Department of Marine Resources
Site Review

Islesboro Marine Enterprises, Inc.
127 Marshall Cove Road
Islesboro, Maine 04848

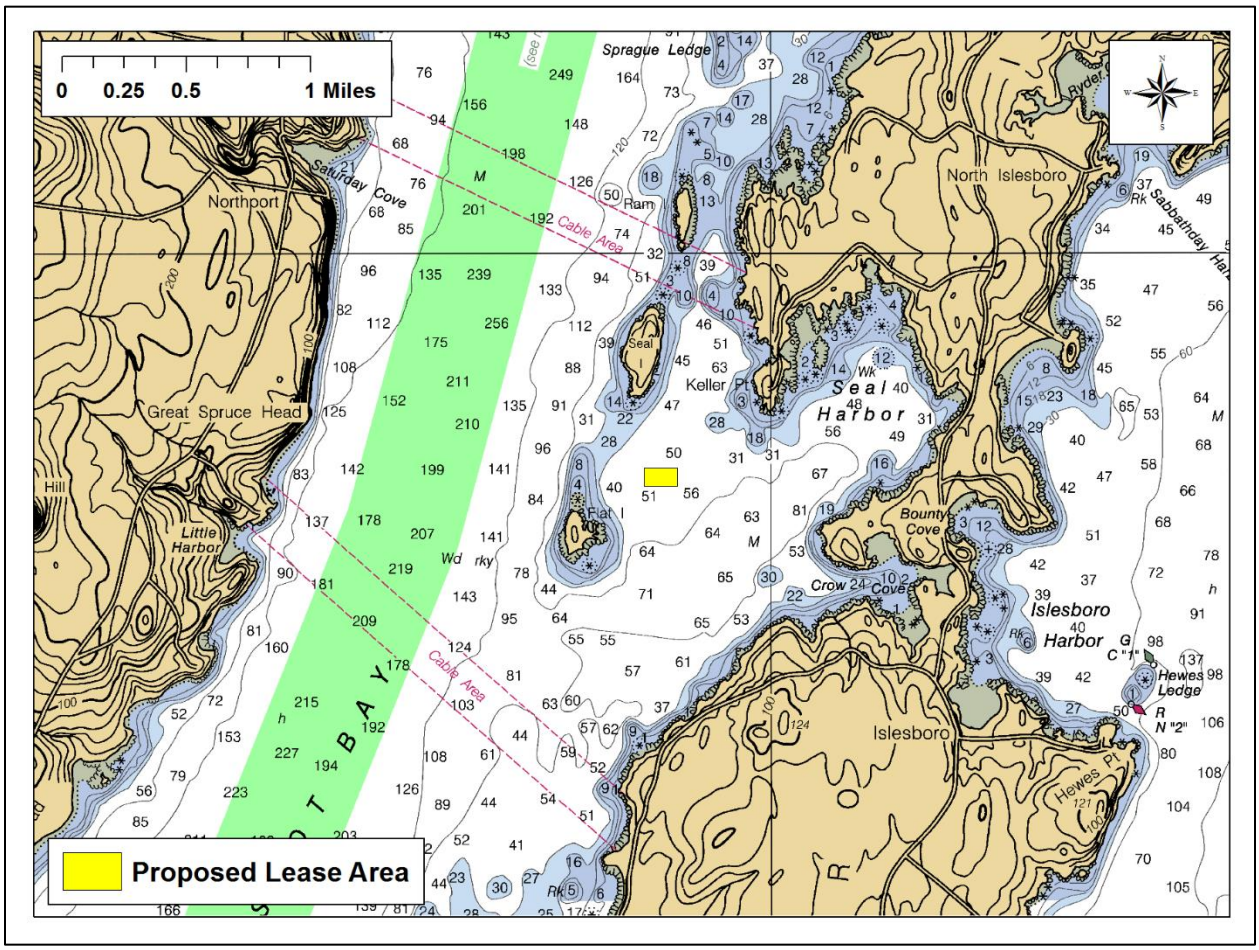


Figure 1: Vicinity map[1]

Location: Northeast of Flat Island, Penobscot Bay, Islesboro, Waldo County, Maine

Purpose: Standard lease for the suspended culture of blue mussels (*Mytilus edulis*), sugar kelp (*Saccharina latissima*), skinny kelp (*Saccharina angustissima*), horsetail kelp (*Laminaria digitata*), winged kelp (*Alaria esculenta*), and dulse (*Palmaria palmata*)

Site Review by: Flora Drury and Cheyenne Adams
Report Preparation by: Cheyenne Adams, Flora Drury, and Marcy Nelson

Report Completed: January 21, 2021

[1] All figures in this report were created in ArcMap version 10.8 using digitized NOAA Nautical Charts or geo-referenced aerial photographs provided by The Maine Office of GIS (orthoCoastalCentralCoast2003and2005).

