Department of Marine Resources
Site Review

Ocean Resources, Inc.
David Quinby
Sedgewick, ME 04676

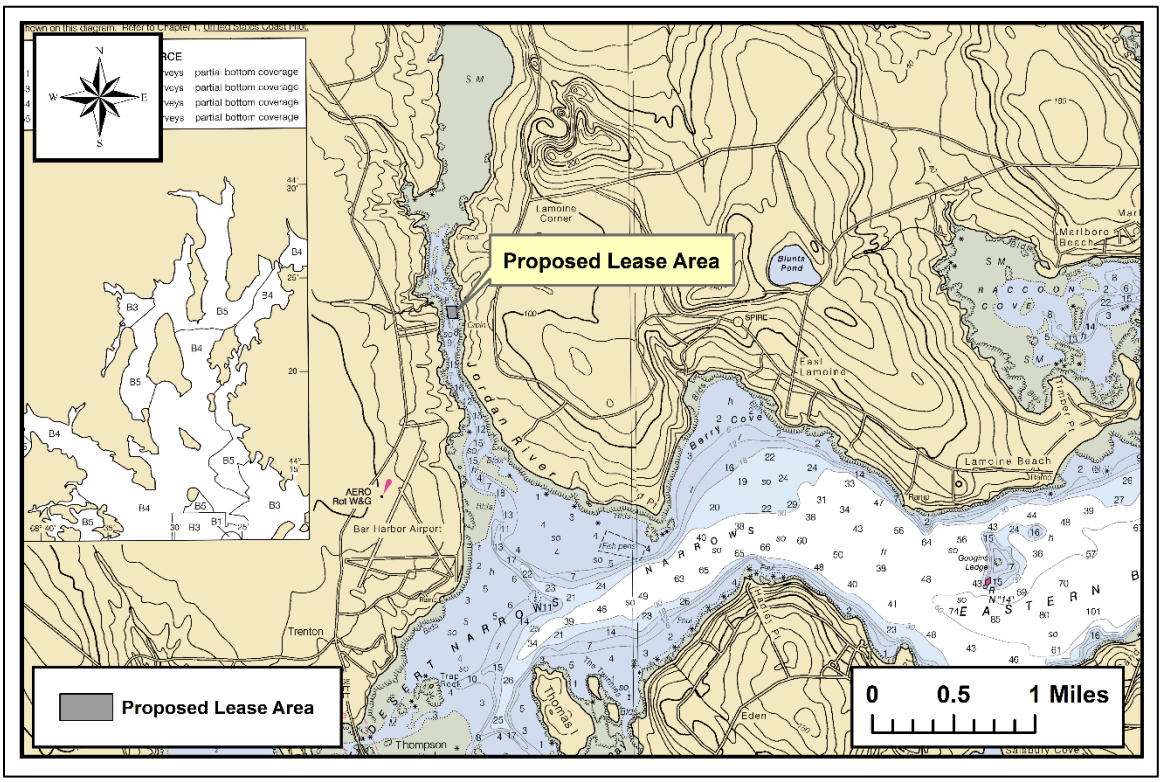


Figure 1: Vicinity map[1]

Location: South of Crippens Brook, Jordan River, Lamoine/Trenton, Hancock County, Maine

Purpose: Standard lease for the suspended culture of American/eastern oysters (*Crassostrea virginica*) and green sea urchins (*Strongylocentrotus droebachiensis*)

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

Report Completed: September 3, 2021

[1]All figures in this report were created in ArcMap version 10.6 using digitized NOAA Nautical Charts or geo-referenced aerial photographs provided by The Maine Office of GIS (orthoCoastalDownEastCoast2008).

Application Overview

The applicant, Ocean Resources, Inc., is requesting 2.94[2] acres south of Crippens Brook in the Jordan River, in both Lamoine and Trenton, for the suspended culture of American/eastern oysters (*Crassostrea virginica*) and green sea urchins (*Strongylocentrotus droebachiensis*). The applicant is requesting to use a maximum of 1,000 mesh-lined lobster traps (36"L x 21.5"W x 13.5"H), deployed on the bottom of the lease site year-round, to culture both American oysters and green sea urchins.[3] The traps would be deployed in approximately 300 sets[4] of 3 traps, with 3 feet between each trap. The applicant proposes to have 18 feet between each set in an east-west direction, and 5 feet between each set in a north-south direction.[5] Each trap would be secured with half of a cinder block.[6] With the exception of corner marker buoys, no gear is proposed to be at the surface of the water.[7]

General Characteristics

On May 27, 2021 Maine Department of Marine Resources (MDMR) Scientists Marcy Nelson, Flora Drury, and Cheyenne Adams visited the proposed lease site. The time of arrival was approximately 9:50 am and the tide was rising. MDMR conducted a second site visit on September 1, 2021 to assess whether eelgrass (*Zostera marina*) was present within the proposed lease boundaries. The proposed lease area occupies subtidal waters in the middle of the Jordan River (Images 1-8). The surrounding shoreline, which features salt marshes and scattered boulders, leads to forested uplands hosting at least 5 residential buildings in the immediate vicinity.

[2] Applicant originally requested 2.96 acres. DMR calculations, based on the coordinates provided by the applicant, indicate the area is 2.94 acres.
[3] Application, pages 6 and 7
[4] Also referred to in the application as "blocks"
[5] Application, pages 9 and 10
[6] Application, page 10
[7] Application, page 9

Image 1: Looking west toward the Trenton shoreline from near the proposed NW corner (May 27, 2021).

Image 2: Looking southwest from near the proposed NW corner (May 27, 2021).

Image 3: Looking south toward the mouth of the Jordan River from near the proposed NW corner (May 27, 2021).

Image 4: Looking southeast toward the mouth of the Jordan River from near the proposed NW corner (May 27, 2021).

Image 5: Looking east at the Lamoine shoreline from near the proposed NW corner (May 27, 2021).

Image 6: Looking northeast from near the proposed NW corner (May 27, 2021).

Image 7: Looking north toward the head of the Jordan River from near the proposed NW corner (May 27, 2021).

Image 8: Looking northwest from near the proposed NW corner (May 27, 2021).

