

Figure 1: Vicinity map¹

Location: East side of mouth of Broad Cove, Casco Bay, Yarmouth, Cumberland County, Maine

Purpose: Standard lease for the suspended culture of American/eastern oysters (*Crassostrea virginica*), sea scallops (*Placopecten magellanicus*), and hard clams (*Mercenaria mercenaria*)

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

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

Report Completed: April 9, 2021

¹All 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 (*orthoCoastalCascoBay2013*).

Application Overview

The applicant, Thomas Henninger, is requesting 5.99² acres on the east side of the mouth of Broad Cove, Casco Bay, in the Town of Yarmouth, for the suspended culture of American/eastern oysters (*Crassostrea virginica*), sea scallops (*Placopecten magellanicus*), and hard clams (*Mercenaria mercenaria*).³ The applicant proposes to use OysterGro® (41" W x 68" L x 22" D) and bottom cages (36" W x 48" L x 48" H) for the cultivation of all three species, and lantern nets (30" diameter x 7' H) for the cultivation of sea scallops only. Additionally, one bird deterrent kite (18' pole with 22" kite)⁴ and a work float (15' x 30') supporting a tumbler/sorter would be deployed at the site. Longlines of gear would be oriented SE to NW, with approximately 14 rows of floating cages/lantern nets and 2 rows of bottom cages, and a minimum of 15' between rows.⁵ Lantern nets would be suspended approximately 1' beneath the surface of the water.⁶ During winter months, scallops would be transferred to bottom cages, OysterGro cages would be sunk to the bottom, and all lantern nets would be removed.⁷

General Characteristics

On October 2, 2020, Maine Department of Marine Resources (MDMR) staff Marcy Nelson, Flora Drury, and Cheyenne Adams visited the proposed lease site. MDMR staff arrived on site at approximately 10:30 am; the tide was flooding.

The proposed lease occupies subtidal waters in Broad Cove, Casco Bay (Figure 1, Images 1-6). The Broad Cove shoreline is composed of rocks, sand, and mud; at low water, extensive mudflats are exposed near the head of Broad Cove. The surrounding uplands are composed of a mixed forest and residential buildings. A town-owned dock and mooring field is located to the northwest of the proposed lease, along the Cumberland shoreline.

² Applicant originally requested 5.9 acres. MDMR calculations, based on the provided coordinates, indicate the area is 5.99 acres.

³ Application, pages 1 & 2

⁴ Application, page 9 & 20 (labelled page 4 & 5g, respectively)

⁵ Application, page 14 (labelled page 5a)

⁶ Application page 18 (labelled page 5e)

⁷ Application, page 23 (labelled page 8)



Image 1: Facing southeast toward the applicant's experimental lease and Cousins Island from the NW Corner of the proposed lease site (October 2, 2020).



Image 2: Facing northeast from the NW Corner of the proposed lease site (October 2, 2020).



Image 3: Facing north toward the head of Broad Cove from the NW Corner of the proposed lease site (October 2, 2020).



Image 4: Facing west from the NW Corner of the proposed lease site (October 2, 2020).



Image 5: Facing southwest from the NW Corner of the proposed lease site (October 2, 2020).



Image 6: Facing south toward Sturdivant Island from the NW Corner of the proposed lease site (October 2, 2020).

Depth

At the time of MDMR's site assessment, depths within the proposed lease site ranged from 16.0 to 21.3 feet, as measured with a transom-mounted depth sounder. MDMR staff observed the depths of the proposed lease site at approximately 10:30 am. Correcting for tidal variation derives water depths approximately 0.92 feet lower (15.08 to 20.38 feet) at mean low water (0.0 feet).

Table 1: Tide predictions at Falmouth Foreside, Casco Bay, Maine (43.7317° N, 70.2050° W)⁸

Date	Time	Height (ft)
10/02/2020	2:11 AM	11.21 H
10/02/2020	8:33 AM	-1.38 L
10/02/2020	2:48 PM	10.07 H
10/02/2020	8:48 PM	-0.33 L

Bottom Characteristics

MDMR staff observed the bottom characteristics of the proposed lease site via a SCUBA transect on October 2, 2020 (Figure 2). 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, nor grain size analysis performed. The bottom of the proposed lease site is composed of soft mud (Image 7).

Table 2: Substrate characteristics of the proposed lease site.