Application Overview

The applicant, Islesboro Marine Enterprises, Inc., is requesting 6.17 acres[2] northeast of Flat Island in Penobscot Bay for the suspended culture of shellfish and marine algae.[3] The applicant plans to deploy up to 18 rafts (each measuring 40' x 40') for the culture of blue mussels and 16 longlines for the culture of marine algae. Eight 650-foot lines and eight 200-foot lines for the culture of marine algae are proposed.[4] The mussel rafts would be arranged in 6 groups of 3 connected rafts, located in the center of the proposed lease footprint; rafts would be deployed year-round. The marine algae longlines would be arranged with 4 lines parallel to each lease boundary and would be deployed fall through spring.[5]

General Characteristics

On August 3, 2021, Maine Department of Marine Resources (MDMR) Scientists Flora Drury and Cheyenne Adams visited the proposed aquaculture lease site. MDMR staff arrived on site at approximately 10:00 am; the tide was ebbing.

The proposed lease occupies subtidal waters off the west coast of Islesboro, between Seal and Flat Islands (Figure 1). The applicant currently operates an experimental lease in the area that partially overlaps with the proposed lease footprint. Flat Island, located to the southwest of the proposed site, is an undeveloped island owned by the Maine Department of Inland Fisheries and Wildlife (MDIF&W, Image 1). The Flat Island shoreline is composed mostly of rock, with a small beach located on the island's eastern shore. Seal Island, located to the north of the proposed lease site, has a rocky shoreline leading to a forested upland (Image 2). During the site assessment on August 3, 2021, a small mooring field was observed to the north of the proposal and east of Seal Island. During a previous site visit to the area on December 20, 2017, MDMR observed a partially constructed pier, ramps, floats, and moorings on Seal Island's east side (Image 3), which appeared to be completed by the August 3, 2021 site visit. The proposed lease is located to the west of Seal Harbor, Islesboro (Image 4). The Islesboro shoreline is rocky, leading to a residential and forested upland. A publicly-owned pier is located within Seal Harbor.

[2] The application requested 6 acres but MDMR calculations, based on the coordinates provided, indicate that the proposed lease is 6.17 acres
[3] Application, pages 1 & 2
[4] Application, page 6
[5] Application, pages 6 & 7

Image 1: Looking southwest at Flat Island from the southwest corner of the proposed lease site (August 3, 2021).

Image 2: Looking north at Seal Island from the southwest corner of the proposed lease site (August 3, 2021).

Image 3: Ramps, floats, and partially constructed pier located on the eastern shore of Seal Island (December 20, 2017).[6]

Image 4: Looking northeast, towards Keller Point, Seal Harbor, and applicant's experimental lease aquaculture gear from the southwest corner of the proposed lease (August 3, 2021).

[6] Image taken from the site report submitted on January 8, 2018 for the applicant's experimental lease application, which overlaps with the proposal under consideration in this report.

Depth

MDMR collected depths at the proposed lease site on August 3, 2021. Measurements were taken at approximately 10:00 am; high tide was predicted to have occurred at 7:59 am with a height of 8.10 feet (Table 1). Depths at the corners of the proposed lease area ranged from 57.8 feet to 59.4 feet. Correcting for tidal variation derives depths between 51.2 feet and 52.8 at mean low water (MLW, 0.0 feet).

Table 1. Tide predictions for Camden, Penobscot River, Maine (44.2000° N, 69.0500° W)[7]

Date	Time	Height (ft)
08/03/2021	1:52 AM	1.49 L
08/03/2021	7:59 AM	8.10 H
08/03/2021	1:55 PM	2.15 L