Depth

MDMR staff assessed the proposed lease site at approximately 9:50 am on May 27, 2021 and collected depths using a transom-mounted depth sounder. Predicted high tide for Mount Desert Narrows, Maine was at 12:23 pm on this date (Table 1). At the time of MDMR's site assessment on May 27, 2021, corners of the proposed lease site ranged in depth from approximately 9 to 12 feet. While the site generally slopes deeper from west to east, as depicted by the 1-foot depth contour on NOAA Nautical Charts (Figure 2), the eastern boundary is more shoal than the western boundary due to a sharp decrease in depth at the eastern boundary. Correcting for tidal variation derives water depths approximately 4.8 feet higher (13.8 to 16.8 feet) at the nearest high water and 7.1 feet lower (1.9 to 4.9 feet) at mean low water (MLW, 0.0 feet). Since the proposed bottom cages measure 13.5" in height, and assuming the corners are the most shoal area of the proposal, there would be a minimum of 9.3" of water over the top of the cages at mean low water, which is discussed further in "Section 1: Riparian Ingress and Egress" and "Section 2: Navigation".

Table 1: Tide predictions at Mount Desert Narrow, Maine (44.4333° N, 68.3667° W)[8]

Date	Time	Height (ft)
5/27/2021	6:07 AM	-2.13 L
5/27/2021	12:23 PM	11.87 H
5/27/2021	6:17 PM	-0.5 L

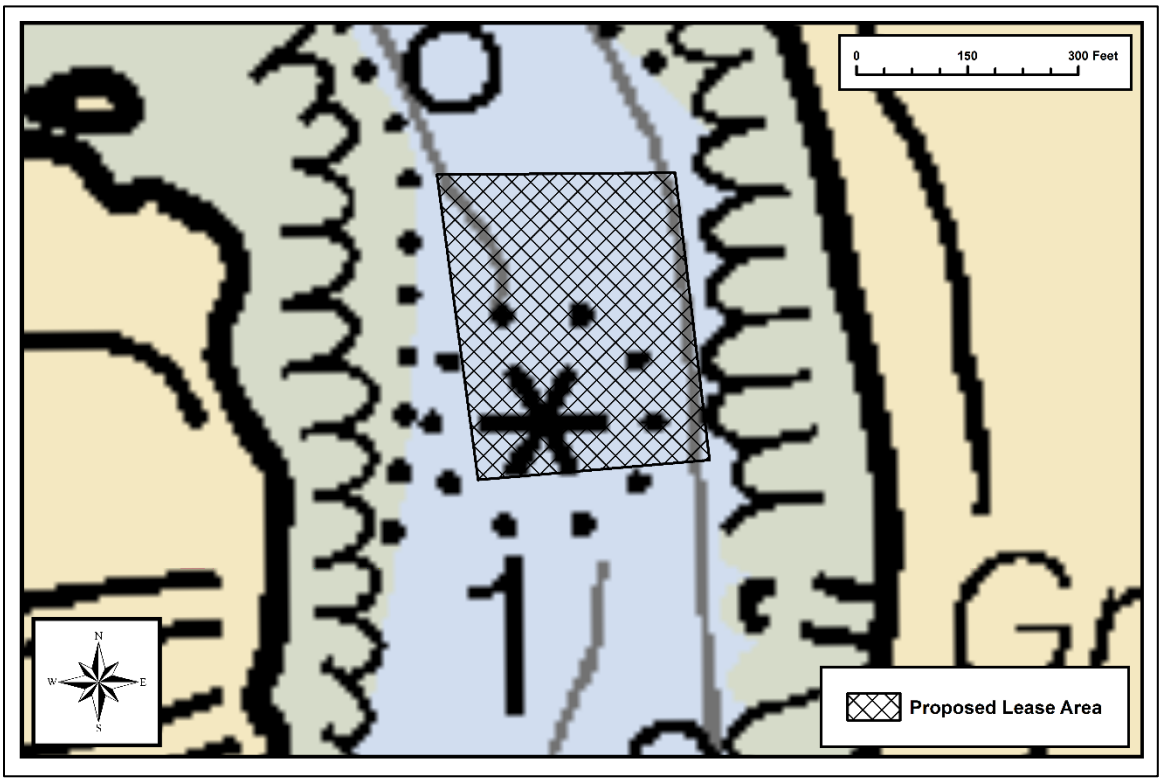


Figure 2: One-foot depth contour on NOAA Nautical Chart bisecting the proposed lease site.

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

Current Speed

During the time of MDMR's site assessment on May 27, 2021, strong northward currents were observed at the proposed lease site. This is likely due to the timing of the site visit, which was conducted roughly halfway between the predicted times of low and high tides, and because of the large tidal range in the region and the narrow width of the Jordan River, which constricts the tidal water masses and increases current speed relative to the nearby Mount Desert Narrows. If the lease were to be granted, these current speeds should be taken into consideration by the applicant when deploying gear in order to ensure that all gear remains securely on the proposed site. This may require additional mooring and tackle gear beyond what was proposed in the application (half of a cinder block per trap).

Bottom Characteristics

MDMR staff observed the bottom characteristics of the proposed lease site via a SCUBA transect on May 27, 2021 (Figure 3) and 2 drop-camera transects on September 1, 2021. Bottom characteristics were categorized using the Coastal and Marine Ecological Classification Standard (CMECS), a national standard for describing features of the marine environment (Table 2). Sediment information was determined based on visual analysis of the video; no sediment samples were taken or grain size analysis performed. The bottom of the proposed lease site is hard substrate composed primarily of pebble, shell rubble and sparse exposed bedrock (Images 9 & 10).

Image 9: Typical bottom of proposed lease site (May 27, 2021).

Image 10: Pebble and shell rubble bottom of proposed lease site (May 27, 2021).

Table 2: Bottom characteristics of proposed site

Substrate Origin	Substrate Class	Substrate Subclass	Substrate Group (Subgroup)
Geologic Substrate	Unconsolidated Mineral Substrate	Course Unconsolidated Substrate	Gravel (Pebble)
Geologic Substrate	Rock	Bedrock	-
Biogenic Substrate	Shell Substrate	Shell Rubble	Mussel Rubble

Position and Distances to Shore

The measuring tool and coordinate geometry (COGO) report tool in ArcMap 10.6 were used to verify the distances and bearings between proposed lease corners. Distances to shore were determined using the measuring tool in ArcMap 10.6, digital orthophotography provided by the Maine Office of GIS, and the application coordinates.

