041	0.042	0.061	0.079	0.081	0.093	0.037	0.551	0.023	0.046	
AT3-098	5	9	0.065	0.047	0.081	0.09	0.05	0.047	0.077	0.069	0.073	0.086	0.055	0.115	0.042	0.043	0.062	0.081	0.083	0.095	0.038	0.088	0.023	0.047	

Analyst: NR QA: JR

Bioaccumulation Evaluation - PCB Congeners - Macoma EA-EST, Inc. PBC

Batch ID:	14-7703-1847	**Test Type:**	Bioaccumulation - PCBs - Mn	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:48	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:48	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample ID:	10-1907-8970	**Code:**	AT3-191	**Project:**	Dredged Sediment Evaluation
Sample Date:	20 Mar-23	**Material:**	Laboratory Control Sediment	**Source:**	Yachtsman Marina NAE-2004-00319 (
Receipt Date:	20 Mar-23 16:00	**CAS (PC):**		**Station:**	Laboratory Control
Sample Age:	9d 14h	**Client:**	Eco-Analysts, Inc.		

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
11-6719-3611	PCB 008	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 008	1
16-3276-0407	PCB 018	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 018	1
13-9608-7387	PCB 028	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 028	1
19-3839-9687	PCB 044	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 044	1
05-0591-9058	PCB 052	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 052	1
09-3696-3646	PCB 052	Wilcoxon Rank Sum Two-Sample Test	0.0040	AT3-098 failed pcb 052	1
14-5817-1474	PCB 066	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 066	1
14-9269-7357	PCB 101	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 101	1
04-1507-5714	PCB 105	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 105	1
20-1325-5525	PCB 118	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 118	1
11-1662-6316	PCB 118	Wilcoxon Rank Sum Two-Sample Test	0.0040	AT3-098 failed pcb 118	1
11-7225-5352	PCB 128	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 128	1
09-9129-8390	PCB 138	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 138	1
10-1176-5480	PCB 153	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 153	1
08-1735-4110	PCB 153	Wilcoxon Rank Sum Two-Sample Test	0.0040	AT3-098 failed pcb 153	1
12-8292-6359	PCB 170	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 170	1
15-8865-0666	PCB 180	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 180	1
01-5676-1440	PCB 187	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 187	1
02-4694-1435	PCB 195	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 195	1
03-3708-3472	PCB 206	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 206	1
08-3719-0550	PCB 209	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed pcb 209	1

Bioaccumulation Evaluation - PCB Congeners - Macoma **EA-EST, Inc. PBC**

PCB 008 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0467	0.0451	0.0483	0.0455	0.0485	0.000583	0.0013	2.79%	0.00%
AT3-098		5	0.0639	0.0627	0.0651	0.0625	0.065	0.00043	0.000962	1.51%	-36.83%

PCB 018 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.034	0.0327	0.0353	0.033	0.0355	0.000474	0.00106	3.12%	0.00%
AT3-098		5	0.0465	0.0455	0.0475	0.0453	0.0474	0.000354	0.000792	1.70%	-36.82%

PCB 028 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0578	0.0557	0.0599	0.056	0.06	0.000752	0.00168	2.91%	0.00%
AT3-098		5	0.0791	0.0775	0.0807	0.077	0.0805	0.000579	0.00129	1.64%	-36.85%

PCB 044 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0644	0.0621	0.0667	0.0625	0.067	0.000828	0.00185	2.87%	0.00%
AT3-098		5	0.0883	0.0865	0.0901	0.086	0.09	0.000663	0.00148	1.68%	-37.11%

PCB 052 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0359	0.0346	0.0372	0.035	0.0375	0.000485	0.00108	3.02%	0.00%
AT3-098		5	0.172	-0.169	0.512	0.0479	0.662	0.123	0.274	159.63%	-378.27%

PCB 066 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0338	0.0327	0.0349	0.033	0.035	0.000406	0.000908	2.69%	0.00%
AT3-098		5	0.0462	0.0452	0.0471	0.045	0.0471	0.000346	0.000773	1.67%	-36.63%

PCB 101 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.055	0.0528	0.0572	0.0535	0.0575	0.000775	0.00173	3.15%	0.00%
AT3-098		5	0.0754	0.0738	0.077	0.0735	0.077	0.000579	0.00129	1.72%	-37.09%

PCB 105 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0493	0.0475	0.0511	0.048	0.0515	0.000663	0.00148	3.01%	0.00%
AT3-098		5	0.0675	0.0661	0.0689	0.066	0.069	0.0005	0.00112	1.66%	-36.92%

PCB 118 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0522	0.0502	0.0542	0.0505	0.0545	0.000718	0.0016	3.07%	0.00%
AT3-098		5	0.142	-0.0536	0.337	0.0695	0.423	0.0703	0.157	110.98%	-171.46%

PCB 128 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0616	0.0593	0.0639	0.06	0.064	0.000812	0.00182	2.95%	0.00%
AT3-098		5	0.0843	0.0825	0.0861	0.082	0.086	0.000663	0.00148	1.76%	-36.85%

PCB 138 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0394	0.0381	0.0407	0.0385	0.041	0.000485	0.00108	2.75%	0.00%
AT3-098		5	0.0539	0.0527	0.0551	0.0525	0.055	0.00043	0.000962	1.78%	-36.80%

Bioaccumulation Evaluation - PCB Congeners - Macoma **EA-EST, Inc. PBC**

PCB 153 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.082	0.0789	0.0851	0.0795	0.0855	0.00112	0.0025	3.05%	0.00%
AT3-098		5	0.142	0.0599	0.224	0.109	0.26	0.0295	0.066	46.54%	-73.05%

PCB 170 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0303	0.0292	0.0314	0.0295	0.0315	0.000406	0.000908	3.00%	0.00%
AT3-098		5	0.0414	0.0405	0.0422	0.0403	0.0422	0.00031	0.000693	1.68%	-36.47%

PCB 180 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0309	0.0296	0.0322	0.03	0.0325	0.000485	0.00108	3.51%	0.00%
AT3-098		5	0.0423	0.0414	0.0432	0.0412	0.0432	0.000321	0.000717	1.69%	-36.89%

PCB 187 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0445	0.0427	0.0463	0.043	0.0465	0.000652	0.00146	3.28%	0.00%
AT3-098		5	0.0607	0.0593	0.0621	0.059	0.062	0.00049	0.0011	1.80%	-36.40%

PCB 195 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.058	0.0558	0.0602	0.0565	0.0605	0.000775	0.00173	2.99%	0.00%
AT3-098		5	0.0794	0.0778	0.081	0.0775	0.081	0.000579	0.00129	1.63%	-36.90%

PCB 206 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0594	0.0571	0.0617	0.0575	0.062	0.000828	0.00185	3.12%	0.00%
AT3-098		5	0.081	0.0794	0.0826	0.079	0.0825	0.00057	0.00127	1.57%	-36.36%

PCB 209 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.068	0.0655	0.0705	0.066	0.071	0.000908	0.00203	2.99%	0.00%
AT3-098		5	0.0929	0.0909	0.0949	0.0905	0.095	0.000731	0.00164	1.76%	-36.62%

PCB 008 Detail MD5: 9C603D30B16A57D426E738700F73B519

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0465	0.0475	0.0455	0.0485	0.0455
AT3-098		0.0625	0.064	0.0645	0.0635	0.065

PCB 018 Detail MD5: DD9BEDC40F682A4349BA0136904F97C7

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.034	0.0345	0.033	0.0355	0.033
AT3-098		0.0453	0.0466	0.0468	0.0463	0.0474

PCB 028 Detail MD5: 786773990FB8BBB1B08C3594EEA9CE4D

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0575	0.059	0.0565	0.06	0.056
AT3-098		0.077	0.0795	0.0795	0.079	0.0805

PCB 044 Detail MD5: D2EFAD9773BDE40510B0CEAEF31B9A2D

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.064	0.0655	0.063	0.067	0.0625
AT3-098		0.086	0.0885	0.089	0.088	0.09

PCB 052 Detail MD5: 936FDE147307595B0DD61AD9E6253183

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0355	0.0365	0.035	0.0375	0.035
AT3-098		0.0479	0.0492	0.0494	0.662	0.05

PCB 066 Detail MD5: 7A24F9E788E803B4DB65AED846AE44FA

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0335	0.0345	0.033	0.035	0.033
AT3-098		0.045	0.0463	0.0465	0.046	0.0471

PCB 101 Detail MD5: 030FC5C2EC3878D6CB1097D3BD05BD5C

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0545	0.056	0.0535	0.0575	0.0535
AT3-098		0.0735	0.0755	0.076	0.075	0.077

PCB 105 Detail MD5: D02B9D3F2A01B1B333F2F0D7963B1648

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.049	0.05	0.048	0.0515	0.048
AT3-098		0.066	0.0675	0.068	0.067	0.069

PCB 118 Detail MD5: F4A31E554A76400BC4D54496C71B1A3E

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.052	0.053	0.051	0.0545	0.0505
AT3-098		0.0695	0.423	0.072	0.071	0.073

PCB 128 Detail MD5: F7C2E9EACAC0BEBB404EE5A1AC418C2

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.061	0.063	0.06	0.064	0.06
AT3-098		0.082	0.0845	0.085	0.084	0.086

PCB 138 Detail MD5: EB396B64B9D31D9A53B859815C4B1256

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.039	0.04	0.0385	0.041	0.0385
AT3-098		0.0525	0.054	0.0545	0.0535	0.055

Bioaccumulation Evaluation - PCB Congeners - Macoma **EA-EST, Inc. PBC**

PCB 153 Detail MD5: BFDB7A2262DFC5BD213F5DAA527DC792

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0815	0.0835	0.08	0.0855	0.0795
AT3-098		0.109	0.112	0.113	0.26	0.115

PCB 170 Detail MD5: 5B285380C382208B75EA8F6FD2806A3E

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.03	0.031	0.0295	0.0315	0.0295
AT3-098		0.0403	0.0415	0.0416	0.0412	0.0422

PCB 180 Detail MD5: E7A91940C4BA30C77459FE5B9AFB47F1

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0305	0.0315	0.03	0.0325	0.03
AT3-098		0.0412	0.0424	0.0426	0.0421	0.0432

PCB 187 Detail MD5: 2CB198593AF1373895ED983CC6673022

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.044	0.0455	0.0435	0.0465	0.043
AT3-098		0.059	0.061	0.061	0.0605	0.062

PCB 195 Detail MD5: 4BD0DE09D74BAE601C1618D06FEEEE3D

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0575	0.059	0.0565	0.0605	0.0565
AT3-098		0.0775	0.0795	0.08	0.079	0.081

PCB 206 Detail MD5: 3D17519E07607620A736093499E06742

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.059	0.0605	0.058	0.062	0.0575
AT3-098		0.079	0.081	0.0815	0.081	0.0825

PCB 209 Detail MD5: 927A5DA40F4466C5BFC0586882D4BFFD

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0675	0.069	0.0665	0.071	0.066
AT3-098		0.0905	0.093	0.0935	0.0925	0.095

STUDY: **TN-23-303**
CLIENT: **Eco-Analysts, Inc.**
PROJECT: **Yachtsman Marina, Kennebunkport, ME NAE-2004-00319**
ASSAY: ***M. nasuta*** **28-day Bioaccumulation Evaluation**
TASK: **Statistical Analysis of Body Burden PCBs**

Endpoint	Method	C	<	T	Statistic	Critical	P Level	Alpha	Reject Null	MSD	DF	Ties	P-Type
PCB 008	Equal Variance t Two-Sample Test	IOSN	<	Comp	23.73826	1.859548	0	0.05	TRUE	0.00134737	8		C
PCB 018	Equal Variance t Two-Sample Test	IOSN	<	Comp	21.15057	1.859548	0	0.05	TRUE	0.001100752	8		C
PCB 028	Equal Variance t Two-Sample Test	IOSN	<	Comp	22.45218	1.859548	0	0.05	TRUE	0.001764121	8		C
PCB 044	Equal Variance t Two-Sample Test	IOSN	<	Comp	22.53314	1.859548	0	0.05	TRUE	0.001972349	8		C
PCB 052	Wilcoxon Rank Sum Two-Sample Test	IOSN	<	Comp	15		0.003968254	0.05	TRUE		8	0	E
PCB 052	Equal Variance t Two-Sample Test	IOSN	<	Comp	19.43555	1.894579	1.20916E-07	0.05	TRUE	0.001289174	7		C
PCB 066	Equal Variance t Two-Sample Test	IOSN	<	Comp	23.21432	1.859548	0	0.05	TRUE	0.000991681	8		C
PCB 101	Equal Variance t Two-Sample Test	IOSN	<	Comp	21.09718	1.859548	0	0.05	TRUE	0.001798097	8		C
PCB 105	Equal Variance t Two-Sample Test	IOSN	<	Comp	21.91023	1.859548	0	0.05	TRUE	0.001544656	8		C
PCB 118	Equal Variance t Two-Sample Test	IOSN	<	Comp	18.34905	1.894579	1.78724E-07	0.05	TRUE	0.00197986	7		C
PCB 118	Wilcoxon Rank Sum Two-Sample Test	IOSN	<	Comp	15		0.003968254	0.05	TRUE		8	0	E
PCB 128	Equal Variance t Two-Sample Test	IOSN	<	Comp	21.64359	1.859548	0	0.05	TRUE	0.001950312	8		C
PCB 138	Equal Variance t Two-Sample Test	IOSN	<	Comp	22.37398	1.859548	0	0.05	TRUE	0.001205125	8		C
PCB 153	Wilcoxon Rank Sum Two-Sample Test	IOSN	<	Comp	15		0.003968254	0.05	TRUE		8	0	E
PCB 153	Equal Variance t Two-Sample Test	IOSN	<	Comp	19.38645	1.894579	1.23008E-07	0.05	TRUE	0.002968457	7		C
PCB 170	Equal Variance t Two-Sample Test	IOSN	<	Comp	21.62928	1.859548	0	0.05	TRUE	0.000950009	8		C
PCB 180	Equal Variance t Two-Sample Test	IOSN	<	Comp	19.61586	1.859548	0	0.05	TRUE	0.0010807	8		C
PCB 187	Equal Variance t Two-Sample Test	IOSN	<	Comp	19.86572	1.859548	0	0.05	TRUE	0.001516415	8		C
PCB 195	Equal Variance t Two-Sample Test	IOSN	<	Comp	22.13136	1.859548	0	0.05	TRUE	0.001798097	8		C
PCB 206	Equal Variance t Two-Sample Test	IOSN	<	Comp	21.49281	1.859548	0	0.05	TRUE	0.001868822	8		C
PCB 209	Equal Variance t Two-Sample Test	IOSN	<	Comp	21.35157	1.859548	0	0.05	TRUE	0.002168588	8		C

Bioaccumulation Evaluation - PCB Congeners - Macoma — **EA-EST, Inc. PBC**

Analysis ID:	11-6719-3611	**Endpoint:**	PCB 008	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:47	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	FECC1FE80AF281307E4EC8BA3C0DF58	**Editor ID:**	

Batch ID:	14-7703-1847	**Test Type:**	Bioaccumulation - PCBs - Mn	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:48	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:48	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 008 endpoint	2.89%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	23.7	1.86	0.00135	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.67	2.29	0.7532	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0007396	0.0007396	1	564	<1.0E-05	Significant Effect
Error	0.0000105	1.313E-06	8			
Total	0.0007501		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.84	23.2	0.5700	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.949	0.741	0.6522	Normal Distribution

PCB 008 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0467	0.0451	0.0483	0.0465	0.0455	0.0485	0.000583	2.79%	0.00%
AT3-098		5	0.0639	0.0627	0.0651	0.064	0.0625	0.065	0.00043	1.51%	-36.83%

PCB 008 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0465	0.0475	0.0455	0.0485	0.0455
AT3-098		0.0625	0.064	0.0645	0.0635	0.065

Bioaccumulation Evaluation - PCB Congeners - Macoma			**EA-EST, Inc. PBC**

Analysis ID:	16-3276-0407	**Endpoint:**	PCB 018	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:47	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	D3EC8A4E7F778C71526F3FF6A664DC74	**Editor ID:**	

Batch ID:	14-7703-1847	**Test Type:**	Bioaccumulation - PCBs - Mn	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:48	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:48	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 018 endpoint	3.24%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	21.2	1.86	0.0011	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.7	2.29	0.6826	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0003919	0.0003919	1	447	<1.0E-05	Significant Effect
Error	7.008E-06	8.76E-07	8			
Total	0.0003989		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.79	23.2	0.5851	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.952	0.741	0.6974	Normal Distribution

PCB 018 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.034	0.0327	0.0353	0.034	0.033	0.0355	0.000474	3.12%	0.00%
AT3-098		5	0.0465	0.0455	0.0475	0.0467	0.0453	0.0475	0.000354	1.70%	-36.82%

PCB 018 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.034	0.0345	0.033	0.0355	0.033
AT3-098		0.0453	0.0467	0.0469	0.0464	0.0475

Bioaccumulation Evaluation - PCB Congeners - Macoma — **EA-EST, Inc. PBC**

Analysis ID:	13-9608-7387	**Endpoint:**	PCB 028	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:47	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	0377D7B29B5F9732FE5E94EDBB423E9A	**Editor ID:**	

Batch ID:	14-7703-1847	**Test Type:**	Bioaccumulation - PCBs - Mn	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:48	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:48	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 028 endpoint	3.05%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	22.5	1.86	0.00176	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.56	2.29	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0011342	0.0011342	1	504	<1.0E-05	Significant Effect
Error	0.000018	2.25E-06	8			
Total	0.0011522		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.69	23.2	0.6250	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.962	0.741	0.8099	Normal Distribution

PCB 028 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0578	0.0557	0.0599	0.0575	0.056	0.06	0.000752	2.91%	0.00%
AT3-098		5	0.0791	0.0775	0.0807	0.0795	0.077	0.0805	0.000579	1.64%	-36.85%

PCB 028 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0575	0.059	0.0565	0.06	0.056
AT3-098		0.077	0.0795	0.0795	0.079	0.0805

Bioaccumulation Evaluation - PCB Congeners - Macoma			**EA-EST, Inc. PBC**

Analysis ID:	19-3839-9687	**Endpoint:**	PCB 044	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:48	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	3EAC3D0D7916F43F6F89F408981BBB9F	**Editor ID:**	

Batch ID:	14-7703-1847	**Test Type:**	Bioaccumulation - PCBs - Mn	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:48	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:48	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 044 endpoint	3.06%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	22.5	1.86	0.00197	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.64	2.29	0.8024	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0014280	0.0014280	1	508	<1.0E-05	Significant Effect
Error	0.0000225	2.813E-06	8			
Total	0.0014505		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.56	23.2	0.6785	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.976	0.741	0.9412	Normal Distribution

PCB 044 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0644	0.0621	0.0667	0.064	0.0625	0.067	0.000828	2.87%	0.00%
AT3-098		5	0.0883	0.0865	0.0901	0.0885	0.086	0.09	0.000663	1.68%	-37.11%

PCB 044 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.064	0.0655	0.063	0.067	0.0625
AT3-098		0.086	0.0885	0.089	0.088	0.09

Bioaccumulation Evaluation - PCB Congeners - Macoma					EA-EST, Inc. PBC
Analysis ID:	09-3696-3646	**Endpoint:**	PCB 052	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:48	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	1BE4B4C3D6E2B223EE9F421AA372C32C	**Editor ID:**	

Batch ID:	14-7703-1847	**Test Type:**	Bioaccumulation - PCBs - Mn	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:48	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:48	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 052 endpoint	634.92%

Wilcoxon Rank Sum Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	Ties	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	15	---	0	Exact	0.0040	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.68	2.29	0.0004	Outlier Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0461041	0.0461041	1	1.23	0.3001	Non-Significant Effect
Error	0.3005	0.0375625	8			
Total	0.346604		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	63900	23.2	<1.0E-05	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.628	0.741	0.0001	Non-Normal Distribution

PCB 052 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0359	0.0346	0.0372	0.0355	0.035	0.0375	0.000485	3.02%	0.00%
AT3-098		5	0.172	-0.169	0.512	0.0495	0.0479	0.662	0.123	159.63%	-378.27%

PCB 052 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0355	0.0365	0.035	0.0375	0.035
AT3-098		0.0479	0.0492	0.0495	0.662	0.05

Bioaccumulation Evaluation - PCB Congeners - Macoma					**EA-EST, Inc. PBC**
Analysis ID:	14-5817-1474	**Endpoint:**	PCB 066	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:48	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	4D9D160EF348E0EFD14D69E0CFCD9004	**Editor ID:**	

Batch ID:	14-7703-1847	**Test Type:**	Bioaccumulation - PCBs - Mn	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:48	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:48	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 066 endpoint	2.93%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	23.2	1.86	0.000992	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.51	2.29	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0003832	0.0003832	1	539	<1.0E-05	Significant Effect
Error	5.688E-06	7.11E-07	8			
Total	0.0003888		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.38	23.2	0.7616	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.963	0.741	0.8243	Normal Distribution

PCB 066 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0338	0.0327	0.0349	0.0335	0.033	0.035	0.000406	2.69%	0.00%
AT3-098		5	0.0462	0.0452	0.0471	0.0463	0.045	0.0471	0.000346	1.67%	-36.63%

PCB 066 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0335	0.0345	0.033	0.035	0.033
AT3-098		0.045	0.0463	0.0465	0.046	0.0471

Bioaccumulation Evaluation - PCB Congeners - Macoma	**EA-EST, Inc. PBC**

Analysis ID:	14-9269-7357	**Endpoint:**	PCB 101	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:48	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	3353EB38044B278D7CACC4E48E04E727	**Editor ID:**	

Batch ID:	14-7703-1847	**Test Type:**	Bioaccumulation - PCBs - Mn	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:48	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:48	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 101 endpoint	3.27%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	21.1	1.86	0.0018	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.73	2.29	0.6144	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0010404	0.0010404	1	445	<1.0E-05	Significant Effect
Error	0.0000187	2.338E-06	8			
Total	0.0010591		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.79	23.2	0.5862	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.959	0.741	0.7763	Normal Distribution

PCB 101 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.055	0.0528	0.0572	0.0545	0.0535	0.0575	0.000775	3.15%	0.00%
AT3-098		5	0.0754	0.0738	0.077	0.0755	0.0735	0.077	0.000579	1.72%	-37.09%

PCB 101 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0545	0.056	0.0535	0.0575	0.0535
AT3-098		0.0735	0.0755	0.076	0.075	0.077

Bioaccumulation Evaluation - PCB Congeners - Macoma	**EA-EST, Inc. PBC**

Analysis ID:	04-1507-5714	**Endpoint:**	PCB 105	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:48	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	99C7BBF4546172ABF116BDFFE560FFE6	**Editor ID:**	

Batch ID:	14-7703-1847	**Test Type:**	Bioaccumulation - PCBs - Mn	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:48	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:48	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 105 endpoint	3.13%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	21.9	1.86	0.00154	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.78	2.29	0.5371	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0008281	0.0008281	1	480	<1.0E-05	Significant Effect
Error	0.0000138	1.725E-06	8			
Total	0.0008419		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.76	23.2	0.5974	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.943	0.741	0.5867	Normal Distribution

