

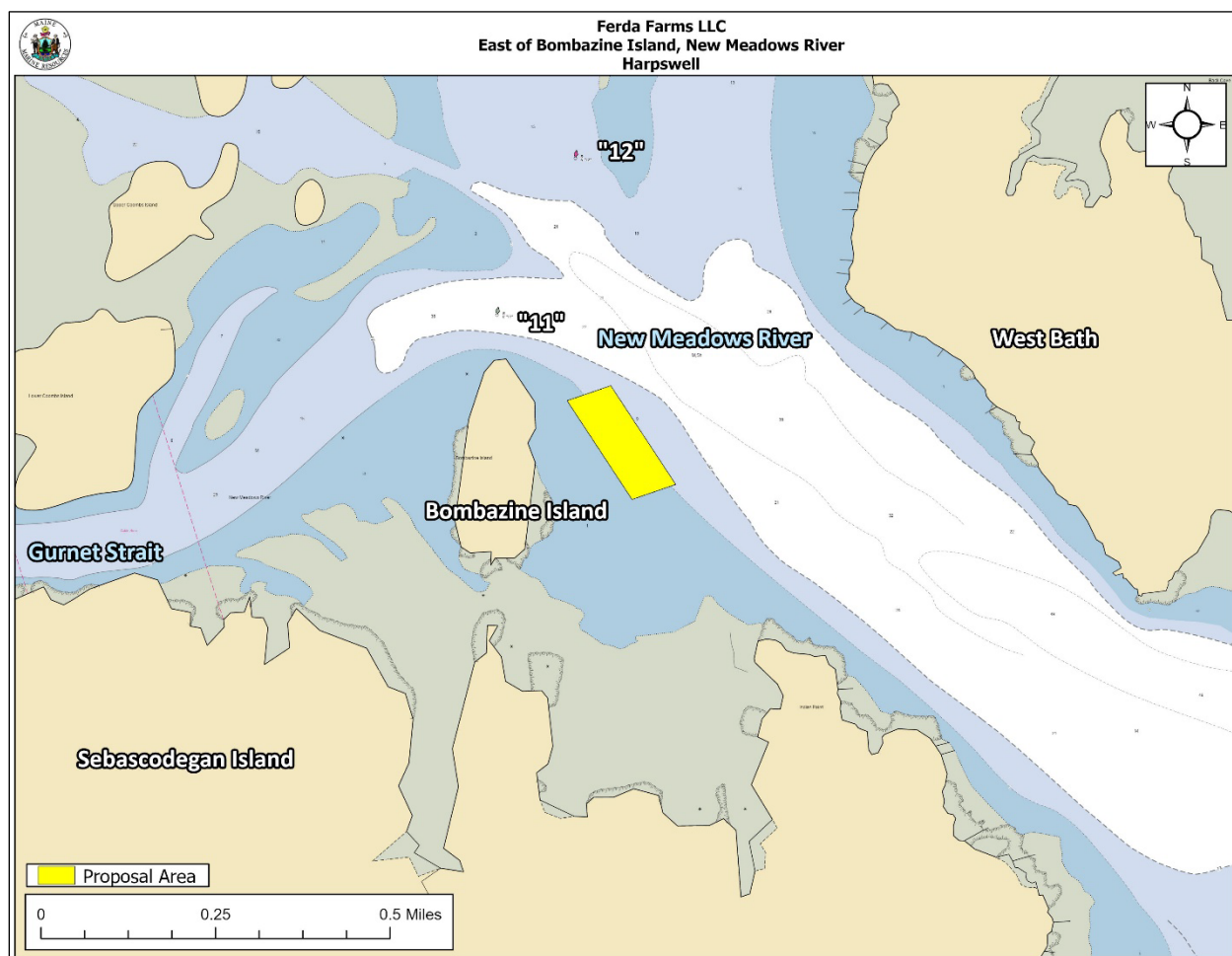


Figure 1. Vicinity map.<sup>1</sup>

**Location:** East of Bombazine Island, New Meadows River, Harpswell, Cumberland County, Maine

**Purpose:** Standard lease for bottom and suspended culture of American oysters (*Crassostrea virginica*) and hard-shell clams/ quahogs (*Mercenaria mercenaria*).

Site Review: Meryl Grady, Geoffrey Shook, and Katie Von Hohenleiten

Report Preparation: Geoffrey Shook, Meryl Grady, and Amanda Ellis

<sup>1</sup> Unless otherwise noted, all figures in this report were created in ArcGIS Pro version 3.3 using digitized NOAA Nautical Charts or geo-referenced aerial photographs provided by Esri (Firefly).



### **Application Overview**

The applicant, Ferda Farms LLC, is requesting a 5.00-acre, 10-year standard lease east of Bombazine Island in the New Meadows River for the bottom and suspended culture of shellfish. The applicant intends to have a work platform consisting of two 12'x24' rafts located in the center of the lease. The applicant intends for the site to be active year-round. During the winter months, approximately January 1- April 1 of each year, all cages will be sunk to the bottom. Bags and baskets would be stored on the work platform or the applicant's property. Only marker buoys at the end of each longline would remain on the surface during this time. During the winter months, the work platform is intended to be stored on shore on the south side of Upper Coombs Island. The lease application states that the applicant has verbal permission to store the work platform on shore from the owners of Upper Coombs Island. If the proposal is granted, the applicant intends to relinquish Limited Purpose Aquaculture (LPA) sites SSHA218, SSHA319, SSHA419, SSHA118, and CBUR219. <sup>2</sup>

### **General Characteristics**

On July 2, 2025, Department of Marine Resources (DMR) scientists visited the proposed lease site. DMR scientists arrived on site at approximately 10:13 AM. The proposal is located in subtidal waters near a fork in the New Meadows River approximately 176 feet to the east of Bombazine Island at mean low water (MLW). Gurnet Strait extends to the west of Bombazine Island and the proposal with the main body of the New Meadows River to the east of the proposal (Figure 3). Nearby Bombazine Island was observed to have a rocky shoreline dotted with gravel beaches leading to a primarily coniferous upland. There were two riparian properties observed on the island. The West Bath shoreline of the New Meadows River is located approximately 1,470 feet to the east of the proposal at MLW and contains numerous residential properties and piers with attached docks.

### **Depth**

On July 2, 2025, DMR scientists began collecting depths at the proposed site at approximately 10:35 AM. The tide was ebbing with the next low tide predicted at 11:17 AM (Table 1). Depths were determined to be between 3.2-8.6 feet at the proposal corners. Correcting for tidal variations derives depths at mean low water (MLW, 0.0 feet) to be between 2.1-7.5 feet at the proposal corners. Approximate depths at mean high water (MHW, 9.1 feet<sup>3</sup>) are between 11.2-16.6 feet at the proposal corners (Table 2). Water current was flowing to the north at the time of the site visit.