Application Coordinates (WGS84)– 2.94 Acres (Figure 3)

Corner	Latitude	Longitude	
NW	44° 28.131' N	68° 21.370' W	then 321.86 feet at 89.55° True to
NE	44° 28.131' N	68° 21.296' W	then 391.16 feet at 173.16° True to
SE	44° 28.067' N	68° 21.286' W	then 314.11 feet at 265.11° True to
SW	44° 28.063' N	68° 21.358' W	then 416.31 feet at 352.35° True to NW.

Table 3: Approximate distances from proposed lease to surrounding features (Figures 2 & 3). Measurements were made using digital orthophotography provided by the Maine Office of GIS (orthoCoastalDownEastCoast2008).

Feature	Distance
SW-SE Boundary to nearest mooring	~215 feet to the south
SW Corner to western shore of the Jordan River, nearest point (~MLW)	~185 feet to the southwest
SE Corner to eastern shore of the Jordan River, nearest point (~MLW)	~40 feet to the east
SE-NE Boundary to eastern shore of the Jordan River, nearest point (~MLW)	~20 feet to the east
NE Corner to eastern shore of the Jordan River, nearest point (~MLW)	~25 feet to the southeast
NW Corner to western shore of the Jordan River, nearest point (~MLW)	~130 feet to the southwest

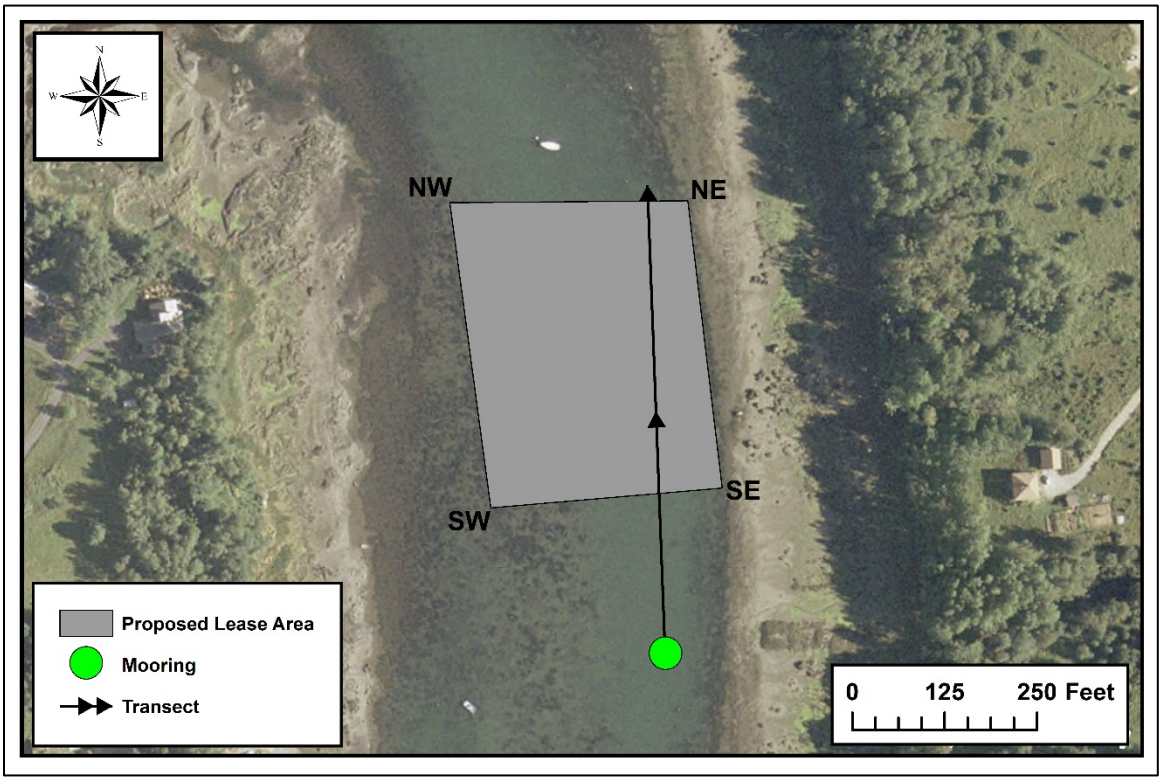


Figure 3: Proposed lease area, observed mooring, and SCUBA transect (May 27, 2021).

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

(1) Riparian Ingress and Egress

On May 27, 2021 one mooring was observed approximately 215 feet to the south of the proposed lease site (Figure 3). Along both the eastern and western shores of the Jordan River, a total of at least 5 residential buildings with beach access were observed. Most of the houses had kayaks and other hand-powered paddle craft stored on the uplands near the shoreline, and many also had shoreline stairs for water access. Additionally, one dock was observed to the northeast of the proposed NE corner.

Although it appears that nearby landowners regularly access the Jordan River via shore launching and landing, it is unlikely the proposal will impede these activities since only bottom gear is proposed to be deployed on the lease site. Additionally, the proposed bottom cages are 13.5" in height and the site is approximately 22.8" deep at MLW at the most shoal proposed corner. Therefore, assuming the corners are the most shoal section of the proposal, a minimum of approximately 9.3" of water would remain over the proposed bottom cages at MLW, which is likely sufficient for the observed paddle craft to transit to and from riparian shorelines. Further discussion of water depth and motorized vessels is addressed in "Section 2: Navigation."

Finally, a minimum of 20 feet would remain free of gear between the eastern boundary of the proposed lease site and the eastern shore of the Jordan River at MLW, if the lease were granted. Although this distance would likely limit motorized vessels and vessels under sail, particularly at lower tidal stages, it is unlikely to prevent access by the paddle craft observed along the shoreline during MDMR's site assessment.

(2) Navigation

During MDMR's site assessment on May 27, 2021, one small motorized vessel was observed navigating within the Jordan River. The vessel was observed south of the proposal and was travelling south. On September 1, 2021, MDMR observed a small motorized vessel which appeared to be fishing north of the proposal and then transited through the proposal. Additionally, one mooring was observed during both site assessments and GPS coordinates collected on May 27, 2021 indicate it is approximately 215 feet to the south of proposed lease. Although no vessel was moored to it at the time of MDMR's site assessments, the presence of the mooring likely indicates some amount of motorized vessel traffic in the immediate vicinity of the proposal. Furthermore, a greater amount of vessel traffic may be present in the area at different times of the year than at the time of MDMR's assessment.