PCB 105 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0493	0.0475	0.0511	0.049	0.048	0.0515	0.000663	3.01%	0.00%
AT3-098		5	0.0675	0.0661	0.0689	0.0675	0.066	0.069	0.0005	1.66%	-36.92%

PCB 105 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.049	0.05	0.048	0.0515	0.048
AT3-098		0.066	0.0675	0.068	0.067	0.069

Bioaccumulation Evaluation - PCB Congeners - Macoma — **EA-EST, Inc. PBC**

Analysis ID:	20-1325-5525	**Endpoint:**	PCB 118	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:48	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	0597AABE8A5C5DFE63E5199110DC7087	**Editor ID:**	

Batch ID:	14-7703-1847	**Test Type:**	Bioaccumulation - PCBs - Mn	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:48	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:48	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 118 endpoint	3.79%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	7	18.3	1.89	0.00198	CDF	<1.0E-05	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0008171	0.0008171	1	337	<1.0E-05	Significant Effect
Error	1.699E-05	2.427E-06	7			
Total	0.0008341		8			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.16	46.2	0.9433	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.955	0.701	0.7426	Normal Distribution

PCB 118 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0522	0.0502	0.0542	0.052	0.0505	0.0545	0.000718	3.07%	0.00%
AT3-098		4	0.0714	0.069	0.0738	0.071	0.0695	0.073	0.000747	2.09%	-36.73%

PCB 118 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.052	0.053	0.051	0.0545	0.0505
AT3-098		0.0695	---	0.072	0.071	0.073

Bioaccumulation Evaluation - PCB Congeners - Macoma — **EA-EST, Inc. PBC**

Analysis ID:	11-7225-5352	**Endpoint:**	PCB 128	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:48	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	85B5447611C018A32DDC654868069831	**Editor ID:**	

Batch ID:	14-7703-1847	**Test Type:**	Bioaccumulation - PCBs - Mn	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:48	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:48	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 128 endpoint	3.17%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	21.6	1.86	0.00195	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.54	2.29	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0012882	0.0012882	1	468	<1.0E-05	Significant Effect
Error	0.000022	2.75E-06	8			
Total	0.0013102		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.5	23.2	0.7040	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.964	0.741	0.8284	Normal Distribution

PCB 128 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0616	0.0593	0.0639	0.061	0.06	0.064	0.000812	2.95%	0.00%
AT3-098		5	0.0843	0.0825	0.0861	0.0845	0.082	0.086	0.000663	1.76%	-36.85%

PCB 128 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.061	0.063	0.06	0.064	0.06
AT3-098		0.082	0.0845	0.085	0.084	0.086

Bioaccumulation Evaluation - PCB Congeners - Macoma — **EA-EST, Inc. PBC**

Analysis ID:	09-9129-8390	**Endpoint:**	PCB 138	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:48	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	9769FBC2DCBFB15B6C7D55433F7C843E	**Editor ID:**	

Batch ID:	14-7703-1847	**Test Type:**	Bioaccumulation - PCBs - Mn	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:48	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:48	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 138 endpoint	3.06%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	22.4	1.86	0.00121	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.66	2.29	0.7759	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0005256	0.0005256	1	501	<1.0E-05	Significant Effect
Error	8.400E-06	1.05E-06	8			
Total	0.0005340		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.27	23.2	0.8223	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.963	0.741	0.8142	Normal Distribution

PCB 138 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0394	0.0381	0.0407	0.039	0.0385	0.041	0.000485	2.75%	0.00%
AT3-098		5	0.0539	0.0527	0.0551	0.054	0.0525	0.055	0.00043	1.78%	-36.80%

PCB 138 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.039	0.04	0.0385	0.041	0.0385
AT3-098		0.0525	0.054	0.0545	0.0535	0.055

Bioaccumulation Evaluation - PCB Congeners - Macoma					EA-EST, Inc. PBC
Analysis ID:	08-1735-4110	**Endpoint:**	PCB 153	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:48	**Analysis:**	Nonparametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	00ECE76B49D2C091BA135A7A3DE94EC	**Editor ID:**	

Batch ID:	14-7703-1847	**Test Type:**	Bioaccumulation - PCBs - Mn	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:48	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:48	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 153 endpoint	67.03%

Wilcoxon Rank Sum Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	Ties	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	15	---	0	Exact	0.0040	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.68	2.29	0.0005	Outlier Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0089700	0.0089700	1	4.11	0.0773	Non-Significant Effect
Error	0.0174727	0.0021841	8			
Total	0.0264427		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	698	23.2	1.2E-05	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.655	0.741	0.0003	Non-Normal Distribution

PCB 153 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.082	0.0789	0.0851	0.0815	0.0795	0.0855	0.00112	3.05%	0.00%
AT3-098		5	0.142	0.0599	0.224	0.113	0.11	0.26	0.0295	46.54%	-73.05%

PCB 153 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0815	0.0835	0.08	0.0855	0.0795
AT3-098		0.11	0.113	0.113	0.26	0.115

Bioaccumulation Evaluation - PCB Congeners - Macoma — **EA-EST, Inc. PBC**

Analysis ID:	12-8292-6359	**Endpoint:**	PCB 170	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:48	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	67E462D9ADC4D30E150C55A068B00550	**Editor ID:**	

Batch ID:	14-7703-1847	**Test Type:**	Bioaccumulation - PCBs - Mn	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:48	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:48	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 170 endpoint	3.14%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	21.6	1.86	0.00095	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.58	2.29	0.9685	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0003053	0.0003053	1	468	<1.0E-05	Significant Effect
Error	5.22E-06	6.525E-07	8			
Total	0.0003105		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.72	23.2	0.6127	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.955	0.741	0.7278	Normal Distribution

PCB 170 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0303	0.0292	0.0314	0.03	0.0295	0.0315	0.000406	3.00%	0.00%
AT3-098		5	0.0414	0.0405	0.0422	0.0415	0.0403	0.0422	0.00031	1.68%	-36.47%

PCB 170 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.03	0.031	0.0295	0.0315	0.0295
AT3-098		0.0403	0.0415	0.0416	0.0412	0.0422

Bioaccumulation Evaluation - PCB Congeners - Macoma — **EA-EST, Inc. PBC**

Analysis ID:	15-8865-0666	**Endpoint:**	PCB 180	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:48	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	03DC1AB4E1FD1E4DFD5ACE341B1943A	**Editor ID:**	

Batch ID:	14-7703-1847	**Test Type:**	Bioaccumulation - PCBs - Mn	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:48	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:48	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 180 endpoint	3.50%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	19.6	1.86	0.00108	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.85	2.29	0.4236	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0003249	0.0003249	1	385	<1.0E-05	Significant Effect
Error	6.755E-06	8.444E-07	8			
Total	0.0003317		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.29	23.2	0.4427	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.957	0.741	0.7484	Normal Distribution

PCB 180 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0309	0.0296	0.0322	0.0305	0.03	0.0325	0.000485	3.51%	0.00%
AT3-098		5	0.0423	0.0414	0.0432	0.0424	0.0412	0.0432	0.000321	1.69%	-36.89%

PCB 180 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0305	0.0315	0.03	0.0325	0.03
AT3-098		0.0412	0.0424	0.0426	0.0422	0.0432

Bioaccumulation Evaluation - PCB Congeners - Macoma | **EA-EST, Inc. PBC**

Analysis ID:	01-5676-1440	**Endpoint:**	PCB 187	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:48	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	86402B7DEFC80573430F72405948C151	**Editor ID:**	

Batch ID:	14-7703-1847	**Test Type:**	Bioaccumulation - PCBs - Mn	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:48	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:48	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 187 endpoint	3.41%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	19.9	1.86	0.00152	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.65	2.29	0.8005	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0006561	0.0006561	1	395	<1.0E-05	Significant Effect
Error	0.0000133	1.663E-06	8			
Total	0.0006694		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.77	23.2	0.5935	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.969	0.741	0.8860	Normal Distribution

PCB 187 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0445	0.0427	0.0463	0.044	0.043	0.0465	0.000652	3.28%	0.00%
AT3-098		5	0.0607	0.0593	0.0621	0.061	0.059	0.062	0.00049	1.80%	-36.40%

PCB 187 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.044	0.0455	0.0435	0.0465	0.043
AT3-098		0.059	0.061	0.061	0.0605	0.062

Bioaccumulation Evaluation - PCB Congeners - Macoma — **EA-EST, Inc. PBC**

Analysis ID:	02-4694-1435	**Endpoint:**	PCB 195	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:48	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	52480CC6C967322F8696B7D2B1073D17	**Editor ID:**	

Batch ID:	14-7703-1847	**Test Type:**	Bioaccumulation - PCBs - Mn	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:48	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:48	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 195 endpoint	3.10%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	22.1	1.86	0.0018	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.73	2.29	0.6144	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0011449	0.0011449	1	490	<1.0E-05	Significant Effect
Error	0.0000187	2.338E-06	8			
Total	0.0011636		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.79	23.2	0.5862	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.959	0.741	0.7763	Normal Distribution

PCB 195 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.058	0.0558	0.0602	0.0575	0.0565	0.0605	0.000775	2.99%	0.00%
AT3-098		5	0.0794	0.0778	0.081	0.0795	0.0775	0.081	0.000579	1.63%	-36.90%

PCB 195 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0575	0.059	0.0565	0.0605	0.0565
AT3-098		0.0775	0.0795	0.08	0.079	0.081

Bioaccumulation Evaluation - PCB Congeners - Macoma					**EA-EST, Inc. PBC**
Analysis ID:	03-3708-3472	**Endpoint:**	PCB 206	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:48	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	0052B1A254D0C6A3EC0F1C651396EBD1	**Editor ID:**	

Batch ID:	14-7703-1847	**Test Type:**	Bioaccumulation - PCBs - Mn	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:48	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:48	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 206 endpoint	3.15%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	21.5	1.86	0.00187	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.74	2.29	0.6123	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0011664	0.0011664	1	462	<1.0E-05	Significant Effect
Error	0.0000202	2.525E-06	8			
Total	0.0011866		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	2.11	23.2	0.4880	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.96	0.741	0.7875	Normal Distribution

PCB 206 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0594	0.0571	0.0617	0.059	0.0575	0.062	0.000828	3.12%	0.00%
AT3-098		5	0.081	0.0794	0.0826	0.081	0.079	0.0825	0.00057	1.57%	-36.36%

PCB 206 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.059	0.0605	0.058	0.062	0.0575
AT3-098		0.079	0.081	0.0815	0.081	0.0825

Bioaccumulation Evaluation - PCB Congeners - Macoma — **EA-EST, Inc. PBC**

Analysis ID:	08-3719-0550	**Endpoint:**	PCB 209	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:48	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	A94FA3F1BA86D1A63C7A3EFA1334CCE	**Editor ID:**	

Batch ID:	14-7703-1847	**Test Type:**	Bioaccumulation - PCBs - Mn	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:48	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:48	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed pcb 209 endpoint	3.19%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	21.4	1.86	0.00217	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.73	2.29	0.6312	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0015500	0.0015500	1	456	<1.0E-05	Significant Effect
Error	0.0000272	0.0000034	8			
Total	0.0015772		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	1.54	23.2	0.6850	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.97	0.741	0.8953	Normal Distribution

PCB 209 Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.068	0.0655	0.0705	0.0675	0.066	0.071	0.000908	2.99%	0.00%
AT3-098		5	0.0929	0.0909	0.0949	0.093	0.0905	0.095	0.000731	1.76%	-36.62%

PCB 209 Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0675	0.069	0.0665	0.071	0.066
AT3-098		0.0905	0.093	0.0935	0.0925	0.095

ATTACHMENT XI

Macoma nasuta 28-Day Solid Phase Bioaccumulation Testing
Tissue Chemistry and Body Burden Statistical Analyses

Pesticides

(30 pages)

Yachtsman Marina
NAE-2004-00319

APPENDIX A. CONCENTRATIONS OF COCs IN THE CLAM (*M. nasuta*)

		Pre-Assay			
CONTAMINANT	REP1	REP2	REP3	REP4 *	REP5 *
Pesticides (ng/g wet weight)					
Aldrin	0.0199 U	0.0202 U	0.0199 U		
cis-Chlordane	0.0430 U	0.0437 U	0.0430 U		
trans-Chlordane	0.0121 U	0.0123 U	0.0121 U		
cis-Nonachlor	0.00580 U	0.00585 U	0.00580 U		
trans-Nonachlor	0.00530 U	0.00540 U	0.00530 U		
Oxychlordane	0.0247 U	0.0251 U	0.0247 U		
Total Chlordanes	0.0908	0.0923	0.0908		
4,4'-DDT	0.00785 U	0.00795 U	0.00785 U		
4,4'-DDD	0.00595 U	0.00605 U	0.00595 U		
4,4'-DDE	0.00363 U	0.00369 U	0.00363 U		
Total DDT	0.0174	0.0177	0.0174		
Dieldrin	0.0120 U	0.0122 U	0.0120 U		
alpha-Endosulfan	0.0110 U	0.0111 U	0.0110 U		
beta-Endosulfan	0.00565 U	0.00575 U	0.00565 U		
Endosulfans	0.0166	0.0169	0.0166		
Endrin	0.00650 U	0.00660 U	0.00650 U		
Heptachlor	0.0125 U	0.0127 U	0.0125 U		
Heptachlor epoxide	0.0256 U	0.0260 U	0.0256 U		
Hexachlorobenzene	0.107 U	0.109 U	0.107 U		
Lindane	0.0180 U	0.0183 U	0.0180 U		
Methoxychlor	0.0284 U	0.0288 U	0.0283 U		
Toxaphene	0.515 U	0.525 U	0.515 U		

* = Qualifiers
U Analyte not detected; below Method Detection Limit; value is one-half the Method Detection Limit
J Analyte estimated; detection below Reporting Limit but above Method Detection Limit
NA Not Analyzed

Yachtsman Marina
NAE-2004-00319

APPENDIX A. CONCENTRATIONS OF COCs IN THE CLAM (*M. nasuta*)

	IOSN Reference									
CONTAMINANT	REP1		REP2		REP3		REP4		REP5	
Pesticides (ng/g wet weight)										
Aldrin	0.0295	U	0.0300	U	0.0290	U	0.0310	U	0.0285	U
cis-Chlordane	0.0635	U	0.0650	U	0.0620	U	0.0665	U	0.0620	U
trans-Chlordane	0.0180	U	0.0185	U	0.0175	U	0.0185	U	0.0175	U
cis-Nonachlor	0.00850	U	0.00900	U	0.00850	U	0.00900	U	0.00850	U
trans-Nonachlor	0.00800	U	0.00800	U	0.00750	U	0.00800	U	0.00750	U
Oxychlordane	0.0365	U	0.0375	U	0.0355	U	0.0380	U	0.0355	U
Total Chlordanes	0.135		0.138		0.131		0.140		0.131	
4,4'-DDT	0.0115	U	0.0120	U	0.0115	U	0.0120	U	0.0115	U
4,4'-DDD	0.00900	U	0.00900	U	0.00850	U	0.00900	U	0.00850	U
4,4'-DDE	0.191	J	0.224	J	0.228	J	0.213	J	0.239	
Total DDT	0.212		0.245		0.248		0.234		0.259	
Dieldrin	0.0175	U	0.0180	U	0.0175	U	0.0185	U	0.0175	U
alpha-Endosulfan	0.0160	U	0.0165	U	0.0160	U	0.0170	U	0.0160	U
beta-Endosulfan	0.00850	U	0.00850	U	0.00800	U	0.00900	U	0.00800	U
Endosulfans	0.0245		0.0250		0.0240		0.0260		0.0240	
Endrin	0.00950	U	0.0100	U	0.00950	U	0.0100	U	0.00950	U
Heptachlor	0.0185	U	0.0190	U	0.0180	U	0.0195	U	0.0180	U
Heptachlor epoxide	0.0380	U	0.0390	U	0.0370	U	0.0395	U	0.0370	U
Hexachlorobenzene	0.158	U	0.162	U	0.155	U	0.166	U	0.154	U
Lindane	0.0265	U	0.0270	U	0.0260	U	0.0280	U	0.0260	U
Methoxychlor	0.408	U	0.419	U	0.401	U	0.428	U	0.399	U
Toxaphene	0.760	U	0.780	U	0.750	U	0.800	U	0.745	U

* = Qualifiers
U Analyte not detected; belo
J Analyte estimated; detectio
NA Not Analyzed

Yachtsman Marina
NAE-2004-00319

APPENDIX A. CONCENTRATIONS OF COCs IN THE CLAM (*M. nasuta*)

10 Stations at 4 Marinas Mud

CONTAMINANT	REP1		REP2		REP3		REP4		REP5	
Pesticides (ng/g wet weight)										
Aldrin	0.0197	U	0.0203	U	0.0203	U	0.0201	U	0.0206	U
cis-Chlordane	0.0425	U	0.0437	U	0.0439	U	0.0435	U	0.0445	U
trans-Chlordane	0.0120	U	0.0123	U	0.0124	U	0.0122	U	0.0125	U
cis-Nonachlor	0.00570	U	0.00590	U	0.00590	U	0.00585	U	0.00600	U
trans-Nonachlor	0.00525	U	0.00540	U	0.00540	U	0.00535	U	0.00550	U
Oxychlordane	0.0244	U	0.0251	U	0.0252	U	0.0250	U	0.0256	U
Total Chlordanes	0.0898		0.0924		0.0928		0.0918		0.0941	
4,4'-DDT	0.00775	U	0.00800	U	0.00800	U	0.00795	U	0.00810	U
4,4'-DDD	0.485		0.299		0.381		0.414		0.374	
4,4'-DDE	0.546		0.434		0.456		0.532		0.528	
Total DDT	1.04		0.741		0.845		0.954		0.910	
Dieldrin	0.0119	U	0.0122	U	0.0123	U	0.0121	U	0.0124	U
alpha-Endosulfan	0.0108	U	0.0112	U	0.0112	U	0.0111	U	0.0114	U
beta-Endosulfan	0.00560	U	0.00575	U	0.00575	U	0.00570	U	0.00585	U
Endosulfans	0.0164		0.0169		0.0170		0.0168		0.0172	
Endrin	0.00645	U	0.00665	U	0.00665	U	0.00660	U	0.00675	U
Heptachlor	0.0123	U	0.0127	U	0.0128	U	0.0126	U	0.0129	U
Heptachlor epoxide	0.0254	U	0.0261	U	0.0262	U	0.0259	U	0.0265	U
Hexachlorobenzene	0.106	U	0.109	U	0.110	U	0.108	U	0.111	U
Lindane	0.0178	U	0.0183	U	0.0184	U	0.0182	U	0.0186	U
Methoxychlor	0.0280	U	0.0288	U	0.0290	U	0.0287	U	0.0293	U
Toxaphene	0.510	U	0.525	U	0.530	U	0.520	U	0.535	U

* = Qualifiers
U Analyte not detected; belo
J Analyte estimated; detectio
NA Not Analyzed

CETIS Test Data Worksheet

Report Date: 19 Aug-23 06:50 (p 1 of 1)
Test Code/ID: TN-23-303MnPest / 17-4167-8246

Bioaccumulation Evaluation - Pesticides - Macoma | **EA-EST, Inc. PBC**

Start Date:	29 Mar-23 13:49	**Species:**	Macoma nasuta	**Sample Code:**	AT3-191
End Date:	26 Apr-23 12:49	**Protocol:**	US ACE NED RIM (2004)	**Sample Source:**	Yachtsman Marina NAE-2004-00319
Sample Date:	20 Mar-23	**Material:**	Laboratory Control Sediment	**Sample Station:**	Laboratory Control

Sample	Rep	Pos	4-4'-DDD	4-4'-DDE	4-4'-DDT	aldrin	alpha chlordane	alpha-BHC	beta-BHC	cis-Nonachlor	delta-BHC	Dieldrin	endosulfan I	endosulfan II	endrin	gamma-BHC (Lindane)	gamma-chlordane	heptachlor	heptachlor epoxide	hexachlorobenzene	Methoxychlor	oxychlordane	toxaphene	trans-nonachlor	2-4'-DDD	2-4'-DDE	2-4'-DDT	endosulfan sulfate	Total DDTs
IOSN 2019	1	1	0.009	0.19	0.01	0.03	0.06			0.009		0.02	0.02	0.009	0.01	0.03	0.02	0.02	0.04	0.16	0.41	0.04	0.76	0.008					
IOSN 2019	2	4	0.009	0.22	0.01	0.03	0.07			0.009		0.02	0.02	0.009	0.01	0.03	0.02	0.02	0.04	0.16	0.42	0.04	0.78	0.008					
IOSN 2019	3	6	0.009	0.23	0.01	0.03	0.06			0.009		0.02	0.02	0.008	0.01	0.03	0.02	0.02	0.04	0.16	0.40	0.04	0.75	0.008					
IOSN 2019	4	7	0.009	0.21	0.01	0.03	0.07			0.009		0.02	0.02	0.009	0.01	0.03	0.02	0.02	0.04	0.17	0.43	0.04	0.8	0.008					
IOSN 2019	5	10	0.009	0.24	0.01	0.03	0.06			0.009		0.02	0.02	0.008	0.01	0.03	0.02	0.02	0.04	0.15	0.4	0.04	0.75	0.008					
AT3-098	1	2	0.49	0.55	0.008	0.02	0.04	0.01	0.008	0.006	0.009	0.01	0.01	0.006	0.006	0.02	0.01	0.01	0.03	0.11	0.03	0.02	0.51	0.005					
AT3-098	2	3	0.3	0.43	0.008	0.02	0.04	0.01	0.008	0.006	0.01	0.01	0.01	0.006	0.007	0.02	0.01	0.01	0.03	0.11	0.03	0.03	0.53	0.005					
AT3-098	3	5	0.38	0.46	0.008	0.02	0.04	0.01	0.008	0.006	0.01	0.01	0.01	0.006	0.007	0.02	0.01	0.01	0.03	0.11	0.03	0.03	0.53	0.005					
AT3-098	4	8	0.41	0.53	0.008	0.02	0.04	0.01	0.008	0.006	0.01	0.01	0.01	0.006	0.007	0.02	0.01	0.01	0.03	0.11	0.03	0.02	0.52	0.005					
AT3-098	5	9	0.37	0.53	0.008	0.02	0.04	0.01	0.009	0.006	0.01	0.01	0.01	0.006	0.007	0.02	0.01	0.01	0.03	0.11	0.03	0.03	0.54	0.006					

CETIS Summary Report

Bioaccumulation Evaluation - Pesticides - Macoma **EA-EST, Inc. PBC**

Batch ID:	16-7638-7277	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:49	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:49	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample ID:	10-1907-8970	**Code:**	AT3-191	**Project:**	Dredged Sediment Evaluation
Sample Date:	20 Mar-23	**Material:**	Laboratory Control Sediment	**Source:**	Yachtsman Marina NAE-2004-00319 (
Receipt Date:	20 Mar-23 16:00	**CAS (PC):**		**Station:**	Laboratory Control
Sample Age:	9d 14h	**Client:**	Eco-Analysts, Inc.		