**Table 1.** Predicted tidal heights in the New Meadows River, Maine.<sup>4</sup>

| Date       | Time     | Height (ft) |
|------------|----------|-------------|
| 2025/07/02 | 04:58 AM | 8.8 H       |
| 2025/07/02 | 11:17 AM | 0.9 L       |
| 2025/07/02 | 05:33 PM | 8.9 H       |
| 2025/07/02 | 11:51 PM | 1.5 L       |

<sup>2</sup> Application page 6, 7, 8, 13, 16. At the time of this report, all stated LPAs have been terminated.

<sup>3</sup> MHW in Portland, ME is 9.1 feet, NOAA Tide Station 8418150

<sup>4</sup> <https://www.usharbors.com/harbor/maine/new-meadows-river-me/tides/?tide=2025-07#monthly-tide-chart>



# **Department of Marine Resources** **Site Report**

Ferda Farms LLC  
East of Bombazine Island, New Meadows River  
Harpwell

**Table 2.** Collected and derived depths at corners of the proposed lease area.

| Corner | Measured Depth (ft) | MLW Depth (ft) | MHW Depth (ft) |
|--------|---------------------|----------------|----------------|
| NW     | 4.7                 | 3.6            | 12.7           |
| NE     | 8.6                 | 7.5            | 16.6           |
| SE     | 4.3                 | 3.2            | 12.3           |
| SW     | 3.2                 | 2.1            | 11.2           |

## **Bottom Characteristics**

DMR scientists observed the bottom characteristics of the proposed lease site via a remotely operated vehicle (ROV). Bottom characteristics were categorized using the Coastal and Marine Ecological Classification Standard (CMECS), a national standard for describing features of the marine environment (Table 3). Sediment information was determined based on visual analysis of the video. The bottom of the proposed lease site is primarily composed of mud with areas of sheet algal bed.

**Table 3.** Bottom characteristics of the proposed site.

| Substrate Origin       | Substrate Class                  | Substrate Subclass            | Substrate Group |
|------------------------|----------------------------------|-------------------------------|-----------------|
| Geologic Substrate     | Unconsolidated Mineral Substrate | Fine Unconsolidated Substrate | Mud             |
| Benthic/Attached Biota | Aquatic Vegetation Bed           | Benthic Macroalgae            | Sheet Algal Bed |

## **Position and Distances to Shore**

The geodesic measuring tool in ArcGIS Pro 3.3 was used to verify the distances and bearings between proposed lease corners. Distances to shore were determined using the measuring tool in ArcGIS Pro 3.3, a nautical chart provided by the National Oceanic and Atmospheric Administration (NOAA), and the application coordinates (Table 4, Figure 2,3).

### **Application Coordinates (WGS84) – 5.00 Acres**

| Corner | Latitude   | Longitude   |      |     |         |      |            |
|--------|------------|-------------|------|-----|---------|------|------------|
| NW     | 43.862170° | -69.896105° | then | 264 | feet at | 65°  | True to    |
| NE     | 43.862481° | -69.895201° | then | 825 | feet at | 155° | True to    |
| SE     | 43.860438° | -69.893857° | then | 264 | feet at | 245° | True to    |
| SW     | 43.860127° | -69.894760° | then | 825 | feet at | 335° | True to NW |

