

Figure 1: Vicinity map¹

Location: Southeast of Barnes Landing, Middle Bay, Brunswick and Harpswell, Cumberland County, Maine

Purpose: Standard lease for the bottom culture of American/eastern oysters (*Crassostrea virginica*) and hard clam/northern quahog (*Mercenaria mercenaria*)

Site Review by: Flora Drury and Cheyenne Adams

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

Report Submitted: February 16, 2022

¹Unless otherwise noted, 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 (*orthoCoastalCascoBay2018*).

Application Summary

The applicant is requesting 17.36² acres southeast of Barnes Landing in Middle Bay, in the Towns of Brunswick and Harpswell, for the bottom culture of American/eastern oysters (*Crassostrea virginica*), and hard clams/northern quahogs (*Mercenaria mercenaria*). Corner markers, and additional markers as needed, are the only gear proposed to be deployed.³ According to the application, American/eastern oysters would be harvested with a drag measuring 36” or less, and hard clams would be harvested with a hand rake or bull rake.⁴

General Site Characteristics

Maine Department of Marine Resources (MDMR) Aquaculture staff Flora Drury and Cheyenne Adams, along with MDMR Bureau of Public Health staff Geoff Shook, conducted an initial assessment, including a dive transect, of the proposal on June 29, 2021. Staff arrived on site at 11:15 am that day; the tide was rising. MDMR staff returned on August 6, 2021 to collect additional information on the surrounding area.⁵ A third visit, in order to collect additional videos of the bottom via scuba transect, was conducted by MDMR staff on November 9, 2021.⁶ MDMR staff returned a fourth, and final, time on December 15, 2021 to conduct a bull rake survey within the proposed lease area. MDMR aquaculture staff Cheyenne Adams and Flora Drury and MDMR Area Biologist Program Supervisor Denis-Marc Nault, along with Brunswick Harbormaster Dan Sylvain and Brunswick Coastal Resource Manager Dan Devereaux, were present for this survey.

The proposed lease occupies subtidal waters in Upper Middle Bay (Figures 1 & 2, Images 1-5). The surrounding uplands are wooded, with occasional residences. Docks and moorings are located along the surrounding shorelines.

² Applicant originally requested 17 acres. MDMR calculations, based on the coordinates provided by the applicant, indicate the area is 17.36 acres.

³ Application, page 9

⁴ Application, page 10

⁵ Cheyenne Adams and Flora Drury conducted the August 6, 2021 site visit.

⁶ Cheyenne Adams, Flora Drury, and Patrol Officer Will Reinsborough conducted the November 9, 2021 site visit.

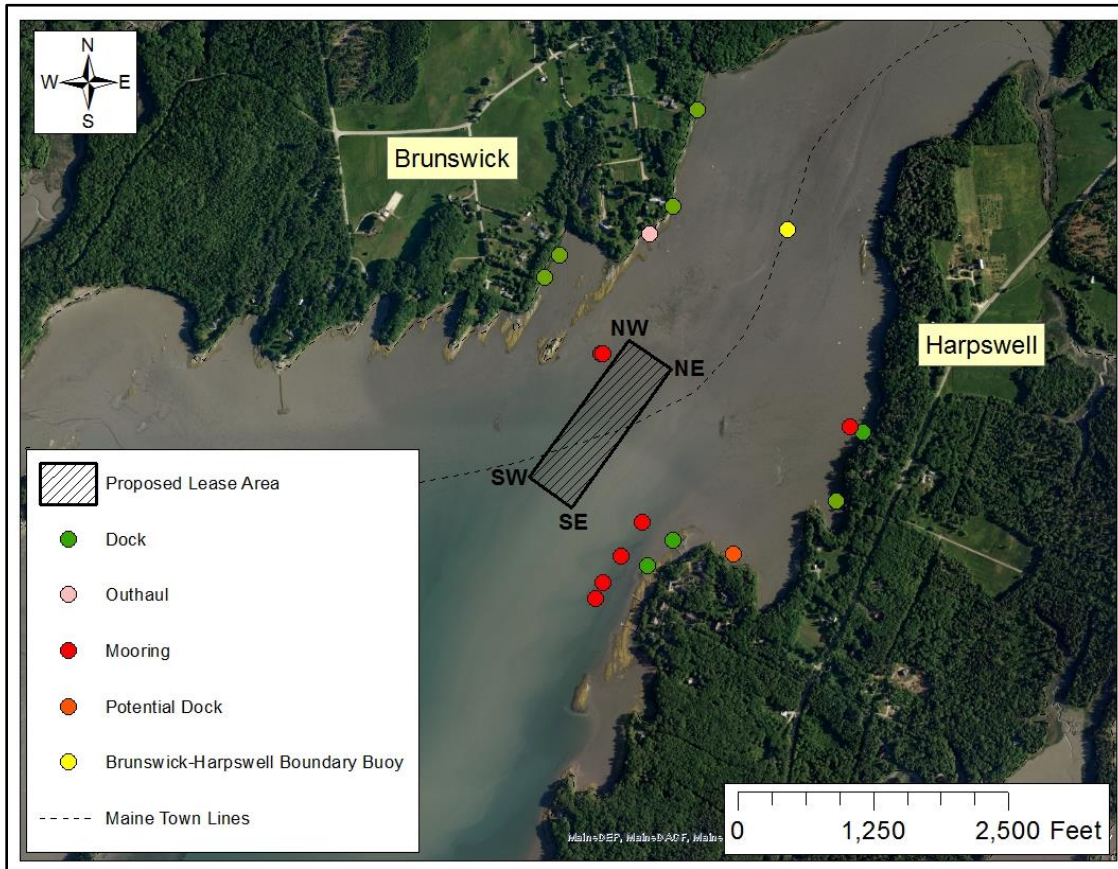


Figure 2: Proposed lease area.