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

SIngle Comparison Summary

Analysis ID	Endpoint	Comparison Method	P-Value	Comparison Result	S
04-1300-9223	4-4'-DDD	Unequal Variance t Two-Sample Test	0.0001	AT3-098 failed 4-4'-ddd	1
19-1389-8615	4-4'-DDE	Equal Variance t Two-Sample Test	<1.0E-05	AT3-098 failed 4-4'-dde	1
13-4412-8912	4-4'-DDT	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed 4-4'-ddt	1
11-0747-7870	aldrin	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed aldrin	1
09-4761-2761	alpha chlordane	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed alpha chlordane	1
12-1877-4562	cis-Nonachlor	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed cis-nonachlor	1
07-6660-5254	Dieldrin	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed dieldrin	1
03-9121-3921	endosulfan I	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed endosulfan i	1
00-9261-3119	endosulfan II	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed endosulfan ii	1
12-3923-0051	endrin	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed endrin	1
06-4834-6007	gamma-BHC (Lindane)	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed gamma-bhc (lindane)	1
00-5738-4808	gamma-chlordane	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed gamma-chlordane	1
16-1399-3357	heptachlor	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed heptachlor	1
15-0976-0545	heptachlor epoxide	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed heptachlor epoxide	1
17-3869-7799	hexachlorobenzene	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed hexachlorobenzene	1
20-4435-9159	Methoxychlor	Unequal Variance t Two-Sample Test	1.0000	AT3-098 passed methoxychlor	1
06-1250-5714	oxychlordane	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed oxychlordane	1
20-3031-3246	toxaphene	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed toxaphene	1
21-2045-5284	trans-nonachlor	Equal Variance t Two-Sample Test	1.0000	AT3-098 passed trans-nonachlor	1

Bioaccumulation Evaluation - Pesticides - Macoma | **EA-EST, Inc. PBC**

4-4'-DDD Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0088	0.00846	0.00914	0.0085	0.009	0.000122	0.000274	3.11%	0.00%
AT3-098		5	0.391	0.307	0.474	0.299	0.485	0.0302	0.0675	17.28%	-4338.64

4-4'-DDE Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.219	0.196	0.242	0.191	0.239	0.00814	0.0182	8.31%	0.00%
AT3-098		5	0.499	0.436	0.562	0.434	0.546	0.0226	0.0505	10.12%	-127.95%

4-4'-DDT Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0117	0.0114	0.012	0.0115	0.012	0.000122	0.000274	2.34%	0.00%
AT3-098		5	0.00796	0.0078	0.00812	0.00775	0.0081	0.0000579	0.000129	1.63%	31.97%

aldrin Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0296	0.0284	0.0308	0.0285	0.031	0.00043	0.000962	3.25%	0.00%
AT3-098		5	0.0202	0.0197	0.0206	0.0196	0.0206	0.000155	0.000347	1.72%	31.82%

alpha chlordane Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0638	0.0614	0.0662	0.062	0.0665	0.000875	0.00196	3.07%	0.00%
AT3-098		5	0.0436	0.0427	0.0445	0.0425	0.0445	0.000327	0.000732	1.68%	31.65%

cis-Nonachlor Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0087	0.00836	0.00904	0.0085	0.009	0.000122	0.000274	3.15%	0.00%
AT3-098		5	0.00587	0.00573	0.00601	0.0057	0.006	0.000049	0.00011	1.87%	32.53%

Dieldrin Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0178	0.0172	0.0184	0.0175	0.0185	0.0002	0.000447	2.51%	0.00%
AT3-098		5	0.0122	0.0119	0.0124	0.0119	0.0124	0.0000914	0.000204	1.68%	31.69%

endosulfan I Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0163	0.0157	0.0169	0.016	0.017	0.0002	0.000447	2.74%	0.00%
AT3-098		5	0.0111	0.0109	0.0114	0.0108	0.0114	0.0000914	0.000204	1.84%	31.84%

endosulfan II Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0084	0.00788	0.00892	0.008	0.009	0.000187	0.000418	4.98%	0.00%
AT3-098		5	0.00573	0.00562	0.00584	0.0056	0.00585	0.0000406	0.0000908	1.59%	31.79%

endrin Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0097	0.00936	0.01	0.0095	0.01	0.000122	0.000274	2.82%	0.00%
AT3-098		5	0.00662	0.00648	0.00676	0.00645	0.00675	0.000049	0.00011	1.65%	31.75%

gamma-BHC (Lindane) Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0267	0.0257	0.0277	0.026	0.028	0.000374	0.000837	3.13%	2.60%
AT3-098		5	0.0183	0.0179	0.0186	0.0178	0.0186	0.000133	0.000297	1.62%	1.79%

Bioaccumulation Evaluation - Pesticides - Macoma **EA-EST, Inc. PBC**

gamma-chlordane Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.018	0.0174	0.0186	0.0175	0.0185	0.000224	0.0005	2.78%	1.77%
AT3-098		5	0.0123	0.012	0.0125	0.012	0.0125	0.0000914	0.000204	1.67%	1.21%

heptachlor Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0186	0.0178	0.0194	0.018	0.0195	0.000292	0.000652	3.50%	0.00%
AT3-098		5	0.0126	0.0124	0.0129	0.0123	0.0129	0.0001	0.000224	1.77%	31.99%

heptachlor epoxide Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0381	0.0367	0.0395	0.037	0.0395	0.00051	0.00114	2.99%	0.00%
AT3-098		5	0.026	0.0255	0.0265	0.0254	0.0265	0.00019	0.000426	1.64%	31.76%

hexachlorobenzene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.159	0.153	0.165	0.154	0.166	0.00216	0.00483	3.04%	0.00%
AT3-098		5	0.109	0.106	0.111	0.106	0.111	0.000831	0.00186	1.71%	31.59%

Methoxychlor Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.411	0.395	0.426	0.398	0.428	0.00552	0.0124	3.01%	0.00%
AT3-098		5	0.0287	0.0281	0.0293	0.028	0.0293	0.000214	0.000479	1.67%	93.00%

oxychlordane Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0366	0.0352	0.038	0.0355	0.038	0.00051	0.00114	3.12%	0.00%
AT3-098		5	0.025	0.0245	0.0256	0.0244	0.0256	0.000188	0.00042	1.68%	31.58%

toxaphene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.767	0.739	0.795	0.745	0.8	0.0102	0.0228	2.97%	0.00%
AT3-098		5	0.524	0.512	0.536	0.51	0.535	0.0043	0.00962	1.84%	31.68%

trans-nonachlor Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
IOSN 2019	RS	5	0.0078	0.00746	0.00814	0.0075	0.008	0.000122	0.000274	3.51%	0.00%
AT3-098		5	0.00538	0.00527	0.00549	0.00525	0.0055	0.0000406	0.0000908	1.69%	31.03%

4-4'-DDD Detail MD5: 6E6988FA5B03C7BC3EB6353D464682D1

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.009	0.009	0.0085	0.009	0.0085
AT3-098		0.485	0.299	0.381	0.414	0.374

4-4'-DDE Detail MD5: F4D550F088660B59635932B36EB9DF79

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.191	0.224	0.228	0.213	0.239
AT3-098		0.546	0.434	0.456	0.532	0.528

4-4'-DDT Detail MD5: AF75DA90CA351C43F7C196271A7F16D6

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0115	0.012	0.0115	0.012	0.0115
AT3-098		0.00775	0.008	0.008	0.00795	0.0081

aldrin Detail MD5: 301E73616502E2670F5FC3318FEE7A12

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0295	0.03	0.029	0.031	0.0285
AT3-098		0.0196	0.0203	0.0203	0.0201	0.0206

alpha chlordane Detail MD5: 703F861370B0A94C257C3A8C12D3CC37

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0635	0.065	0.062	0.0665	0.062
AT3-098		0.0425	0.0437	0.0439	0.0435	0.0445

cis-Nonachlor Detail MD5: D2850062905152A4167463F1E3886452

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0085	0.009	0.0085	0.009	0.0085
AT3-098		0.0057	0.0059	0.0059	0.00585	0.006

Dieldrin Detail MD5: 02D3602EC2A5FCEFFEAC483B9BD8EEF8

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0175	0.018	0.0175	0.0185	0.0175
AT3-098		0.0119	0.0122	0.0122	0.0121	0.0124

endosulfan I Detail MD5: 2179FD1F268BFEB969D482E0762F6824

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.016	0.0165	0.016	0.017	0.016
AT3-098		0.0108	0.0111	0.0112	0.011	0.0114

endosulfan II Detail MD5: DD9592CFE4FFDEFA1D01AFBD9A3C3E38

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0085	0.0085	0.008	0.009	0.008
AT3-098		0.0056	0.00575	0.00575	0.0057	0.00585

endrin Detail MD5: 0B41949737A6651ACC510A71D8D476CA

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0095	0.01	0.0095	0.01	0.0095
AT3-098		0.00645	0.00665	0.00665	0.0066	0.00675

gamma-BHC (Lindane) Detail MD5: 60251AA948AC95E51588C67755903211

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0265	0.027	0.026	0.028	0.026
AT3-098		0.0178	0.0183	0.0184	0.0182	0.0186

gamma-chlordane Detail MD5: 49923285CFE98A4BA040D71D755F8CAA

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.018	0.0185	0.0175	0.0185	0.0175
AT3-098		0.012	0.0123	0.0124	0.0122	0.0125

heptachlor Detail MD5: 53B685F92CDB3914E9196B3D340E172D

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0185	0.019	0.018	0.0195	0.018
AT3-098		0.0123	0.0127	0.0127	0.0126	0.0129

heptachlor epoxide Detail MD5: E354D5595899229516607BE234C05DC9

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.038	0.039	0.037	0.0395	0.037
AT3-098		0.0254	0.026	0.0262	0.0259	0.0265

hexachlorobenzene Detail MD5: DCABBBE8D68BA42551D06690801EE595

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.158	0.162	0.155	0.166	0.154
AT3-098		0.106	0.109	0.109	0.108	0.111

Methoxychlor Detail MD5: A2FD57269A20FEF0C987EC0129C39497

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.408	0.419	0.401	0.428	0.398
AT3-098		0.028	0.0288	0.029	0.0287	0.0293

oxychlordane Detail MD5: 67211C76559A024E63B0B7BF0F707FB0

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0365	0.0375	0.0355	0.038	0.0355
AT3-098		0.0244	0.0251	0.0252	0.0249	0.0256

toxaphene Detail MD5: DBF200E2A25282F09214EF29AE0B7FB9

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.76	0.78	0.75	0.8	0.745
AT3-098		0.51	0.525	0.53	0.52	0.535

trans-nonachlor Detail MD5: F12EA705331241F011416BDAB4D4E33C

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.008	0.008	0.0075	0.008	0.0075
AT3-098		0.00525	0.0054	0.0054	0.00535	0.0055

STUDY: TN-23-303
CLIENT: Eco-Analysts, Inc.
PROJECT: Yachtsman Marina, Kennebunkport, ME NAE-2004-00319
ASSAY: *M. nasuta* 28-day Bioaccumulation Evaluation
TASK: Statistical Analysis of Body Burden Pesticides

Endpoint	Method	C	<	T	Statistic	Critical	P Level	Alpha	Reject Null	MSD	DF	Ties	P-Type
4-4'-DDD	Unequal Variance t Two-Sample Test	IOSN	<	Comp	12.65047	2.131847	0.000112413	0.05	TRUE	0.06434064	4		C
4-4'-DDE	Equal Variance t Two-Sample Test	IOSN	<	Comp	11.66548	1.859548	1.32927E-06	0.05	TRUE	0.04466556	8		C
4-4'-DDT	Equal Variance t Two-Sample Test	IOSN	<	Comp	-27.60917	1.859548	1	0.05	FALSE	0.000251899	8		C
aldrin	Equal Variance t Two-Sample Test	IOSN	<	Comp	-20.59785	1.859548	1	0.05	FALSE	0.000850426	8		C
alpha chlordane	Equal Variance t Two-Sample Test	IOSN	<	Comp	-21.61987	1.859548	1	0.05	FALSE	0.001736563	8		C
cis-Nonachlor	Equal Variance t Two-Sample Test	IOSN	<	Comp	-21.45421	1.859548	1	0.05	FALSE	0.000245291	8		C
Dieldrin	Equal Variance t Two-Sample Test	IOSN	<	Comp	-25.64962	1.859548	1	0.05	FALSE	0.000408889	8		C
endosulfan I	Equal Variance t Two-Sample Test	IOSN	<	Comp	-23.60311	1.859548	1	0.05	FALSE	0.000408889	8		C
endosulfan II	Equal Variance t Two-Sample Test	IOSN	<	Comp	-13.9468	1.859548	0.9999996	0.05	FALSE	0.000355995	8		C
endrin	Equal Variance t Two-Sample Test	IOSN	<	Comp	-23.34941	1.859548	1	0.05	FALSE	0.000245291	8		C
gamma-BHC (Lindane)	Equal Variance t Two-Sample Test	IOSN	<	Comp	-21.26005	1.859548	1	0.05	FALSE	0.00073822	8		C
gamma-chlordane	Equal Variance t Two-Sample Test	IOSN	<	Comp	-23.76246	1.859548	1	0.05	FALSE	0.000449188	8		C
heptachlor	Equal Variance t Two-Sample Test	IOSN	<	Comp	-19.30434	1.859548	1	0.05	FALSE	0.000573152	8		C
heptachlor epoxide	Equal Variance t Two-Sample Test	IOSN	<	Comp	-22.23085	1.859548	1	0.05	FALSE	0.001012131	8		C
hexachlorobenzene	Equal Variance t Two-Sample Test	IOSN	<	Comp	-21.70335	1.859548	1	0.05	FALSE	0.004301147	8		C
Methoxychlor	Unequal Variance t Two-Sample Test	IOSN	<	Comp	-69.11124	2.131847	0.9999999	0.05	FALSE	0.01178525	4		C
oxychlordane	Equal Variance t Two-Sample Test	IOSN	<	Comp	-21.27108	1.859548	1	0.05	FALSE	0.001010592	8		C
toxaphene	Equal Variance t Two-Sample Test	IOSN	<	Comp	-21.95524	1.859548	1	0.05	FALSE	0.02058143	8		C
trans-nonachlor	Equal Variance t Two-Sample Test	IOSN	<	Comp	-18.7546	1.859548	1	0.05	FALSE	0.000239947	8		C

Bioaccumulation Evaluation - Pesticides - Macoma — **EA-EST, Inc. PBC**

Analysis ID:	04-1300-9223	**Endpoint:**	4-4'-DDD	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:50	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	365E136C7ABE425E3505FB05BD0FEC9A	**Editor ID:**	

Batch ID:	16-7638-7277	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:49	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:49	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed 4-4'-ddd endpoint	731.14%

Unequal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	4	12.7	2.13	0.0643	CDF	0.0001	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.1	2.29	0.1497	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.364428	0.364428	1	160	<1.0E-05	Significant Effect
Error	0.0182175	0.0022772	8			
Total	0.382646		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	60700	23.2	<1.0E-05	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.818	0.741	0.0238	Normal Distribution

4-4'-DDD Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0088	0.00846	0.00914	0.009	0.0085	0.009	0.000122	3.11%	0.00%
AT3-098		5	0.391	0.307	0.474	0.381	0.299	0.485	0.0302	17.28%	-4338.64%

4-4'-DDD Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.009	0.009	0.0085	0.009	0.0085
AT3-098		0.485	0.299	0.381	0.414	0.374

Bioaccumulation Evaluation - Pesticides - Macoma — **EA-EST, Inc. PBC**

Analysis ID:	19-1389-8615	**Endpoint:**	4-4'-DDE	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:50	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	0449532986689BF4D27ED639AF32C67A	**Editor ID:**	

Batch ID:	16-7638-7277	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:49	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:49	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 failed 4-4'-dde endpoint	20.40%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098*	8	11.7	1.86	0.0447	CDF	<1.0E-05	Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.82	2.29	0.4634	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.19628	0.19628	1	136	<1.0E-05	Significant Effect
Error	0.0115388	0.0014424	8			
Total	0.207819		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	7.7	23.2	0.0732	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.952	0.741	0.6872	Normal Distribution

4-4'-DDE Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.219	0.196	0.242	0.224	0.191	0.239	0.00814	8.31%	0.00%
AT3-098		5	0.499	0.436	0.562	0.528	0.434	0.546	0.0226	10.12%	-127.95%

4-4'-DDE Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.191	0.224	0.228	0.213	0.239
AT3-098		0.546	0.434	0.456	0.532	0.528

Bioaccumulation Evaluation - Pesticides - Macoma — **EA-EST, Inc. PBC**

Analysis ID:	13-4412-8912	**Endpoint:**	4-4'-DDT	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:50	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	A51056C72B17F409154A14A5FFBA4206	**Editor ID:**	

Batch ID:	16-7638-7277	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:49	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:49	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed 4-4'-ddt endpoint	2.15%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-27.6	1.86	0.000252	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.49	2.29	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.497E-05	3.497E-05	1	762	<1.0E-05	Significant Effect
Error	3.67E-07	4.588E-08	8			
Total	3.534E-05		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	4.48	23.2	0.1756	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.859	0.741	0.0740	Normal Distribution

4-4'-DDT Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0117	0.0114	0.012	0.0115	0.0115	0.012	0.000122	2.34%	0.00%
AT3-098		5	0.00796	0.0078	0.00812	0.008	0.00775	0.0081	0.0000579	1.63%	31.97%

4-4'-DDT Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0115	0.012	0.0115	0.012	0.0115
AT3-098		0.00775	0.008	0.008	0.00795	0.0081

Bioaccumulation Evaluation - Pesticides - Macoma — **EA-EST, Inc. PBC**

Analysis ID:	11-0747-7870	**Endpoint:**	aldrin	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:50	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	4F40C84C6B9CA709AB35EFFDDB21BEE	**Editor ID:**	

Batch ID:	16-7638-7277	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:49	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:49	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed aldrin endpoint	2.87%

Equal Variance t Two-Sample Test

Sample I	vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed		AT3-098	8	-20.6	1.86	0.00085	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.05	2.29	0.1849	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0002218	0.0002218	1	424	<1.0E-05	Significant Effect
Error	4.183E-06	5.229E-07	8			
Total	0.0002260		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	7.66	23.2	0.0738	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.958	0.741	0.7671	Normal Distribution

aldrin Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0296	0.0284	0.0308	0.0295	0.0285	0.031	0.00043	3.25%	0.00%
AT3-098		5	0.0202	0.0197	0.0206	0.0203	0.0197	0.0206	0.000155	1.72%	31.82%

aldrin Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0295	0.03	0.029	0.031	0.0285
AT3-098		0.0197	0.0203	0.0203	0.0201	0.0206

Bioaccumulation Evaluation - Pesticides - Macoma					**EA-EST, Inc. PBC**
Analysis ID:	09-4761-2761	**Endpoint:**	alpha chlordane	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:50	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	448C3EA7D282402304013A540199B9B4	**Editor ID:**	

Batch ID:	16-7638-7277	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:49	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:49	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed alpha chlordane endpoint	2.72%

Equal Variance t Two-Sample Test

Sample I	vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed		AT3-098	8	-21.6	1.86	0.00174	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.94	2.29	0.3000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0010191	0.0010191	1	467	<1.0E-05	Significant Effect
Error	1.744E-05	2.180E-06	8			
Total	0.0010365		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	7.14	23.2	0.0831	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.954	0.741	0.7193	Normal Distribution

alpha chlordane Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0638	0.0614	0.0662	0.0635	0.062	0.0665	0.000875	3.07%	0.00%
AT3-098		5	0.0436	0.0427	0.0445	0.0437	0.0425	0.0445	0.000327	1.68%	31.65%

alpha chlordane Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0635	0.065	0.062	0.0665	0.062
AT3-098		0.0425	0.0437	0.0439	0.0435	0.0445

Bioaccumulation Evaluation - Pesticides - Macoma | **EA-EST, Inc. PBC**

Analysis ID:	12-1877-4562	**Endpoint:**	cis-Nonachlor	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:50	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	D00F2F890F999B426D2D24A5205E0A8E	**Editor ID:**	

Batch ID:	16-7638-7277	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:49	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:49	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed cis-nonachlor endpoint	2.82%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-21.5	1.86	0.000245	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.53	2.29	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.002E-05	2.002E-05	1	460	<1.0E-05	Significant Effect
Error	3.48E-07	4.35E-08	8			
Total	2.037E-05		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	6.25	23.2	0.1037	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.865	0.741	0.0873	Normal Distribution

cis-Nonachlor Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0087	0.00836	0.00904	0.0085	0.0085	0.009	0.000122	3.15%	0.00%
AT3-098		5	0.00587	0.00573	0.00601	0.0059	0.0057	0.006	0.000049	1.87%	32.53%

cis-Nonachlor Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0085	0.009	0.0085	0.009	0.0085
AT3-098		0.0057	0.0059	0.0059	0.00585	0.006

Bioaccumulation Evaluation - Pesticides - Macoma — **EA-EST, Inc. PBC**

Analysis ID:	07-6660-5254	**Endpoint:**	Dieldrin	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:50	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	B1F5A087058062B2C2CD2637621354E4	**Editor ID:**	

Batch ID:	16-7638-7277	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:49	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:49	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed dieldrin endpoint	2.30%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-25.6	1.86	0.000409	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.14	2.29	0.1241	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	7.952E-05	7.952E-05	1	658	<1.0E-05	Significant Effect
Error	9.67E-07	1.209E-07	8			
Total	8.049E-05		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	4.79	23.2	0.1583	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.868	0.741	0.0948	Normal Distribution

Dieldrin Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0178	0.0172	0.0184	0.0175	0.0175	0.0185	0.0002	2.51%	0.00%
AT3-098		5	0.0122	0.0119	0.0124	0.0122	0.0119	0.0124	0.0000914	1.68%	31.69%

Dieldrin Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0175	0.018	0.0175	0.0185	0.0175
AT3-098		0.0119	0.0122	0.0123	0.0121	0.0124

Bioaccumulation Evaluation - Pesticides - Macoma — **EA-EST, Inc. PBC**

Analysis ID:	03-9121-3921	**Endpoint:**	endosulfan I	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:50	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	FF47CC503AB8E950BFB23279C7F3F277	**Editor ID:**	

Batch ID:	16-7638-7277	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:49	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:49	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed endosulfan i endpoint	2.51%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-23.6	1.86	0.000409	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.14	2.29	0.1241	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	6.734E-05	6.734E-05	1	557	<1.0E-05	Significant Effect
Error	9.67E-07	1.209E-07	8			
Total	6.831E-05		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	4.79	23.2	0.1583	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.868	0.741	0.0948	Normal Distribution

endosulfan I Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0163	0.0157	0.0169	0.016	0.016	0.017	0.0002	2.74%	0.00%
AT3-098		5	0.0111	0.0109	0.0114	0.0112	0.0108	0.0114	0.0000914	1.84%	31.84%

endosulfan I Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.016	0.0165	0.016	0.017	0.016
AT3-098		0.0108	0.0112	0.0112	0.0111	0.0114

Bioaccumulation Evaluation - Pesticides - Macoma					**EA-EST, Inc. PBC**
Analysis ID:	00-9261-3119	**Endpoint:**	endosulfan II	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:50	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	37132A5DA7BEE80601694F5308195EDA	**Editor ID:**	