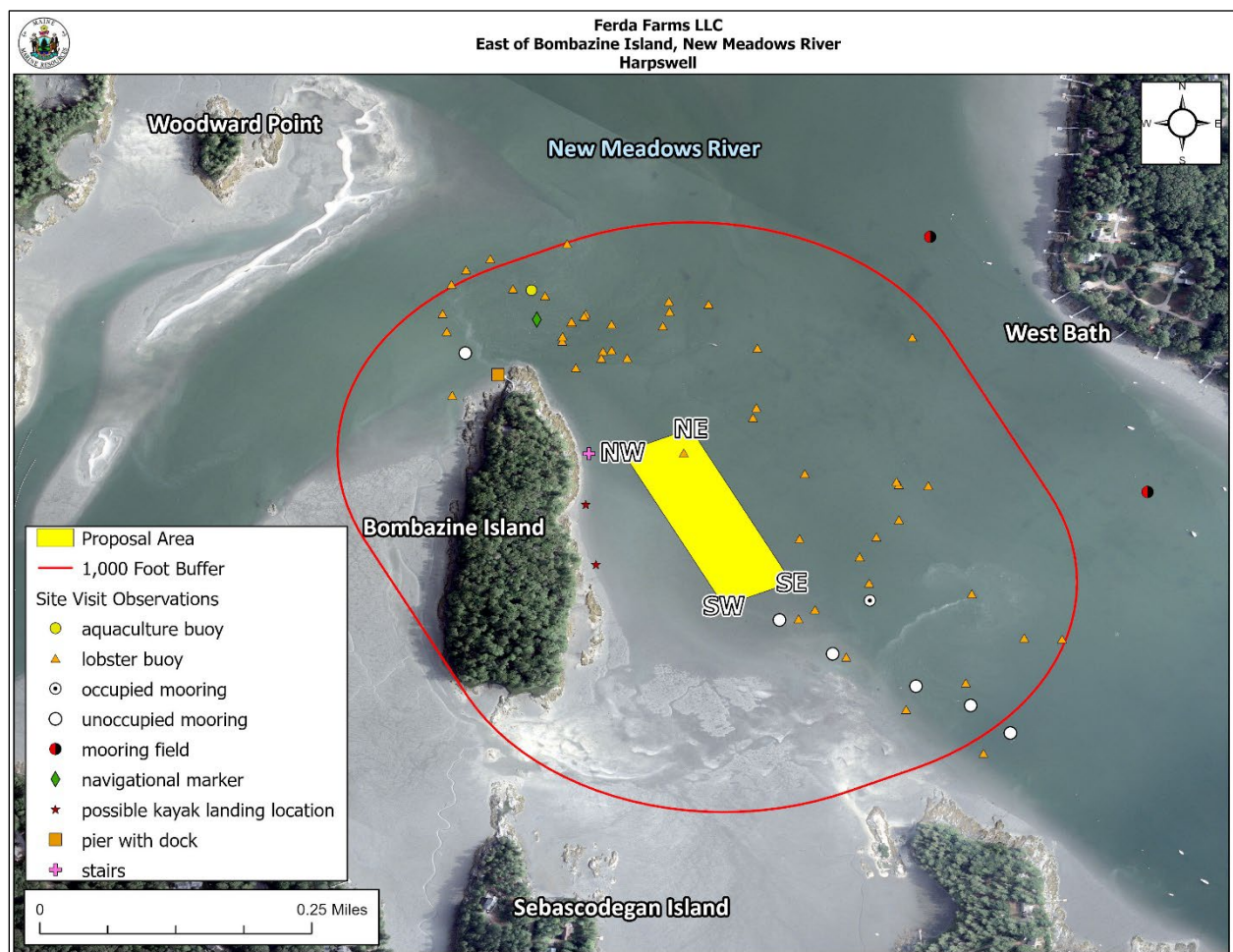


**Department of Marine Resources**  
**Site Report**

Ferda Farms LLC  
East of Bombazine Island, New Meadows River  
Harpswell

**Table 4.** Approximate distances from proposal corners to surrounding features (Figure 2,3).

| Feature                                 | Distance               |
|-----------------------------------------|------------------------|
| NW corner to Bombazine Island at MLW    | ~176' to the west      |
| NW corner to green navigation aid "11"  | ~756' to the northwest |
| NE corner to red navigation aid "12"    | ~1,742' to the north   |
| NE corner to West Bath shoreline at MLW | ~1,470' to the east    |
| SE corner to West Bath shoreline at MLW | ~1,696' to the east    |
| SE corner to Sebascodegan Island at MLW | ~852' to the south     |
| SW corner to Sebascodegan Island at MLW | ~795' to the southwest |
| SW corner to Bombazine Island at MLW    | ~430' to the west      |



**Figure 2.** Proposed lease area with site visit observations.



## Department of Marine Resources Site Report

Ferda Farms LLC  
East of Bombazine Island, New Meadows River  
Harpwell

***Pursuant to statute and regulation, aquaculture leases are evaluated in consideration of applicable decision criteria. The Site Report documents DMR's observations of the area and other information, in consideration of those criteria, as noted below:***

### **(1) Riparian Ingress and Egress**

During the site visit, DMR scientists observed two residential structures on Bombazine Island within the vicinity of the proposal approximately 244 feet and 403 feet to the west. The structures were located on the northern end of the island in the vicinity of an observed dock, located approximately 550 feet northwest of the proposal. A set of concrete stairs leading to the shoreline was observed located approximately 205 feet west of the proposal (Image 1, Figure 2). Seven moorings were observed within the vicinity of the proposal, in addition to two small mooring fields to the east along the West Bath shoreline. Moorings were located approximately 731 feet to the northwest and 147 feet, 374 feet, 665 feet, 865 feet, 1,058 feet south-southeast and 287 feet to the southeast. One mooring in the vicinity of the proposal was occupied, with an approximate 30-foot powerboat. The mooring fields along the West Bath shoreline were located approximately 1,253 feet and 1,322 feet to the east and contained both occupied and unoccupied moorings.

A Harbormaster Questionnaire was received by DMR from the local Harbormaster on December 31, 2024. The Harbormaster stated there are no permitted moorings within the boundary of the proposal, but there is a string of moorings southeast of the proposal with the closest located approximately 187 feet from the [SE] corner and 238 feet from the [SW] corner.<sup>5</sup> The Harbormaster also stated that, other than a direct abutter to the west on Bombazine Island, it is unlikely that other riparian owners would be unreasonably affected by the proposal.

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<sup>5</sup> Images of the proposal area received with the completed Harbormaster Questionnaire have the corners of the proposal mislabeled. The Harbormaster Questionnaire is likely referencing the SE and SW corners, respectively (Figure 2).



**Image 1.** Concrete stairs leading to the shoreline

## **(2) Navigation**

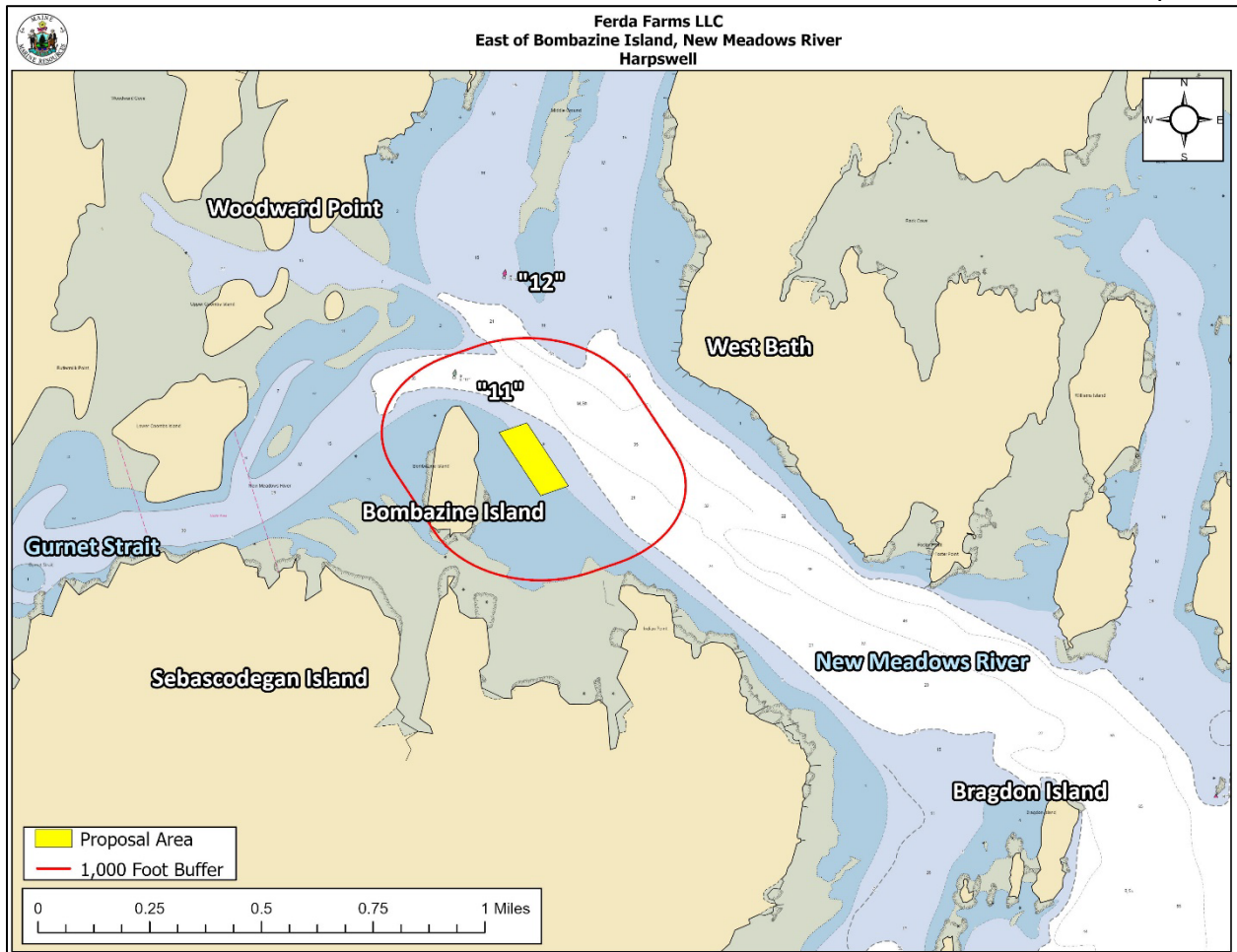
The proposal is located along the western shore of the New Meadows River approximately 176 feet to the east of Bombazine Island at MLW. The proposal is located entirely outside of the mapped deepwater channel and approximately 25 feet west of the charted navigational channel that utilizes red and green navigational buoys to assist mariners with transiting up and down the river. There is approximately 1,266 feet of navigable water in between the NE corner of the proposal and a charted area of shallow water (1 foot at MLW) that would typically be considered too shallow for navigation at MLW.