Substrate Origin	Substrate Class	Substrate Subclass	Substrate Group
Geologic Substrate	Unconsolidated Mineral Substrate	Fine Unconsolidated Substrate	Mud



Image 7: Soft mud sediment on the bottom of the proposed lease site (October 2, 2020).

⁸ <http://tbone.biol.sc.edu/tide/tideshow.cgi>

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.

NAD83 Coordinates – 5.99 acres (Figure 2)

<u>Corner</u>	<u>Latitude</u>	<u>Longitude</u>	
NE	43.761859° N	70.183446° W	<i>then 884.56 feet at 157.74° True to</i>
SE	43.759626° N	70.182133° W	<i>then 295.07 feet at 247.77° True to</i>
SW	43.759309° N	70.183161° W	<i>then 884.80 feet at 337.76° True to</i>
NW	43.761543° N	70.184473° W	<i>then 294.68 feet at 67.82° True to NE.</i>

Table 3: Approximate distances from proposed lease to surrounding features (Figures 1 & 2). Measurements were made using digital orthophotography provided by the Maine Office of GIS (*orthoCoastalCascoBay2013*⁹).

Feature	Distance
NW Corner to western shore of Broad Cove (~MLW)	~2,445 feet to the northwest
NW Corner to Anderson Rock, nearest point (~MLW)	~2,000 feet to the southwest
SW Corner to Anderson Rock, nearest point (~MLW)	~2,140 feet to the west
SE Corner to The Nubbin, nearest point (~MLW)	~1,600 feet to the southeast
SE Corner to Sunset Point, nearest point (~MLW)	~1,040 feet to the northeast
NE Corner to Sunset Point, nearest point (~MLW)	~1,080 feet to the west

⁹ More recent digital orthophotography is available (*orthoCoastalCascoBay2018*), but *orthoCoastalCascoBay2013* was collected during a low tide closer to MLW (0.0 feet)

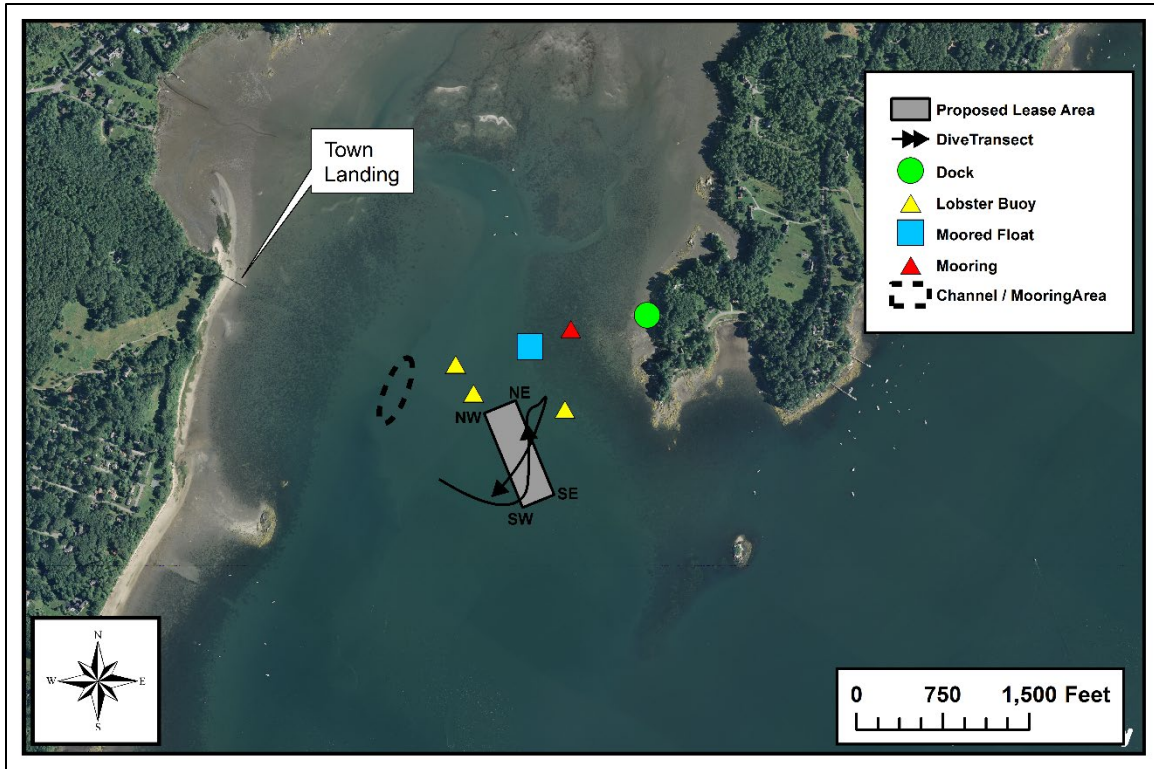


Figure 2: Proposed lease area and nearest lobster buoys, dock, and other features.