Although the proposed lease area occupies the majority of the river channel, the applicant is proposing to deploy bottom cages only, with each cage measuring 13.5" in height. As described in "Section 1: Riparian Ingress and Egress," there would be a minimum of approximately 9.3" of water over the proposed bottom cages at MLW if the corners are the most shoal section of the proposal. Additionally, the majority of the site, with the exception of the immediate eastern boundary of the proposal, would have a minimum of nearly 3 feet of water over the proposed bottom cages at MLW. Moreover, according to NOAA charts, the depth in the deeper part of the channel is 8 feet at MLW, and therefore approximately 6.9 feet would remain over the top of the cages in this section of the river. Although 3 feet of water depth outside of the deeper part of the channel may not be sufficient for many motorized vessels, particularly during negative tides when this depth would be further reduced, the nearly 7 feet of water available in the deeper channel would likely accommodate most motorized vessels that are expected to navigate in the Jordan River. However, the presence of bottom cages, if the lease were granted, may reduce the navigable area to only the deeper channel of the river for some motorized vessels and/or during lower tidal stages. Additionally, the presence of unmarked bottom cages below the surface of the water may pose a collision risk for unaware boaters, especially in the shallower sections of the proposal.

There is a Seed Mussel Conservation Area to the immediate north of the site (MDMR Regulations Chapter 12.06(B), Figure 4). Commercial aquaculture vessels access this

conservation area for seed collection and occasional storm anchorage. Although the presence of bottom gear would reduce the water depth available for navigating through the proposed lease area to access the Seed Mussel Conservation Area, the water depth at the proposed lease site is greater than in the conservation area. Therefore, vessels that are able to navigate within the conservation area at any particular tidal stage would likely be able to navigate through the proposed lease site, over the proposed bottom gear.

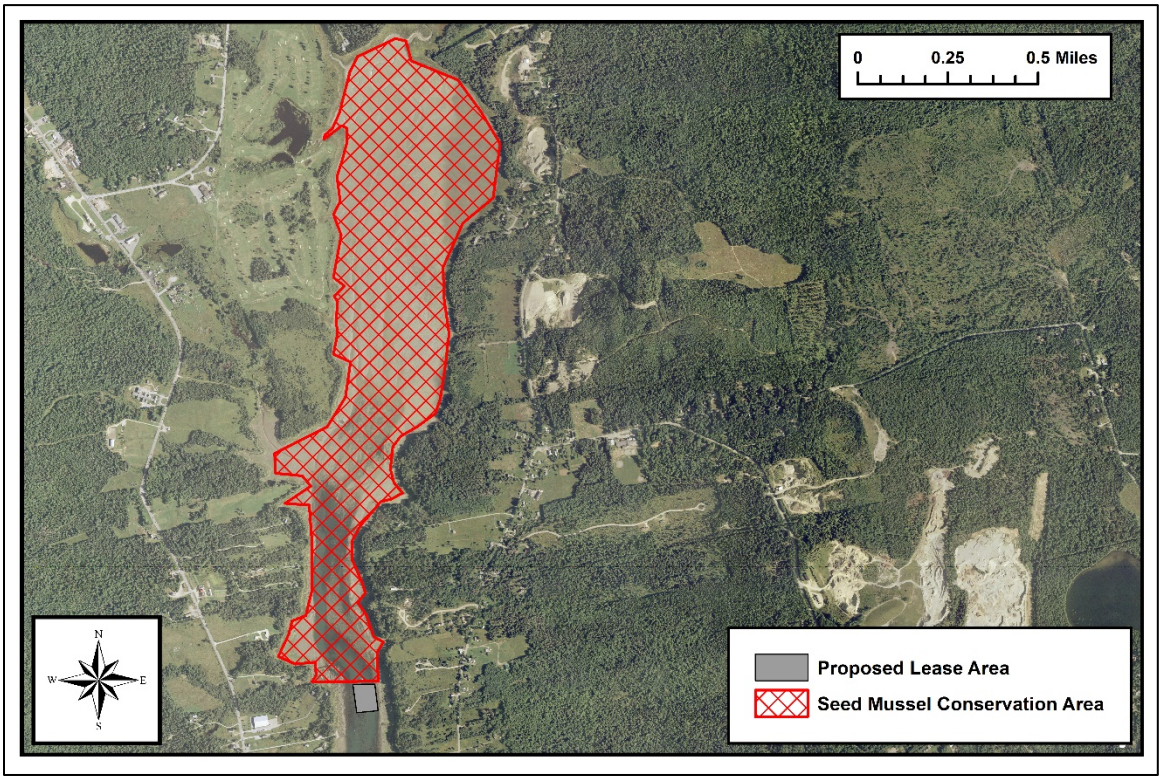


Figure 4: Approximate location of the Seed Mussel Conservation Area to the north of the proposed lease site.

(3) Fishing and Other Uses

During MDMR's site assessment on May 27, 2021, no fishing activity was observed in the immediate vicinity of the proposal. Light lobster (*Homarus americanus)* fishing activity was observed to the south of the proposed lease site, near the mouth of the Jordan River. On September 1, 2021, one recreational fishing vessel observed fishing to the north of the proposal and no lobstering activity was observed in the immediate vicinity. The only commercially valuable species observed in abundance during the underwater assessment was sugar kelp (*Saccharina latissima*).

(4) Other Aquaculture Uses

A Limited Purpose Aquaculture (LPA) license held by James Quinby, the president of Ocean Resources, Inc. is the only existing aquaculture site within 1 mile of the proposal (Figure 5). The nearest aquaculture site associated with an individual other than the applicant is approximately 1.6 miles to the southeast. This lease site is 89.7 acres and is approved for the bottom culture of blue mussels (*Mytilus edulis*). Additionally, vessels associated with aquaculture operations

outside of the Jordan River are known to transit through the proposed lease site to access the Seed Mussel Conservation Area to the immediate north of the proposal for the collection of mussel seed. Although the presence of the proposed bottom gear would reduce the functional depth of the water, it is unlikely to prevent access to the shallower conservation area, as described in "Section 2: Navigation.".