Batch ID:	16-7638-7277	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:49	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:49	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed endosulfan ii endpoint	4.24%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-13.9	1.86	0.000356	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.1	2.29	0.1467	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.782E-05	1.782E-05	1	195	<1.0E-05	Significant Effect
Error	7.33E-07	9.162E-08	8			
Total	1.856E-05		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	21.2	23.2	0.0118	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.895	0.741	0.1938	Normal Distribution

endosulfan II Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0084	0.00788	0.00892	0.0085	0.008	0.009	0.000187	4.98%	0.00%
AT3-098		5	0.00573	0.00562	0.00584	0.00575	0.0056	0.00585	0.0000406	1.59%	31.79%

endosulfan II Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0085	0.0085	0.008	0.009	0.008
AT3-098		0.0056	0.00575	0.00575	0.0057	0.00585

Bioaccumulation Evaluation - Pesticides - Macoma					EA-EST, Inc. PBC
Analysis ID:	12-3923-0051	**Endpoint:**	endrin	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:50	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	4B88CC605516CF4BE2798D8338BEB52A	**Editor ID:**	

Batch ID:	16-7638-7277	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:49	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:49	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed endrin endpoint	2.53%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-23.3	1.86	0.000245	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.53	2.29	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.372E-05	2.372E-05	1	545	<1.0E-05	Significant Effect
Error	3.48E-07	4.35E-08	8			
Total	2.406E-05		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	6.25	23.2	0.1037	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.865	0.741	0.0873	Normal Distribution

endrin Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0097	0.00936	0.01	0.0095	0.0095	0.01	0.000122	2.82%	0.00%
AT3-098		5	0.00662	0.00648	0.00676	0.00665	0.00645	0.00675	0.000049	1.65%	31.75%

endrin Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0095	0.01	0.0095	0.01	0.0095
AT3-098		0.00645	0.00665	0.00665	0.0066	0.00675

Bioaccumulation Evaluation - Pesticides - Macoma					EA-EST, Inc. PBC
Analysis ID:	06-4834-6007	**Endpoint:**	gamma-BHC (Lindane)	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:50	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	952F1413F8BBDA7AF2A0951D723E0DDE	**Editor ID:**	

Batch ID:	16-7638-7277	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:49	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:49	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed gamma-bhc (lindane) endpoint	2.76%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-21.3	1.86	0.000738	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.2	2.29	0.0891	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0001781	0.0001781	1	452	<1.0E-05	Significant Effect
Error	3.152E-06	3.94E-07	8			
Total	0.0001812		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	7.95	23.2	0.0693	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.915	0.741	0.3168	Normal Distribution

gamma-BHC (Lindane) Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0267	0.0257	0.0277	0.0265	0.026	0.028	0.000374	3.13%	2.60%
AT3-098		5	0.0183	0.0179	0.0186	0.0183	0.0178	0.0186	0.000133	1.62%	1.79%

gamma-BHC (Lindane) Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0265	0.027	0.026	0.028	0.026
AT3-098		0.0178	0.0183	0.0184	0.0182	0.0186

Bioaccumulation Evaluation - Pesticides - Macoma | **EA-EST, Inc. PBC**

Analysis ID:	00-5738-4808	**Endpoint:**	gamma-chlordane	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:50	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	EB91F29CD133C53DA8BED1666723A7AE	**Editor ID:**	

Batch ID:	16-7638-7277	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:49	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:49	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed gamma-chlordane endpoint	2.50%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-23.8	1.86	0.000449	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.39	2.29	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	8.237E-05	8.237E-05	1	565	<1.0E-05	Significant Effect
Error	1.167E-06	1.459E-07	8			
Total	8.354E-05		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	5.99	23.2	0.1111	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.928	0.741	0.4274	Normal Distribution

gamma-chlordane Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.018	0.0174	0.0186	0.018	0.0175	0.0185	0.000224	2.78%	1.77%
AT3-098		5	0.0123	0.012	0.0125	0.0123	0.012	0.0125	0.0000914	1.67%	1.21%

gamma-chlordane Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.018	0.0185	0.0175	0.0185	0.0175
AT3-098		0.012	0.0123	0.0124	0.0122	0.0125

Bioaccumulation Evaluation - Pesticides - Macoma — **EA-EST, Inc. PBC**

Analysis ID:	15-0976-0545	**Endpoint:**	heptachlor epoxide	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:50	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	43A5EA41BA8B2FE6A9EB5F2F725DCAE1	**Editor ID:**	

Batch ID:	16-7638-7277	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:49	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:49	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed heptachlor epoxide endpoint	2.66%

Equal Variance t Two-Sample Test

Sample I	vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed		AT3-098	8	-22.2	1.86	0.00101	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.73	2.29	0.6316	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0003660	0.0003660	1	494	<1.0E-05	Significant Effect
Error	5.925E-06	7.406E-07	8			
Total	0.000372		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	7.17	23.2	0.0825	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.957	0.741	0.7545	Normal Distribution

heptachlor epoxide Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0381	0.0367	0.0395	0.038	0.037	0.0395	0.00051	2.99%	0.00%
AT3-098		5	0.026	0.0255	0.0265	0.0261	0.0254	0.0265	0.00019	1.64%	31.76%

heptachlor epoxide Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.038	0.039	0.037	0.0395	0.037
AT3-098		0.0254	0.0261	0.0262	0.0259	0.0265

Bioaccumulation Evaluation - Pesticides - Macoma					EA-EST, Inc. PBC
Analysis ID:	16-1399-3357	**Endpoint:**	heptachlor	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:50	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	11143760E14E109A61EEF9D035EBD914	**Editor ID:**	

Batch ID:	16-7638-7277	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:49	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:49	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed heptachlor endpoint	3.08%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-19.3	1.86	0.000573	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.96	2.29	0.2778	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	8.851E-05	8.851E-05	1	373	<1.0E-05	Significant Effect
Error	0.0000019	2.375E-07	8			
Total	9.041E-05		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	8.5	23.2	0.0618	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.955	0.741	0.7224	Normal Distribution

heptachlor Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0186	0.0178	0.0194	0.0185	0.018	0.0195	0.000292	3.50%	0.00%
AT3-098		5	0.0126	0.0124	0.0129	0.0127	0.0123	0.0129	0.0001	1.77%	31.99%

heptachlor Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0185	0.019	0.018	0.0195	0.018
AT3-098		0.0123	0.0127	0.0128	0.0126	0.0129

Bioaccumulation Evaluation - Pesticides - Macoma — **EA-EST, Inc. PBC**

Analysis ID:	17-3869-7799	**Endpoint:**	hexachlorobenzene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:50	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	F0E4A641FACB3A5649CF9480030475F0	**Editor ID:**	

Batch ID:	16-7638-7277	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:49	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:49	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed hexachlorobenzene endpoint	2.71%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-21.7	1.86	0.0043	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.91	2.29	0.3310	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0063001	0.0063001	1	471	<1.0E-05	Significant Effect
Error	0.000107	1.338E-05	8			
Total	0.0064071		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	6.75	23.2	0.0912	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.976	0.741	0.9428	Normal Distribution

hexachlorobenzene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.159	0.153	0.165	0.158	0.154	0.166	0.00216	3.04%	0.00%
AT3-098		5	0.109	0.106	0.111	0.109	0.106	0.111	0.000831	1.71%	31.59%

hexachlorobenzene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.158	0.162	0.155	0.166	0.154
AT3-098		0.106	0.109	0.11	0.108	0.111

Bioaccumulation Evaluation - Pesticides - Macoma	**EA-EST, Inc. PBC**

Analysis ID:	20-4435-9159	**Endpoint:**	Methoxychlor	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:50	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	181BFD1EECC5567DCF971DEE81281D0	**Editor ID:**	

Batch ID:	16-7638-7277	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:49	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:49	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed methoxychlor endpoint	2.87%

Unequal Variance t Two-Sample Test

Sample I	vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed		AT3-098	4	-69.1	2.13	0.0118	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2.09	2.29	0.1580	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.364925	0.364925	1	4780	<1.0E-05	Significant Effect
Error	0.0006112	7.640E-05	8			
Total	0.365536		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	666	23.2	1.3E-05	Unequal Variances
Distribution	Shapiro-Wilk W Normality Test	0.905	0.741	0.2509	Normal Distribution

Methoxychlor Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.411	0.395	0.426	0.408	0.399	0.428	0.00552	3.01%	0.00%
AT3-098		5	0.0287	0.0281	0.0293	0.0288	0.028	0.0293	0.000214	1.67%	93.00%

Methoxychlor Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.408	0.419	0.401	0.428	0.399
AT3-098		0.028	0.0288	0.029	0.0287	0.0293

Bioaccumulation Evaluation - Pesticides - Macoma — **EA-EST, Inc. PBC**

Analysis ID:	06-1250-5714	**Endpoint:**	oxychlordane	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:50	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	2CEAE8CE035F223B0DAD46500D2D3437	**Editor ID:**	

Batch ID:	16-7638-7277	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:49	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:49	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed oxychlordane endpoint	2.76%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-21.3	1.86	0.00101	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.73	2.29	0.6265	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0003341	0.0003341	1	452	<1.0E-05	Significant Effect
Error	5.907E-06	7.384E-07	8			
Total	0.00034		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	7.36	23.2	0.0791	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.956	0.741	0.7424	Normal Distribution

oxychlordane Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0366	0.0352	0.038	0.0365	0.0355	0.038	0.00051	3.12%	0.00%
AT3-098		5	0.025	0.0245	0.0256	0.0251	0.0244	0.0256	0.000188	1.68%	31.58%

oxychlordane Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.0365	0.0375	0.0355	0.038	0.0355
AT3-098		0.0244	0.0251	0.0252	0.025	0.0256

Bioaccumulation Evaluation - Pesticides - Macoma					**EA-EST, Inc. PBC**
Analysis ID:	20-3031-3246	**Endpoint:**	toxaphene	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:50	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	64BBF430881C98257BBB693837667970	**Editor ID:**	

Batch ID:	16-7638-7277	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:49	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:49	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed toxaphene endpoint	2.68%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-22	1.86	0.0206	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	2	2.29	0.2341	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.147623	0.147623	1	482	<1.0E-05	Significant Effect
Error	0.00245	0.0003063	8			
Total	0.150073		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	5.62	23.2	0.1231	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.963	0.741	0.8219	Normal Distribution

toxaphene Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.767	0.739	0.795	0.76	0.745	0.8	0.0102	2.97%	0.00%
AT3-098		5	0.524	0.512	0.536	0.525	0.51	0.535	0.0043	1.84%	31.68%

toxaphene Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.76	0.78	0.75	0.8	0.745
AT3-098		0.51	0.525	0.53	0.52	0.535

Bioaccumulation Evaluation - Pesticides - Macoma					EA-EST, Inc. PBC
Analysis ID:	21-2045-5284	**Endpoint:**	trans-nonachlor	**CETIS Version:**	CETISv2.1.1
Analyzed:	19 Aug-23 6:50	**Analysis:**	Parametric-Two Sample	**Status Level:**	1
Edit Date:	08 May-23 22:45	**MD5 Hash:**	E900AD219B0D2BF45F2DDF2B2F538B16	**Editor ID:**	

Batch ID:	16-7638-7277	**Test Type:**	Bioaccumulation - Pesticides	**Analyst:**	Nancy Roka
Start Date:	29 Mar-23 13:49	**Protocol:**	US ACE NED RIM (2004)	**Diluent:**	Not Applicable
Ending Date:	26 Apr-23 12:49	**Species:**	Macoma nasuta	**Brine:**	Not Applicable
Test Length:	27d 23h	**Taxon:**	Bivalvia	**Source:**	ARO - Aquatic Research Or **Age:**

Sample Code	Sample ID	Sample Date	Receipt Date	Sample Age	Client Name	Project
IOSN 2019	13-4648-8170	08 Mar-23	08 Mar-23	21d 14h	Eco-Analysts, Inc.	Dredged Sediment Evalu
AT3-098	07-1559-4974	08 Feb-23 13:00	09 Feb-23 16:30	49d 1h		

Sample Code	Material Type	Sample Source	Station Location	Lat/Long
IOSN 2019	Reference sediment	Yachtsman Marina NAE-2004-00	IOSN Reference	
AT3-098	Marine Sediment	Yachtsman Marina NAE-2004-00	10 Stations at 4 Marinas Mu	

Data Transform	Alt Hyp	Comparison Result	PMSD
Untransformed	C < T	AT3-098 passed trans-nonachlor endpoint	3.08%

Equal Variance t Two-Sample Test

Sample I vs	Sample II	df	Test Stat	Critical	MSD	P-Type	P-Value	Decision(α:5%)
Reference Sed	AT3-098	8	-18.8	1.86	0.00024	CDF	1.0000	Non-Significant Effect

Auxiliary Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:5%)
Outlier	Grubbs Extreme Value Test	1.56	2.29	1.0000	No Outliers Detected

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.464E-05	1.464E-05	1	352	<1.0E-05	Significant Effect
Error	3.330E-07	4.163E-08	8			
Total	1.497E-05		9			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Variance Ratio F Test	9.09	23.2	0.0550	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.877	0.741	0.1214	Normal Distribution

trans-nonachlor Summary

Sample	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
IOSN 2019	RS	5	0.0078	0.00746	0.00814	0.008	0.0075	0.008	0.000122	3.51%	0.00%
AT3-098		5	0.00538	0.00527	0.00549	0.0054	0.00525	0.0055	0.0000406	1.69%	31.03%

trans-nonachlor Detail

Sample	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
IOSN 2019	RS	0.008	0.008	0.0075	0.008	0.0075
AT3-098		0.00525	0.0054	0.0054	0.00535	0.0055

ATTACHMENT XII

Report Quality Assurance Record
(2 pages)

REPORT QUALITY ASSURANCE RECORD

Client: EcoAnalysts

Project Number: EA.TOX

Author: M. Chanov

EA Report Number: 9180

REPORT CHECKLIST

QA/QC ITEM	REVIEWER	DATE
1. Samples collected, transported, and received according to study plan requirements.	[signature]	9/5/23
2. Samples prepared and processed according to study plan requirements.	[signature]	9/5/23
3. Data collected using calibrated instruments and equipment.	[signature]	9/5/23
4. Calculations checked: - Hand calculations checked	[signature]	9/5/23
- Documented and verified statistical procedure used.	[signature]	9/5/23
5. Data input/statistical analyses complete and correct.	[signature]	9/6/2023
6. Reported results and facts checked against original sources.	[signature]	9/6/2023
7. Data presented in figures and tables correct and in agreement with text.	[signature]	9/6/2023
8. Results reviewed for compliance with study plan requirements.	[signature]	9/5/23

	AUTHOR	DATE
9. Commentary reviewed and resolved.	[signature]	9/6/23
10. All study plan and quality assurance/control requirements have been met and the report is approved:	[signature]	9/6/23
	PROJECT MANAGER	DATE
	[signature]	9/6/2023
	QUALITY CONTROL OFFICER	DATE
	[signature]	9/6/23
	SENIOR TECHNICAL OFFICER	DATE

ATTACHMENT XIII

Army Corps of Engineers Quality Assurance Records
(3 pages)

Table II-1: Completeness Checklist

Quality Assurance/Quality Control Questions	Yes/No? Comments?
1. Was the report signed by the responsible applicant approved representative?	Yes
2. Were the methods for sampling, chemical and biological testing described in the Sampling and Analysis Plan (SAP) and the Laboratory QA Plan (LQAP) followed?	Yes
3. If not, were deviations documented?	NA
4. Was the SAP approved by the New England District?	Yes
5. Did the applicant use a laboratory with a LQAP on file at the New England District?	Yes
6. Did the samples adequately represent the physical/chemical variability in the dredging area?	Yes
7. Were the correct stations sampled (include the precision of the navigation method used)?	Yes
8. Were the preservation and storage requirements in Chapter 8 of the EPA/Corps QA/QC Manual (EPA/USACE 1995) and EPA (2001d) followed?	Yes
9. Were the samples properly labeled?	Yes
10. Were all the requested data included?	Yes
11. Were the reporting limits met?	Yes
12. Were the chain-of-custody forms properly processed?	Yes
13. Were the method blanks run and were the concentration below the acceptance criteria?	See Tissue Chemistry report under separate cover
14. Was the MDL study performed on each matrix (with this data submission) or within the last 12 months?	See Tissue Chemistry report under separate cover
15. Were the SRM/CRM analyses within acceptance criteria?	See Tissue Chemistry report under separate cover
16. Were the matrix spike/matrix spike duplicates run at the required frequency and was the percent recovery/RPD within the acceptance criteria?	See Tissue Chemistry report under separate cover
17. Were the duplicate samples analyzed and were the RPDs within the required acceptance criteria?	See Tissue Chemistry report under separate cover
18. For each analytical fraction of organic compounds, were recoveries for the internal standard within the acceptance criteria?	See Tissue Chemistry report under separate cover
19. Were surrogate recoveries within the required acceptance criteria?	See Tissue Chemistry report under separate cover
20. Were corrective action forms provided for all non-conforming data?	NA
21. Were all the species-specific test conditions in Appendix V met?	Yes
22. Were the test-specific age requirements met for each test species?	Yes
23. Was the bulk physical/chemical testing performed on the sediments/composites that were biologically tested?	See data package from first phase of testing
24. Were the mortality acceptance criteria met for the water column and sediment toxicity tests?	Yes
25. Were the test performance requirements in Table 11.3 of EPA (1994a) met?	Yes

Table II-8: Quality Control Summary for Biological Toxicity Testing only

Method Reference Numbers:

Quality Control (QC) Element	Acceptance Criteria*	Criteria Met? Yes/No	List results outside criteria (Cross-reference results table in data report)	Location of Results (Retained at Lab or in Data Package)
Test condition requirements for each species: Temperature, Salinity, pH, D.O., Ammonia (Total, Un-ionized)	Test conditions within the requirements specified for each species	Yes		Data Package
Test species age	Age/health within guidelines for each species (Appendix V)	Yes		Data Package
Bulk physical/chemical analyses (If required by the Sampling plan)	Required? If so, performed? Yes or No	Yes		Data Package (separate cover)
Water column toxicity test: Control mortality Control abnormality	 $\leq$ 10% mean $\leq$ 30% mussel/oyster; < 40% clam larvae, < 30% sea urchin larvae	NA		
Sediment toxicity test: Control mortality Compliance with applicable test acceptability requirements in Table 11.3 (EPA 1994a)	 $\leq$ 10% mean (no chamber > 20%) See EPA (1994a) Section 9; Table 11.3	Yes		Data Package

* The Quality Control Acceptance Criteria are general guidelines. If alternate criteria are used, they must be documented in this table.

ATTACHMENT XIV

Email Communications
(7 pages)

Tissue Reporting

Fri, Mar 30, 2018 at 10:17 AM

To:
Cc:

Good morning -

Please see the below confirmation just received from NAE regarding the handling of statistics under their recently requested "totals" calculation protocol. Please proceed using the below guidance and let us know if any questions etc

Best

-----Original Message-----
From: Loyd, Richard B CIV USARMY CENAE (US) [mailto:Richard.B.Loyd@usace.army.mil]
Sent: Friday, March 30, 2018 10:12 AM
To:
Cc:
Su

Hey there ,
I agree with ESI's recommendation to use 1/2 MDL for non-detects for both the computation of totals and for statistical analysis. It took a little while to get you an answer because I was waiting on a call back from our regulatory office to make sure they were ok with that methodology as well. In future ESI should follow the proposed protocol for both federal and private projects.

Thanks,
Ben

Richard B. Loyd
US Army Corps of Engineers
696 Virginia Road
Concord, MA 01742
Office: (978) 318-8048
Cell: (978) 763-5438
Richard.B.Loyd@usace.army.mil

-----Original Message-----
From:
Sent: Wednesday, March 28, 2018 4:56 PM
To: Lo usace.army.mil>
Cc:
Subject: [Non-DoD Source] Tissue Reporting

Based on the recent directive regarding reporting on non-detects and summation of totals, we have some further questions regarding statistical evaluation. The issue, paraphrased from ESI is as follows:

“Historically the Bioaccumulation EDD, where totals for PCBs etc are provided, uses the MDL when a value is a non-detect "ND" and the statistical analysis on the individual compounds are run using the MDL in place of the ND. Going forward, as per direction from USACE, we will use 1/2 of the MDL to compute the "Total" concentration for specified compounds. Under this scenario what number should be incorporated into the statistical analysis program, the 1/2 MDL or the MDL? As indicated, the "Total" numbers have not been included in the statistical analysis historically. However, a potential issue arises if the stats were run using the MDL then a review of the full data package differs shows different numbers which could potentially lead to some level of confusion. ESI’s suggestion would be to use the 1/2 MDL for the computation of totals and for the statistical analysis, for those groups where total are generated, PCBs, Pesticides and PAHs.

Do you concur with ESI’s recommendation?

Thanks Ben,

-----Original Message-----
From: Loyd, Richard B CIV USARMY CENAE (US) [mailto:Richard.B.Loyd@usace.army.mil <mailto:Richard.B.Loyd@usace.army.mil>]
Sent: Monday, March 26, 2018 2:28 PM
To:
Cc:
Subject: RE: Draft Report

Hello,
I realize that the reporting methods we requested are in conflict with the guidance of the RIM and the 2009 errata. The 2009 errata is the most recent RIM update. Please stick to the guidance we gave you in our last conference call, which is summarized below:

- Please continue to report NDs as the full RL. We are in the process of changing our methods to report NDs as the full MDL, but this change might not take place in the near future.

- For totals calculations (PCBs, DDT, PAHs) please use 1/2 the MDL for NDs. Please remember that PCB totals are calculated using only the NOAA 18 congeners. Also, despite what the errata guidance, please continue to calculate PCB totals for sediment chemistry.

Thanks,
Ben

Richard B. Loyd
US Army Corps of Engineers
696 Virginia Road
Concord, MA 01742
Office: (978) 318-8048
Cell: (978) 763-5438
Richard.B.Loyd@usace.army.mil <mailto:Richard.B.Loyd@usace.army.mil>

From: Loyd, Richard B CIV USARMY CENAE (USA) <Richard.B.Loyd@usace.army.mil> on behalf of Loyd, Richard B CIV USARMY CENAE (USA)
Sent: Tuesday, July 28, 2020 1:08 PM
To:
Cc:
Subject: RE: [Non-DoD Source] Re: CLDS and CCBDS reference area data

Hello,

Please continue to use 1/2 the MDL for non-detects and add appropriate qualifiers as you have done in the past.

The only thing that is changing is the removal of the 'c' qualifier and the requirement to run statistics in a scenario where you have measurable analyte concentrations in your dredge area samples but non-detects in the reference area sample.

Thanks,
Ben

Richard B. Loyd
US Army Corps of Engineers
696 Virginia Road
Concord, MA 01742
Office: (978) 318-8048
Cell: (978) 763-5438
Richard.B.Loyd@usace.army.mil

-----Original Message-----
From:
Sent: Tuesday, July 28, 2020 12:53 PM
To: Loyd, Richard B CIV USARMY CENAE (USA) <Richard.B.Loyd@usace.army.mil>
Cc:
Subject: [Non-DoD Source] Re: CLDS and CCBDS reference area data

Greetings,

For the statistical analysis of the bioaccumulation data we have been using half the MDL when a replicate is reported as a non-detect.
Moving forward, what value are we using for instances where the replicate is reported as a non-detect?