Image 1: Looking northeast into Middle Bay Cove from the NE Corner of the proposed lease (June 29, 2021).



Image 2: Looking east toward Harpswell Neck from near the NE Corner of the proposed lease (June 29, 2021).



Image 3: Looking south toward Harpswell Neck from near the NE Corner of the proposed lease (June 29, 2021).



Image 4: Looking southwest toward Harpswell Neck and Birch Island from near the NE Corner of the proposed lease (June 29, 2021).



Image 5: Looking west from NW-NE Boundary of the proposed lease (November 9, 2021).

Depth

MDMR collected depths at the proposed lease site on June 29, 2021. Measurements were taken at approximately 11:15 am; high tide was predicted to occur at 3:55 pm with a height of 9.39 feet (Table 1). Depths at the corners of the proposed lease area ranged from 2.9 feet at the northwest corner to 4.8

feet at the southeast corner. Correcting for tidal variation derives depths between 1.7 and 3.6 feet at mean low water (MLW, 0.0 feet).

Table 1. Tide predictions for Wilson Cove, Middle Bay, Maine (43° 49.5 N, 69° 58.6 W)⁷

| Date | Time | Height (ft) |
|-----------|---------|-------------|
| 6/29/2021 | 3:08 AM | 10.47 H |
| 6/29/2021 | 9:34 AM | -0.48 L |
| 6/29/2021 | 3:55 PM | 9.39 H |

Bottom Characteristics

MDMR staff observed the bottom characteristics of the proposed lease site via SCUBA dive transects conducted on June 29, 2021 and November 9, 2021 (Figure 3). 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 (Image 6); the bottom of the southern section of the proposal contains small amounts of shell hash as well (Image 7).

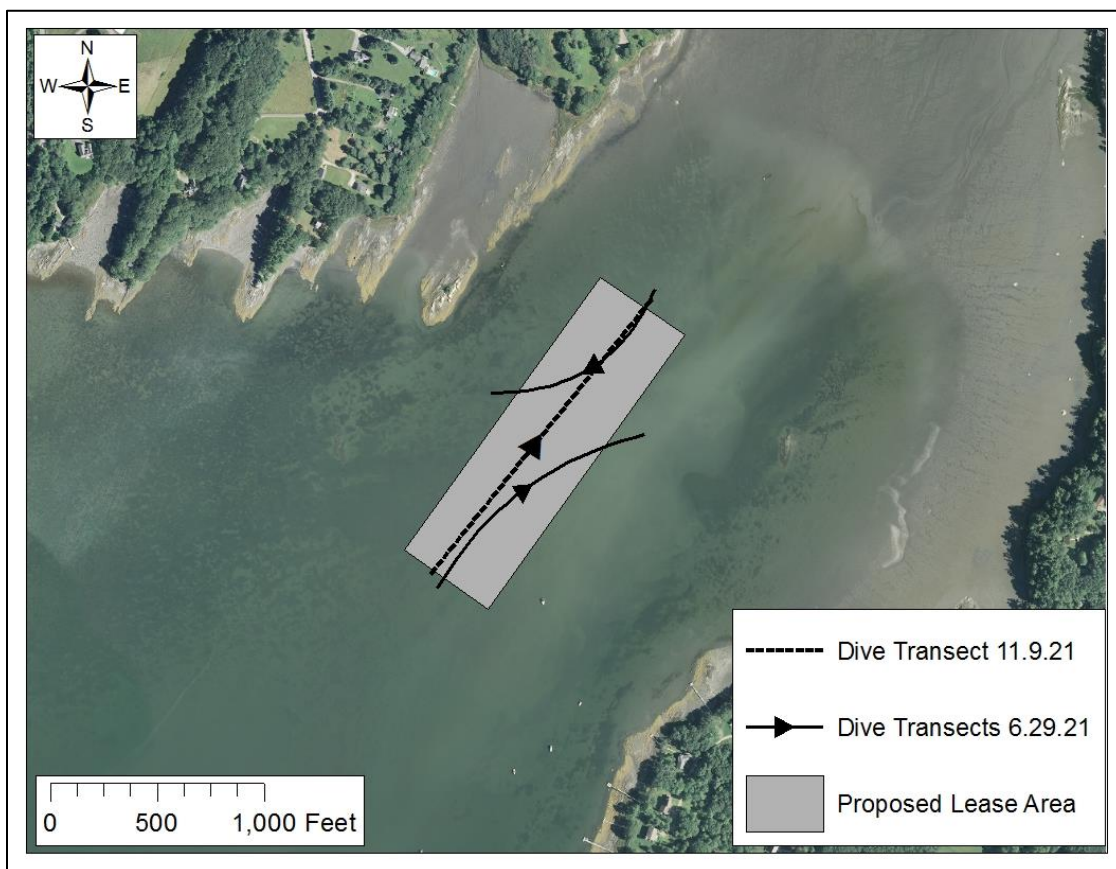


Figure 3: Dive transects conducted within proposed lease boundaries.⁹

⁷ <https://tidesandcurrents.noaa.gov>

⁸ https://www.fgdc.gov/standards/projects/cmecs-folder/CM ECS_Ver sion_06-2012_FINAL.pdf

⁹ Figure 3 was created in ArcMap version 10.8 using geo-referenced aerial photographs provided by The Maine Office of GIS (*orthoCoastalCascoBay2013*).