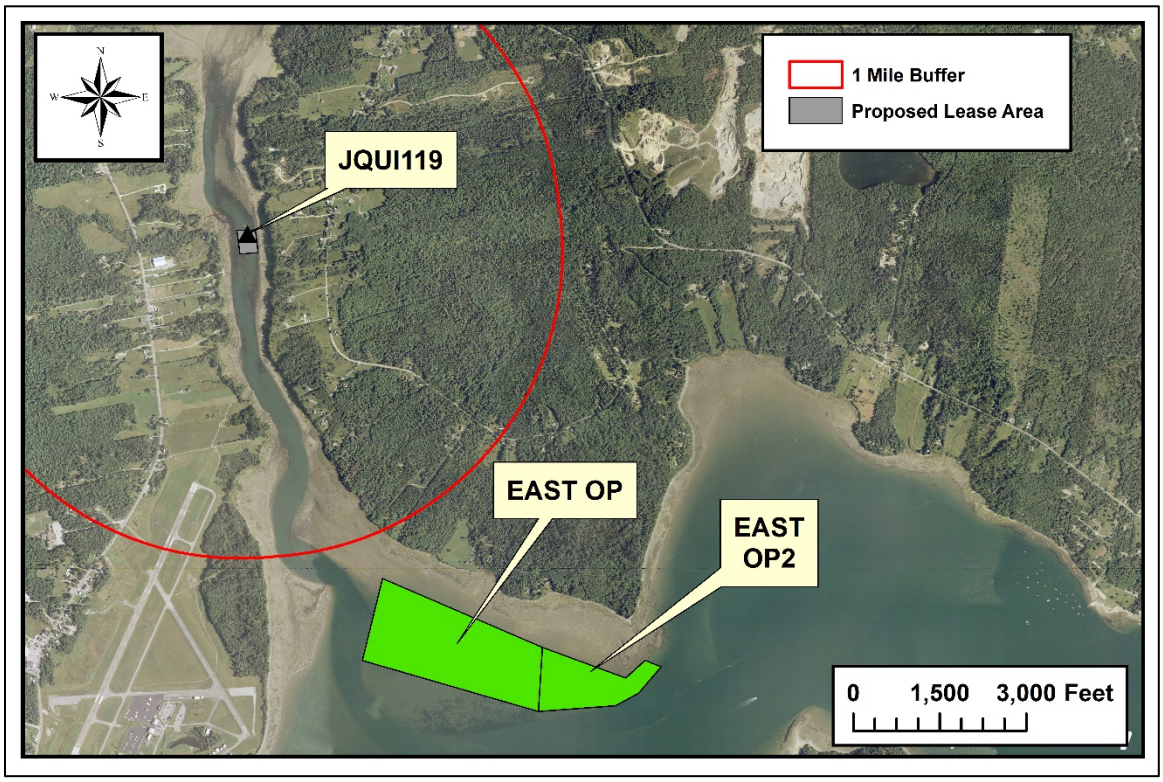


Figure 5: Aquaculture leases and licenses near the proposed lease area.

(5) Existing System Support

Epibenthic Flora and Fauna

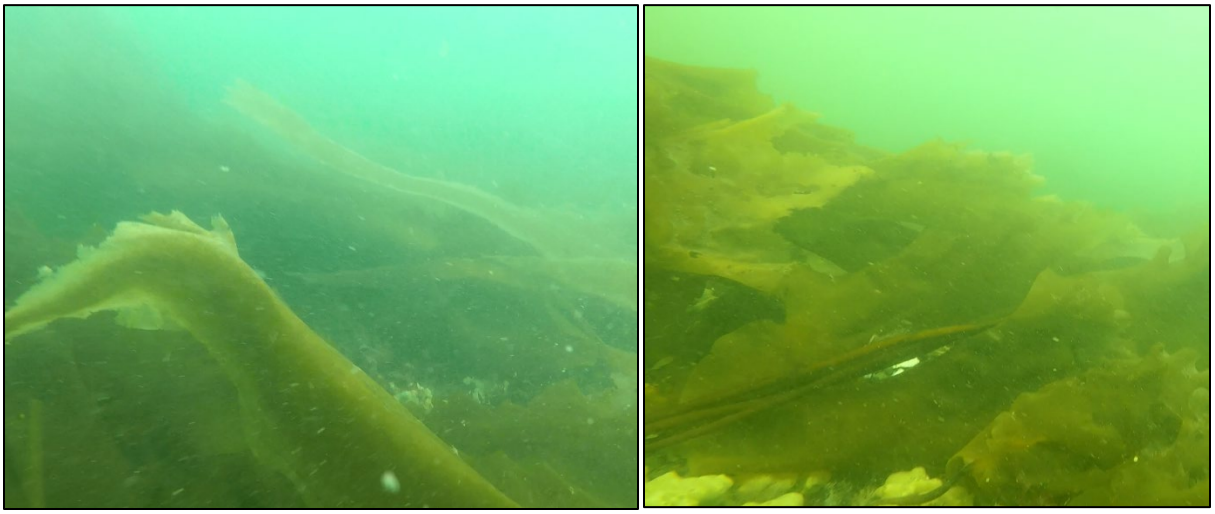
MDMR staff conducted a SCUBA transect on May 27, 2021 and two drop-camera transects on September 1,2021 within the proposed lease site to assess the epibenthic ecology of the area (Figure 3). The bottom substrate of the proposed lease is composed primarily of pebble and shell rubble. The dominant species observed were sugar kelp (*Saccharina latissima,* Images 11 & 12) and a colonial tunicate (*Didemnum sp.,* Image 13). Epibenthic macro flora and fauna observed during the dive transect are described in Table 4.

Sugar kelp is generally recognized as an ecologically significant species in cold-water rocky marine environments. Kelp forests likely play a major role in the global ocean carbon cycle,[9] are important primary producers, provide habitat, export detrital food subsidies, and enhance biodiversity and secondary production.[10] The applicant is proposing bottom gear, which may cause physical damage if placed atop sugar kelp.

[9] Duarte et al. (2004) Major role of marine vegetation on the oceanic carbon cycle. Biogeosciences Discussions 1:659-679
[10] Krumhansel et al. (2016) Global patterns of kelp forest change over the past half-century. PNAS 113:13785-13790

Table 4: Species observed by MDMR divers within the proposed lease site on May 27 and September 1, 2021.