During the site visit, DMR scientists observed 19 powerboats operating in the channel to the east. Scientists also observed two kayakers landing on one of the beaches on the southeastern end of Bombazine Island (Figure 2).

The Harbormaster Questionnaire stated that there should not be a significant impact on general navigation. The Questionnaire described that there is approximately 550 feet between the [SE] and [NE] corners of the proposal and the center of the channel in the New Meadows River.<sup>6</sup> Additionally, some boat traffic transits between the southern end of Bombazine Island and the northern tip of Sebascodegan Shores Road [Sebascodegan Island] from high tide until approximately three hours before low tide, as well as fishermen accessing the intertidal flats.

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<sup>6</sup> Images of the proposal area received with the completed Harbormaster Questionnaire have the corners of the proposal mislabeled. The Harbormaster Questionnaire is likely referencing the SE and NE corners, respectively (Figure 2).



**Figure 3.** Navigational channels in the vicinity of the proposed lease area.

### (3) Fishing and Other Uses

During DMR's site visit, scientists observed 48 lobster buoys within the vicinity of the proposal, with the closest located within the proposal boundaries (Figure 2). Scientists also observed a lobster boat setting and hauling lobster traps in the immediate vicinity of the proposal, as well as another lobster boat working to the north of Bombazine Island within 1,000 feet of the proposal. Two recreational fishing boats were observed within the vicinity of the proposal. One boat was observed fishing to the north of Bombazine Island and the other was observed fishing in the channel to the east of the proposal.

The Harbormaster Questionnaire indicated there are concerns from two Town of Harpswell committees. The Harpswell Harbor and Waterfront Committee stated concerns regarding the location of the proposed lease and the interaction with menhaden fishing in the vicinity of the proposal.



## Department of Marine Resources Site Report

Ferda Farms LLC  
East of Bombazine Island, New Meadows River  
Harpswell

The Harpswell Marine Resources Committee (HMRC) stated concerns about the proposal being located in an area with “restricted current” and “any wild spat that travels through this lease is likely to be absorbed by the marine species within the lease”. In summary, the HMRC posits that the current speed in this area creates conditions for American oysters cultivated on the proposed site to consume wild shellfish spat, potentially resulting in adverse impacts to wild shellfish populations.

Pursuant to 12 M.R.S.A. § 6671, municipalities may adopt shellfish conservation ordinances governing the management and harvesting of shellfish within the intertidal zone. Consistent with this authority, the Town of Harpswell has adopted a shellfish ordinance that regulates the harvest of quahogs (*Mercenaria mercenaria*), American oysters, European oysters (*Ostrea edulis*), and razor clams (*Ensis directus*).

Beginning in 2023, some wild shellfish harvesters and members of special interest groups began speculating that the increase in American oyster aquaculture has negatively impacted the soft-shell clam population.<sup>7</sup> In 2024, at the direction of the DMR Commissioner and with encouragement from the 131st Maine Legislature, DMR conducted a literature review and investigation into the interactions between American oysters and softshell clams, culminating in a report.<sup>8</sup>

The report includes a summary of historical soft-shell clam landings in Maine, which documents a nearly 75% decrease in Maine’s commercial soft-shell clam harvest over the past 40 years. The research attributes the decline to the influences of a changing climate, acidification, and predation by the invasive European green crab (*Carcinus maenas*).

More specifically, a review of the scientific literature has found that “rigorous studies over the last decade in the Maine coastal environment have shown that the larval supply of softshell clams to the ocean floor is not the limiting factor for abundance. Rather, low post-settlement survival (after the juvenile clam enters the mud) is the primary driver of softshell clam abundance. Intensive rates of predation by invasive European green crabs are responsible for the decline in softshell clam populations as evidenced repeatedly by predator exclusion studies over decades. These studies have shown that when protected from bottom-dwelling predators like crabs, softshell clam larvae settle and survive in abundant numbers.”<sup>9</sup> Though the literature review focused on the dynamics between American oysters and soft-shell clams specifically, the literature also supports the conclusion that “in dynamic marine systems, the culture of American oysters is unlikely to impact the abundance of other bivalve species that have co-evolved in western north Atlantic estuarine systems.”<sup>10</sup>

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<sup>7</sup> DMR report: *A summary of literature related to the interactions between American oysters (Crassostrea virginica) and softshell clams (Mya arenaria), and a case study in the Damariscotta River*, pg. 4

<sup>8</sup> Ibid., pg. 4

<sup>9</sup> Ibid., pg. 3

<sup>10</sup> Ibid., pg. 25



## Department of Marine Resources Site Report

Ferda Farms LLC  
East of Bombazine Island, New Meadows River  
Harpwell

Regarding current, the average ocean water current speed near the coast of Maine ranges approximately from 5-15 centimeters per second (cm/s).<sup>11</sup> However, in river systems, the current speed can increase substantially as the channel becomes narrower or the cross-sectional area of flow decreases.<sup>12</sup>

In 2017, the University of Maine deployed a sensor in the New Meadows River, within the boundaries of the proposed lease site, as depicted in Figure 5. An additional sensor was also deployed in the upper Damariscotta River near Perkins Point. The sensors collected current speeds once per hour over a five-month period. The current speeds in this area of the New Meadows River ranged from 0.4 cm/s to 60.9 cm/s, and the current speeds in this area of the Damariscotta River ranged from 0.1 cm/s to 48.6 cm/s. Lower ranges are attributed to slack tide.<sup>13</sup> Figure 4 compares the current speeds of the Damariscotta River and New Meadows River. Overall, the New Meadows River often had higher current speeds than the Damariscotta River.