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 Hash | |



Image 6: Mud bottom of the proposed lease (November 9, 2021).

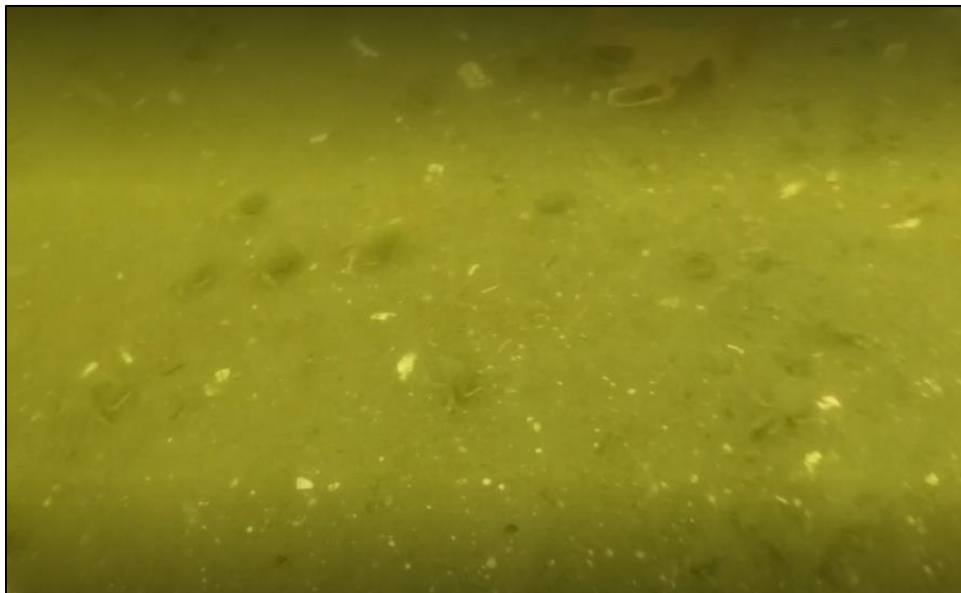


Image 7: Mud and shell hash bottom of the proposed lease (November 9, 2021).

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)– 17.36 Acres (Figure 2)

| <u>Corner</u> | <u>Latitude</u> | <u>Longitude</u> |
|---------------|-----------------|--|
| NW | 43.85250° N | -69.96122° W then 481.08 feet at 124.24° True to |
| NE | 43.85177° N | -69.95970° W then 1577.07 feet at 215.78° True to |
| SE | 43.84823° N | -69.96314° W then 480.82 feet at 305.31° True to |
| SW | 43.84898° N | -69.96464° W then 1568.38 feet at 35.75° True to NW. |

Table 3. Approximate distances from the proposed lease to surrounding features (Figures 1-3). Measurements to the mean low water (MLW) line were made using digital orthophotography provided by the Maine Office of GIS (*orthoCoastalCascoBay2013*).¹⁰

| Feature | Distance |
|--|------------------------------|
| NW Corner to Brunswick shoreline, nearest point (~MLW) | ~430 feet to the northwest |
| NW Corner to MLLW line (NOAA Chart) | ~215 feet to the northwest |
| NW-SW Boundary to ledges, nearest point (~MLW) | ~460 feet to the northwest |
| SW Corner to Scrag Island, nearest point (~MLW) | ~4,960 feet to the southwest |
| SE Corner to Harpswell shoreline, nearest point (~MLW) | ~880 feet to the southeast |
| NE Corner to Harpswell shoreline, nearest point (~MLW) | ~1,045 feet to the northeast |

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 Ingress and Egress

The proposed lease is located in Upper Middle Bay, in the Towns of Brunswick and Harpswell. Extensive mudflats are located to the northeast of the proposal at low water. Docks and moorings are located along both the Brunswick shoreline to the northwest and the Harpswell shoreline to the east/southeast (Figure 2). The closest docks observed by MDMR staff to the northwest are approximately 970 and 1,055 feet from the NW Corner of the proposal (Image 8). A series of ledges that extend from the Brunswick shoreline are located between these docks and the proposal. It is likely that access to and from these docks occurs from the south,

¹⁰Distances to shore were measured with aerial photograph *orthoCoastalCascoBay2013*, which was used to make Figure 3, and was taken August 11 and 12, 2013 at low tide. Low tide was 0.12 feet above MLW on the 11th and 0.21 feet above MLW on the 12th (<http://tbone.biol.sc.edu/tide/tideshow.cgi>). This service is provided by The Maine Office of GIS. *orthoCoastalCascoBay2018*, which is used as the base map for some figures in this report, was taken during low tides with heights of -1.66 feet on the 16th and -1.48 feet, and therefore wasn't used for measuring distances to shore.

instead of the east where the proposal is located, as a result of these ledges. A mooring was observed to the east of these ledges, approximately 125 feet to the west of the proposal's NW-SW Boundary (Figure 2). Docks were also observed to the north of the proposal, along Middle Bay's western shoreline, and to the east/southeast along the Harpswell shoreline. The closest docks to the east/southeast are approximately 895 and 940 feet from the proposal's NE-SE Boundary. Moorings are located nearby these docks; the closest mooring observed by MDMR staff to the east/southeast was approximately 610 feet from the proposal.

It is likely that access to and from the docks and moorings in the area occasionally traverses the proposed lease site. With the potential exception of when the applicant is actively tending the site, no impact to the use of these docks or mooring is anticipated from the proposal, as no gear other than corner markers¹¹, is proposed. Furthermore, riparian owners in the area would have ample room to navigate around the leaseholder's seeding/tending/harvest operations, which are proposed to be conducted using 22-foot vessels, occasionally towing a small drag.