Species	Abundance
Sugar kelp (*Saccharina latissima*)	Abundant in deeper channel; common in shoal areas
Colonial tunicate (*Didemnum sp.*)	Abundant
Coralline algae (*Lithothamnion sp.*)	Common
Irish moss (*Chondrus crispus*)	Common
Various other macroalgae	Occasional
Green crab (*Carcinus maenus*)	Occasional
Dulse (*Palmaria palmata*)	Occasional
Northern sea start (*Asterias rubens*)	Occasional
Sea lettuce (*Ulva lactuca*)	Occasional
Blue Mussel (*Mytilus edulis*)	Rare
Horse Mussel (*Modiolus modiolus*)	Rare
Rockweed (*Ascophyllum nodosum*)	Rare
Moon jelly (*Aurelia aurita*)	Rare



Images 11 & 12: Sugar kelp (*S. latissima*) observed within the proposal (May 27, 2021).

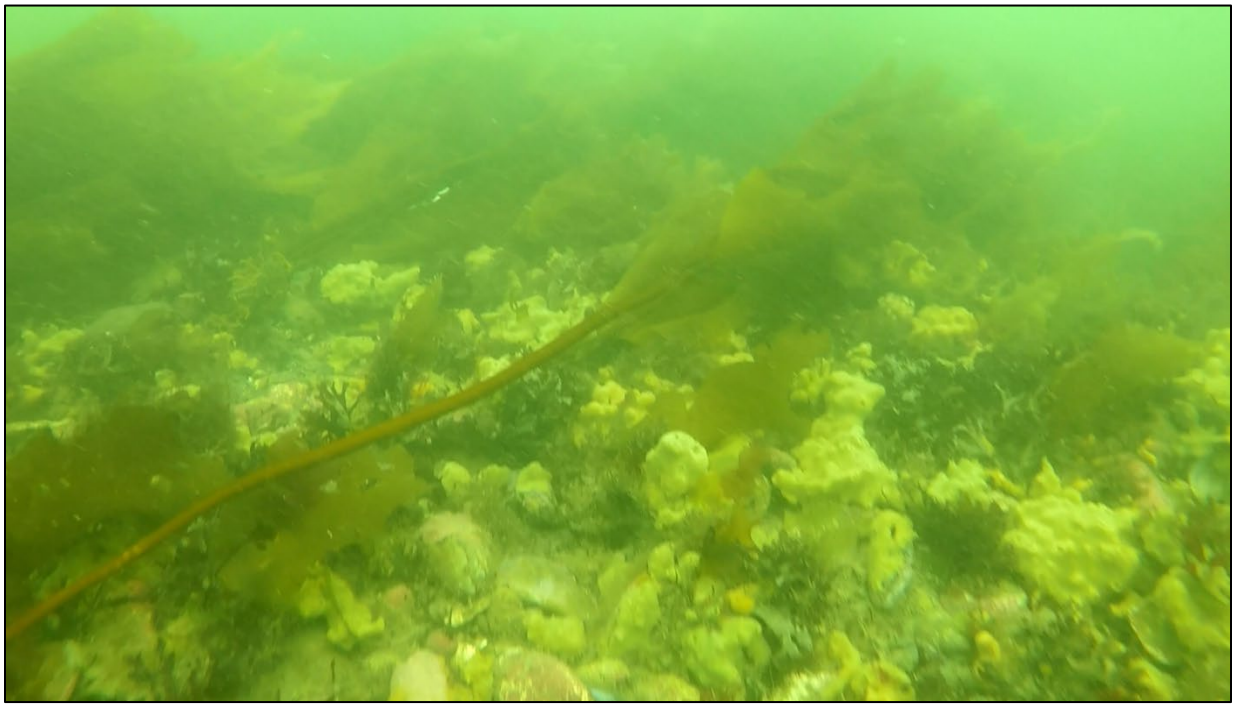


Image 13: Colonial tunicate (*Didemnum sp.*) on the bottom of the proposal (May 27, 2021).

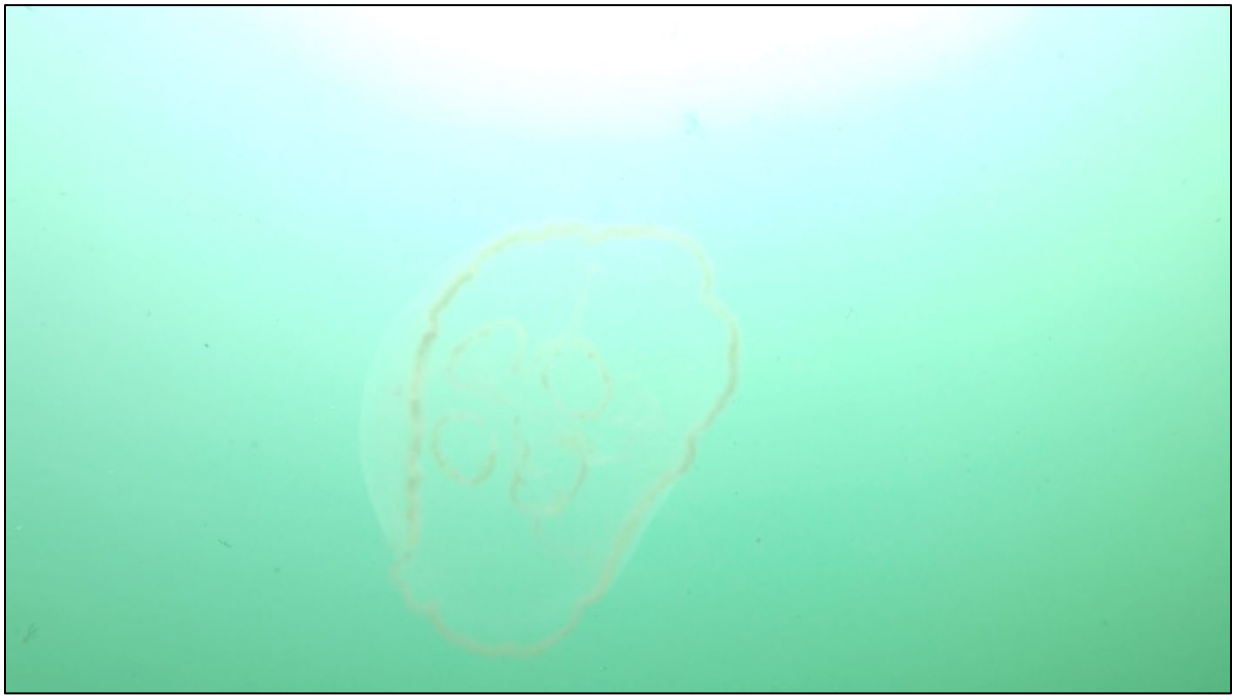


Image 14. Moon jelly (*A. aurelia*) observed within the proposal (May 27, 2021).