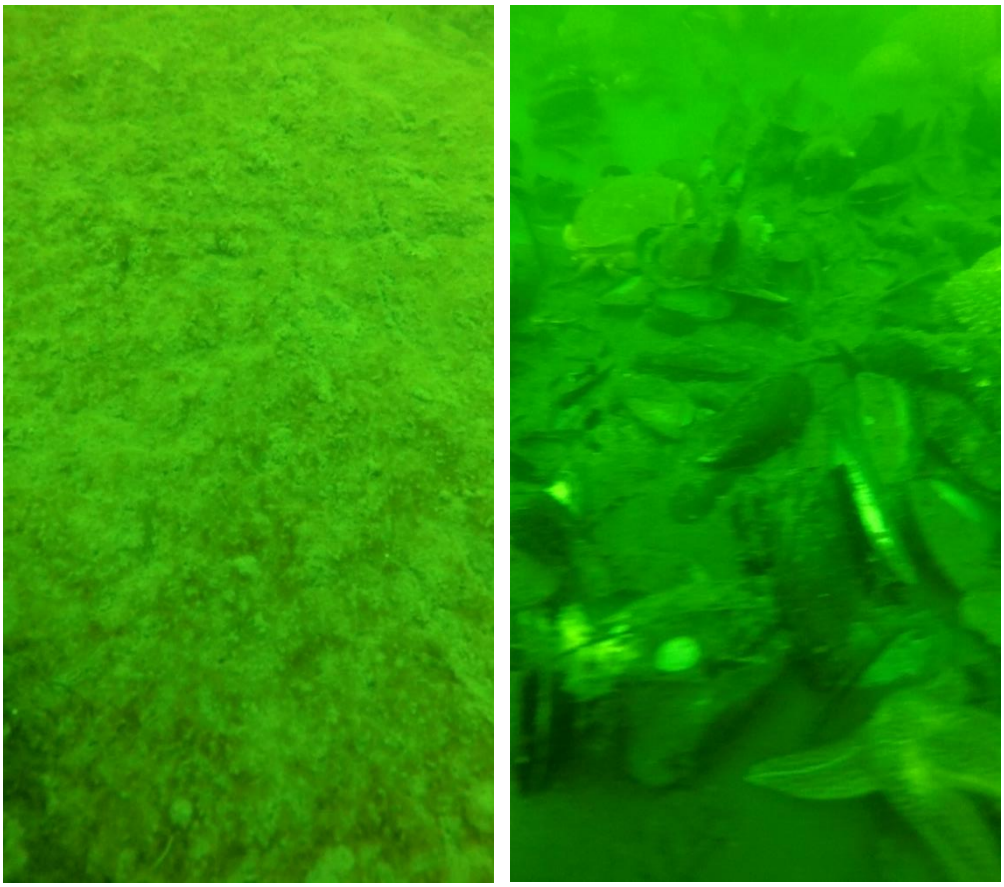
Bottom Characteristics

MDMR staff observed the bottom characteristics of the proposed lease site via two drop camera transects conducted on August 3, 2021 (Figure 2). The sediment was classified using the Coastal and Marine Ecological Classification Standard,[8] a national standard for describing features of the marine environment (Table 2). Sediments were categorized based on visual analysis; no sediment samples were collected, or grain size analyses performed. The bottom of proposed lease is composed of mud (Images 5 and 6) with sections of dense blue mussel shell rubble (Image 7).

Table 2. Substrate classification on proposed lease site.

Substrate Origin	Substrate Class	Substrate Subclass	Substrate Group
Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Mud
Biogenic Substrate	Shell Substrate	Shell Rubble	Mussel Rubble

[7] http://tbone.biol.sc.edu/tide/tideshow.cgi



Images 5 & 6: Bottom of the proposed lease – mud and mud with shell rubble (August 3, 2021).

Image 7: Shell rubble bottom of the proposed lease (August 3, 2021).