Image 8: Two docks located to the northwest of the proposed lease (August 6, 2021).

(2) Navigation

During the August 6, 2021 site visit, hand powered vessels were observed operating to the west of the proposal and a motorized vessel was observed navigating through the proposed lease area. During the site visit on June 29, 2021, a single lobster boat was observed operating to the south. Boats were observed moored, attached to docks, or hauled onshore in Upper Middle Bay on both dates. No gear, other than the required boundary markers, would be deployed on the

¹¹ And additional markers, if needed

proposed lease. As result, lease seeding/tending/harvest operations are the only proposed activities that might impact navigation.

As the section of Upper Middle Bay in which the proposal is located is over 2,000 feet wide, boats navigating in the area would have ample room to navigate around the leaseholder's seeding/tending/harvest operations, which are proposed to be conducted using 22-foot vessels, occasionally towing a small drag. Furthermore, depth measurements collected by MDMR, and subsequent tidal variation corrections, derive depths between 1.7 and 3.6 feet at mean low water (MLW, 0.0 feet) at the corners of the proposed lease. Therefore, navigation in the proposed lease area at lower tidal stages is naturally constrained by water depth.

(3) Fishing and Other Uses

Lobstering

Although a lobster boat was observed operating to the south of the proposal during the June 29, 2021 site visit, no lobster buoys were observed within the proposal during any of the four site visits conducted by MDMR. As no gear other than boundary markers are proposed, the proposed lease is unlikely to negatively impact lobster fishing in the vicinity, with the possible exception of minor interferences during times when the applicant is actively working the site.

Shellfish Harvest

One individual was observed harvesting shellfish in the intertidal to the north of the proposal on June 29, 2021. According to outreach conducted by MDMR's Bureau of Public Health (BPH), a local Marine Patrol Officer indicated there is clamming activity in the general vicinity; the BPH also indicated that subtidal bull rakers harvest in the area. Depth measurements collected by MDMR staff and subsequent calculations for tidal variation derives depths between 1.7 and 3.6 feet at the corners of the proposal at mean low water (MLW, 0.0 feet). Therefore, northern portions of the lease area might be available for intertidal harvest at the lowest of low tides, but the proposal is likely covered by water the vast majority of the time and therefore if wild shellfish harvesting were to occur within the site, it would more likely occur via bull rake.

During the dive transects conducted on June 29 and November 9, 2021, MDMR staff observed American oysters (*Crassostrea virginica*) and hard clams (*Mercenaria mercenaria*) within the bounds of the proposed lease (Figure 3). American oyster presence was observed to be patchy but dense within the lease. According to the applicant, the American oysters found within the bounds of the proposal are shellfish he planted. Therefore, the presence of this species does not indicate a wild resource, the harvest of which might be interfered with by the proposal. Although not visible in the video collected on June 29, 2021, due to poor visibility, notes taken by MDMR after the dive indicate that hard clams were observed in greater abundance in the northern ~1/4 of the proposal. Hard clams were observed occasionally during the November 9, 2021 dive transect as well. To assess hard clam abundance within the proposal in a more quantitative manner, MDMR staff, in partnership with the Town of Brunswick, conducted a bull rake survey of the proposed lease area. To complete this survey, the lease was divided into (15) 130-foot x 300-foot grids. A bull rake outfitted with 1/2-inch wire mesh to capture smaller shellfish along with market sized individuals, was used by an experienced operator for 30 seconds at the center of each grid. All hard clams collected were measured along their longest axis. Only one hard clam, which was below legal size, was collected during this survey.

The applicant is requesting that any dragging, hand raking, or bull raking be prohibited within the lease area, along with the handpicking of oysters or hard clams. Therefore, the proposal would prevent wild harvesters from harvesting hard clams within the proposal. It is difficult to reconcile what was observed during the dive transects, where hard clams were occasionally observed, and the results of the bull rake survey, which produced only one hard clam, and therefore it is challenging to determine the extent to which the proposal might impact the wild fishery. However, the sample grid used in the bull rake survey resulted in only three samples being collected in the northern 1/4 of the proposal, where divers most frequently observed hard clams. Due to the small sample number in the northern 1/4 of the site, it's possible that the hard clams observed by divers were missed by the bull rake survey.

Menhaden Fishing

A school of menhaden (*Brevoortia tyrannus*) was observed within the proposed lease during the June 29, 2021 site visit. Bait fishing is common in Casco Bay in the summer months when schooling fish are present and the season is open, and therefore it is likely that the commercial harvest of schooling baitfish occurs in the vicinity of the proposed lease area during these times. Due to the fact that the applicant is not applying to deploy gear on the proposed lease, it is unlikely that the proposed lease would unreasonably interfere with bait fishing, with the possible exception of during times when the applicant is actively tending the site.

Recreational Fishing

Recreational hook and line fishing was observed in the vicinity of the lease during MDMR's August 6, 2021 site visit. The proposed lease is not expected to negatively impact recreational fishing, with the possible exception of minor interferences during times when the applicant is actively tending the site.

(4) Other Aquaculture Uses

One aquaculture lease and ten Limited Purpose Aquaculture (LPA) licenses are located within one mile of the proposed lease (Figure 4). The closest aquaculture activity to the proposal are a total of four LPA licenses held by Jesse and Derek Devereaux, which are permitted for the suspended culture of shellfish. The closest of these licenses is located less than 500 feet to the west of the proposal. There are no pending lease applications located within Middle Bay that were deemed complete prior to the application considered here.