Eelgrass (*Zostera marina*)

Historical eelgrass (*Zostera marina*) data collected by The Maine Department of Marine Resources indicates that, in 2008, eelgrass beds were located within the boundaries of the proposed lease (Figure 6). Although no eelgrass was observed during the underwater assessment conducted on May 27, 2021, the SCUBA transect did not overlap with the historically mapped

eelgrass beds. Therefore, MDMR science staff re-visited the site on September 1, 2021 and conducted two drop-camera transects near the eastern and western boundaries of the proposal, through the areas with historical mapped eelgrass beds. Although no eelgrass beds were observed, a few scattered eelgrass blades were present along the western drop-camera transect. It is not clear from the video footage obtained whether these scattered blades were rooted or drifting. MDMR science staff recommend that, if the lease is granted, the applicant make observations for eelgrass before placing any gear on the bottom and maintain a separation of 25 feet or more between submerged gear and any identified patches of eelgrass within the site.

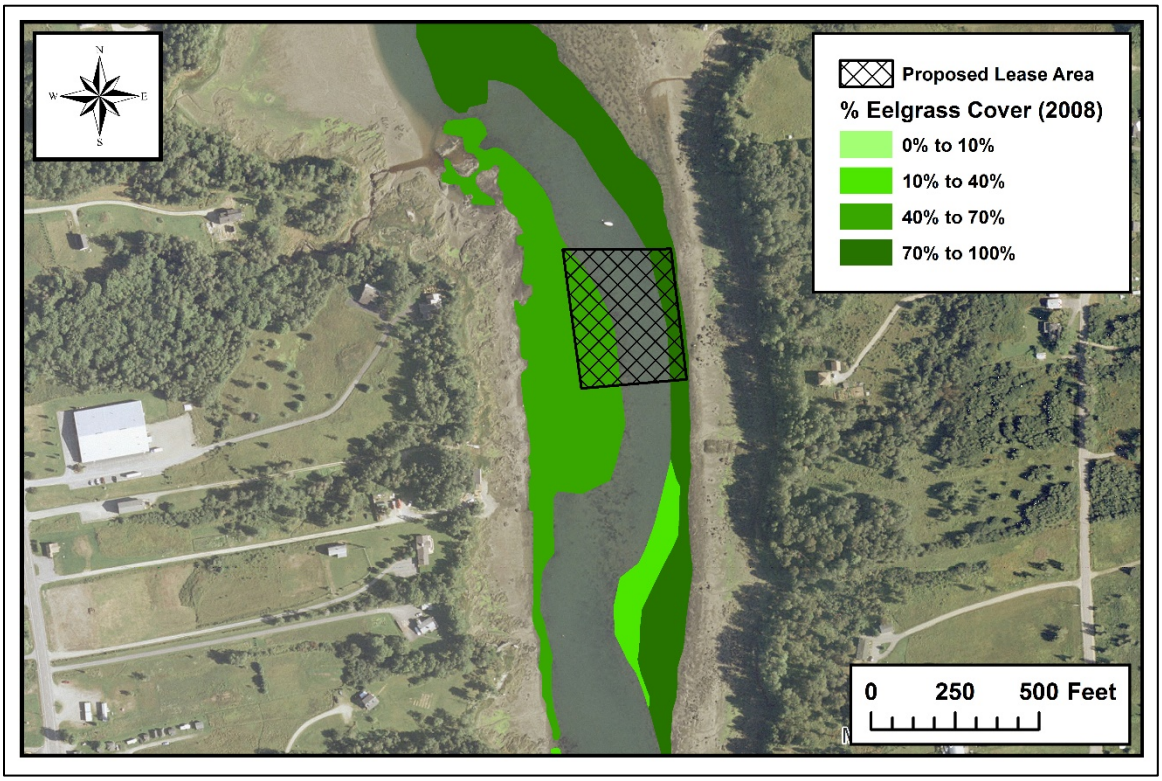


Figure 6: Historical records of eelgrass (*Z. marina*)[11] in the vicinity of the proposed lease site.

Wildlife

According to GIS (Geographic Information System) data maintained by The Maine Department of Inland Fisheries and Wildlife (MDIF&W) and available through the Maine Office of GIS, the proposed lease is located entirely within Tidal Wading Bird and Waterfowl Habitat. Tidal Wading Bird and Waterfowl Habitat is defined under Maine's Natural Resources Protection Act (NRPA) as Significant Wildlife Habitat (Figure 7).

In response to the "Request for Agency Review and Comment" for this proposal, a wildlife biologist for MDIF&W stated in an email dated December 21, 2020:

[11] Data obtained from Maine Department of Marine Resources Open Data "MaineDMR – Eelgrass 2010".

"The proposed aquaculture [lease] is located within Tidal Waterfowl and Wading Bird Habitat. We recommend minimizing the project footprint to the smallest amount possible to minimize impacts to wildlife."