The criteria MDMR uses to determine the suitability of an experimental aquaculture operation to a particular area (MDMR Regulations Chapter 2.37(1)(A)(1-7)) are discussed, with respect to the proposal, below:

(1) Riparian Owners Ingress and Egress

The proposed lease site is located to the west of Sunset Point, at the mouth of Broad Cove, in Casco Bay. During MDMR’s site visit on October 2, 2020, houses were observed to the west, north, and east of the proposed lease. Docks and moorings associated with some of the houses along the shoreline were also observed. The closest dock was located over 1,300 feet to the northeast (Figure 2), and 2 sets of shoreline stairs were observed to the north of this dock. Additionally, a fouled buoy was observed approximately 785 feet to the northeast of the proposal, which may have been marking a mooring (Figure 2).

(2) Navigation

Broad Cove is bisected by a deep channel that snakes up its center (Figure 1). The Cumberland town dock is on the western shore of the cove, with channel markers indicating the primary route of access (Figure 2). Additionally, a mooring field is located near the channel markers. The proposed lease is located on the eastern side of this channel, between the 12-foot and 6-foot contour lines. Approximately 1,100 feet are located between the western boundary of the proposed lease and the 6-foot contour line on the western side of the channel, at the nearest point. The proposal and mooring field are separated by approximately 750 feet, and the deepest part of the channel that bisects the cove. Due to this distance, and the expected vessel flow along the deep water of the

channel and within the channel markers leading to and from the town dock, the proposal is unlikely to hinder the use of these features.

Additionally, the proposed lease is located to the northwest of a series of ledges located just outside of Broad Cove. Due to these ledges, mariners navigating into Broad Cove from Casco Bay are not likely to enter the cove on a straight course from the southeast, but instead are likely to enter the cove from a more southerly direction.

Lastly, approximately 1,040 feet are located between the proposed lease and Sunset Point. Therefore, the proposal is unlikely to unreasonably interfere with depth appropriate vessels navigating to the east of the proposal.

(3) Fishing and Water-Related Uses

At the time of MDMR's site assessment on October 2, 2020, a few lobster buoys were observed in the general vicinity of the proposal, the closest of which are indicated in Figure 2. Additionally, light lobstering activity was observed to the southeast, between the proposal and The Nubbin (Figure 1). MDMR recognizes that commercial and recreational fisheries are more prevalent in the summer months. Due to the timing of the site visit, it is likely that other activities occur in the vicinity of the proposed lease that were not observed during the site visit.

A Harbormaster Questionnaire was sent to the Town of Yarmouth Harbormaster on July 9, 2020. At the time of this report, a response has not been received.

(4) Other Aquaculture Uses

There are 13 Limited Purpose Aquaculture (LPA) licenses and 2 leases located within one mile of the proposed lease (Figure 3). The closest active aquaculture site to the proposed lease is the experimental lease CAS BC2x, which is held by the applicant. The closest aquaculture activity permitted to someone other than the lease applicant is BBUR220, an LPA license located approximately 335 feet to the southeast of the proposed lease and permitted for the suspended culture of American/eastern oysters (*C. virginica*).

At the time of DMR's site visit on October 2, 2020, floating gear associated with the lease CAS BC2x was located within the proposed lease site, and the applicant was observed tending the gear.