The report also noted that research has found that bivalves, such as American oysters, selectively feed on particles of preferred sizes and that soft-shell clam larvae become too large for American oysters to consume after two days.<sup>14</sup> This, combined with current speeds, further reduces the window of opportunity for consumption and limits the duration of larval exposure to American oysters.

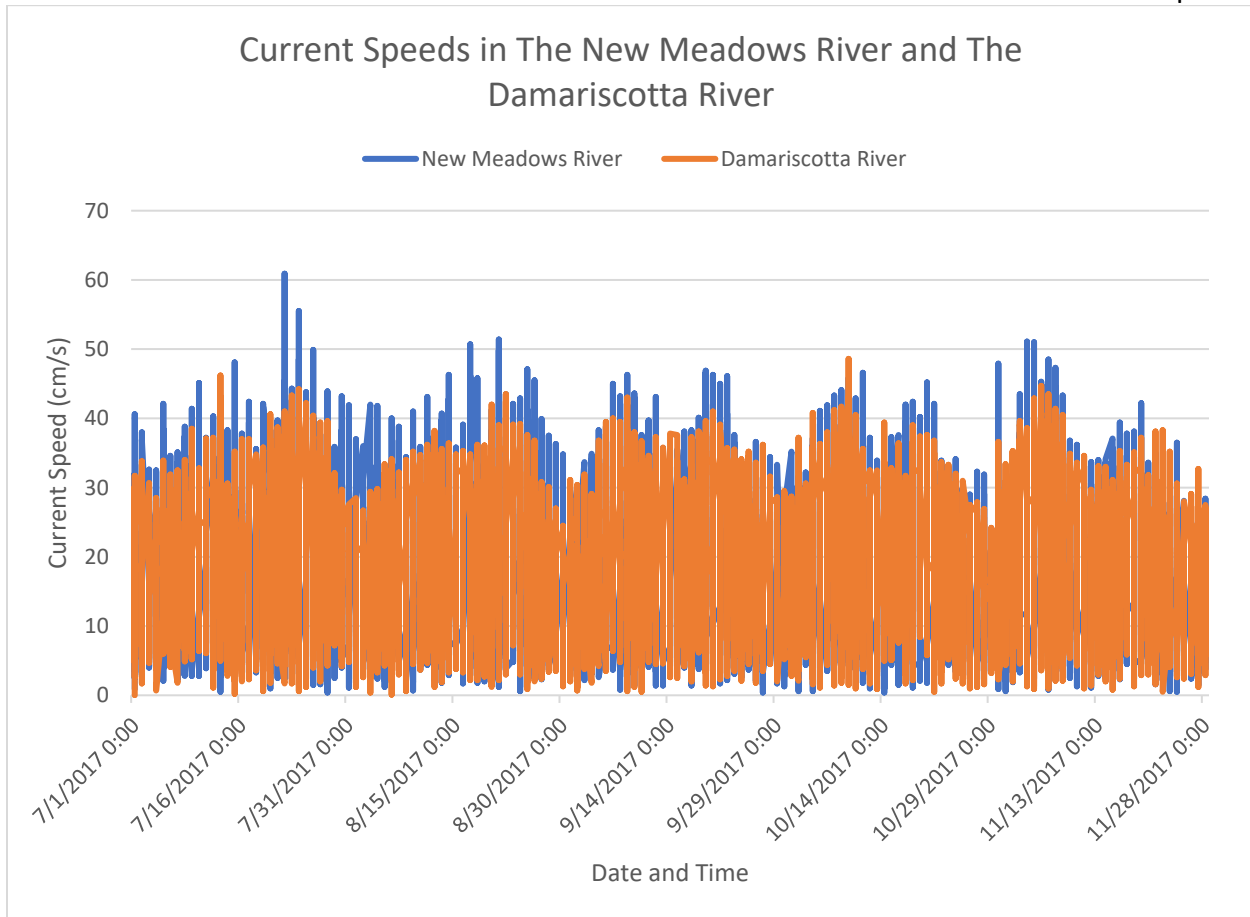
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<sup>11</sup> <https://stellwagen.noaa.gov/about/the-setting/oceanography.html>, <https://pmc.ncbi.nlm.nih.gov/articles/PMC5617362/>

<sup>12</sup> <https://pubs.usgs.gov/pp/1242/report.pdf>

<sup>13</sup> Slack tide is when the current is at or near zero, because the tide is changing direction. Slack tide typically occurs around the time of high or low tide.

<sup>14</sup> DMR report: *A summary of literature related to the interactions between American oysters (Crassostrea virginica) and softshell clams (Mya arenaria), and a case study in the Damariscotta River*, pg. 14



**Figure 4.** A line plot displaying current speeds over time in the New Meadows River and the Damariscotta River.



**Figure 5.** The location of the sensor in relation to the proposed lease area.

#### **(4) Other Aquaculture Uses**

There are not any active Limited Purpose Aquaculture (LPA) sites or active aquaculture leases within 1,000 feet of the proposal. Standard lease NMR CI, held by Ferda Farms LLC, is approximately 1,300 feet northwest of the proposal (Figure 6).

At the time of the site visit, DMR scientists observed one buoy related to aquaculture approximately 847 feet north-northwest of the proposal (Figure 2).