Regards,

<Blockedhttps://mail.google.com/mail/u/0/?ui=2&ik=5daaac60f2&attid=0.1&permmsgid=msg-f%3A1626109999743927214&th=16911a6de47283ae&view=fimg&sz=s0-l75-ft&attbid=ANGjdJ-0i0-ICKOCTnsL25z4zFmO422I3FDAfvBsfnV4B17PjvXhvUWXWaVHz6HM-0GQEVw3iHhW3FcmarSRaMZ0MW0gEjSr655W30Proa_AXugmmSR-DiYCxX_-qEQ&disp=emb&realattid=677ce2b6e9998d9d_0.1>

Please take a moment to provide   Customer Feedback <Blockedhttps://www.surveymonkey.com/r/T2SSR8W>

On Tue, Jul 28, 2020 at 11:49 AM Loyd, Richard B CIV USARMY CENAE (USA) <Richard.B.Loyd@usace.army.mil <mailto:Richard.B.Loyd@usace.army.mil> > wrote:

Hello,

The 10-day / 28-day survival and the tissue chemistry results for the standard CLDS and CCBDS reference area data sets are attached. I believe these are the only two sites you are working with at the moment. Please reach out to me for data for other reference areas as needed. Please note that we plan to update these data sets every few years.

When you run bioaccumulation stats we want you to treat the reference site values as a detectable concentrations even if there are 'u'/'a' qualifiers in the data. This will eliminate the use of the 'c' qualifier for the dredge area samples. This is being done to simplify the data input process for the EPA risk assessment model. In the past we have seen elevated dredge area tissue concentrations that are flagged with a 'c' because the analyte was not detected in the reference area sample. This means we have to go through the EDD manually to determine if any of the analytes with a 'C' qualifier need to be included in the model run.

Please let me know if you have any questions.

Thanks,
Ben

Richard B. Loyd

From:	Loyd, Richard B CIV USARMY CENAE (USA) <Richard.B.Loyd@usace.army.mil> on behalf of Loyd, Richard B CIV USARMY CENAE (USA)
Sent:	Friday, October 09, 2020 3:58 PM
To:	
Cc:	
Subject:	RE: [Non-DoD Source] Re: CLDS and CCBDS reference area data

I think it would be fine to use the 'c' qualifier, but please be sure to update the footnote descriptions accordingly so that no one gets confused.

best,
Ben

Richard B. Loyd
US Army Corps of Engineers
696 Virginia Road
Concord, MA 01742
Office: (978) 318-8048
Cell: (978) 763-5438
Richard.B.Loyd@usace.army.mil

-----Original Message-----
From:
Sent: Friday, October 9, 2020 3:53 PM
To: Loyd, Richard B CIV USARMY CENAE (USA) <Richard.B.Loyd@usace.army.mil>;
Cc:
Subject: RE: [Non-DoD Source] Re: CLDS and CCBDS reference area data

Hello Ben, I do have a follow up question.

The COCs that will be eliminated from further evaluation because they are not detected in any of the reference and dredge area replicates would be footnoted as such. Should we use the "c" footnote in that instance? Or will that get confused with the prior definition of "c" in the Corps' EDD?

Thanks again-

-----Original Message-----
From: Loyd, Richard B CIV USARMY CENAE (USA) <Richard.B.Loyd@usace.army.mil>
Sent: Friday, October 09, 2020 3:34 PM
To:
Cc:
Subject: RE: [Non-DoD Source] Re: CLDS and CCBDS reference area data

Hello ,
If both the reference and dredge area samples are 'a' qualified with non-detects for all replicates then you can eliminate them from further evaluation. If one or more of the dredge area replicates came back with a detectable concentration then you should proceed with further evaluation.

Let me know if you have any other questions.

Thanks,
Ben

Richard B. Loyd
US Army Corps of Engineers
696 Virginia Road
Concord, MA 01742
Office: (978) 318-8048
Cell: (978) 763-5438
Richard.B.Loyd@usace.army.mil

-----Original Message-----
From:
Sent: Thursday, October 8, 2020 1:41 PM
To: Loyd, Richard B CIV USARMY CENAE (USA) <Richard.B.Loyd@usace.army.mil>;
Cc:
Subject: RE: [Non-DoD Source] Re: CLDS and CCBDS reference area data

Good afternoon Ben-

I am in the beginning stages of reporting two 28-day bioaccumulation evaluations (private and IDIQ projects), and am seeking clarification on the new approach for treating "c" qualified data as outlined in your email below. My understanding from your email is that "c" qualifiers should be eliminated, and those COCs that had been removed from further consideration because they were "c" qualified will now be retained for further evaluation.

My question is this: How should we treat COCs that are not detected in either the historic reference tissue or in any current (i.e.,
project-specific) site composite tissues? Should those COCs be retained for further evaluation or should they be eliminated?

Much appreciated-

ECOTOXICOLOGICAL TESTING
WATER COLUMN BIOASSAYS

KENNEBUNKPORT, MAINE

Prepared for:

Eco-Analysts, Inc.
P.O. Box 224
Bath, Maine 04530

Prepared by:

EA Engineering, Science, and Technology, Inc., PBC
231 Schilling Circle
Hunt Valley, Maryland 21031
For questions concerning this report, please contact Michael Chanov
ph: 410-584-7000

Results relate only to the items tested or to the samples as received by the laboratory.

This report contains 21 pages plus 6 attachments.

8 August 2023

Michael K. Chanov II — Date
Laboratory Director

EA Project Number 70022.TOX

E87550

EA Report Number 9259

1. INTRODUCTION

In accordance with the US Army Corps of Engineers, New England District (CENAE), EA Engineering, Science, and Technology, Inc., PBC performed water column toxicity testing on sediment samples collected from the area of dredging proposed for the marinas located on the Kennebunk River in Kennebunkport, Maine. Placement of dredge materials is proposed at the Isles of Shoals North (IOSN) Disposal Site. Samples were provided by Eco-Analysts, Inc., Bath, Maine. The purpose of this study was to evaluate the toxicity of standard elutriates prepared from the sediment samples on water column organisms.

The toxicity testing program consisted of acute water column bioassays with *Mytilus* sp. (blue mussel), *Americamysis bahia* (opossum shrimp), and *Menidia beryllina* (inland silverside). The acute water column bioassays evaluated the effects of exposure to the sediment elutriates on survival of the test organisms, and on the development of embryonic *Mytilus* sp. All biological testing was completed at EA Engineering, Science and Technology, Inc. PBC (EA), Hunt Valley, Maryland. All chemical analyses of elutriate solutions were completed by Alpha Analytical, Westborough, Massachusetts.

2. MATERIALS AND METHODS

2.1 SAMPLE RECEIPT AND PREPARATION

Ten sediment samples were collected by Eco-Analysts personnel from locations in the dredge footprint identified in the Sampling and Analysis Plan. One sediment composite was created for the project and placed into five 5-gallon buckets. Water collected from the dredge footprint was collected in 5-gallon pails. The samples were held at ≤4°C and were hand delivered to EA's Ecotoxicology Laboratory in Hunt Valley, Maryland. The samples were logged in and assigned an EA laboratory accession number and stored in the dark in a secured walk-in cooler at ≤4°C until used for testing. Table 1 summarizes the sample identification, accession numbers, and collection and receipt information for the sediment and site water samples. Chain-of-custody records are included in Attachment I.

2.2 TOXICITY TEST METHODS

All toxicity testing was conducted following EA's standard operating procedures (EA 2022) which are in accordance with the *Regional Implementation Manual for Evaluation of Dredged Material Proposed for Disposal in New England Waters* (US EPA, CENAE 2004), USEPA/USACE guidance (1991, 1998) and USEPA guidance (2002).

2.2.1 Water Column Toxicity Testing

Elutriates were prepared using the sediment composite samples and the site water. A subsample of homogenized sediment was combined with site water in a 1:4 sediment to water ratio, on a volume/volume basis. The sediment/water combination was vigorously mixed by aeration and manual stirring for 30 minutes and was then allowed to settle for a minimum of one hour. After settling, the supernatant was siphoned off and adjusted, if necessary, to 30 ppt salinity using Crystal Sea Bioassay Grade synthetic sea salts. The elutriate was used for the water column acute toxicity testing within 24 hours of preparation. Aliquots of the prepared elutriate were couriered overnight and on ice to Alpha Analytical for chemical analysis.

Static, non-renewal bioassays were conducted on the prepared elutriates using *Americamysis bahia* (opossum shrimp) and *Menidia beryllina* (inland silverside). The blue mussel (*Mytilus* sp.*)* was used as the test species for embryo development tests. The test organisms were acquired from outside vendors. Acquired lots of organisms were gradually acclimated to test temperature and salinity prior to use in testing.

Test concentrations of 100, 50, and 10 percent elutriate were prepared by measuring aliquots of elutriate in a graduated cylinder and bringing to final volume with 30 ppt artificial sea water. A test was also prepared for an undiluted site water sample. The artificial seawater was prepared by mixing Crystal Sea synthetic sea salts with laboratory water to a final salinity of 30 ppt. The source of the laboratory water was the City of Baltimore municipal tap water that was passed through a high-capacity, activated carbon filtration system. This synthetic seawater formulation has proven acceptable for aquatic toxicological studies, and has been used successfully at EA for maintaining multigeneration cultures, and for holding healthy populations of estuarine and marine species. Batches of artificial seawater were aerated and aged at least 24 hours prior to use in testing.

In order to evaluate the toxicity of ammonia to the test species, separate toxicity tests were conducted in which the test organisms were exposed to a graded concentration of ammonia, administered as ammonium chloride (NH_4Cl).

2.2.1.1 *Mytilus* sp. Water Column Toxicity Testing

Larval development tests were conducted with the blue mussel (*Mytilus* sp.) on the prepared elutriate. Adult mussels were acquired from Aquatic Research Organisms (Hampton, New Hampshire). Upon receipt at EA, the adult mussels were visually inspected, were scrubbed clean (e.g., barnacles removed) and were placed in 30 ppt artificial seawater at 4ºC. The collection of mussel eggs and sperm, and preparation of gamete dilution were performed according to EA's standard operating procedures (EA 2022) which follow guidelines in USEPA/USACE (1998), USEPA (1995) and ASTM (2012). Spawning was temperature induced by placing the mussels individually into 125 ml cups containing 30 ppt artificial seawater and raising the temperature of the water from 12ºC and 20ºC. Gametes were microscopically inspected to determine normality of eggs and motility of sperm. Gametes that were determined to be acceptable for testing were pooled and were used to prepare the sperm and egg suspensions for the fertilization procedures. Care was taken to keep male and female gametes completely separate to avoid accidental fertilization during gamete preparation. Only combined gamete preparations that had achieved a minimum of 90 percent fertilization were used in testing. Toxicity tests were initiated within 4 hours of egg fertilization.

Test chambers were 30-ml scintillation vials with screw caps. Each test concentration and control had five replicate test chambers containing 10 ml of test solution. At test initiation, 100 µl of fertilized gamete preparation was delivered into each test chamber containing test dilution. Extra replicates of controls were prepared to monitor embryo counts at test initiation and termination. The tests were maintained at a target temperature of 16±1°C with a 16-hour light/8-hour dark photoperiod. Water quality parameters (temperature, pH, dissolved oxygen, and salinity) were measured in separate water quality cups at test initiation and daily during the 48-hour exposure period. Summaries of water quality parameters can be found in Table 4.

The toxicity tests were terminated by adding 250 µl of 37 percent buffered formalin to each test chamber. The preserved samples were then observed microscopically to determine the percent survival of control organisms, and the percentage of embryos in each test treatment and control that had normally developed (C-shaped, hinged, prodissoconch larvae) shells.

In order to evaluate the toxicity of ammonia to *Mytilus* sp., a separate toxicity test was conducted in which the *Mytilus* sp. embryos were exposed to a graded concentration of ammonia, administered as ammonium chloride (NH_4Cl). Copies of all data sheets from the mussel toxicity tests are included in Attachment II.

2.2.1.2 ***Americamysis bahia* and *Menidia beryllina* Water Column Toxicity Testing**

The 96-hour toxicity tests with *A. bahia* and *M. beryllina* were initiated using test organisms received from Aquatic BioSystems (Fort Collins, Colorado). At test initiation, the *A. bahia* were

5 days old. The *M. beryllina* were 12 days old at test initiation. The opossum shrimp and inland silversides were fed *Artemia* sp. nauplii (<24 hours old) during holding, prior to use in testing.

The *A. bahia* and *M. beryllina* testing was conducted in 1-L beakers. Each beaker contained 200 ml of test solution, with five replicate beakers per test concentration. Ten organisms were randomly introduced into each replicate for a total of 50 organisms per concentration. The test chambers were maintained at 20±1°C and 30 ppt ±10%. Dissolved oxygen was maintained at ≥40% saturation using aeration as needed. Illumination was kept at 16-hour light/8-hour dark photoperiod. The *A. bahia* and *M. beryllina* were fed a small ration of brine shrimp nauplii (*Artemia* sp.) daily to avoid starvation and cannibalism (*A. bahia*). Temperature, pH, dissolved oxygen, and salinity were measured daily in one replicate of each concentration of the *A. bahia* and *M. beryllina* toxicity tests during the 96-hour exposure period. Summaries of water quality parameters measured during the toxicity tests are presented in Tables 4 (*A. bahia*) and 5 (*M. beryllina*). The number of live organisms in each test chamber were counted daily and recorded on the test data sheets. Copies of the *A. bahia* and *M. beryllina* acute toxicity test data sheets are included in Attachments III and IV, respectively.

2.2.2 Data Analysis

Statistical analyses were performed on the water column test data according to USEPA/USACE (1998) guidance and using the ToxCalc statistical software package (Version 5.0, Tidepool Scientific Software). For the elutriate testing, an EC50 (median effective concentration) or LC50 (median lethal concentration) was calculated for each test species using the linear interpolation, Spearman-Karber, Trimmed Spearman-Karber, or probit method. Additionally, if normal development or survival in the 100 percent elutriate concentration was at least 10 percent lower than the dilution water control, then a statistical comparison (t-Test) was performed between the 100 percent elutriate concentration and the control. The t-test was based on the assumptions that the observations were independent and normally distributed as determined by the Shapiro-Wilk's test. The F-Test was used to test for homogeneity of variance. When the data did not meet the normality assumption, the nonparametric test, Wilcoxon's Two-Sample Test, was used to analyze the data. An arc sine (square root [Y]) transformation was performed on the survival percentages.

The results of the ammonia testing are summarized in Table 6. The results of the water column testing on the elutriate samples are presented in Tables 7 through 9, and summarized in Table 10.

2.2.3 Reference Toxicant Testing

In conformance with EA's quality assurance/quality control program requirements, reference toxicant testing was performed by EA on *Mytilus* sp., *A. bahia* and *M. beryllina*. The reference toxicant tests consisted of a graded concentration series of a specific toxicant in water only tests. The results of the reference toxicant tests were compared to established control chart limits. Table 11 presents the results of the reference toxicant testing.

2.3 ARCHIVES

Original data sheets, records, memoranda, notes, and computer printouts are archived at EA's Office in Hunt Valley, Maryland. These data will be retained for a period of 5 years unless a longer period of time is requested.

3. RESULTS AND DISCUSSION

This bioassay study using elutriates prepared from the composited sediments collected the marinas located on the Kennebunk River in Kennebunkport, Maine, was designed and conducted to meet the requirements of the USEPA/USACE dredged material testing program and the CENAE protocol requirements. The results of these toxicity tests met the current NELAC standards, where applicable. A summary of the toxicity testing results can be found in Table 10.

3.1 WATER COLUMN TOXICITY TESTING

In order to evaluate the toxicity of ammonia to the test species, separate toxicity tests were conducted in which the test organisms were exposed to a graded concentration of ammonia, administered as ammonium chloride (NH_4Cl). The results of this ammonia study are summarized in Table 6. The 48-hour LC50 value for *Mytilus* sp. was 7.6 mg/L NH_3-N, while the corresponding EC50 was 5.6 mg/L NH_3-N. The ammonia 96-hour LC50 value for *Americamysis bahia* was 31.2 mg/L NH_3-N, while the 96-hour LC50 value for *Menidia beryllina* was 19.7 mg/L NH_3-N.

3.1.1 *Mytilus* sp. Water Column Testing

The results of the *Mytilus* sp. toxicity tests conducted on the elutriate sample are presented in Table 7. Exposure to the sample indicated that the 48-hour LC50 value was >100 percent elutriate. Exposure to the sample did not produce an adverse effect on embryo development, with 48-hour EC50 value of >100 percent elutriate. Percent survival and normal development in 100 percent concentration of the elutriate was 90 and 86 percent, respectively, and was not significantly less (p=0.05) than the laboratory control. The percent survival and normal embryo development in the site water used to prepare the elutriate were 94 and 90 percent, respectively.

3.1.2 *Americamysis bahia* Water Column Testing

Table 8 summarizes the results of the elutriate testing with *A. bahia*. The elutriate sample was not acutely toxic to *A. bahia*. The elutriate had a 96-hour LC50 value of >100 percent elutriate, and survival in the 100 percent test concentration was 90 percent. There was a minimum of 94 percent survival in the laboratory controls, and the site water had 96 percent survival at test termination.

3.1.3 *Menidia beryllina* Water Column Testing

The *M. beryllina* water column test results are presented in Table 9. The elutriate sample was not acutely toxic to *M. beryllina*. The elutriate had a 96-hour LC50 value of >100 percent elutriate, and survival in the 100 percent test concentration was 88 percent. There was a minimum of 94 percent survival in the laboratory controls, and the site water had 82 percent survival at test termination.

3.2 REFERENCE TOXICANT TESTS

The results of the reference toxicant tests are summarized in Table 11. All of the reference toxicant test results fell within the established laboratory control chart limits.

4. REFERENCES CITED

EA. 2022. EA Ecotoxicology Laboratory Quality Assurance and Standard Operating Procedures Manual. EA Manual ATS-102. Internal document prepared by EA's Ecotoxicology Laboratory, EA Engineering, Science, and Technology, Inc., PBC, Hunt Valley, Maryland.

USEPA/USACE, 1991. Evaluation of Dredged Material Proposal for Ocean Disposal, Testing Manual (commonly called "The Green Book").

USEPA/USACE. 1998. Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S.-Inland Testing Manual. EPA/823/B-94/004. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. and Department of the Army, U.S. Army Corps of Engineers, Washington, D.C.

US EPA. 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms. Fifth Edition. EPA-821-R-02-012. U.S. Environmental Protection Agency, Office of Water, Washington, D.C.

U.S. Army Corps of Engineers (USACE) New York District/U.S. Environmental Protection Agency (USEPA) Region 2. 2016. Guidance for Performing Tests on Dredged Material Proposed for Ocean Disposal. Regional Testing Manual. April.

US EPA Region 1, CENAE. 2004. Regional Implementation Manual for Evaluation of Dredged Material Proposed for Disposal in New England Waters. September 2004.

TABLE 1 SUMMARY OF COLLECTION AND RECEIPT INFORMATION FOR SEDIMENT AND SITEWATER SAMPLES

Sample Identification	EA Accession Number	Collection		Receipt	
		Time	Date	Time	Date
10 Stations at 4 Marinas Mud	AT3-098	0900-1300	8 February 2023	1630	9 February 2023
10 Stations at 4 Marinas Site Water	AT3-099	0900-1300	8 February 2023	1630	9 February 2023

TABLE 2 AMMONIA CONCENTRATIONS MEASURED ON ELUTRIATES PRIOR TO WATER COLUMN TOXICITY TESTING

		Ammonia (mg/L NH_3-N)
Sediment Identification	**EA Accession Number**	**(Total/Unionized) Elutriate**
10 Stations at 4 Marinas Mud	AT3-098	2.2/0.05
10 Stations at 4 Marinas Site Water	AT3-099	<0.1/<0.1

TABLE 3 SUMMARY OF WATER QUALITY PARAMETERS MEASURED DURING ELUTRIATE BIOASSAY TESTING WITH *Mytilus* sp.

Sediment Sample Identification	**EA Accession Number**	**Test Number**	**Range**			
			Temperature (°C)	**pH**	**Dissolved Oxygen (mg/L)**	**Salinity (ppt)**
10 Stations at 4 Marinas Mud	AT3-098	TN-23-209	15.6 – 16.9	7.7 – 8.2	7.9 – 8.5	28.6 – 32.9
10 Stations at 4 Marinas Site Water	AT3-099	TN-23-210	15.6 – 16.7	7.8 – 8.2	8.0 – 8.6	28.8 – 33.0

TABLE 4 SUMMARY OF WATER QUALITY PARAMETERS MEASURED DURING ELUTRIATE BIOASSAY TESTING WITH *Americamysis bahia*

Sediment Sample Identification	EA Accession Number	Test Number	Range			
			Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Salinity (ppt)
10 Stations at 4 Marinas Mud	AT3-098	TN-23-212	19.0 – 20.4	7.2 – 8.0	5.8 – 7.7	28.3 – 33.0
10 Stations at 4 Marinas Site Water	AT3-099	TN-23-213	19.0 – 20.0	7.4 – 8.0	5.9 – 7.7	28.4 – 33.0

TABLE 5 SUMMARY OF WATER QUALITY PARAMETERS MEASURED DURING ELUTRIATE BIOASSAY TESTING WITH *Menidia beryllina*

Sediment Sample Identification	EA Accession Number	Test Number	Range			
			Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Salinity (ppt)
10 Stations at 4 Marinas Mud	AT3-098	TN-23-214	19.0 – 20.4	7.7 – 8.1	6.7 – 7.7	28.6 – 33.0
10 Stations at 4 Marinas Site Water	AT3-099	TN-23-215	19.0 – 20.3	7.8 – 8.0	6.7 – 7.9	28.7 – 33.0

TABLE 6 RESULTS OF AMMONIA (NH_4Cl) TOXICITY TESTING

Test Organism	Test Number	48-Hour Survival (%)						48-hour LC50 ($mg/L\ NH_3$-N)
			mg/L NH_3-N					
		Lab Control	50 mg/L	10 mg/L	3.7 mg/L	1.5 mg/L	0.65 mg/L	
Mytilus sp.	TN-23-211	99	4	24	90	94	90	7.6

Test Organism	Test Number	48-Hour Normal Development (%)						48-hour EC50 ($mg/L\ NH_3$-N)
			mg/L NH_3-N					
		Lab Control	50 mg/L	10 mg/L	3.7 mg/L	1.5 mg/L	0.65 mg/L	
Mytilus sp.	TN-23-211	97	0	1	85	89	86	5.6

Test Organism	Test Number	96-Hour Survival (%)						96-hour LC50 ($mg/L\ NH_3$-N)
			mg/L NH_3-N					
		Lab Control	150 mg/L	87 mg/L	42 mg/L	21 mg/L	7.5 mg/L	
A. bahia	TN-23-202	90	0	0	10	80	80	31.2
M. beryllina	TN-23-205	90	0	0	0	50	80	19.7

TABLE 7 RESULTS OF TOXICITY TESTING WITH *Mytilus* sp. ON ELUTRIATES

Sediment Sample Identification	EA Accession Number	Test Number	48-Hour Survival (%)				
			Lab Control	Percent Elutriate			48-hour LC50 (% elutriate)
				100%	50%	10%	
10 Stations at 4 Marinas Mud	AT3-098	TN-23-209	94	90	100	98	>100
10 Stations at 4 Marinas Site Water	AT3-099	TN-23-210	93	94	---	---	>100