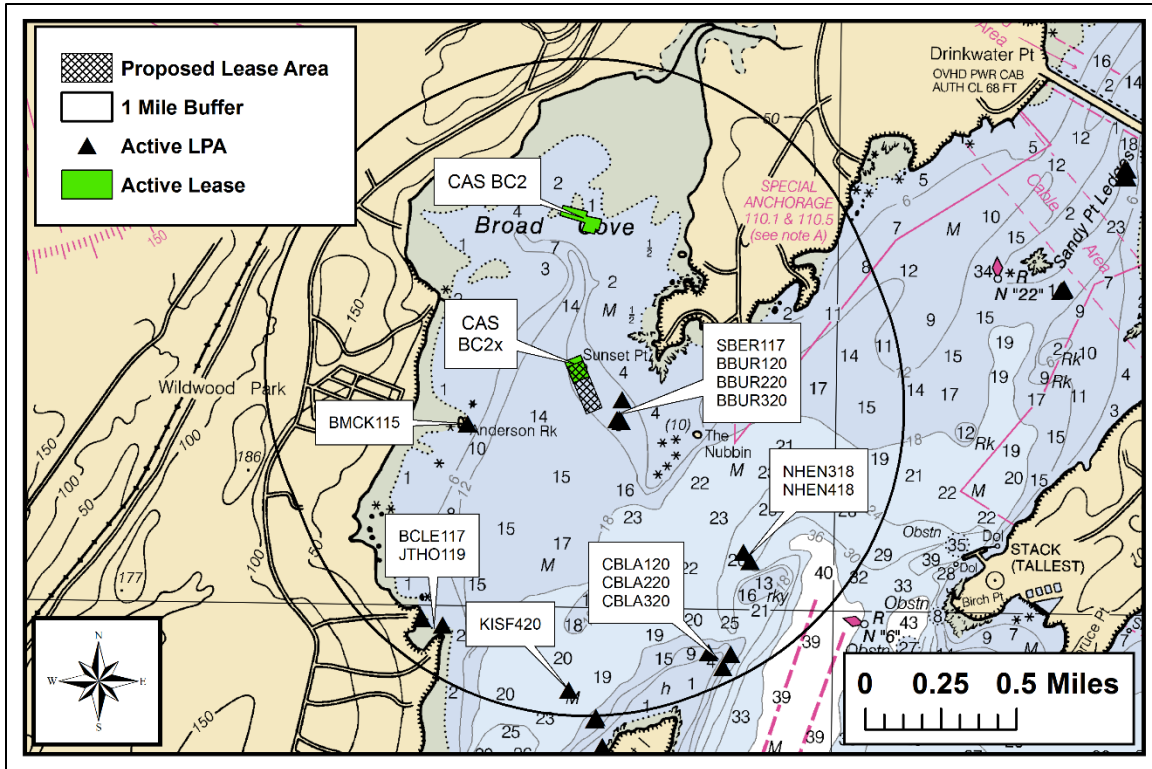


Figure 3: Aquaculture activity near the proposed lease area.

(5) Existing System Support

Epibenthic Flora and Fauna

On October 2, 2020, MDMR staff conducted a SCUBA transect through the proposed lease site to assess the epibenthic ecology of the area (Figure 2). The bottom of the proposed lease was dominated by soft mud sediment. Brown benthic microalgae were the primary species observed (Image 8), in addition to horseshoe crabs (Image 9) and drift eelgrass (Table 4).

Table 4: Species observed during SCUBA transect.

Species Observed	Abundance
Benthic Microalgae	Abundant
Drift eelgrass (<i>Zostera marina</i>)	Common
Horseshoe crab (<i>Limulus polyphemus</i>)	Common
European oyster (<i>Ostrea edulis</i>)	Occasional
Northern Sea Star (<i>Asteria rubens</i>)	Occasional
Colonial tunicate (<i>Didemnum sp.</i>)	Rare
Green crab (<i>Carcinus maenus</i>)	Rare
Club tunicate (<i>Styela clava</i>)	Rare
Hermit crab (<i>Pagurus sp.</i>)	Rare