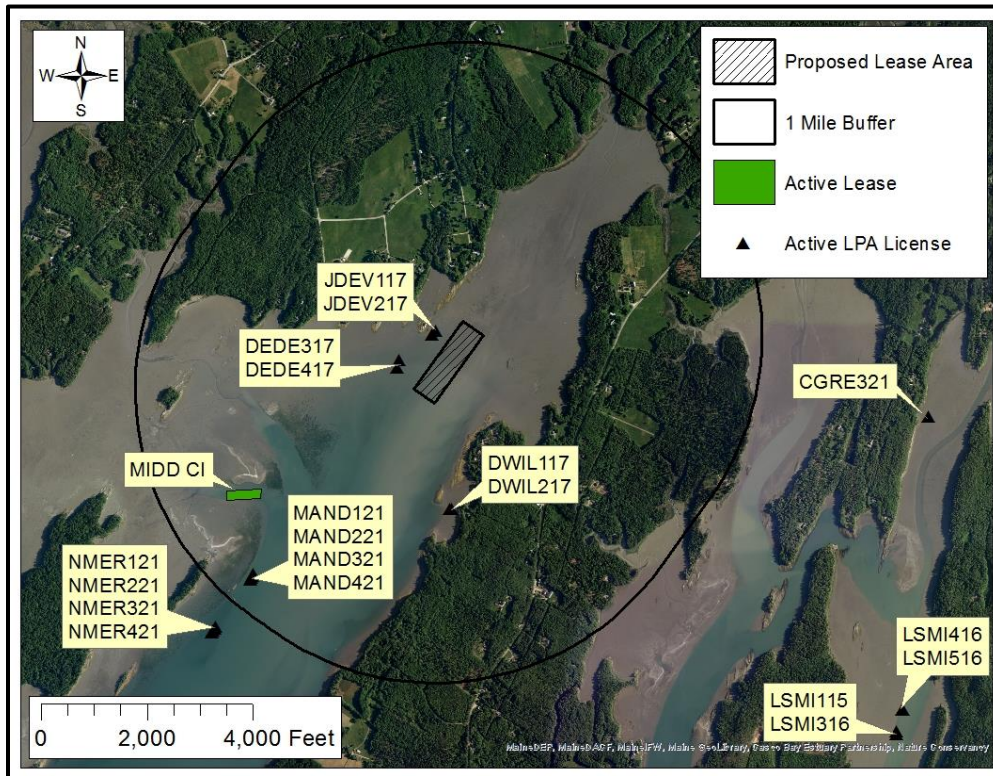


Figure 4: Aquaculture leases and Limited Purpose Aquaculture (LPA) licenses in the vicinity of the proposed lease.

(5) Existing System Support

MDMR staff conducted two dive transects within the proposal on June 29, 2021. As result of poor visibility, and therefore video quality, MDMR staff conducted another dive transect on November 9, 2021 to collect additional video of the bottom (Figure 3). The bottom of the proposed lease is composed of semi-soft mud, with some shell hash present on certain portions of the lease. Epibenthic macro flora and fauna observed during the dive transects are described in Table 4 (Images 9-11).

Table 4. Species observed from video of dive transect conducted within the proposal on November 9, 2021 and from notes collected after the June 29, 2021 dive transects.¹²

| Species Observed | Abundance |
|--|--|
| Benthic diatoms | Abundant in sections of proposal with mud bottom |
| Hermit Crab (<i>Pagurus sp.</i>) | Abundant |
| Mud snail (<i>Nassarius sp.</i>) | Abundant - patchy |
| American Oyster (<i>Crassostrea virginica</i>) | Observed in dense, patchy beds |
| Green crab (<i>Carcinus maenus</i>) | Occasional |

¹² Due to poor underwater visibility, the video collected by MDMR divers on June 29, 2021 was not used to inform table 5.

| | |
|--|--|
| Hard clam/Northern Quahog (<i>Mercenaria mercenaria</i>) | Observed occasionally throughout lease site and more frequently in northern ~1/4 |
| Horseshoe Crab (<i>Limulus polyphemus</i>) | Occasional |
| Eelgrass (<i>Zostera marina</i>) | Rare |
| <i>Ulva</i> or <i>Ulvaria</i> sp. | Rare |
| Knotted Wrack (<i>Ascophyllum nodosum</i>) | Rare |
| Filamentous algae | Rare |