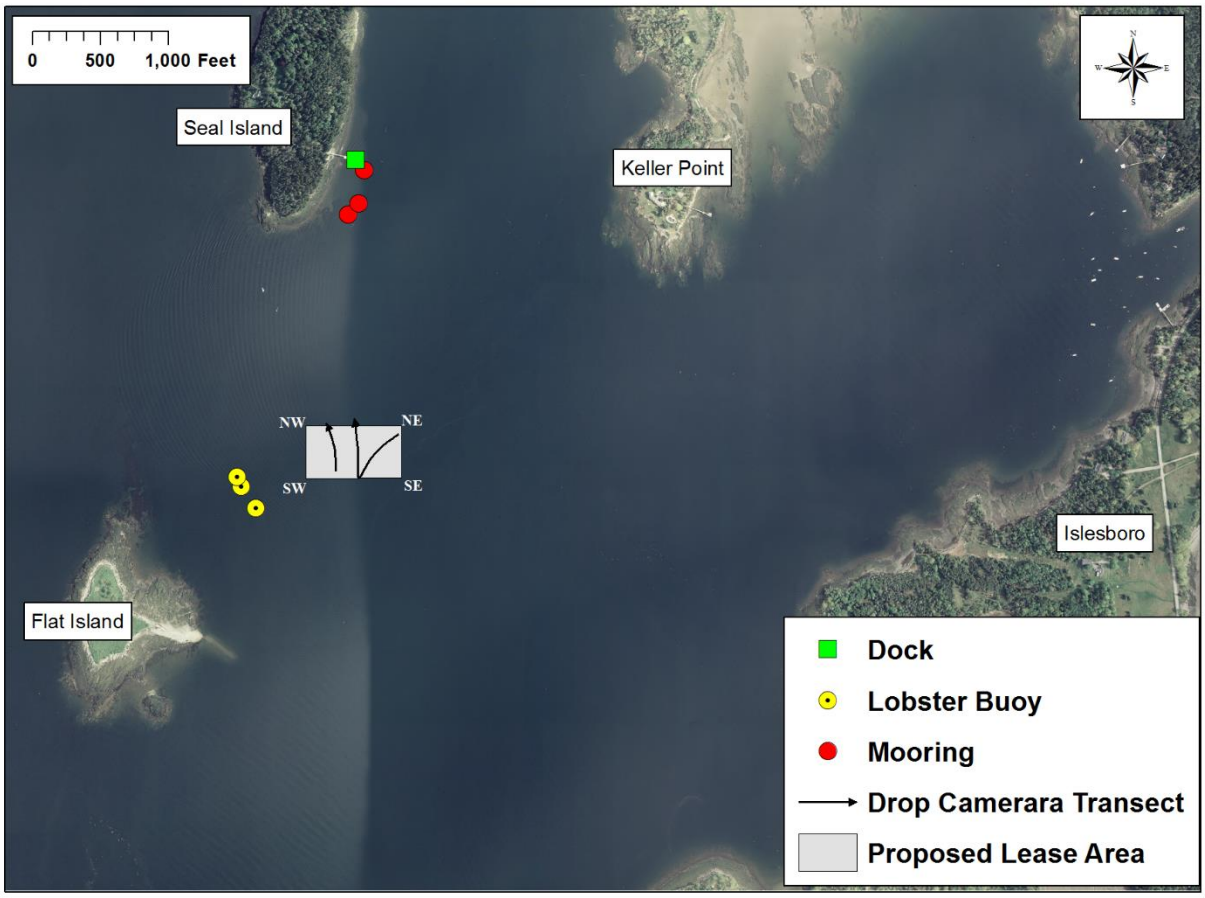


Figure 2. Drop camera transects and nearest observed lobster buoys, moorings, and dock/pier (August 3, 2021)

Position and Distances to Shore

The measuring tool and coordinate geometry (COGO) report tool in ArcMap 10.8 were used to verify the distances and bearings between proposed lease corners. Distances to shore were determined using the measuring tool in ArcMap 10.8, digital orthophotography provided by the Maine Office of GIS, and the application coordinates.

Application Coordinates (WGS84) – 6.17 acres (Figure 2)

Corner	Latitude	Longitude
NW	44° 19.250’ N	68° 55.618’ W *then 382.64 feet at 179.95° True to*
SW	44° 19.187’ N	68° 55.618’ W *then 702.19 feet at 89.95° True to*
SE	44° 19.187’ N	68° 55.457’ W *then 382.64 feet at 359.95° True to*
NE	44° 19.250’ N	68° 55.457’ W *then 702.18 feet at 269.95° True to NW.*

Table 3. Approximate distances from the proposed lease to surrounding features (Figures 1 & 2). Measurements to the mean low water (MLW) line were made using digital orthophotography provided by the Maine Office of GIS (*orthoCoastalCentral2004).*

Feature	Distance
NW Corner to Nearest Point Seal Island (MLW)	~1,440 feet to the north
Northern Boundary to Nearest Observed Seal Island Mooring	~1,550 feet to the north
Northern Boundary to Nearest Observed Pier	~1,950 feet to the north
NE Corner to Keller Point, Nearest Point (MLW)	~2,030 feet to the northeast
SE Corner to Nearest Point Islesboro (MLW)	~3,065 feet to the southeast
SW Corner to Nearest Point Flat Island (MLW)	~1,160 feet to the southwest
SW Corner to Nearest Lobster Buoy observed on August 3, 2021	~430 feet to the southwest
West Boundary to Mainland (MLW)	>1.3 miles to the west

The criteria MDMR uses to determine the suitability of an aquaculture operation to an area (MDMR Regulations Chapter 2.37(1)(A)) are discussed, with respect to the proposal, below:

(1) Riparian Owners Ingress and Egress

There are no riparian landowners within 1,000 feet of the proposed lease site. Flat Island, the nearest land to the proposed lease site, is located approximately 1,160 feet to the southwest. On August 3, 2021 and during a previous visit to the area by MDMR on December 20, 2017, no moorings, piers, or docks were observed on or around Flat Island. It is likely that Flat Island's main access point is the island's only beach, which is located over 1,300 feet from the proposed lease. Due to this distance, it is unlikely that the proposed lease would interfere with riparian ingress and egress of Flat Island.