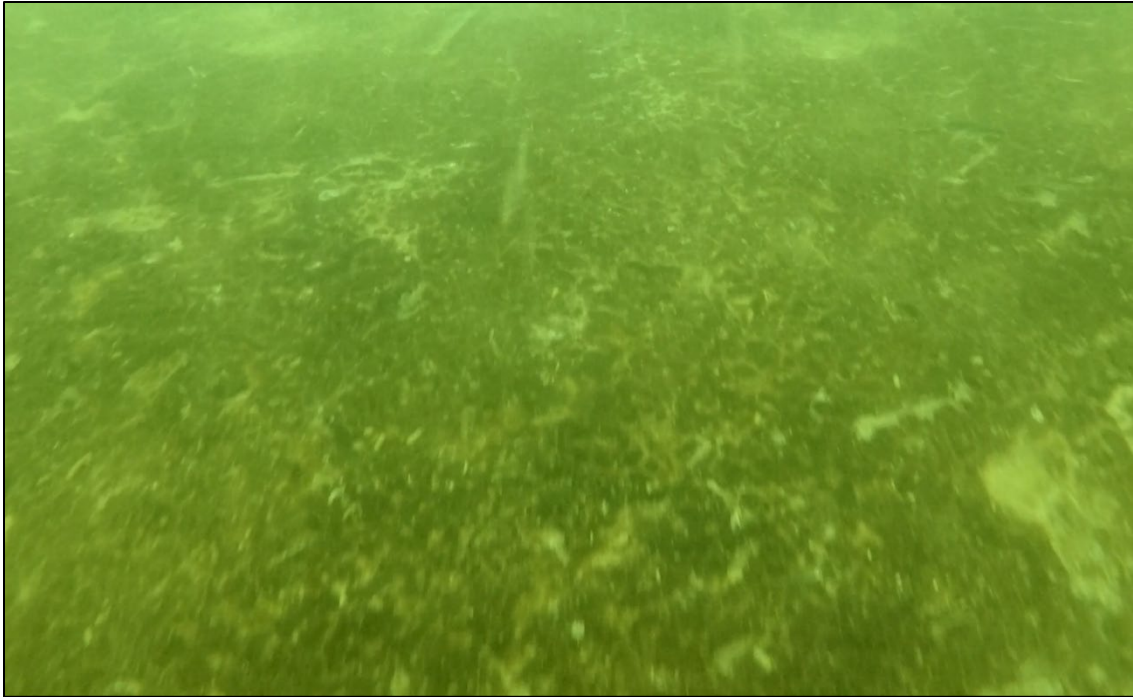


Image 8: Benthic microalgae observed on the bottom of the proposed lease site (October 2, 2020).

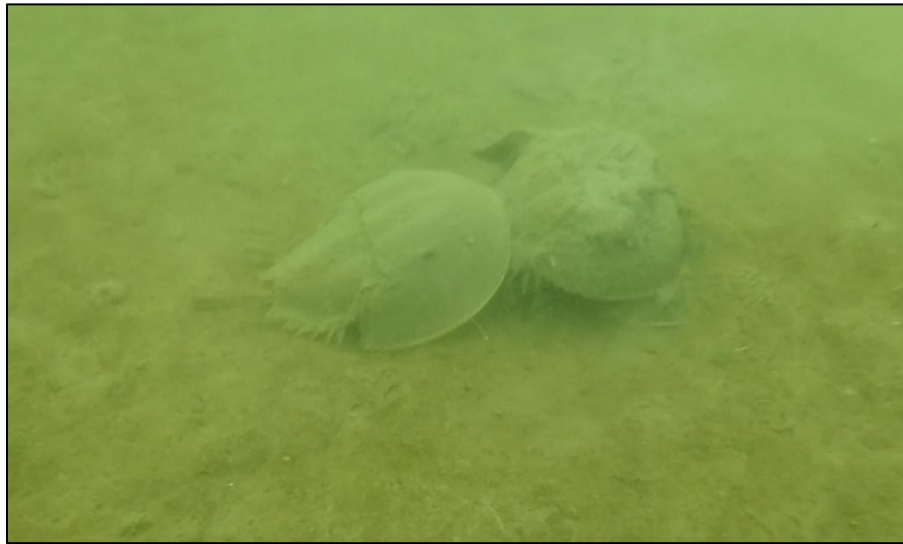


Image 9: Horseshoe crabs (*Limulus polyphemus*) observed on the bottom of the proposed lease site (October 2, 2020).

Wildlife

On October 2, 2020, MDMR staff observed various gulls (*Larus sp.*), a cormorant (*Phalacrocorax auritus*), and a juvenile bald eagle (*Haliaeetus leucocephalus*) in the vicinity of the proposed lease. 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 approximately 250 feet to the west of Tidal Wading Bird and Waterfowl Habitat. This

habitat type is defined under Maine's Natural Resources Protection Act (NRPA) as Significant Wildlife Habitat.