Sediment Sample Identification	EA Accession Number	Test Number	48-Hour Normal Embryo Development (%)				
			Lab Control	Percent Elutriate			48-hour EC50 (% elutriate)
				100%	50%	10%	
10 Stations at 4 Marinas Mud	AT3-098	TN-23-209	91	86	99	94	>100
10 Stations at 4 Marinas Site Water	AT3-099	TN-23-210	90	90	---	---	>100

TABLE 8 RESULTS OF TOXICITY TESTING WITH *Americamysis bahia* ON ELUTRIATES

Sample Identification	EA Accession Number	Test Number	96-Hour Survival (%)				
			Lab Control	Percent Elutriate			96-hour LC50 (% elutriate)
				100%	50%	10%	
10 Stations at 4 Marinas Mud	AT3-098	TN-23-212	94	90	92	98	>100
10 Stations at 4 Marinas Site Water	AT3-099	TN-23-213	94	96	---	---	>100

TABLE 9 RESULTS OF TOXICITY TESTING WITH *Menidia beryllina* ON ELUTRIATES

Sample Identification	EA Accession Number	Test Number	96-Hour Survival (%)				
			Lab Control	Percent Elutriate			96-hour LC50 (% elutriate)
				100%	50%	10%	
10 Stations at 4 Marinas Mud	AT3-098	TN-23-214	94	88	92	90	>100
10 Stations at 4 Marinas Site Water	AT3-099	TN-23-215	100	82[(a)]	---	---	>100

(a) 100 percent elutriate treatment is significantly different (p=0.05) from the laboratory control

TABLE 10 SUMMARY OF RESULTS OF TOXICITY TESTING ON ELUTRIATES

Sample Identification	*Mytilus* sp.		*Mytilus* sp.		*Americamysis bahia*		*Menidia beryllina*	
	48-hour LC_{50} (% elutriate)	Statistical Difference 100% vs. Control	48-hour EC_{50} (% elutriate)	Statistical Difference 100% vs. Control	96-hour LC_{50} (% elutriate)	Statistical Difference 100% vs. Control	96-hour LC_{50} (% elutriate)	Statistical Difference 100% vs. Control
Standard Elutriates								
10 Stations at 4 Marinas Mud	>100	No	>100	No	>100	No	>100	No
10 Stations at 4 Marinas Site Water	>100	No	>100	No	>100	No	>100	Yes

TABLE 11 RESULTS OF REFERENCE TOXICANT TESTING ON ACQUIRED TEST ORGANISMS

Test Species	Reference Toxicant	Test Endpoint	Acceptable Control Chart Limits
Mytilus sp.	Copper chloride ($CuCl_2$)	48-Hour EC50: 5.1 µg/L Cu	2.2– 10.0 µg/L Cu
Americamysis bahia	Potassium chloride (KCl)	48-Hour LC50: 485 mg/L KCl	412 – 604 mg/L KCl
Menidia beryllina	Potassium chloride (KCl)	48-Hour LC50: 1,105 mg/L KCl	817 – 1,325 mg/L KCl

ATTACHMENT I

Chain-of-Custody Records
(2 pages)

Chain-of-Custody Record

EA® EA Engineering, Science, and Technology

EA Ecotoxicology Laboratory
231 Schilling Circle
Hunt Valley, Maryland 21031
Telephone: 410-584-7000
Fax: 410-584-1057

Sample Shipped By: (circle)

Fed. Ex. UPS Other: courier

Tracking #:

Client: ECO-ANALYSTS, INC. Project No.:

NPDES Number: Client Purchase Order Number:

City/State Collected: KENNEBUNK RIVER, MAINE

PLEASE READ SAMPLING INSTRUCTIONS ON BACK OF FORM

Accession Number (office use only)	Grab	Composite	Collection Start Date/Time	Collection End Date/Time	Sample Description (including Site, Station Number, and Outfall Number)	Number/Volume of Container
AT3-098		x	2/8/23 0900	02/8/23 1300	10 Stations at 4 Marinas Mud	5 Ten Gal Buckets
AT3-099	X		"	"	" Sitewater	"

Sampled By: Dustin Kach & Bud Brown	Date/Time 2/8/23 0900 - 1300	Received By: Dustin Kach	Date/Time 2/8/23 1300
Sampler's Printed Name: Dustin Kach & Bud Brown	Title: President	Relinquished By: [signature]	Date/Time 2/9/23 @ 11:37am
Relinquished By: [signature]	Date/Time 2/8/23 1137	Received By Laboratory: [signature]	Date/Time 2/9/23 1630

Was Sample Chilled During Collection? **No**

Comments:

Sample Collection Parameters

Visual Description:

Temperature (°C):

pH:

TRC (mg/L):

Other:

ATTACHMENT II

Mytilus sp. 48-Hour Elutriate Toxicity Tests
Data Sheets and Statistical Analyses
(26 pages)

TOXICITY TEST SET-UP BENCH SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-209

TEST ORGANISM INFORMATION

Common Name: BLUE MUSSEL

Scientific Name: *Mytilus sp.*

Lot Number: ME-097

Source: ARO

Adults Isolated (Time, Date): ______

Neonates Pulled & Fed (Time, Date): ______

Acclimation: <4 hrs

Age: 24 hours

Culture Water (T/S): 16.0 °C 29.0 ppt

TEST INITIATION

Date	Time	Initials	Activity
2/15/23	0905	TP	Dilutions Made
↓	↓	↓	Test Vessels Filled
↓	1620	↓	Organisms Transferred
↓	1700	M	Head Counts

TEST SET-UP

Sample Number: AT3-098

Dilution Number: 30 ppt C.S. (LD3-180)

Test Concentration	Volume Test Material	Final Volume
Control	0 ml	100 ml
10 %	10 ml	↓
50 %	50 ml	↓
100 %	100 ml	↓

EA

TOXICITY TEST DATA SHEET

Project Number: EA.TOX
Client: Eco Analysts
QC Test Number: TN-23-209
Test Material: ELUTRIATE
Accession Number: AT3-098
Dilution Water: 30 PPT C.S.
Accession Number: LD3- 180

TEST ORGANISM
Common Name: BLUE MUSSEL
Scientific Name: *Mytilus sp.*

TARGET VALUES
Temp: 16 °C
pH: 6.0 - 9.0
Photoperiod: 16 *l*, 8 *d*
DO: ≥4.0 mg/L
Salinity: 30±3 ppt
Light Intensity: 50 - 100 fc

Beginning Date: 2/15/23 Time: 1620
Ending Date: 2/17/23 Time: 1630
TEST TYPE: **Static** / Flowthrough
Renewal / **Non-renewal**
Test Container: 30 ml vial
Test Volume: 10 ml
Test Duration: 48 hours

Concentration	Rep	Number of Live Organisms					Temperature (°C)					pH					Dissolved Oxygen (mg/L)					Salinity (ppt)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Control							15.6	16.4	16.5			8.1	8.2	7.7			8.5	8.0	8.1			28.8	29.7	29.7		
10%							15.6	16.5	16.6			8.1	8.2	7.7			8.5	8.1	8.0			29.2	29.3	28.6		
50%							15.9	16.7	16.8			8.1	8.2	7.7			8.4	8.2	7.9			30.7	30.9	29.9		
100%							16.5	16.9	16.8			8.0	8.2	7.7			8.4	8.1	7.9			32.6	32.9	31.8		
Meter Number							682	682	681			682	682	681			682	682	681			682	682	681		
Time							1027	1237				1027	1237	1453			1027	1237	1453			1027	1237	1453		
Initials							TP	TP	TP			TP	TP	TP			TP	TP	TP			TP	TP	TP		

EPA Test Method: EPA 821-R-02-012 (CHECK ONE)

Ceriodaphnia: 2002.0_____ Fathead: 2000.0_____ Americamysis: 2007._____ Menidia:2006.0
Magna/pulex: 2021.0_____ Trout: 2019.0_____ Cyprinodon: 2004.0_____ OTHER: X

BIVALVE DEVELOPMENT TEST
EMBRYO OBSERVATION DATA SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-209

Initial number of embryos: 224

Embryos counted (date, initials): 4/6/23 MA

Test Species

Scientific Name: *Mytilus sp.*

Elutriate: --

Accession Number: AT3-098

Lot#: ME- 097

Test Concentration	Replicate	Total # Surviving/ Counted	# Normal	# Abnormal
Control	A	218	212	6
	B	207	203	4
	C	207	200	7
	D	201	195	6
	E	223	214	9
10%	A	216	204	12
	B	224	210	14
	C	218	209	9
	D	219	212	7
	E	227	217	10
50%	A	241	236	5
	B	226	216	10
	C	231	225	6
	D	~~252~~ 251	243	8
	E	232	223	9
100%	A	227	213	14
	B	184	177	7
	C	199	188	11
	D	187	181	6
	E	211	200	11

@ 8/7/2023 JR

TOXICOLOGY LABORATORY CORRECTION BENCH SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-209

Correction Explanations

(a) Technician Error-Mathematical

(b) Technician Error-Manual Data Recording

(c) Technician Error-Head Count Observation

(d) Technician Error-Overwrite

(e) Technician Error-Missing Data

(f) Technician Error-Lost Organism

(g) Technician Error-Transcription Error

(h) Technician Error-Other:

(i) Meter Malfunction

TOXICOLOGY LABORATORY BENCH SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-209

Date/Time/Initials	Comments/Activity

TOXICOLOGY LABORATORY BENCH SHEET - TESTING LOCATION

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-209

Day	Testing Location	Date	Time	Initials
0	51	2/15/23	1620	TO
1	51	2/16/23	1605	TP
2	51	2/17/23	1454	TP
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

Bivalve Larval Survival and Development Test-Proportion Alive

Start Date:	2/15/2023	Test ID:	TN-23-209	Sample ID:	Eco Analysts
End Date:	2/17/2023	Lab ID:		Sample Type:	Elutriate
Sample Date:		Protocol:		Test Species:	MS-Mytilis species
Comments:					

Conc-%	1	2	3	4	5
Control	0.9732	0.9241	0.9241	0.8973	0.9955
10	0.9643	1.0000	0.9732	0.9777	1.0000
50	1.0000	1.0000	1.0000	1.0000	1.0000
100	1.0000	0.8214	0.8884	0.8348	0.9420

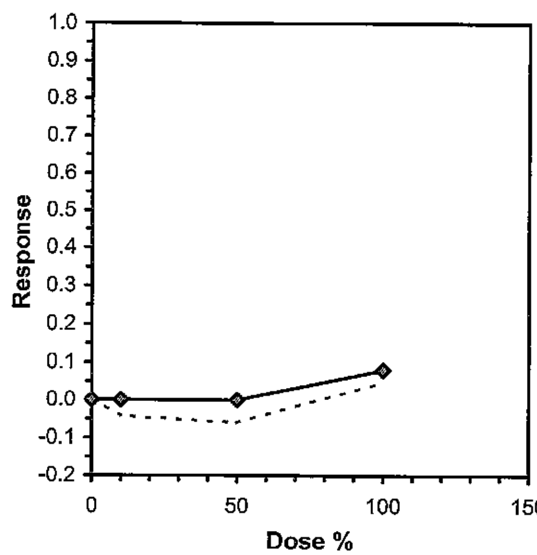
			Transform: Arcsin Square Root					Rank	1-Tailed	Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
Control	0.9429	1.0000	1.3477	1.2446	1.5039	7.849	5			0.9753	1.0000
10	0.9830	1.0426	1.4565	1.3807	1.5374	5.163	5	35.50	17.00	0.9753	1.0000
50	1.0000	1.0606	1.5374	1.5374	1.5374	0.000	5	40.00	17.00	0.9753	1.0000
100	0.8973	0.9517	1.2764	1.1345	1.5374	12.898	5	23.00	17.00	0.8973	0.9200

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.92896	0.868	1.05644	1.66226
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	100	>100		1

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)	Skew
IC05	81.269			
IC10	>100			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			



 ToxCalc v5.0.23 Reviewed by:

Bivalve Larval Survival and Development Test-Proportion Normal

Start Date:	2/15/2023	Test ID:	TN-23-209	Sample ID:	Eco Analysts
End Date:	2/17/2023	Lab ID:		Sample Type:	Elutriate
Sample Date:		Protocol:		Test Species:	MS-Mytilis species
Comments:					

Conc-%	1	2	3	4	5
Control	0.9464	0.9063	0.8929	0.8705	0.9554
10	0.9107	0.9375	0.9330	0.9464	0.9688
50	1.0000	0.9643	1.0000	1.0000	0.9955
100	0.9509	0.7902	0.8393	0.8080	0.8929

			Transform: Arcsin Square Root						1-Tailed			
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD		
Control	0.9143	1.0000	1.2790	1.2027	1.3579	5.178	5				96	1120
10	0.9393	1.0273	1.3250	1.2674	1.3931	3.461	5	-0.988	2.230	0.1038	68	1120
50	0.9920	1.0850	1.4993	1.3807	1.5374	4.529	5	-4.733	2.230	0.1038	9	1120
100	0.8563	0.9365	1.1910	1.0950	1.3473	8.635	5	1.888	2.230	0.1038	161	1120

Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)					0.98103		0.868		0.26127	0.0741
Bartlett's Test indicates equal variances (p = 0.50)					2.3588		11.3449			
Hypothesis Test (1-tail, 0.05)	**NOEC**	**LOEC**	**ChV**	**TU**	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Dunnett's Test	100	>100		1	0.06577	0.07171	0.08409	0.00542	5.4E-05	3, 16

 ToxCalc v5.0.23 Reviewed by: OR

TOXICITY TEST SET-UP BENCH SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-210

TEST ORGANISM INFORMATION

Common Name: BLUE MUSSEL

Scientific Name: *Mytilus sp.*

Lot Number: ME- 097

Source: ARO

Adults Isolated (Time, Date):

Neonates Pulled & Fed (Time, Date):

Acclimation: <4hrs   Age: <4hrs

Culture Water (T/S): 16.0 °C 29.0 ppt

TEST INITIATION

Date	Time	Initials	Activity
2/15/23	0907	TF	Dilutions Made
↓	↓	↓	Test Vessels Filled
↓	1620	↓	Organisms Transferred
	1700	r	Head Counts

TEST SET-UP

Sample Number: AT3-099

Dilution Number: 30 ppt C.S. (LD3-180)

Test Concentration	Volume Test Material	Final Volume
Control	0 ml	100 ml
Site Water (AT3-099)	100 ml	↓

ATS-T26
11/06/00

TOXICITY TEST DATA SHEET

Project Number: EA.TOX
Client: Eco Analysts
QC Test Number: TN-23-210
Test Material: SITE WATER
Accession Number: SEE BENCH SHEET
Dilution Water: 30 PPT C.S.
Accession Number: LD3- 180

TEST ORGANISM
Common Name: BLUE MUSSEL
Scientific Name: *Mytilus sp.*
TARGET VALUES
Temp: 16 °C   DO: ≥4.0 mg/L
pH: 6.0 - 9.0   Salinity: 30±3 ppt
Photoperiod: 16 *l*, 8 *d*   Light Intensity: 50 - 100 fc

Beginning Date: 2/15/23   Time: 1620
Ending Date: 2/17/23   Time: 1630
TEST TYPE: **Static** / Flowthrough
Renewal / **Non-renewal**
Test Container: 30 ml vial
Test Volume: 10 ml
Test Duration: 48 hours

Concentration	Rep	Number of Live Organisms					Temperature (°C)					pH					Dissolved Oxygen (mg/L)					Salinity (ppt)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Control							15.6	16.5	16.5			8.0	8.2	7.8			8.0	8.1	8.0			28.8	29.5	29.4		
Site Water							16.1	16.7	16.7			8.1	8.2	7.8			8.6	8.1	8.0			33.0	33.0	32.3		
(AT3-099)																										
Meter Number							682	682	681			682	682	681			682	682	681			682	682	681		
Time							1028	1241	1455			1028	1241	1455			1028	1241	1455			1028	1241	1455		
Initials							T	T	TP			T	T	TP			TP	TP	TP			T	T	TP		

EPA Test Method: EPA 821-R-02-012 (CHECK ONE)

Ceriodaphnia: 2002.0_____   Fathead: 2000.0_____   Americamysis: 2007._____   Menidia:2006.0_____
Magna/pulex: 2021.0_____   Trout: 2019.0_____   Cyprinodon: 2004.0_____   OTHER: X

BIVALVE DEVELOPMENT TEST
EMBRYO OBSERVATION DATA SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-210

Initial number of embryos: 224

Embryos counted (date, initials): 4/6/23 MD

Test Species

Scientific Name: *Mytilus sp.*

Elutriate: SITE WATER

Accession Number: AT3-099

Lot#: ME-097

Test Concentration	Replicate	Total # Surviving/ Counted	# Normal	# Abnormal
Control	A	208	200	8
	B	212	201	11
	C	214	205	9
	D	220	213	7
	E	193	187	6
Site Water	A	198	188	10
AT3-099	B	206	190	16
	C	215	211	4
	D	230	217	13
	E	209	199	10

TOXICOLOGY LABORATORY CORRECTION BENCH SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-210

Correction Explanations

(a) Technician Error-Mathematical

(b) Technician Error-Manual Data Recording

(c) Technician Error-Head Count Observation

(d) Technician Error-Overwrite

(e) Technician Error-Missing Data

(f) Technician Error-Lost Organism

(g) Technician Error-Transcription Error

(h) Technician Error-Other:

(i) Meter Malfunction

TOXICOLOGY LABORATORY BENCH SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-210

Date/Time/Initials	Comments/Activity

TOXICOLOGY LABORATORY BENCH SHEET - TESTING LOCATION

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-210

Day	Testing Location	Date	Time	Initials
0	51	2/15/23	1620	TO
1	51	2/16/23	1241	TO
2	51	2/17/23	1455	TO
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

Bivalve Larval Survival and Development Test-Proportion Alive

Start Date:	2/15/2023	Test ID:	TN-23-210	Sample ID:	Eco Analysts
End Date:	2/17/2023	Lab ID:		Sample Type:	Site Water
Sample Date:		Protocol:		Test Species:	MS-Mytilis species
Comments:					

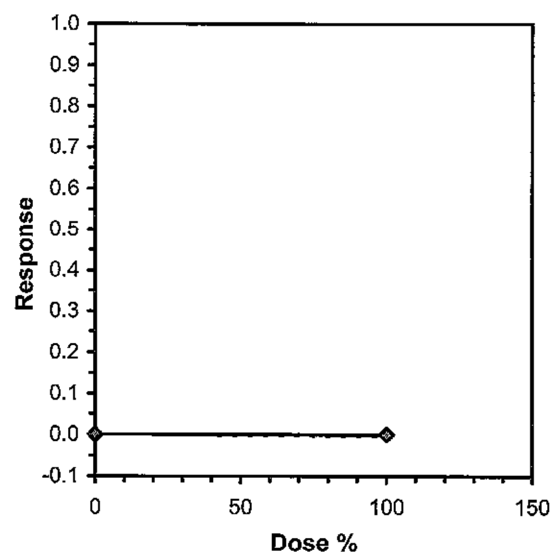
Conc-%	1	2	3	4	5
Control	0.9286	0.9464	0.9554	0.9821	0.8616
100	0.8839	0.9196	0.9598	1.0000	0.9330

			Transform: Arcsin Square Root						1-Tailed		Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.9348	1.0000	1.3244	1.1896	1.4368	6.823	5				0.9371	1.0000
100	0.9393	1.0048	1.3444	1.2231	1.5374	8.920	5	-0.298	1.860	0.1249	0.9371	1.0000

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.95866		0.781		0.57472	0.24716
F-Test indicates equal variances (p = 0.60)	1.76119		23.1545			
Hypothesis Test (1-tail, 0.05)	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Homoscedastic t Test indicates no significant differences	0.07214	0.0767	0.001	0.01127	0.77303	1, 8

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)	Skew
IC05	>100			
IC10	>100			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			



 ToxCalc v5.0.23 Reviewed by:

Bivalve Larval Survival and Development Test-Proportion Normal

Start Date:	2/15/2023	Test ID: TN-23-210	Sample ID:	Eco Analysts
End Date:	2/17/2023	Lab ID:	Sample Type:	Site Water
Sample Date:		Protocol:	Test Species:	MS-Mytilis species
Comments:				

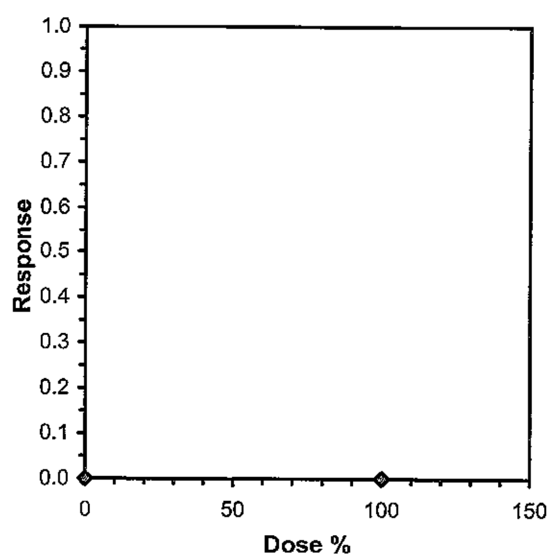
Conc-%	1	2	3	4	5
Control	0.8929	0.8973	0.9152	0.9509	0.8348
100	0.8393	0.8482	0.9420	0.9688	0.8884

			Transform: Arcsin Square Root						1-Tailed		Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.8982	1.0000	1.2514	1.1523	1.3473	5.629	5				0.8982	1.0000
100	0.8973	0.9990	1.2559	1.1583	1.3931	8.101	5	-0.083	1.860	0.1029	0.8973	0.9990

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.93456		0.781		0.32136	-1.0127
F-Test indicates equal variances (p = 0.49)	2.08637		23.1545			
Hypothesis Test (1-tail, 0.05)	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Homoscedastic t Test indicates no significant differences	0.0694	0.077	5.2E-05	0.00766	0.9362	1, 8

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)	Skew
IC05	>100			
IC10	>100			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			



ToxCalc v5.0.23

Reviewed by:

TOXICITY TEST SET-UP BENCH SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-211

TEST ORGANISM INFORMATION

Common Name: BLUE MUSSEL

Scientific Name: *Mytilus sp.*

Lot Number: ME- 097

Source: ARO

Adults Isolated (Time, Date):

Neonates Pulled & Fed (Time, Date):

Acclimation: <24hrs Age: <24hrs

Culture Water (T/S): 16.0 °C 29.0 ppt

TEST INITIATION

Date	Time	Initials	Activity
2/15/23	0910	TP	Dilutions Made
↓	↓	↓	Test Vessels Filled
	1620		Organisms Transferred
	1700	M	Head Counts

TEST SET-UP

Sample Number: SP3-010 1 g/L NH_3-N (0.383 g NH_4Cl / 100 mg DI)

Dilution Number: 30 ppt C.S. (LD3-180)

Test Concentration	Volume Test Material	Final Volume
CONTROL	0 ml	200 ml
0.65 mg/L	0.13 ml	↓
1.5 mg/L	0.30 ml	↓
3.7 mg/L	0.74 ml	↓
10.0 mg/L	2.0 ml	↓
50.0 mg/L	10.0 ml	↓

ACUTE TOXICITY TEST DATA SHEET

Project Number: EA.TOX
Client: Eco Analysts
QC Test Number: TN-23-211
Test Material: 1 g/L NH_3-N
Accession Number: SP3-010
Dilution Water: 30 PPT C.S.
Accession Number: LD3-180