The nearest moorings observed by MDMR staff on August 3, 2021 were located north of the proposed lease site, off the eastern shore of Seal Island. Approximately 8 moorings were observed in the area to the east of Seal Island, and the closest of these moorings was located 1,550 feet from the proposed lease's northeast corner (Figure 2). Additionally, MDMR staff observed a pier/dock on the eastern shore of Seal Island with a lobster fishing vessel and two smaller motorboats tied to the associated float. During a previous visit to the area by MDMR on December 20, 2017, this pier was observed to be under construction (Image 3). The end of the pier, presumably Seal Island's main access point, is located ~1,950 feet to the northeast of the proposed lease site at the nearest point. It is unlikely that the proposed lease will interfere with riparian ingress and egress to and from Seal Island due to its distance from this island.

(2) Navigation

The proposed lease occupies subtidal water between Seal, Flat, and Islesboro Islands (Figures 1 and 2). During MDMR's site assessment on August 3, 2021, a motoring sailboat was observed to the northeast of the proposal.

A mooring field and town-owned pier are located within Seal Harbor, which is located over 2,000 feet to the east of the proposed lease. Boat traffic entering and exiting Seal Harbor from the main channel that separates Flat Island and Islesboro Island should not be impacted by the proposed lease, as it is proposed to be located over 1,000 feet to the north of the channel. Boats navigating between Flat Island and Seal Island will have more than 600 feet on all sides of the proposal with mean low water depths greater than or equal to those experienced when traveling between the two islands. Vessel traffic entering Seal Harbor from points north of Flat Island would have at least 1,600 feet between the proposal and the 18-foot depth contour around Keller Point, which is more distance than similar depth contours between Flat and Seal Island and between Seal Island and Islesboro.

The Islesboro Harbormaster, in a questionnaire received by MDMR on April 5, 2021, stated that the proposed lease would not adversely affect navigation.

(3) Fishing and Water-Related Uses

During MDMR's site assessment on August 3, 2021, moderate lobster fishing activity was observed to the west of the proposed lease site. Lobster trap buoys were observed to the west, northwest, and southwest of the nearest observed trap buoys, which are shown in Figure 2. Additionally, a few scattered lobster trap buoys were observed between the proposal and Seal Island. Although no lobster trap buoys were observed within the requested lease footprint during the time of MDMR's site assessment, the nearshore lobster fishery in Maine follows the annual migration and molt cycle of lobsters (*Homarus americanus*). Therefore, lobster fishing effort may be present in closer proximity to the site later in the season than when MDMR conducted the site assessment.

The Islesboro Harbormaster, in a questionnaire received by MDMR on April 5, 2021, stated that approximately 12 lobster trap buoys may be affected by the proposed lease operations during the summer months, but that no know conflict has existed between lobstering and the current experimental lease. The Islesboro Harbormaster also stated there would be minimal effects on recreational fishing from the proposal.

(4) Other Aquaculture Uses

The only existing aquaculture site located within one mile of the proposal is the applicant's experimental lease (Figure 3). The nearest lease not associated with the proposal is PEN BB, located over 3.5 miles to the northwest and authorized for the suspended culture of shellfish and marine algae. The nearest Limited Purpose Aquaculture (LPA) site is CTIE220, located over 1.8 miles to the west of the proposal and authorized for the suspended culture of marine algae.