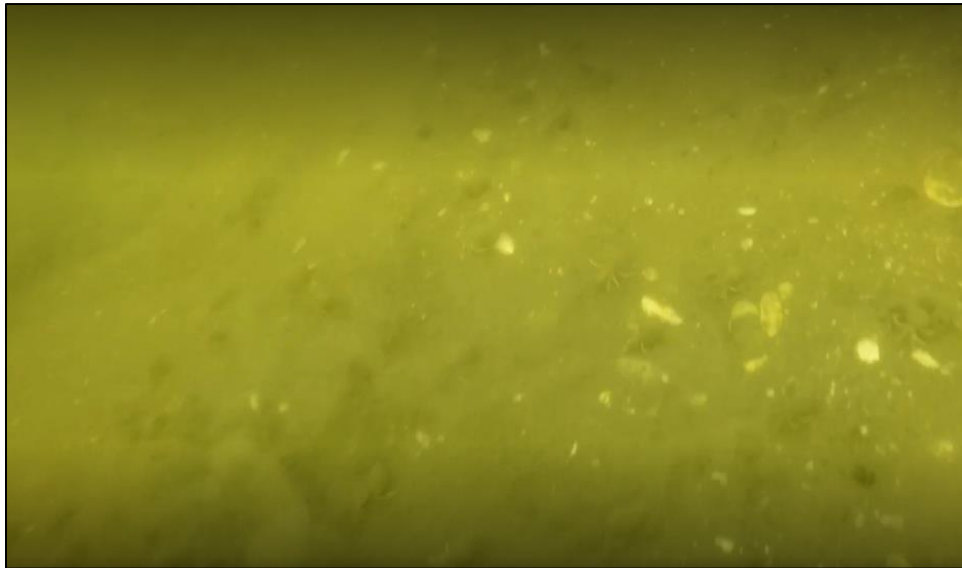


Image 9: Hermit crabs on bottom of proposed lease (November 9, 2021).

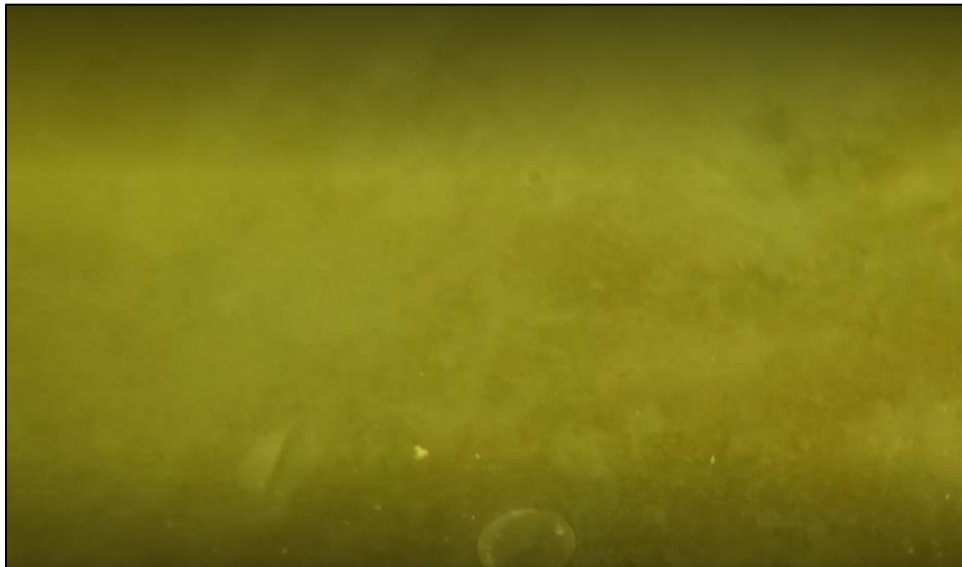


Image 10: Benthic diatoms on proposed lease (November 9, 2021).



Image 11: Mud snails on proposed lease (November 9, 2021).

Eelgrass (*Zostera marina*)

The most recent eelgrass (*Zostera marina*) data, collected in 2018 by the Maine Department of Environmental Protection in cooperation with the Casco Bay Estuary Partnership, do not indicate the presence of eelgrass beds within 1,000 feet of the proposal (Figure 5). MDMR did, however, observe a few patches of eelgrass in the northern portion of the proposed lease, each patch less than 2 square feet in size, during the June 29, 2021 dive transect. The exact location of these patches was not recorded. However, although small in size, the proposed drag harvesting operations would likely damage these patches of eelgrass. If granted, the applicant should avoid drag harvest in areas where eelgrass is observed.

