

Field Surveys at Owls Head

2020 - 2021



Canadian Parks and Wilderness Society – Nova Scotia Chapter

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The Owls Head field surveys were carried out in Mi'kma'ki, the traditional and unceded territory of the Mi'kmaq.

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Executive Summary

Located on Nova Scotia's Eastern Shore, Owls Head is an intact coastal wilderness of high conservation value that has been a priority for protection for the past 50 years. This report documents the ecological significance of Owls Head, through a review of existing studies and original fieldwork undertaken by the Nova Scotia Chapter of the Canadian Parks and Wilderness Society (CPAWS-NS) and a team of volunteers, in 2020 and 2021. More specifically, this report considers findings from:

- Terrestrial and coastal bird surveys undertaken in Summer 2020 which identified 32 species of birds using audio and visual cues, including several species of conservation significance. A total of 92 bird species have now been identified at Owls Head.
- Field surveys by the Ecology of Plants in Communities (EPIC) Lab at St. Mary's University who have identified 80 plant species at Owls Head.
- Snorkel transect surveys, led by Dr Kristina Boerder, which indicated that healthy eelgrass beds surround Owls Head. The surveys took place over two consecutive years and documented a high percentage of canopy cover and average shoot height.
- A sea kayak expedition in July 2021 during which the CPAWS Nova Scotia team observed an endangered leatherback sea turtle close to shore near the federal property at Owls Head.
- A series of snorkel surveys which identified a diversity of marine species in the waters surrounding Owls Head, including juvenile flatfish, American lobster, and a variety of algae.

This report recommends permanent protection of terrestrial and marine ecosystems at Owls Head, in addition to ongoing baseline monitoring and further animal and plant biodiversity surveys.



Owls Head from above and on the land (top left and top right) (Photos: CPAWS-NS), a shorebird (bottom left) (Photo: Nick Hawkins) and an eelgrass ecosystem at Owls Head (bottom right) (Photo: Nicolas Winkler)

Introduction

Owls Head is a site of high conservation value located on Nova Scotia's Eastern Shore, near the community of Little Harbour. A coastal headland with distinctive parallel bedrock ridges, Owls Head is an intact wilderness that supports a diversity of terrestrial and marine life. With only roughly 5% of Nova Scotia's coastline protected (McBain, 2022), the site also provides important public access to the ocean and the nearby archipelago of around 700 islands along the Eastern shore.

The Nova Scotia Chapter of the Canadian Parks and Wilderness Society (CPAWS-NS) and a dedicated team of volunteers conducted a series of terrestrial and marine ecological surveys at Owls Head in 2020 and 2021. The purpose of this report is to summarize the results of these surveys and to highlight the conservation significance of Owls Head.



Owls Head from above (Photo: Nick Hawkins)

Owls Head History

Owls Head has long been recognized as a park with significant conservation value. This 285-hectare coastal headland was first announced for protection by the Nova Scotia government in 1973 as part of the Eastern Shore Provincial Park System (Gourlay, 1973). Over the next 50 years, Owls Head was repeatedly identified as a priority site for conservation.

In 1998, the Nova Scotia Department of Natural Resources designated Owls Head as a 'Zone C3 Park' within their Integrated Management review process. In 2009, the Colin Stewart Forest Forum report highlighted Owls Head as a "Tier 1" priority site for protection (Colin Stewart Forest Forum, 2009). In 2011, the release of the Natural Resource Strategy confirmed Owls Head was a priority site for parkland (Nova Scotia Department of Natural Resources, 2011). From 2011 to 2013, Owls Head was consistently prioritized for conservation throughout land review, park assessment and public consultation processes undertaken in developing the 'Nova Scotia Parks and Protected Areas Plan'. Owls Head was included in the final plan and the Nova Scotia government committed to legally protecting it no later than 2015 (Province of Nova Scotia, 2013).

Despite numerous affirmations of its significance for conservation, Owls Head did not receive a legal designation by the 2015 deadline. Instead, in 2019, it was secretly delisted by the Nova Scotia government in order to sell off these public lands for a golf course development. When the delisting was leaked to the public the following year, it sparked considerable public outcry fuelled an extensive grassroots campaign. The considerable community efforts to protect Owls Head led to the developer withdrawing their letter of offer in 2021 and the Nova Scotia government recommitting to legally protecting Owls Head in 2022. Owls Head Provincial Park finally received an official designation from the provincial government in June 2022.