Additionally, the proposed lease is located approximately 445 feet to the northwest of Essential Habitat for the roseate tern (*Sterna dougallii*). Roseate terns are listed as an endangered species on both the State and Federal Endangered Species Lists.

On August 8, 2020 a “Request for Agency Review and Comment” was sent to MDIFW. At the time of this report, a response has not been received.

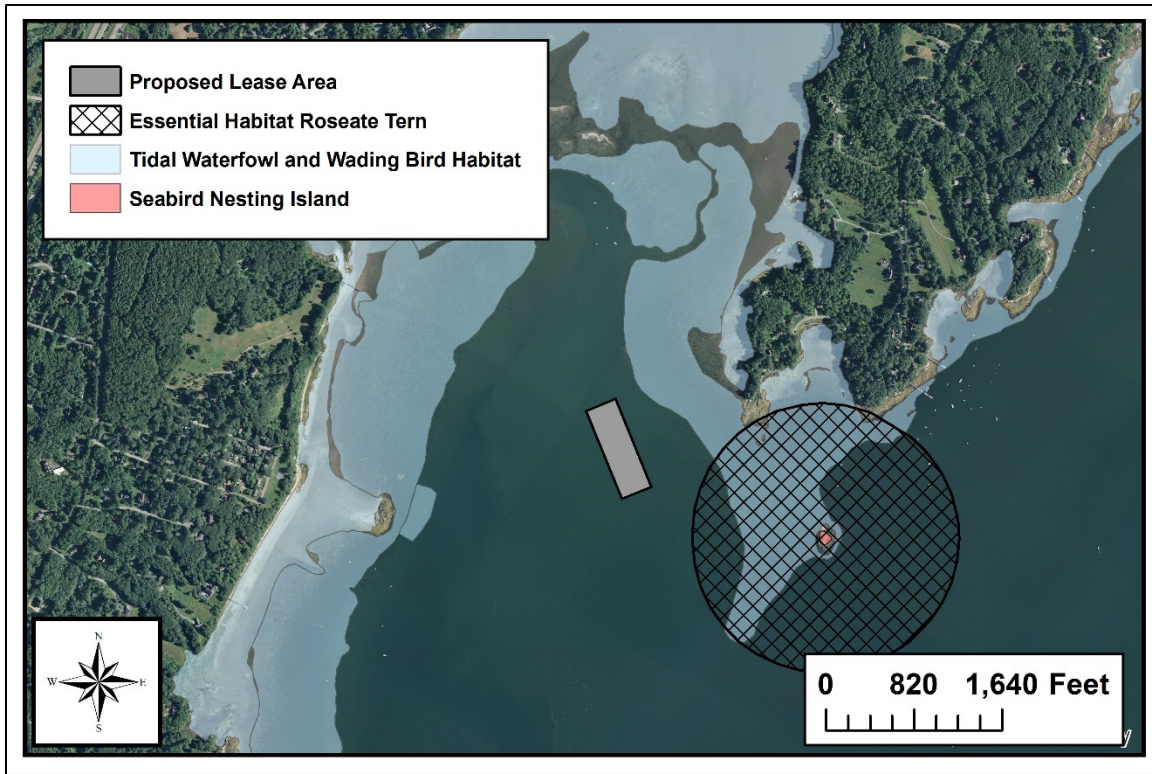


Figure 4: Essential Habitat¹⁰, Seabird Nesting Islands¹¹ and Tidal Wading Bird and Waterfowl Habitat¹² near the proposed lease site.

Eelgrass

Historical eelgrass (*Zostera marina*) data collected by The Maine Department of Environmental Protection in partnership with the Casco Bay Estuary Partnership indicates that, in 2018, the closest observed eelgrass bed to the proposed lease was located approximately 120 feet to the east (Figure 5). On October 2, 2020, MDMR staff assessed the benthic ecology of the proposed lease site via SCUBA diving. Although dead eelgrass was commonly observed drifting, no live eelgrass was observed within the proposed lease site. The mapped eelgrass bed to the east of the site, and a small eelgrass bed approximately 200 feet to the west of the proposal, were observed by MDMR divers.