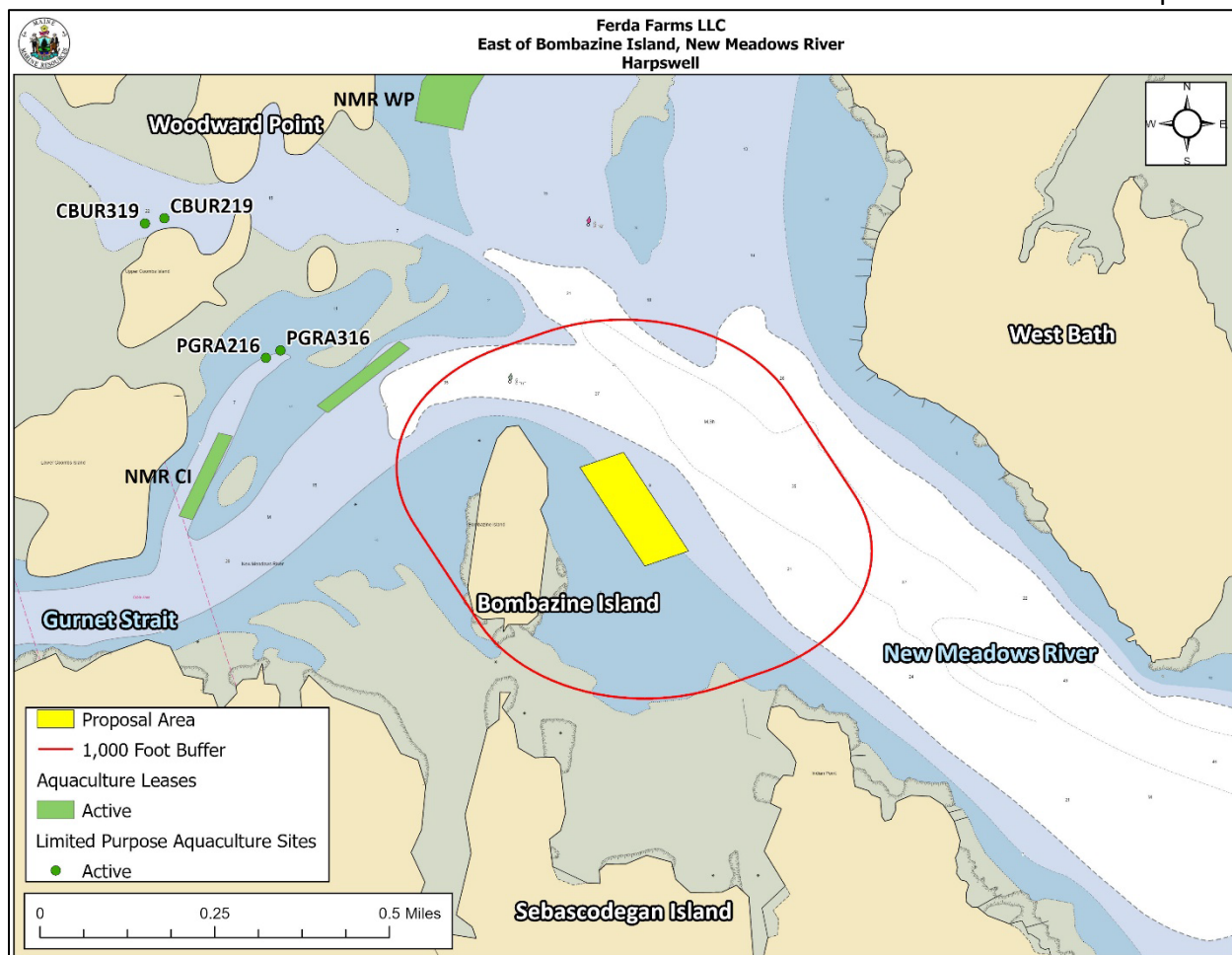


Figure 6. Aquaculture leases and LPA licenses in the vicinity of the proposed lease area.

## (5) Existing System Support

### Epibenthic Flora and Fauna

DMR scientists utilized an ROV to assess the epibenthic ecology of the proposed lease. The relative abundance of epibenthic flora and fauna observed in the video footage is described below in Table 5.

Table 5. Species observed on underwater video footage.

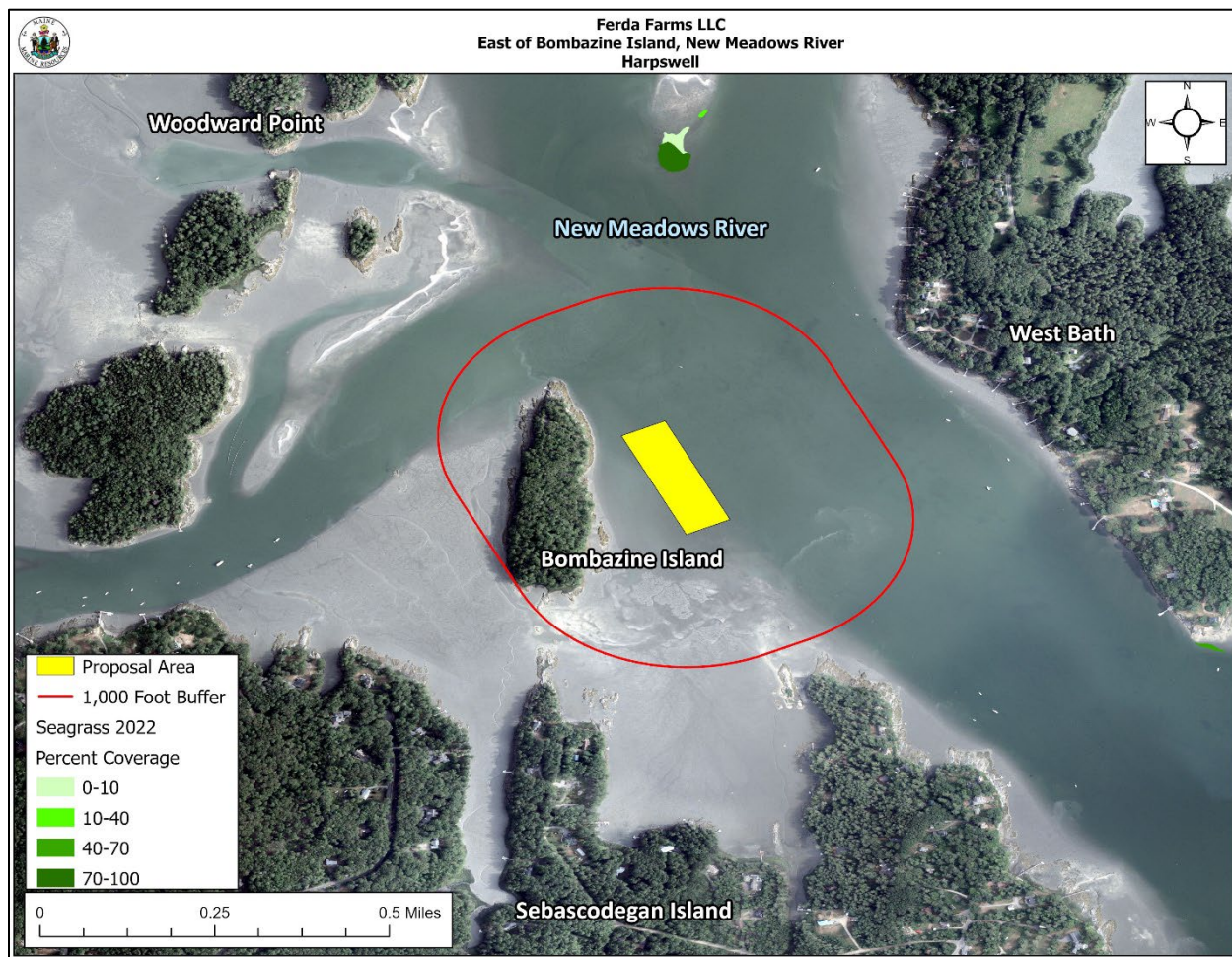
| Species Observed                  | Abundance  |
|-----------------------------------|------------|
| Hermit crab ( <i>Pagurus</i> sp.) | Occasional |



### Eelgrass (*Zostera marina*)

Records of seagrass collected by the Department of Environmental Protection (DEP) in 2022<sup>15</sup> indicate there is not eelgrass mapped within 1,000 feet of the proposal. The nearest mapped eelgrass is approximately 1,878 feet north of the proposal (Figure 7).