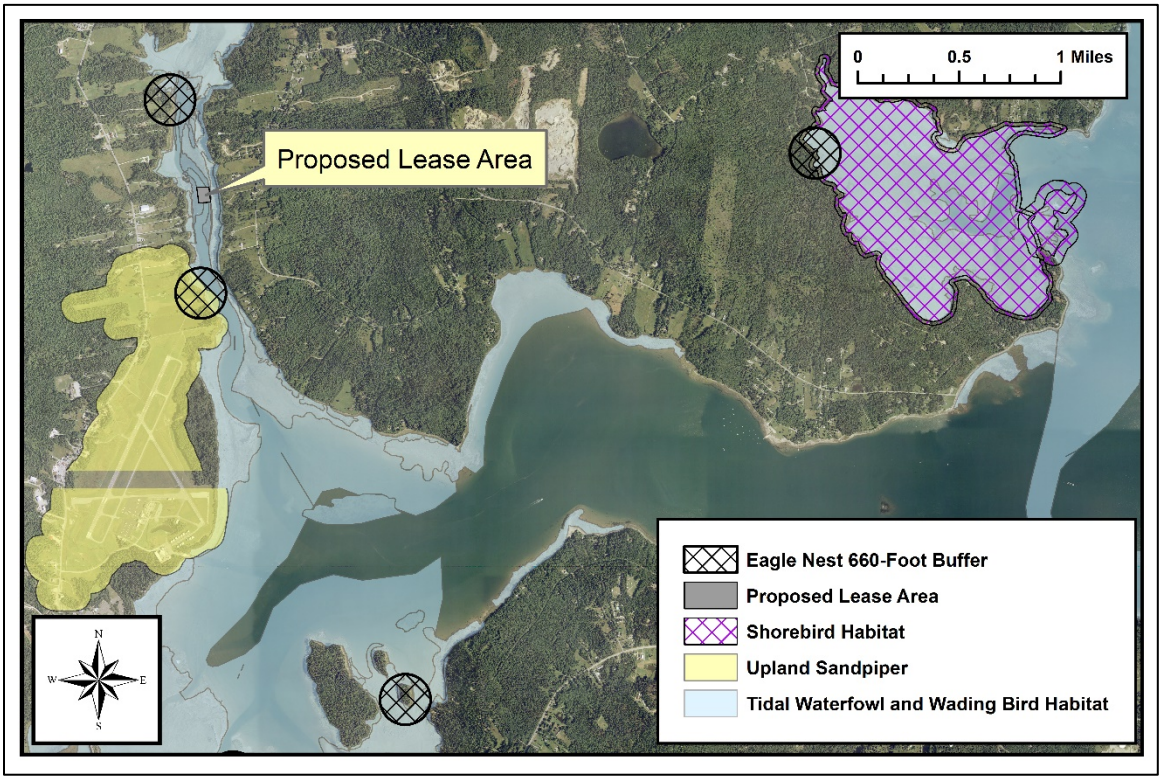


Figure 7: Tidal Wading Bird and Waterfowl[12] and Endangered, Threatened, or Species of Special Concern,[13] Bald Eagle Nests,[14] and Shorebird Habitat[15] near the proposed lease site.

(6) Interference with Public Facilities

The proposed lease is not within 1,000 feet of any beach, park, docking facility, or conserved lands owned by federal, state, or municipal governments (Figure 8).

[12] Data obtained from MDIW&F maintained SDE Feature Class "GISVIEW.MEIFW.Twwh"
[13] Data obtained from MDIW&F maintained SDE Feature Class "GISVIEW.MEIFW.ETSC"
[14] Data obtained from USFWS: https://services.arcgis.com/QVENGdaPbd4LUkLV/ArcGIS/rest/services
[15] Data obtained from MDIW&F maintained SDE Feature Class "GISVIEW.MEIFW.Shorebird"

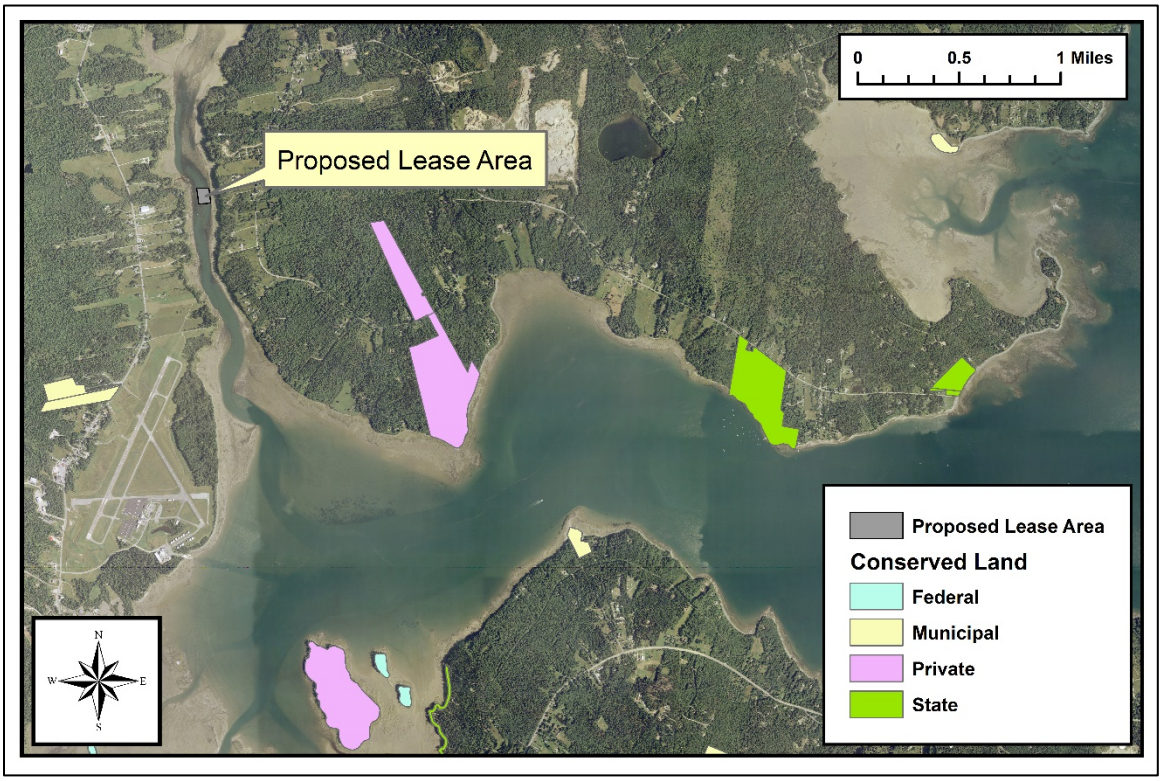


Figure 8: Public facilities near the proposed lease site.[16]

(7) Water Quality

The proposed lease area is currently classified as "Open/Approved" by the MDMR Bureau of Public Health for the harvest of shellfish.

(8) Lighting

According to the application, no lights would be used on site.[17]

(9) Noise

The proposed lease would be accessed and serviced by a 23-foot inboard/outboard vessel. No power equipment is proposed.[18]

(10) Visual Impact

The proposed aquaculture operations comply with the MDMR's height and visual impact limitations.

[16] Data obtained from SDE Feature Class sourced from The Maine Office of GIS "GISVIEW.MECONSLANDS.Conserved_Lands"
[17] Application, page 14
[18] Application, page 14