TEST ORGANISM
Common Name: BLUE MUSSEL
Scientific Name: *Mytilus sp.*

TARGET VALUES
Temp: 16±1 °C
pH: 6.0 - 9.0
Photoperiod: 16 *l*, 8 *d*
DO: ≥4.0 mg/L
Salinity: 30±3 ppt
Light Intensity: 50 - 100 fc

Beginning Date: 2/15/23 Time: 1620
Ending Date: 2/17/23 Time: 1630
TEST TYPE: **Static** / Flowthrough
Renewal / **Non-renewal**
Test Container: 30 ml Vial
Test Volume: 10 ml
Test Duration: 48 hours

Concentration	Rep	Number of Live Organisms					Temperature (°C)					pH					Dissolved Oxygen (mg/L)					Salinity (ppt)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Control							16.3	16.6	16.5			8.0	8.2	7.8			8.3	8.2	8.1			28.2	29.5	29.6		
0.65 mg/L							16.1	16.6	16.4			8.1	8.2	7.8			8.3	8.2	8.1			28.5	29.1	28.7		
1.5 mg/L							16.0	16.9	16.6			8.1	8.2	7.9			8.3	8.7	9.0			28.6	29.1	28.6		
3.7 mg/L							16.0	17.0	16.6			8.2	8.2	7.9			8.2	8.2	8.0			28.6	29.1	28.4		
10 mg/L							15.9	17.0	16.6			8.2	8.2	7.9			8.2	8.2	7.9			28.5	29.0	28.4		
50 mg/L							16.0	16.9	16.5			8.2	8.2	7.9			8.3	8.1	7.9			27.7	28.3	28.0		
Meter Number							682	682	681			682	682	681			682	682	681			682	682	681		
Time							1025	1244	1457			1025	1244	1457			1025	1244	1457			1025	1244	1457		
Initials							JP	JP	JP			JP	JP	JP			JP	JP	JP			JP	JP	JP		

EPA Test Method: EPA 821-R-02-012 (CHECK ONE)

Ceriodaphnia: 2002.0_____ Fathead: 2000.0_____ Americamysis: 2007._____ Menidia: 2006.0
Magna/pulex: 2021.0_____ Trout: 2019.0_____ Cyprinodon: 2004.0_____ OTHER: X

BIVALVE DEVELOPMENT TEST
EMBRYO OBSERVATION DATA SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-211

Test Species

Scientific Name: *Mytilus sp.*

Test Material: 1 g/L NH_3-N

Initial number of embryos: 224

Accession Number: SP3- 010

Embryos counted (date, initials): 4/7/23 MD

Test Concentration	Replicate	Total # Surviving/ Counted	# Normal	# Abnormal
CONTROL	A	~~231~~ 233	226	7
	B	238	231	7
	C	~~22~~6	214	12
	D	209	201	8
	E	225	220	5
0.65 mg/L	A	216	210	6
	B	196	186	10
	C	203	199	4
	D	199	191	8
	E	189	182	7
1.5 mg/L	A	207	199	8
	B	204	196	8
	C	216	206	10
	D	204	195	9
	E	219	206	13
3.7 mg/L	A	202	188	14
	B	204	196	8
	C	201	187	14
	D	204	193	11
	E	198	185	13

9 8/7/2023 JR

EA®

BIVALVE DEVELOPMENT TEST
EMBRYO OBSERVATION DATA SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-211

Test Species

Scientific Name: *Mytilus sp.*

Test Material: 1 g/L NH_3-N

Initial number of embryos: NA

Embryos counted (date, initials): 4/7/23 MD

Accession Number: SP3- 010

Test Concentration	Replicate	Total # Surviving/ Counted	# Normal	# Abnormal
10 mg/L	A	59	1	58
	B	64	1	63
	C	62	0	62
	D	39	1	38
	E	49	3	46
50.0 mg/L	A	12	1	11
	B	15	0	15
	C	8	0	8
	D	9	0	9
	E	2	0	2

TOXICOLOGY LABORATORY CORRECTION BENCH SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-211

Correction Explanations

(a) Technician Error-Mathematical

(b) Technician Error-Manual Data Recording

(c) Technician Error-Head Count Observation

(d) Technician Error-Overwrite

(e) Technician Error-Missing Data

(f) Technician Error-Lost Organism

(g) Technician Error-Transcription Error

(h) Technician Error-Other:

(i) Meter Malfunction

TOXICOLOGY LABORATORY BENCH SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-211

Date/Time/Initials	Comments/Activity

ATS-T29
03/01/00

TOXICOLOGY LABORATORY BENCH SHEET - TESTING LOCATION

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-211

Day	Testing Location	Date	Time	Initials
0	51	2/15/23	1620	TG
1	51	2/16/23	1244	TG
2	51	2/17/23	1457	TG
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

Bivalve Larval Survival and Development Test-Proportion Alive

Start Date:	2/15/2023	Test ID:	TN-23-211	Sample ID:	Eco Analysts
End Date:	2/17/2023	Lab ID:		Sample Type:	Ammonia
Sample Date:		Protocol:		Test Species:	MS-Mytilis species
Comments:					

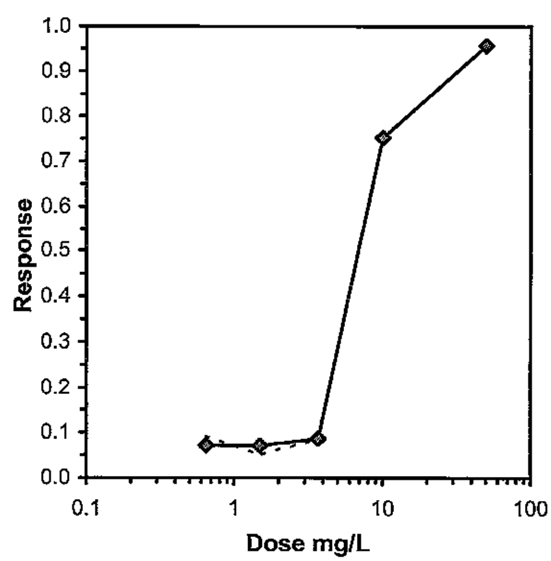
Conc-mg/L	1	2	3	4	5
Control	1.0000	1.0000	1.0000	0.9330	1.0000
0.65	0.9643	0.8750	0.9063	0.8884	0.8438
1.5	0.9241	0.9107	0.9643	0.9107	0.9777
3.7	0.9018	0.9107	0.8973	0.9107	0.8839
10	0.2634	0.2857	0.2768	0.1741	0.2188
50	0.0536	0.0670	0.0357	0.0402	0.0089

			Transform: Arcsin Square Root						1-Tailed		Number	Total
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Resp	Number
Control	0.9866	1.0000	1.4917	1.3090	1.5374	6.846	5				15	1120
*0.65	0.8955	0.9077	1.2489	1.1644	1.3807	6.520	5	5.473	2.360	0.1047	117	1120
*1.5	0.9375	0.9502	1.3256	1.2674	1.4208	5.339	5	3.744	2.360	0.1047	70	1120
*3.7	0.9009	0.9131	1.2509	1.2231	1.2674	1.470	5	5.427	2.360	0.1047	111	1120
*10	0.2438	0.2471	0.5148	0.4304	0.5639	10.834	5	22.015	2.360	0.1047	847	1120
*50	0.0411	0.0416	0.1964	0.0946	0.2618	32.284	5	29.191	2.360	0.1047	1074	1120

Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)					0.96664		0.9		-0.6622	1.23727
Bartlett's Test indicates equal variances (p = 0.14)					8.28922		15.0863			
Hypothesis Test (1-tail, 0.05)	**NOEC**	**LOEC**	**ChV**	**TU**	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Dunnett's Test	<0.65	0.65			0.02716	0.02734	1.35376	0.00492	2.3E-20	5, 24

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%			
5.0%			
10.0%	7.4688	7.1647	7.7857
20.0%	6.9359	6.6822	7.1993
Auto-7.1%	7.6248	7.2938	7.9709



ToxCalc v5.0.23

Reviewed by: ____

Bivalve Larval Survival and Development Test-Proportion Normal

Start Date:	2/15/2023	Test ID:	TN-23-211	Sample ID:	Eco Analysts
End Date:	2/17/2023	Lab ID:		Sample Type:	Ammonia
Sample Date:		Protocol:		Test Species:	MS-Mytilis species
Comments:					

Conc-mg/L	1	2	3	4	5
Control	1.0000	1.0000	0.9554	0.8973	0.9821
0.65	0.9375	0.8304	0.8884	0.8527	0.8125
1.5	0.8884	0.8750	0.9196	0.8705	0.9196
3.7	0.8393	0.8750	0.8348	0.8616	0.8259
10	0.0045	0.0045	0.0000	0.0045	0.0134
50	0.0045	0.0000	0.0000	0.0000	0.0000

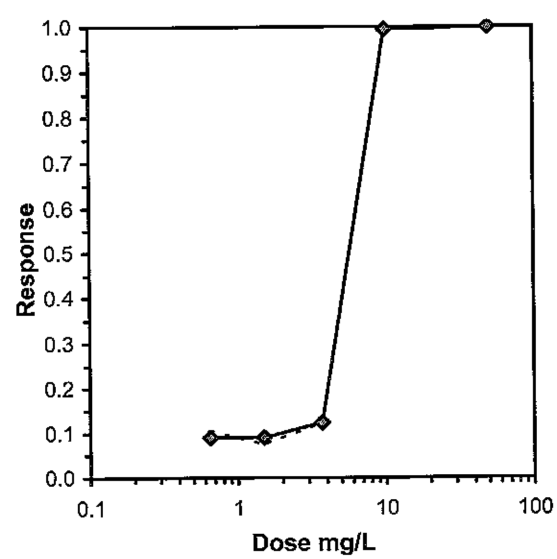
			Transform: Arcsin Square Root					Rank	1-Tailed	Number	Total
Conc-mg/L	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Resp	Number
Control	0.9670	1.0000	1.4228	1.2446	1.5374	8.780	5			37	1120
*0.65	0.8643	0.8938	1.1989	1.1230	1.3181	6.489	5	16.00	16.00	152	1120
1.5	0.8946	0.9252	1.2418	1.2027	1.2834	3.162	5	17.00	16.00	118	1120
*3.7	0.8473	0.8763	1.1700	1.1404	1.2094	2.443	5	15.00	16.00	171	1120
*10	0.0054	0.0055	0.0700	0.0334	0.1160	42.155	5	15.00	16.00	1114	1120
*50	0.0009	0.0009	0.0401	0.0334	0.0669	37.303	5	15.00	16.00	1119	1120

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.92351	0.9	-0.2971	2.44307
Bartlett's Test indicates unequal variances (p = 1.33E-03)	19.8514	15.0863		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	<0.65	0.65		

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%			
5.0%			
10.0%	5.6340	5.4966	5.7749
20.0%	5.6858	5.6127	5.7599
Auto-9.0%	5.5869	5.4508	5.7264



ToxCalc v5.0.23

Reviewed by: [signature]

ATTACHMENT III

Americamysis bahia 96-Hour Elutriate Toxicity Tests
Data Sheets and Statistical Analyses
(14 pages)

TOXICITY TEST SET-UP BENCH SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-212

TEST ORGANISM INFORMATION

Common Name: OPOSSOM SHRIMP

Scientific Name: *Americamysis bahia*

Lot Number: AB- 1218

Source: ABS

Adults Isolated (Time, Date):

Neonates Pulled & Fed (Time, Date):

Acclimation: 24h Age: 5days

Culture Water (T/S): 18.9 °C 27.0 ppt

TEST INITIATION

Date	Time	Initials	Activity
2/15/23	0840	SC	Dilutions Made
↓	↓	↓	Test Vessels Filled
	0951	SC	Organisms Transferred
↓	1049	Tb	Head Counts

TEST SET-UP

Sample Number: AT3-098

Dilution Number: LD3-181 (30 ppt C.S.)

Test Concentration	Volume Test Material	Final Volume
Control	0 ml	1,000 ml
10 %	100 ml	↓
50 %	500 ml	↓
100 %	1,000 ml	↓

ACUTE TOXICITY TEST DATA SHEET

Project Number: EA.TOX
Client: Eco Analysts
QC Test Number: TN-23-212
Test Material: ELUTRIATE
Accession Number: AT3-098
Dilution Water: 30 PPT C.S.
Accession Number: LD3-181

TEST ORGANISM
Common Name: OPOSSUM SHRIMP
Scientific Name: *Americamysis bahia*

TARGET VALUES
Temp: 20±1 °C
pH: 6.0 - 9.0
Photoperiod: 16 *l*, 8 *d*
DO: ≥4.0 mg/L
Salinity: 30±3 ppt
Light Intensity: 50 - 100 fc

Beginning Date: 2/15/23 Time: 0957
Ending Date: 2/19/23 Time: 0926
TEST TYPE: **Static** / Flowthrough
Renewal / **Non-renewal**
Test Container: 1-L BEAKER
Test Volume: 200 ml
Test Duration: 96 hours

Concentration	Rep	Number of Live Organisms 0	24	48	72	96	Temperature (°C) 0	24	48	72	96	pH 0	24	48	72	96	Dissolved Oxygen (mg/L) 0	24	48	72	96	Salinity (ppt) 0	24	48	72	96
CONTROL	A	10	10	10	10	10	19.0	19.2	20.1	19.6	19.3	7.7	8.0	7.9	8.6	7.2	7.7	7.2	6.4	7.3	7.4	29.5	29.9	28.3	29.9	30.1
	B	10	10	10	10	10																				
	C	10	9	10	9	9																				
	D	10	9	9	9	9																				
	E	10	10	10	10	9																				
10%	A	10	10	10	10	10	19.0	19.4	20.0	19.7	19.4	7.8	8.0	7.9	8.1	7.2	7.7	6.5	6.1	6.9	7.1	29.6	29.8	28.5	30.1	30.1
	B	10	10	10	10	10																				
	C	10	10	10	10	9																				
	D	10	10	10	10	10																				
	E	10	10	10	10	10																				
Meter Number							681	682	683	682	681	682	682	683	682	681	682	682	683	682	681	682	682	683	682	682 681
Time		1049	0956	1004	0944	0926	0903	0954	0956	0937	0920	0903	0954	0956	0937	0920	0903	0954	0956	0937	0920	0903	0954	0956	0937	0920
Initials		TP	TP	GL	JL	JL	SL	TP	GL	JL	JL	SL	TP	GL	JL	JL	SL	TP	GL	JL	JL	SL	TP	GL	JL	JL

(b) JL 2/19/23

ATS-T01
12/02/08

EPA Test Method: EPA 821-R-02-012 (CHECK ONE)

Ceriodaphnia: 2002.0____ Fathead: 2000.0____ Americamysis: 2007. X Menidia:2006.0 ____
Magna/pulex: 2021.0____ Trout: 2019.0____ Cyprinodon: 2004.0____ OTHER:____

ACUTE TOXICITY TEST DATA SHEET

Project Number: EA.TOX
Client: Eco Analysts
QC Test Number: TN-23-212
Test Material: ELUTRIATE
Accession Number: AT3-098
Dilution Water: 30 PPT C.S.
Accession Number: LD3- 181

TEST ORGANISM
Common Name: OPOSSUM SHRIMP
Scientific Name: *Americamysis bahia*
TARGET VALUES
Temp: 20±1 °C DO: ≥4.0 mg/L
pH: 6.0 - 9.0 Salinity: 30±3 ppt
Photoperiod: 16 *l*, 8 *d* Light Intensity: 50 - 100 fc

Beginning Date: 2/15/23 Time: 0951
Ending Date: 2/19/23 Time: 0926
TEST TYPE: **Static** / Flowthrough
Renewal / **Non-renewal**
Test Container: 1-L BEAKER
Test Volume: 200 ml
Test Duration: 96 hours

Concentration	Rep	Number of Live Organisms					Temperature (°C)					pH					Dissolved Oxygen (mg/L)					Salinity (ppt)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
50%	A	10	10	10	10	10	19.8	19.3	19.8	19.7	19.3	7.8	8.0	7.8	8.0	7.3	7.6	6.3	5.8	6.7	7.0	31.1	31.2	29.8	31.5	31.3
	B	10	10	10	10	9																				
	C	10	10	10	10	8																				
	D	10	10	10	10	10																				
	E	10	10	10	10	9																				
100%	A	10	10	10	9	9	20.4	19.2	19.8	19.7	19.5	7.8	7.9	7.8	8.0	7.3	7.6	6.4	6.2	6.7	7.3	32.9	32.9	31.6	33.0	33.0
	B	10	10	10	9	8																				
	C	10	10	10	10	9																				
	D	10	10	10	10	10																				
	E	10	10	10	9	9																				

EPA Test Method: EPA 821-R-02-012 (CHECK ONE)

Ceriodaphnia: 2002.0____ Fathead: 2000.0____ Americamysis: 2007. X Menidia:2006.0 ____
Magna/pulex: 2021.0____ Trout: 2019.0____ Cyprinodon: 2004.0____ OTHER:____

TOXICOLOGY LABORATORY CORRECTION BENCH SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-212

Correction Explanations

(a) Technician Error-Mathematical

(b) Technician Error-Manual Data Recording

(c) Technician Error-Head Count Observation

(d) Technician Error-Overwrite

(e) Technician Error-Missing Data

(f) Technician Error-Lost Organism

(g) Technician Error-Transcription Error

(h) Technician Error-Other:

(i) Meter Malfunction

TOXICOLOGY LABOATORY BENCH SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-212

Date/Time/Initials	Comments/Activity
2/15/23 1127 SC	No dead observed

TOXICOLOGY LABORATORY BENCH SHEET - TESTING LOCATION

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-212

Day	Testing Location	Date	Time	Initials
0	SB	2/15/23	0905	SC
1	SB	2/16/23	0957	7b
2	SB	2/17/23	0959	GC
3	SB	2/18/23	0957	JZ
4	SB	2/19/23	0737	JL
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

Acute Test-96 Hr Survival

Start Date:	2/15/2023	Test ID:	TN-23-212	Sample ID:	Eco Analysts
End Date:	2/19/2023	Lab ID:		Sample Type:	Elutriate
Sample Date:		Protocol:		Test Species:	MY-Mysidopsis bahia
Comments:					

Conc-%	1	2	3	4	5
Control	1.0000	1.0000	0.9000	0.9000	0.9000
10	1.0000	1.0000	0.9000	1.0000	1.0000
50	1.0000	0.9000	0.8000	1.0000	0.9000
100	0.9000	0.8000	0.9000	1.0000	0.9000

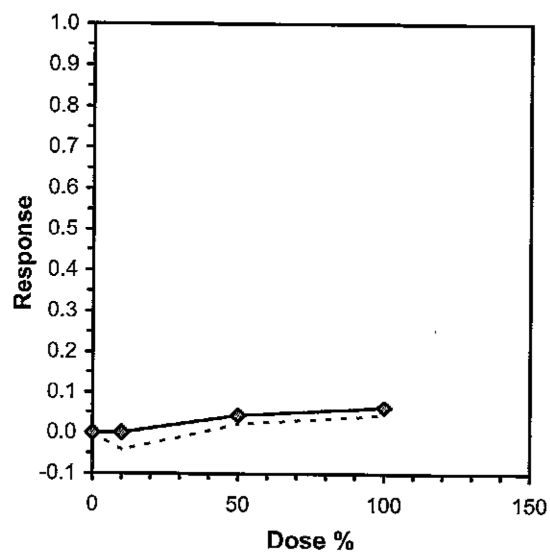
			Transform: Arcsin Square Root						1-Tailed		Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.9400	1.0000	1.3142	1.2490	1.4120	6.792	5				0.9600	1.0000
10	0.9800	1.0426	1.3794	1.2490	1.4120	5.284	5	-1.011	2.230	0.1437	0.9600	1.0000
50	0.9200	0.9787	1.2859	1.1071	1.4120	10.026	5	0.440	2.230	0.1437	0.9200	0.9583
100	0.9000	0.9574	1.2533	1.1071	1.4120	8.613	5	0.946	2.230	0.1437	0.9000	0.9375

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.96751	0.868	-0.1392	-0.5638
Bartlett's Test indicates equal variances (p = 0.74)	1.27199	11.3449		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	100	>100		1	0.08747	0.0935	0.01438	0.01039	0.28366	3, 16

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)	Skew
IC05	70.000			
IC10	>100			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			



ToxCalc v5.0.23

Reviewed by: Ok

TOXICITY TEST SET-UP BENCH SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-213

TEST ORGANISM INFORMATION

Common Name: OPOSSOM SHRIMP	Adults Isolated (Time, Date):
Scientific Name: *Americamysis bahia*	Neonates Pulled & Fed (Time, Date):
Lot Number: AB- 1218	Acclimation: 24h Age: 5 days
Source: ABS	Culture Water (T/S): 18.9 °C 27.0 ppt

TEST INITIATION

Date	Time	Initials	Activity
2/15/23	0928	SC	Dilutions Made
↓	↓	↓	Test Vessels Filled
	0958	SC	Organisms Transferred
↓	1037	TP	Head Counts

TEST SET-UP

Sample Number: AT3-099

Dilution Number: LD3- 181

Test Concentration	Volume Test Material	Final Volume
Control	0 ml	1,000 ml
AT3-099	1,000 ml	↓

EA

ACUTE TOXICITY TEST DATA SHEET

Project Number: EA.TOX
Client: Eco Analysts
QC Test Number: TN-23-213
Test Material: ELUTRIATE
Accession Number: AT3-099
Dilution Water: 30 PPT C.S.
Accession Number: LD3(181

TEST ORGANISM
Common Name: OPOSSUM SHRIMP
Scientific Name: *Americamysis bahia*
TARGET VALUES
Temp: 20±1 °C DO: ≥4.0 mg/L
pH: 6.0 - 9.0 Salinity: 30±3 ppt
Photoperiod: 16 *l*, 8 *d* Light Intensity: 50 - 100 fc

Beginning Date: 2/15/23 Time: 0958
Ending Date: 2/19/23 Time: 0937
TEST TYPE: **Static** / Flowthrough
Renewal / **Non-renewal**
Test Container: 1-L BEAKER
Test Volume: 200 ml
Test Duration: 96 hours

Concentration	Rep	Number of Live Organisms					Temperature (°C)					pH					Dissolved Oxygen (mg/L)					Salinity (ppt)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
CONTROL	A	10	10	10	10	10	19.0	19.4	19.9	19.8	19.9	8.0	7.9	7.9	8.0	7.4	7.7	7.3	6.9	7.1	7.0	29.6	29.8	28.4	27.8	27.4
	B	10	10	10	10	9																				
	C	10	10	10	10	9																				
	D	10	10	10	~~10~~ 9	9																				
	E	10	10	10	~~X~~ 10	10																				
AT3-099	A	10	10	9	9	9	19.0	19.4	19.9	19.8	20.0	8.0	7.9	7.9	8.0	7.4	7.7	6.9	5.9	6.8	6.7	33.0	33.0	31.7	33.0	32.9
	B	10	10	10	10	10																				
	C	10	10	10	9	9																				
	D	10	10	10	10	10																				
	E	10	10	10	10	10																				
Meter Number							682	682	683	682	681	682	682	683	662	681	682	682	683	662	681	682	682	683	682	681
Time		1037	1002	1044	0934	0937	0940	1000	1036	0936	0933	0940	1000	1036	0930	0933	0940	1000	1036	0936	0933	0940	1000	1036	0930	0933
Initials		JP	JP	GL	OR	JL	SL	JP	GL	JL	JL	SL	JP	GL	JL	JL	SL	JP	GL	JL	JL	SL	JP	GL	JL	JL