¹⁰ Data obtained from MDIWF maintained SDE Feature Class “GISVIEW.MEIFW.Ehrtern”

¹¹ Data obtained from MDIWF maintained SDE Feature Class “GISVIEW.MEIFW.sni”

¹² Data obtained from MDIWF maintained SDE Feature Class “GISVIEW.MEIFW.Twwh”

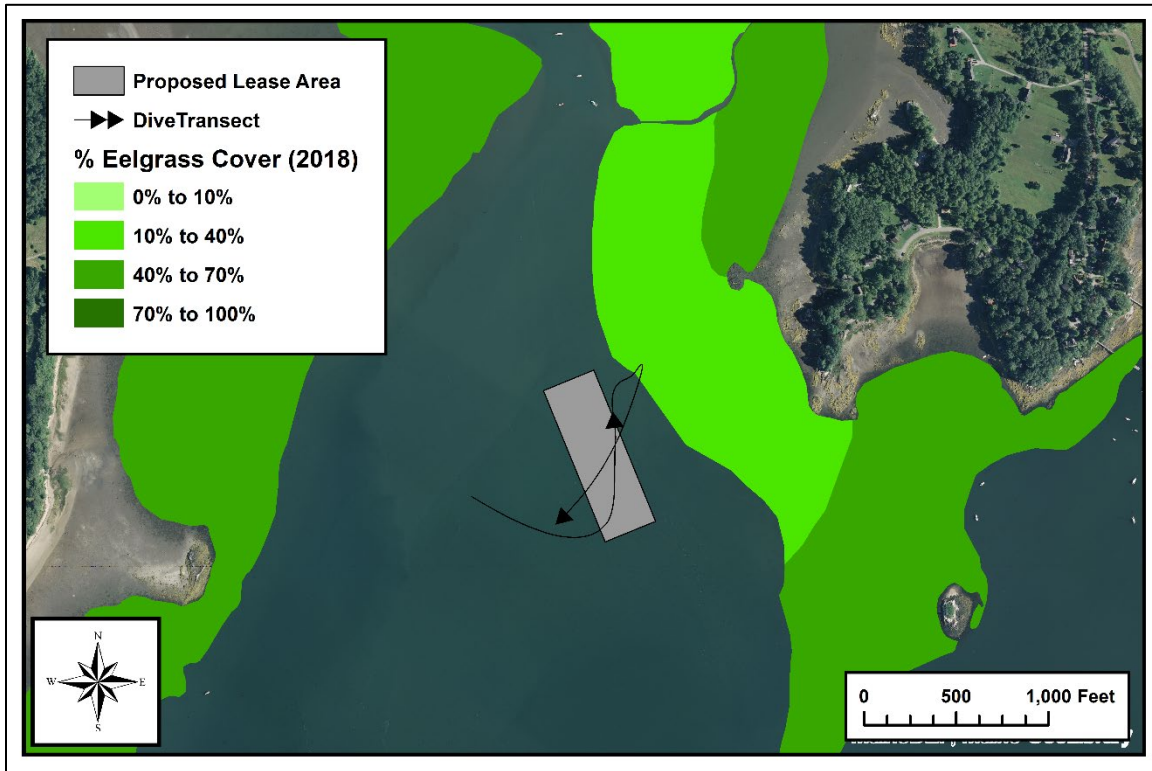


Figure 5: Historical eelgrass (*Z. marina*) data collected in 2018 in the vicinity of proposed lease.¹³

(6) Source of Organisms to be Cultured

The applicant lists Mook Sea Farm in Bristol as the proposed source of American oysters, sea scallops, and hard clams. This source is an MDMR approved hatchery.

(7) Interference with Public Facilities

There are no beaches, parks, or docking facilities owned by federal, state, or municipal government within 1,000 feet of the proposed lease site (Figure 6). Sunset Point Overlook, owned by the Town of Yarmouth, is located approximately 1,360 feet to the east of the proposed lease site. Additionally, the Town of Cumberland has a public-access pier that is approximately 3,745 feet to the northwest of the proposed lease site, off Broad Cove Reserve (Figure 6). The town maintains a nearby mooring field and a well-marked channel to this pier,¹⁴ approximately 800 feet to the northwest of the proposal (Figure 2). Access to this pier and mooring field would not be prevented by the proposed lease, as they are located on opposite shorelines of Broad Cove. However, it is possible that the proposal will have some impact to users of this public pier, as the location of the proposed lease will decrease the navigable area for mariners traveling between the pier and Casco Bay proper.