During DMR's site visit, scientists observed unattached eelgrass floating on the surface of the water but did not observe any eelgrass on underwater footage within the proposal boundaries.



**Figure 7.** Mapped eelgrass (*Z. marina*) in the vicinity of the proposed lease area.

<sup>15</sup>Data obtained from The Maine Office of GIS "GISVIEW.MEDEP.Seagrass2022". Widgeon grass was observed only in the New Meadows River area off Old Brunswick Road near shore. Eelgrass was the dominant vascular species in all other locations. This is the most current record of mapped eelgrass within the vicinity of the proposal.



## Department of Marine Resources Site Report

Ferda Farms LLC  
East of Bombazine Island, New Meadows River  
Harpowell

### Wildlife

During the site visit, DMR scientists observed moon jellyfish (*Aurelia aurita*), common tern (*Sterna hirundo*), bald eagle (*Haliaeetus leucocephalus*), great blue heron (*Ardea herodias*), Atlantic menhaden (*Brevoortia tyrannus*), great cormorant (*Phalacrocorax carbo*), osprey (*Pandion haliaetus*), harbor seal (*Phoca vitulina*), common eider (*Somateria mollissima*), Bonapartes gull (*Chroicocephalus philadelphia*), and an American crow (*Corvus brachyrhynchos*) in the general vicinity of the proposal. The harbor seal was observed in the water and swimming. A bald eagle nest was observed on Bombazine Island in the location indicated on the wildlife habitat figure (Figure 8).

The Department of Inland Fisheries and Wildlife (IFW) has jurisdiction over inland fisheries and wildlife resources of the State. IFW also has the authority to conserve wildlife populations and their ecosystems through applicable state laws and rules. DMR provides IFW with notice and the opportunity to comment on all complete lease applications. In addition, the Site Report also includes IFW designated and mapped habitat types that are within 1,000 feet of the lease proposal, if applicable.

According to Geographic Information System (GIS) data maintained by IFW and available through the Maine Office of GIS (MEGIS), there is one mapped habitat type within 1,000 feet of the lease proposal. Approximately 3.8 acres of the proposal are located within Tidal Waterfowl and Wading Bird Habitat (TWWH) (Figure 8).

IFW was provided with the opportunity to comment on this proposal. On January 3, 2025, a Resource Biologist with IFW responded by email to a "Request for Agency Review and Comment" stating that the proposal is located partially within TWWH. However, given the proposed activities, minimal impacts are anticipated.<sup>16</sup>

Though bald eagles are no longer listed on Maine's Endangered and Threatened Species List, the United States Fish and Wildlife Service (USFWS) may also have jurisdiction over the management and conservation of the species based on applicable law and rule. Data collected by USFWS in 2023 by aerial nest survey shows the nearest bald eagle nest is mapped approximately 324 feet to the west of the proposal (Figure 8).

The applicant communicated with USFWS in the Spring of 2023 about the presence of the bald eagle nest located within the vicinity of the proposal. The communication is included with the application.

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<sup>16</sup> Email correspondence between IFW and DMR