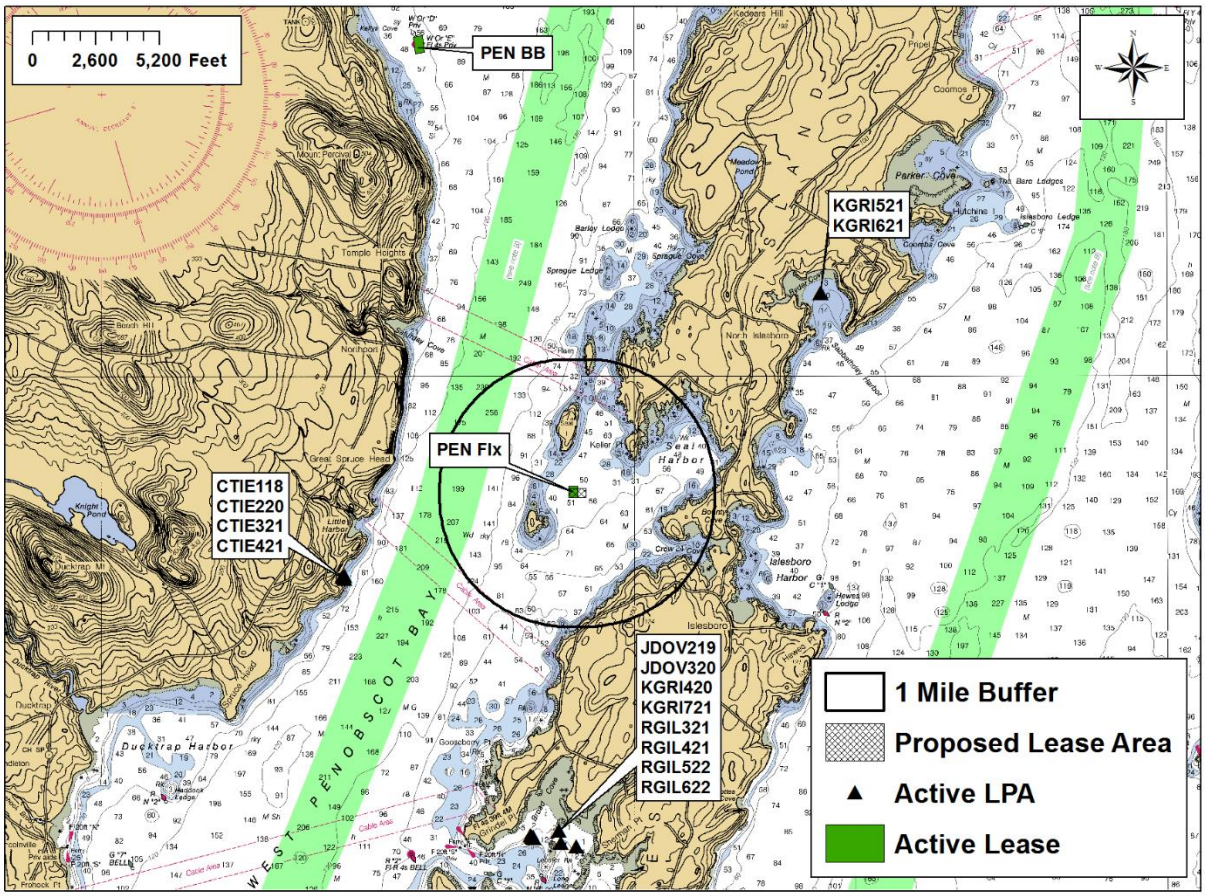


Figure 3: Other aquaculture sites in the vicinity of the proposed lease area.

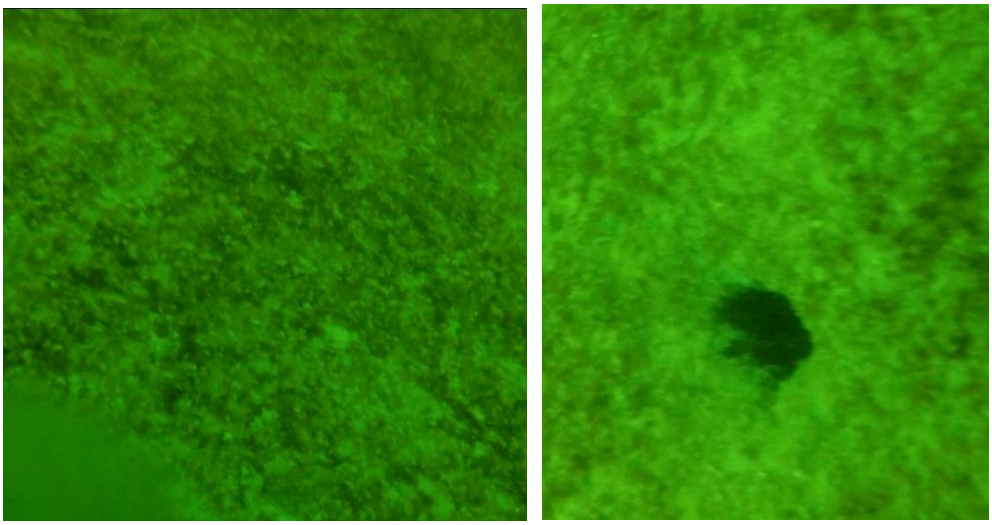
(5) Existing System Support

Epibenthic Flora and Fauna

MDMR staff conducted two drop camera transects within the proposal on August 3, 2021 (Figure 2). The bottom of the proposed lease is composed of semi-soft mud, with abundant blue mussel (*Mytilus edulis*) rubble beneath and near the applicant's existing shellfish rafts. The blue mussel rubble consisted of both living organisms and dead shells; associations of northern sea stars (*Asterias rubens)* and Jonah crabs (*Cancer borealis*) were observed in abundance near shell depositional areas. A single lobster (*Homarus americanus*) was observed in the drop camera footage. Other epibenthic macro flora and fauna observed during the drop camera transects are described in Table 4 (Images 8-11).