¹³ Data obtained from MEDEP maintained SDE Feature Class "GISVIEW.MEDEP.Eelgrass2018"

¹⁴ Phone Conversation with Cumberland Assistant Harbormaster Benjamin Burnes on 4/26/2019, per Site Report for CAS BC2x

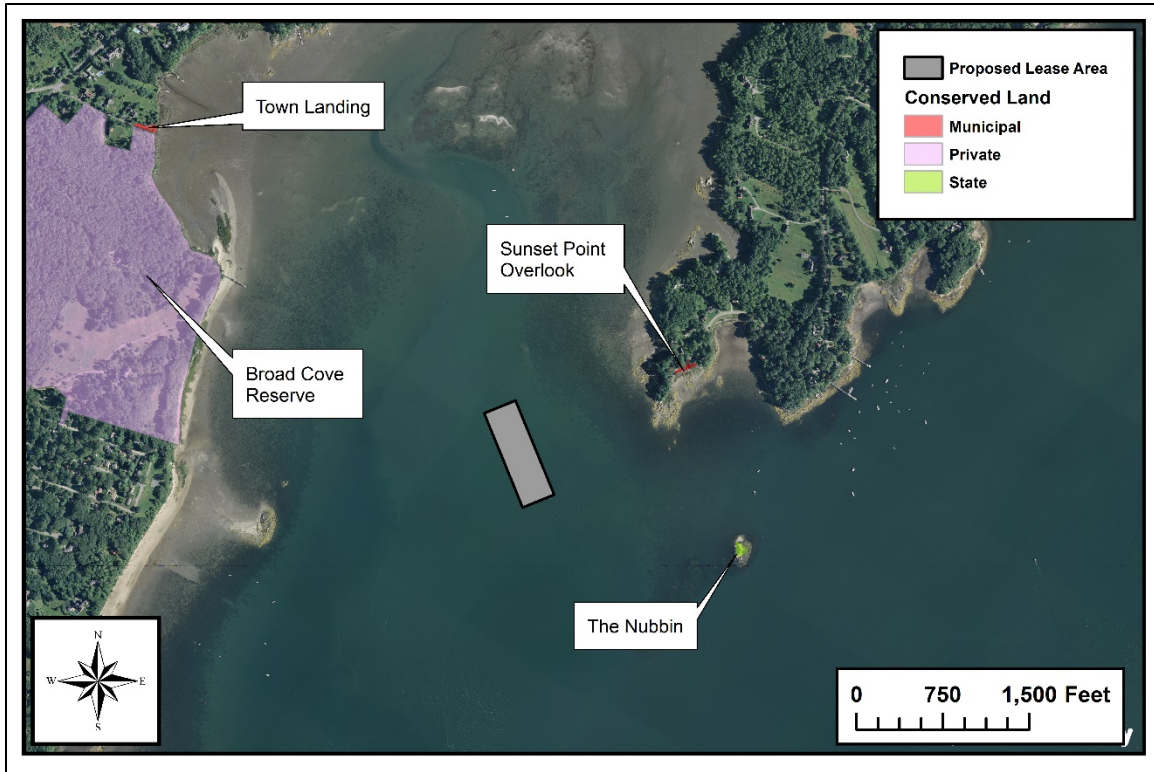


Figure 6: Public facilities near the proposed lease site.¹⁵

(9) Lighting

According to the application, lighting would only be used during emergency situations or when a storm is approaching without sufficient warning to accomplish the necessary preparations during daylight hours.¹⁶

(10) Noise

The proposed lease would be accessed and serviced by vessels up to 24 feet in length with 4-stroke engines up to 115 horsepower.¹⁷ Additionally, a tumbler/sorter may be located on the proposed work float, which would be powered by a Honda 3000 generator. In order to reduce noise levels at the proposed lease site, the applicant intends to insulate the tumbler/sorter with sound-baffling material and cover it with a plastic housing. The generator would be operated in an insulated metal box.¹⁸

(11) Visual Impact

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

¹⁵ Data obtained from SDE Feature Class sourced from The Maine Office of GIS “GISVIEW.MECONSLANDS.Conserved_Lands”

¹⁶ Application, page 24 (labelled page 9)

¹⁷ Application, page 23 (labelled page 8)

¹⁸ Application, page 24 (labelled page 9)