EA 2/18/23

EPA Test Method: EPA 821-R-02-012 (CHECK ONE)

Ceriodaphnia: 2002.0 ___ Fathead: 2000.0 ___ Americamysis: 2007. X Menidia: 2006.0 ___
Magna/pulex: 2021.0 ___ Trout: 2019.0 ___ Cyprinodon: 2004.0 ___ OTHER: ___

TOXICOLOGY LABORATORY CORRECTION BENCH SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-213

Correction Explanations

(a) Technician Error-Mathematical

(b) Technician Error-Manual Data Recording

(c) Technician Error-Head Count Observation

(d) Technician Error-Overwrite

(e) Technician Error-Missing Data

(f) Technician Error-Lost Organism

(g) Technician Error-Transcription Error

(h) Technician Error-Other:

(i) Meter Malfunction

TOXICOLOGY LABOATORY BENCH SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-213

Date/Time/Initials	Comments/Activity
2/15/23 1130 SC	no dead observed

TOXICOLOGY LABORATORY BENCH SHEET - TESTING LOCATION

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-213

Day	Testing Location	Date	Time	Initials
0	6A	2/15/23	0940	SC
1	6A	2/16/23	1200	[illegible]
2	6A	2/17/23	1048	GC
3	6A	2/18/23	0935	JL
4	6A	2/19/23	0938	JL
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

Acute Test-96 Hr Survival

Start Date:	2/15/2023	Test ID:	TN-23-213	Sample ID:	Eco Analysts
End Date:	2/19/2023	Lab ID:		Sample Type:	Sitewater
Sample Date:		Protocol:		Test Species:	MY-Mysidopsis bahia
Comments:					

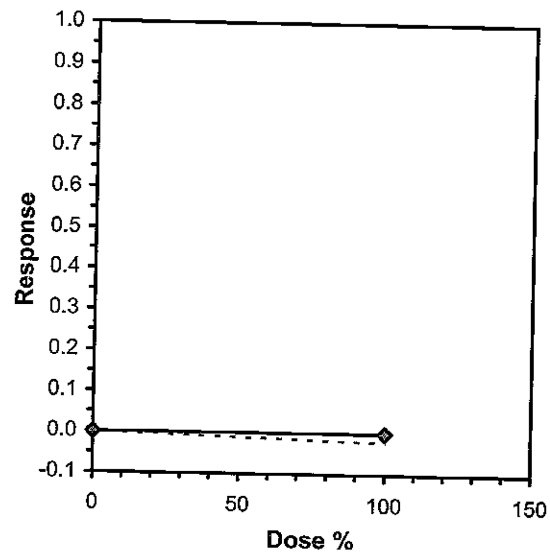
Conc-%	1	2	3	4	5
Control	1.0000	0.9000	0.9000	0.9000	1.0000
100	0.9000	1.0000	0.9000	1.0000	1.0000

			Transform: Arcsin Square Root						1-Tailed		Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.9400	1.0000	1.3142	1.2490	1.4120	6.792	5				0.9500	1.0000
100	0.9600	1.0213	1.3468	1.2490	1.4120	6.628	5	-0.577	1.860	0.1050	0.9500	1.0000

Auxiliary Tests	Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.79894		0.781		0	-2.2768
F-Test indicates equal variances (p = 1.00)	1		23.1545			
Hypothesis Test (1-tail, 0.05)	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Homoscedastic t Test indicates no significant differences	0.06072	0.0649	0.00266	0.00797	0.57958	1, 8

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)	Skew
IC05	>100			
IC10	>100			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			



ToxCalc v5.0.23

Reviewed by: JR

ATTACHMENT IV

Menidia beryllina 96-Hour Elutriate Toxicity Tests
Data Sheets and Statistical Analyses
(15 pages)

TOXICITY TEST SET-UP BENCH SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-214

TEST ORGANISM INFORMATION

Common Name: INLAND SILVERSIDE

Scientific Name: *Menidia beryllina*

Lot Number: MS- 330

Source: ABS

Adults Isolated (Time, Date):

Neonates Pulled & Fed (Time, Date):

Acclimation: 24h   Age: 11 days

Culture Water (T/S): 20.0 °C   27.4 ppt

TEST INITIATION

Date	Time	Initials	Activity
2/15/23	0840	SC	Dilutions Made
↓	↓	↓	Test Vessels Filled
↓	1122	SL	Organisms Transferred
	1155	GL	Head Counts

TEST SET-UP

Sample Number: AT3-098

Dilution Number: LD3-181 (30 ppt C.S.)

Test Concentration	Volume Test Material	Final Volume
Control	0 ml	1,000 ml
10 %	100 ml	↓
50 %	500 ml	↓
100 %	1,000 ml	↓

ACUTE TOXICITY TEST DATA SHEET

Project Number: EA.TOX
Client: Eco Analysts
QC Test Number: TN-23-214
Test Material: ELUTRIATE
Accession Number: AT3-098
Dilution Water: 30 PPT C.S.
Accession Number: LD3-181

TEST ORGANISM
Common Name: INLAND SILVERSIDE
Scientific Name: *Menidia beryllina*

TARGET VALUES
Temp: 20±1 °C
pH: 6.0 - 9.0
Photoperiod: 16 *l*, 8 *d*
DO: ≥4.0 mg/L
Salinity: 30±3 ppt
Light Intensity: 50 - 100 fc

Beginning Date: 2/15/23 Time: 1122
Ending Date: 2/19/23 Time: 1044
TEST TYPE: **Static** / Flowthrough
Renewal / **Non-renewal**
Test Container: 1-L BEAKER
Test Volume: 200 ml
Test Duration: 96 hours

Concentration	Rep	Number of Live Organisms 0	24	48	72	96	Temperature (°C) 0	24	48	72	96	pH 0	24	48	72	96	Dissolved Oxygen (mg/L) 0	24	48	72	96	Salinity (ppt) 0	24	48	72	96
CONTROL	A	10	10	10	10	9	19.0	19.0	20.0	19.6	19.4	7.7	7.9	7.7	8.1	7.8	7.7	7.7	7.1	7.8	7.5	29.5	29.8	28.6	30.0	29.8
	B	10	10	10	9	9																				
	C	10	10	10	10	10																				
	D	10	10	10	10	10																				
	E	10	9	9	9	9																				
10%	A	10	9	8	8	8	19.0	19.1	19.4	19.6	19.5	7.8	7.9	7.9	8.1	7.8	7.7	7.3	6.8	7.7	7.4	29.6	30.0	28.8	30.1	30.0
	B	10	9	8	8	8																				
	C	10	10	10	10	9																				
	D	10	10	10	10	10																				
	E	10	10	10	10	10																				
Meter Number							682	682	683	682	681	682	682 ~~682~~	683	682	681	682	682	683	682	681	682	682	683	682	681
Time		1155	1055	~~1014~~ 1146	1058	1044	0903	1006	1019	1010	1040	0903	1006	1019	1010	1040	0903	1006	1019	1010	1040	0903	1006	1019	1010	1040
Initials		GL	TP	GL	JL	JL	SL	TP	GL	JL	JL	SL	TP	GL	JL	JL	SL	TP	GL	JL	JL	SL	TP	GL	JL	JL

GL 2/17/23

GL 2/15/23

EPA Test Method: EPA 821-R-02-012 (CHECK ONE)

Ceriodaphnia: 2002.0____
Magna/pulex: 2021.0____
Fathead: 2000.0____
Trout: 2019.0____
Americamysis: 2007.____
Cyprinodon: 2004.0____
Menidia:2006.0 X
OTHER:____

ATS-T01
12/02/08

ACUTE TOXICITY TEST DATA SHEET

Project Number: EA.TOX
Client: Eco Analysts
QC Test Number: TN-23-214
Test Material: ELUTRIATE
Accession Number: AT3-098
Dilution Water: 30 PPT C.S.
Accession Number: LD3- 181

TEST ORGANISM
Common Name: INLAND SILVERSIDE
Scientific Name: *Menidia beryllina*

TARGET VALUES
Temp: 20±1 °C DO: ≥4.0 mg/L
pH: 6.0 - 9.0 Salinity: 30±3 ppt
Photoperiod: 16 *l*, 8 *d* Light Intensity: 50 - 100 fc

Beginning Date: 2/15/23 Time: 1122
Ending Date: 2/19/23 Time: 1044
TEST TYPE: **Static** / Flowthrough
Renewal / **Non-renewal**
Test Container: 1-L BEAKER
Test Volume: 200 ml
Test Duration: 96 hours

Concentration	Rep	Number of Live Organisms 0	24	48	72	96	Temperature (°C) 0	24	48	72	96	pH 0	24	48	72	96	Dissolved Oxygen (mg/L) 0	24	48	72	96	Salinity (ppt) 0	24	48	72	96
50%	A	10	9	9	9	9	19.8	19.1	19.4	19.7	19.6	7.8	8.0	7.9	8.1	7.9	7.6	7.3	6.7	7.1	7.3	31.1	31.0	29.9	31.2	31.2
	B	10	10	10	10	10																				
	C	10	9	8	8	8																				
	D	10	10	10	10	10																				
	E	10	9	9	9	9																				
100%	A	10	9	9	8	8	20.4	19.1	19.4	19.6	19.6	7.8	8.0	7.9	8.1	7.8	7.6	7.2	6.7	7.2	7.3	32.9	32.6	31.2	33.0	32.8
	B	10	10	10	10	10																				
	C	10	10	10	10	10																				
	D	10	9	9	9	9																				
	E	10	8	7	7	7																				

EPA Test Method: EPA 821-R-02-012 (CHECK ONE)

Ceriodaphnia: 2002.0____ Fathead: 2000.0____ Americamysis: 2007.____ Menidia:2006.0 X
Magna/pulex: 2021.0____ Trout: 2019.0____ Cyprinodon: 2004.0____ OTHER:____

TOXICOLOGY LABORATORY CORRECTION BENCH SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-214

Correction Explanations

(a) Technician Error-Mathematical

(b) Technician Error-Manual Data Recording

(c) Technician Error-Head Count Observation

(d) Technician Error-Overwrite

(e) Technician Error-Missing Data

(f) Technician Error-Lost Organism

(g) Technician Error-Transcription Error

(h) Technician Error-Other:

(i) Meter Malfunction

TOXICOLOGY LABORATORY BENCH SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-214

Date/Time/Initials	Comments/Activity
2/15/23 1310 SC	no observed dead

TOXICOLOGY LABORATORY BENCH SHEET - TESTING LOCATION

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-214

Day	Testing Location	Date	Time	Initials
0	SA	2/15/23	0905	SL
1	SA	2/16/23	1055	Z
2	SA	2/17/23	1152	GL
3	SA	2/18/23	1013	JL
4	SA	2/19/23	1048	JL
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

Acute Test-96 Hr Survival

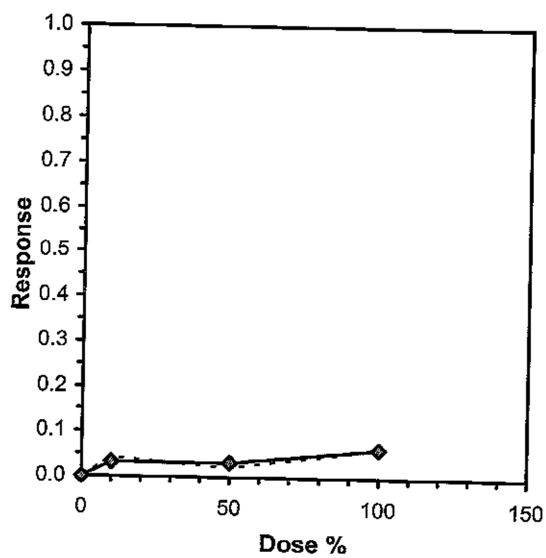
Start Date:	2/15/2023	Test ID:	TN-23-214	Sample ID:	Eco Analysts
End Date:	2/19/2023	Lab ID:		Sample Type:	Elutriate
Sample Date:		Protocol:		Test Species:	MB-Menidia beryllina
Comments:					

Conc-%	1	2	3	4	5
Control	0.9000	0.9000	1.0000	1.0000	0.9000
10	0.8000	0.8000	0.9000	1.0000	1.0000
50	0.9000	1.0000	0.8000	1.0000	0.9000
100	0.8000	1.0000	1.0000	0.9000	0.7000

			Transform: Arcsin Square Root						1-Tailed		Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.9400	1.0000	1.3142	1.2490	1.4120	6.792	5				0.9400	1.0000
10	0.9000	0.9574	1.2575	1.1071	1.4120	12.128	5	0.625	2.230	0.2026	0.9100	0.9681
50	0.9200	0.9787	1.2859	1.1071	1.4120	10.026	5	0.312	2.230	0.2026	0.9100	0.9681
100	0.8800	0.9362	1.2343	0.9912	1.4120	15.085	5	0.880	2.230	0.2026	0.8800	0.9362

Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)					0.93109		0.868		-0.1368	-1.2218
Bartlett's Test indicates equal variances (p = 0.59)					1.91346		11.3449			
Hypothesis Test (1-tail, 0.05)	**NOEC**	**LOEC**	**ChV**	**TU**	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Dunnett's Test	100	>100		1	0.132	0.14109	0.00601	0.02063	0.83102	3, 16

			Linear Interpolation (200 Resamples)	
Point	%	SD	95% CL(Exp)	Skew
IC05	78.333			
IC10	>100			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			



ToxCalc v5.0.23

Reviewed by:

TOXICITY TEST SET-UP BENCH SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-215

TEST ORGANISM INFORMATION	
Common Name: INLAND SILVERSIDE	Adults Isolated (Time, Date):
Scientific Name: *Menidia beryllina*	Neonates Pulled & Fed (Time, Date): 11
Lot Number: MS- 330	Acclimation: 24h Age: ~~12~~ days
Source: ABS	Culture Water (T/S): 19.0 °C 27.4 ppt

(b) 1b 2/15/23

TEST INITIATION			
Date	Time	Initials	Activity
2/15/23	0928	SC	Dilutions Made
↓	↓	↓	Test Vessels Filled
	1103	SC	Organisms Transferred
↓	1151	GL	Head Counts

TEST SET-UP

Sample Number: AT3-099

Dilution Number: LD3-181

Test Concentration	Volume Test Material	Final Volume
Control	0 ml	1,000 ml
AT3-099	1,000 ml	↓

ACUTE TOXICITY TEST DATA SHEET

Project Number: EA.TOX
Client: Eco Analysts
QC Test Number: TN-23-215
Test Material: SITE WATER
Accession Number: AT3-099
Dilution Water: 30 PPT C.S.
Accession Number: LD3-181

TEST ORGANISM
Common Name: INLAND SILVERSIDE
Scientific Name: *Menidia beryllina*

TARGET VALUES
Temp: 20±1 °C DO: ≥4.0 mg/L
pH: 6.0 - 9.0 Salinity: 30±3 ppt
Photoperiod: 16 *l*, 8 *d* Light Intensity: 50 - 100 fc

Beginning Date: 2/15/23 Time: 1103
Ending Date: 2/19/23 Time: 1027
TEST TYPE: **Static** / Flowthrough
Renewal / **Non-renewal**
Test Container: 1-L BEAKER
Test Volume: 200 ml
Test Duration: 96 hours

Concentration	Rep	Number of Live Organisms					Temperature (°C)					pH					Dissolved Oxygen (mg/L)					Salinity (ppt)				
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Control	A	10	10	10	10	10	19.0	19.3	19.4	18.5	20.3	8.0	8.0	7.9	7.9	7.8	7.7	7.4	6.8	7.9	7.3	29.6	29.8	28.7	30.2	29.1
	B	10	10	10	10	10																				
	C	10	10	10	10	10																				
	D	10	10	10	10	10																				
	E	10	10	10	10	10																				
AT3-099	A	10	9	8	8	8	19.0	19.5	19.8	19.7	20.2	8.0	8.0	7.9	7.9	7.8	7.7	7.2	6.7	7.5	7.1	33.0	32.5	31.3	32.7	32.5
	B	10	9	10	8	8																				
	C	10	10	8	8	8																				
	D	10	9	9	9	9																				
	E	10	8	8	8	8																				
Meter Number							682	682	683	682	681	682	682	683	682	681	682	682	683	682	681	682	682	683	682	681
Time		1151	1024	1049	1048	1027	0940	0951	1024	0925	1004	0940	0951	1024	0925	1024	0940	0951	1024	0925	1027	0946	0951	1024	0925	1024
Initials		HSt	JP	GL	JL	JL	SL	JP	GL	JL	JL	SL	JP	GL	JL	JL	SL	JP	GL	JL	JL	SL	JP	GL	JL	JL

GL (b) GL 2/15/23 (b) JL 2/19/23

EPA Test Method: EPA 821-R-02-012 (CHECK ONE)

Ceriodaphnia: 2002.0 Fathead: 2000.0 Americamysis: 2007. Menidia: 2006.0 X
Magna/pulex: 2021.0 Trout: 2019.0 Cyprinodon: 2004.0 OTHER:

ATS-T01
12/02/08

TOXICOLOGY LABORATORY CORRECTION BENCH SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-215

Correction Explanations

(a) Technician Error-Mathematical

(b) Technician Error-Manual Data Recording

(c) Technician Error-Head Count Observation

(d) Technician Error-Overwrite

(e) Technician Error-Missing Data

(f) Technician Error-Lost Organism

(g) Technician Error-Transcription Error

(h) Technician Error-Other:

(i) Meter Malfunction

TOXICOLOGY LABORATORY BENCH SHEET

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-215

Date/Time/Initials	Comments/Activity
2/15/23 1300 SL	no dead observed

ATS-T29
03/01/00

TOXICOLOGY LABORATORY BENCH SHEET - TESTING LOCATION

Project Number: EA.TOX

Client: Eco Analysts

QC Test Number: TN-23-215

Day	Testing Location	Date	Time	Initials
0	6A	2/15/23	0930	SC
1	6A	2/16/23	1026	TP
2	6A	2/17/23	1047	GC
3	6A	2/18/23	0927	JL
4	6A	2/19/23	1027	JL
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

Acute Test-96 Hr Survival

Start Date:	2/15/2023	Test ID:	TN-23-215	Sample ID:	Eco Analysts
End Date:	2/19/2023	Lab ID:		Sample Type:	Sitewater
Sample Date:		Protocol:		Test Species:	MB-Menidia beryllina
Comments:					

Conc-%	1	2	3	4	5
Control	1.0000	1.0000	1.0000	1.0000	1.0000
100	0.8000	0.8000	0.8000	0.9000	0.8000

			Transform: Arcsin Square Root					Rank	1-Tailed	Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical	Mean	N-Mean
Control	1.0000	1.0000	1.4120	1.4120	1.4120	0.000	5			1.0000	1.0000
*100	0.8200	0.8200	1.1355	1.1071	1.2490	5.588	5	15.00	19.00	0.8200	0.8200

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.62485	0.781	2.51558	7.15179
Equality of variance cannot be confirmed				

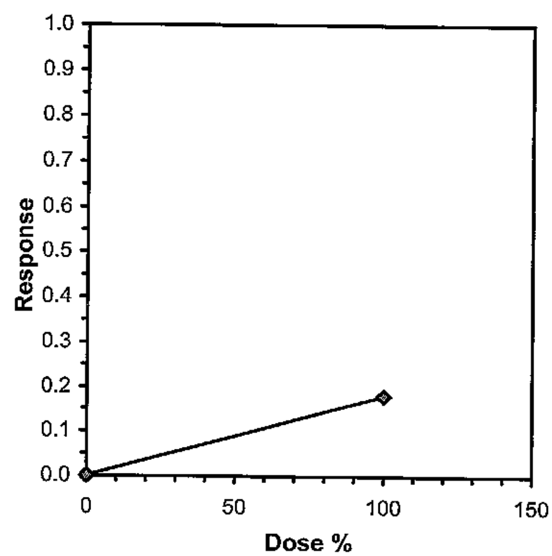
Hypothesis Test (1-tail, 0.05)

Wilcoxon Two-Sample Test indicates significant differences

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)		Skew
IC05*	27.778	3.324	23.333	40.476	1.3377
IC10*	55.556	6.648	46.667	80.952	1.3377
IC15*	83.333				
IC20	>100				
IC25	>100				
IC40	>100				
IC50	>100				

* indicates IC estimate less than the lowest concentration



ToxCalc v5.0.23

Reviewed by: JR

ATTACHMENT V

Report Quality Assurance Records
(2 pages)

REPORT QUALITY ASSURANCE RECORD

Client: Eco Analysts

Author: Michael Chance

Project Number: EA.TOX

EA Report Number: 9259

REPORT CHECKLIST

QA/QC ITEM	REVIEWER	DATE
1. Samples collected, transported, and received according to study plan requirements.		8/1/23
2. Samples prepared and processed according to study plan requirements.		8/1/23
3. Data collected using calibrated instruments and equipment.		8/1/23
4. Calculations checked:		
- Hand calculations checked		8/1/23
- Documented and verified statistical procedure used.		8/1/23
5. Data input/statistical analyses complete and correct.		8/7/2023
6. Reported results and facts checked against original sources.		8/7/2023
7. Data presented in figures and tables correct and in agreement with text.		8/7/2023
8. Results reviewed for compliance with study plan requirements.		8/1/23

9. Commentary reviewed and resolved.

10. All study plan and quality assurance/control requirements have been met and the report is approved:

		DATE
AUTHOR		8/9/23
PROJECT MANAGER		8/9/23
QUALITY CONTROL OFFICER		8/7/2023
SENIOR TECHNICAL OFFICER		8/8/23

ATS-Q8
01/25/02

ATTACHMENT VI

US Army Corps of Engineers Quality Assurance Checklist
(2 pages)

Table II-8: Quality Control Summary for Biological Toxicity Testing only

Method Reference Numbers:

Quality Control (QC) Element	Acceptance Criteria*	Criteria Met? Yes/No	List results outside criteria (Cross-reference results table in data report)	Location of Results (Retained at Lab or in Data Package)
Test condition requirements for each species: Temperature, Salinity, pH, D.O., Ammonia (Total, Un-ionized)	Test conditions within the requirements specified for each species	Yes	N/A	In Data Package
Test species age	Age/health within guidelines for each species (Appendix V)	Yes	N/A	In Data Package
Bulk physical/chemical analyses (If required by the Sampling plan)	Required? If so, performed? Yes or No	N/A	N/A	In Data Package
Water column toxicity test: Control mortality Control abnormality	$\leq$ 10% mean $\leq$ 30% mussel/oyster; $\leq$ 40% clam larvae, $\leq$ 30% sea urchin larvae	Yes	N/A	In Data Package
Sediment toxicity test: Control mortality Compliance with applicable test acceptability requirements in Table 11.3 (EPA 1994a)	$\leq$ 10% mean (no chamber > 20%) See EPA (1994a) Section 9; Table 11.3	N/A	N/A	In Data Package

* The Quality Control Acceptance Criteria are general guidelines. If alternate criteria are used, they must be documented in this table.