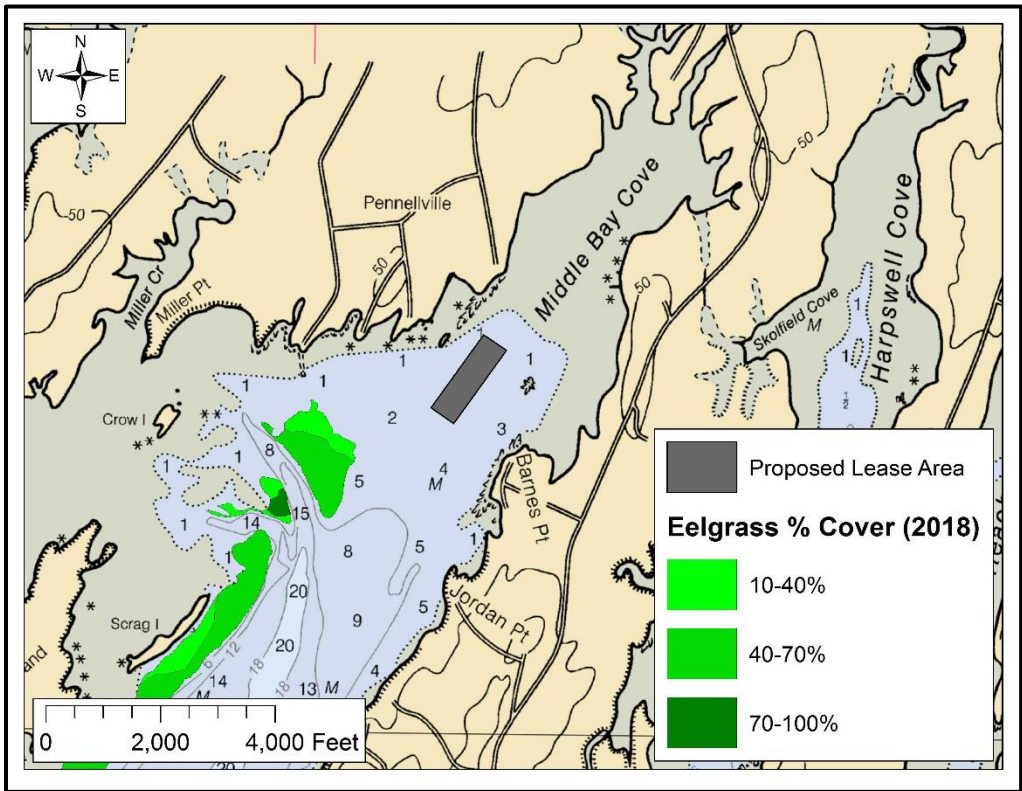


Figure 5: Eelgrass (*Z. marina*) near the proposed lease site, 2018.¹³

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 approximately 100 feet from Maine Shorebird Areas and approximately 165 feet from Tidal Waterfowl and Wading Bird Habitat, both of which are defined as Significant Wildlife Habitat Under the Natural Resources Protection Act (Figure 6).

On April 23, 2021, Rebecca Settele (Wildlife Biologist, MDIF&W) responded, by email, to a “Request for Agency Review and Comment” stating “Minimal impacts to wildlife are anticipated for this project”.

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

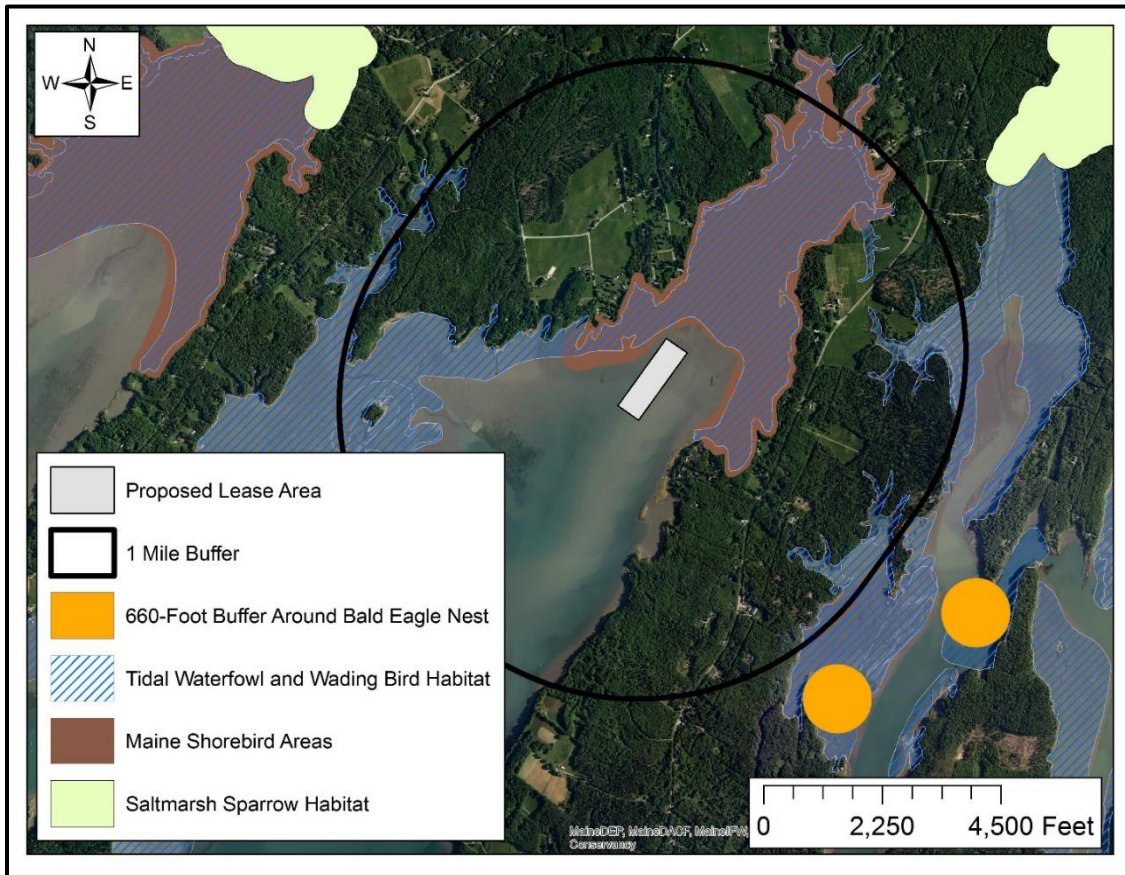


Figure 6. Tidal Waterfowl and Wading Bird Habitat¹⁴, bald eagle nests¹⁵, shorebird areas¹⁶, and Habitat for Endangered, Threatened, or Species of Special Concern¹⁷ near the proposed lease site.

(6) Source of Organisms to be Cultured

The applicant proposes to source American/eastern oyster (*Crassostrea virginica*) and hard clam/northern quahog (*Mercenaria mercenaria*) seed from lease MIDD CI, which is held by the applicant and located approximately 3,455 feet to the southwest of the proposed lease considered here (Figure 6).