Table 4. Species observed in drop camera transects conducted on August 3, 2021.

Species Observed	Abundance
Benthic diatoms	Abundant in areas not beneath or otherwise near shellfish rafts
Blue mussel (*Mytilus edulis*)	Abundant beneath and near shellfish rafts
Northern sea star (*Asterias rubens*)	Abundant beneath and near shellfish rafts
Jonah crab (*Cancer borealis*)	Abundant beneath and near shellfish rafts, rare otherwise
Mud burrows	Common in areas not beneath or near shellfish rafts
Solitary tunicate *(Ciona intestinalis)*	Rare
American lobster (*Homarus americanus*)	Rare



Images 8 & 9: Benthic diatoms and a burrow on the bottom of the proposed lease (August 2, 2021).

Image 10: Solitary tunicate (*C. intestinalis*) on the bottom of the proposed lease (August 3, 2021).

Image 11: Northern sea stars (*A. rubens*) feeding on blue mussels (*M. edulis*) on the bottom of the proposal (August 3, 2021).

Eelgrass

Historical eelgrass (*Zostera marina*) cover data collected by MDMR indicates that, in 2004, no eelgrass was present within the proposed lease (Figure 4). According to these data, the closest eelgrass bed to the proposed lease in 2004 was approximately one mile to the southeast. No eelgrass was observed in the drop camera transects conducted on August 3, 2021. Moreover, the depth of the proposed lease site would likely limit light levels below what is required by eelgrass for photosynthesis.