Department of Marine Resources  
Site Report

Ferda Farms LLC  
East of Bombazine Island, New Meadows River  
Harpswell

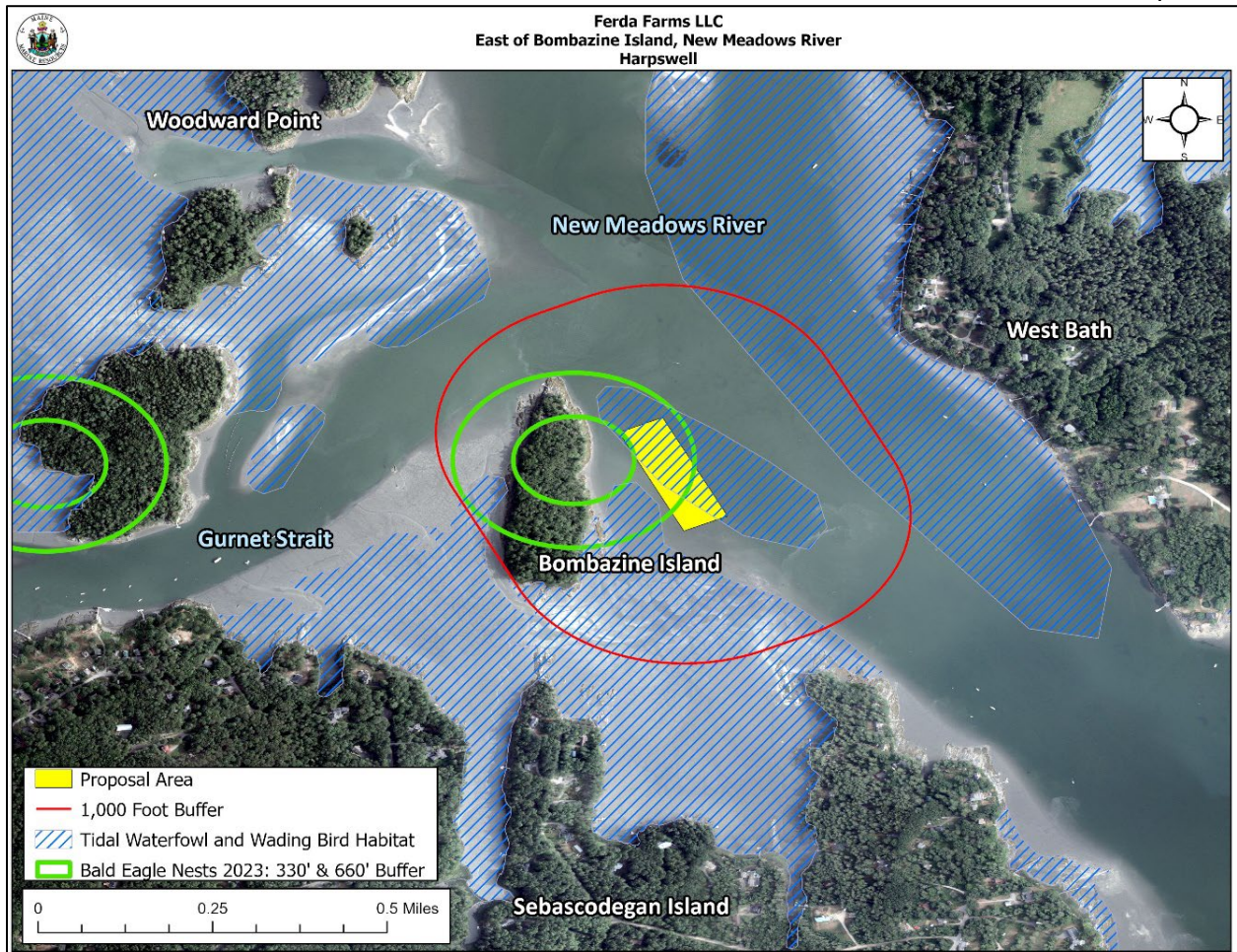


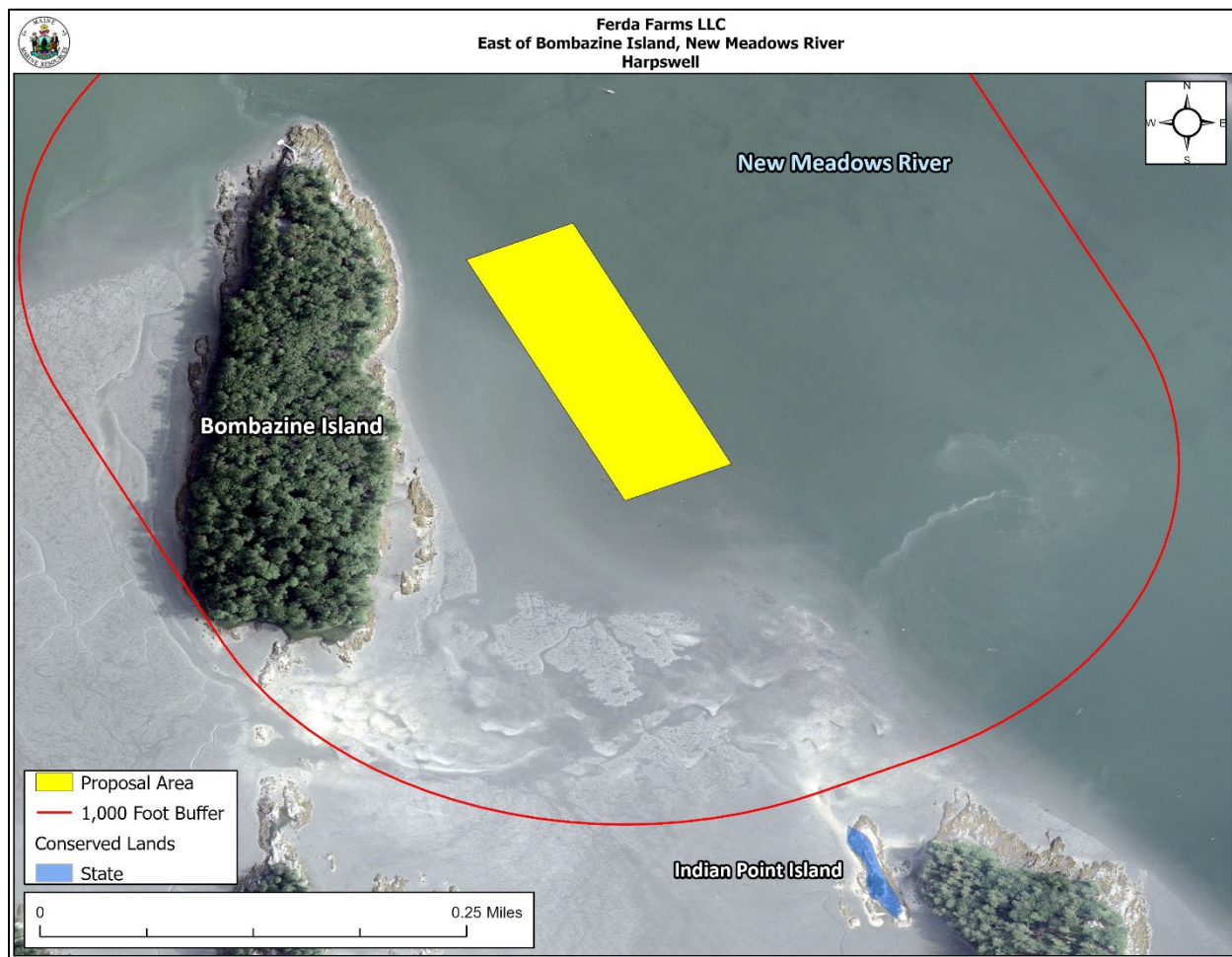
Figure 8. Mapped wildlife habitats in the vicinity of the proposed lease area. <sup>17</sup>

<sup>17</sup> Data obtained from USFWS "Bald\_Eagle\_Nests\_-\_Maine\_2023" and IFW "EHRTERN", "EHPLVTRN", "GISVIEW.MEIFW.Twwh", "ShorebirdAreas", and "SNI".



**(6) Interference with Public Facilities**

The proposed lease is within 1,000 feet of conserved land owned by the State of Maine. Indian Point Island is located approximately 830 feet south-southeast of the proposal at MLW (Figure 9), is owned by the Maine Bureau of Parks and Lands (MBPL) for “multiple uses and natural cover”<sup>18</sup> and is accessible for day use as part of the Maine Island Trail.<sup>19</sup> The proposed lease is not within 1,000 feet of any beach, park, or docking facility owned by federal, state, or municipal governments.



**Figure 9.** Public facilities near the proposed lease site.<sup>20</sup>

**(7) Water Quality**

The proposed lease is currently located within an area classified as Approved by the DMR Bureau of Public Health and Aquaculture.

<sup>18</sup> Data obtained from The Maine Office of GIS “GISVIEW.MECONSLANDS.Conserved\_Lands”

<sup>19</sup> Email correspondence between BPL and DMR

<sup>20</sup> Data obtained from The Maine Office of GIS “GISVIEW.MECONSLANDS.Conserved\_Lands”