(7) Interference with Public Facilities

The Pennellville Road Right-of-Way, which leads to Barnes Landing, and a coastal island owned by the Maine Bureau of Parks and Lands are located within 1,000 feet of the proposed lease (Figure 7). Located approximately 730 feet to the north of the proposal, Barnes Landing hosts a small parking lot and a boat launch for hand-carry watercraft. At the time of the site visit on August 6, 2021, an outhaul holding a canoe was observed at this right of way (Figure 2). Simpson’s Point, a public access point owned by the Town of Brunswick and used, among

¹⁴ Data obtained from: https://services1.arcgis.com/RbMX0mRVOFNTdLzd/arcgis/rest/services/MaineDIFW_TWWH/FeatureServer

¹⁵ Data obtained from USFWS: https://services.arcgis.com/QVENGdaPbd4LUkLV/ArcGIS/rest/services/Maine_Bald_Eagles_2019_with_twn_cnty

¹⁶Data obtained from: <https://services1.arcgis.com/RbMX0mRVOFNTdLzd/ArcGIS/rest/services/ShorebirdAreas/FeatureServer>

¹⁷ Data obtained from: https://services1.arcgis.com/RbMX0mRVOFNTdLzd/ArcGIS/rest/services/MaineDIFW_ETSC_Summarized/FeatureServer

other things, as a location to swim and launch hand carried vessels, is located approximately 2,500 feet to the west of the proposal. The proposal is not expected to interfere with the use of these facilities because no gear other than corner markers is proposed.

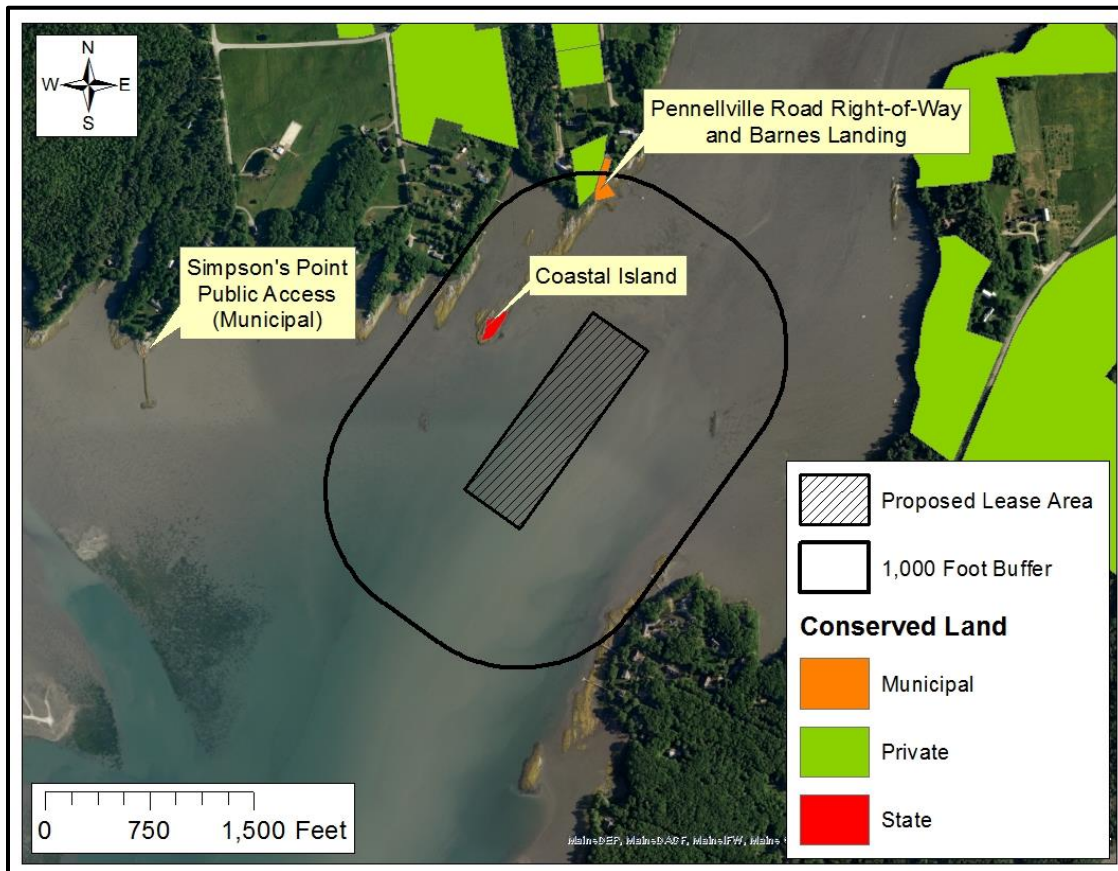


Figure 7. Conserved land and public facilities near the proposed lease site.¹⁸

(8) Public Health

The proposed lease area is currently classified as “Open/Approved” for the harvest of shellfish by the MDMR Bureau of Public Health. According to the Bureau of Public Health, the general area is sometimes subject to biotoxin blooms, of which the applicant will need to pay notice.¹⁹

(9) Lighting

According to the application, the only time lights would be used on the proposed lease would be when weather conditions favor working early before daylight. In these cases, the applicant would use headlamps and navigation lights.²⁰

(10) Noise

¹⁸ Data obtained from SDE Feature Class sourced from The Maine Office of GIS “GISVIEW.MECONSLANDS.Conserved_Lands”

¹⁹ K. Kanwit to MDMR Aquaculture. Email sent 9.16.2020.

²⁰ Application, page 13

According to the application, boats proposed for use at the lease site include (2) 22-foot boats, one powered by a 90-horsepower outboard engine and the other powered by a 30-horsepower outboard engine. Both outboard engines are 4-strokes.²¹ The boats proposed are consistent with the size and type of vessels routinely used for aquaculture operations, as well as other commercial and recreational uses, along the Maine coast. According to the application, no other powered equipment would be used on site.

(11) Visual Impact

The proposal complies with the MDMR's height and visual impact limitations.

²¹ Application, page 12