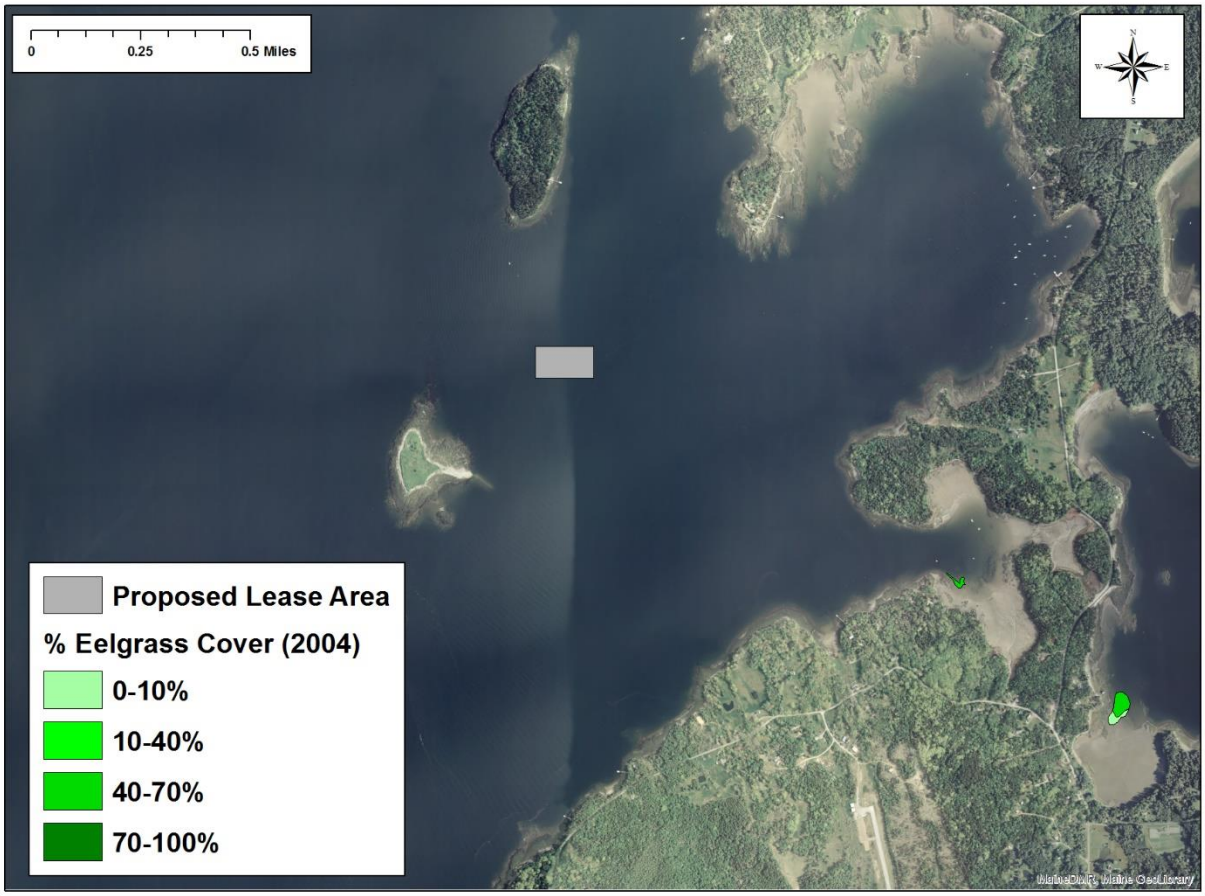


Figure 4: Historical eelgrass (*Z. marina*) distribution in vicinity of proposed lease.[8]

Wildlife

According to GIS (Geographic Information System) data maintained by MDIF&W and available through the Maine Office of GIS, Flat Island, located approximately 1,160 feet to the southwest of the proposed lease, is a Seabird Nesting Island owned by the Maine Department of Inland Fisheries and Wildlife (MDIF&W, Image 1 & Figure 5). The nearest Tidal Wading Bird and Waterfowl Habitat, which is defined as Significant Wildlife Habitat under Maine's Natural Resources Protection Action, is over 3,200 feet to the northeast of the proposal. A buffer associated with a bald eagle (*Haliaeetus leucocephalus*) nest is over 0.8 miles to the north of the proposal. Although bald eagles are no longer

[8] Figure created using data sourced from The Maine Office of GIS (Eelgrass 2010).

recognized in Maine as Species of Special Concern, they are protected by the federal Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c) and the U.S. Fish and Wildlife Service National Bald Eagle Management Guidelines.

On April 2, 2021, MDIF&W responded by email, to a "Request for Agency Review and Comment" and stated that minimal impacts to wildlife are anticipated for this project.[9]

Figure 5: Tidal Wading Bird and Waterfowl Habitat[10], Seabird Nesting Islands,[11] and Bald Eagle Nests[12] in the vicinity of the proposed lease site

(6) Source of Organisms to be Cultured

The applicant proposes to cultivate wild blue mussel (*M. edulis)* seed that has been collected on the proposed lease site. Marine algae seed will be sourced from Atlantic Sea Farms in Saco, Maine.

[9] During review of the applicant's existing experimental lease that partially overlaps with this proposal, MDIF&W submitted a comment requesting that the applicant employ netting that will not cause eider mortality. The application for the current proposal, page 8, states that nets with 4" mesh size would be deployed on each raft, which has been "discussed with MDIF&W as the most effective means for reducing potential conflict with eider duck populations residing on nearby seabird nesting islands."

[10] Data obtained from MDIWF maintained SDE Feature Class "GISVIEW.MEIFW.Twwh"

[11] Data obtained from MDIWF maintained SDE Feature Class "GISVIEW.MEIFW.Sni"

[12] Data obtained from USFWS: https://services.arcgis.com/QVENGdaPbd4LUkLV/ArcGIS/rest/services

(7) Interference with Public Facilities

The proposed lease is not within 1,000 feet of any beach, park, docking facility, or conserved land owned by federal, state, or municipal government. It should be noted that Flat Island, located 1,160 feet to the southwest of the proposed lease, is owned by the State of Maine and designated as a State Wildlife Management Area.

(8) Lighting

The only lights proposed in the application would be employed on navigational markings. Work would not occur beyond daylight hours, with the potential exception of emergency repair work.[13]

(9) Noise

Various vessels, ranging from a 13' skiff to a 55' crane barge, would be equipped with mufflers and used at the site throughout the year. Proposed power equipment includes a generator, washdown pump, conveys, resocking machine, declumper, debysser, and power washer. The application states that sound insulation will be used around powered equipment to reduce noise. Although some activities are seasonally dependent, such as power washing nets in the spring and fall, the proposed use of most power equipment at the site would be year-round.[14]

(10) Visual Impact

Although the height of the crane barge is not provided in the application, the proposed operations appear to comply with MDMR's heigh and visual impact limitations. The crane barge is not proposed for routine use, only the twice-yearly cleaning of nets, and therefore is likely not constrained to the 20-foot height limitation for aquaculture buildings, vessels, barges, and structures (as per MDMR Regulations Chapter 2.37(1)(A)(10)).

[13] Application, page 14
[14] Application, page 14