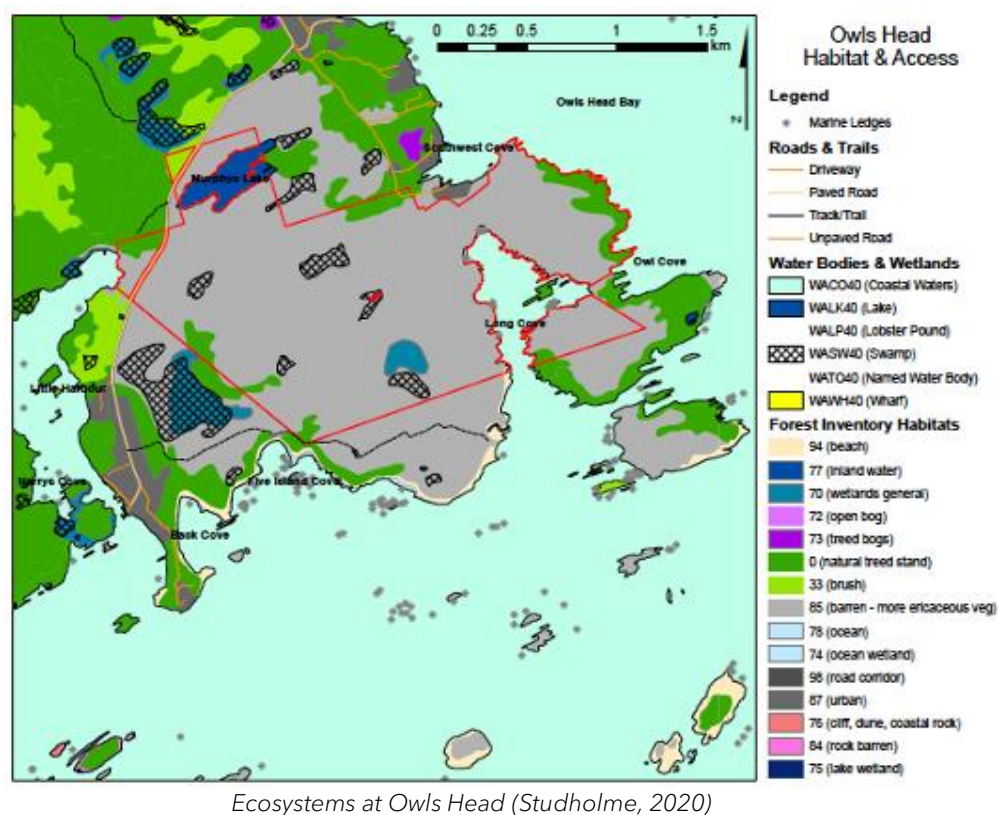
Conservation Significance

Terrestrial

Owls Head provides habitat for species-at-risk and migratory bird populations, such as Ruby-crowned kinglets, barn swallows and common eiders. It supports a globally rare plant community - the coastal broom crowberry - and provides key connectivity in the provincial system of protected areas. The Halifax Green Network Plan identifies an essential ecological corridor between Owls Head and Tangier Grand Lake Wilderness Area (Denty et al., 2018).

The landscape at Owls Head is characterized by a series of parallel bedrock ridges interspersed by coastal barren and wetland ecosystems. The Ecology of Plants in Communities (EPIC) lab at St. Mary's University has documented extensive wetland coverage at this site, including bogs, salt marshes, and swamps (Lundholm & Porter, 2020). Owls Head contains mostly low-lying vegetation as a result of shallow and nutrient-poor soils as well as the cold, foggy, and windy conditions typical of the climate on the Eastern Shore (Lundholm & Porter, 2020). Pockets of forest found along the eastern and western

edges of Owls Head are considered temperate rainforests because of these climate conditions. The following map details the general location of the terrestrial ecosystem types found at Owls Head based on publicly available data:



Marine

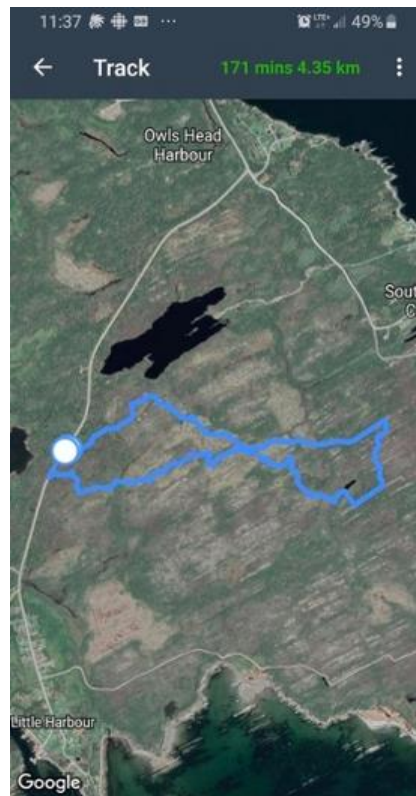
The coastal waters surrounding Owls Head have been identified by the federal department of Fisheries and Oceans Canada as an Ecologically and Biologically Significant Area (Hastings et al., 2014), and as an Area of Interest for potential marine protected area (MPA) establishment (DFO, 2019). The ecosystems found here include eelgrass bed, kelp beds, and an intertidal zone that supports a variety of species (DFO, 2019). The area is a known spawning ground for Atlantic herring (DFO, 1999), the nearby rivers provide habitat for the endangered Atlantic salmon (DFO, 2019), and the shoreline supports nesting and foraging seabirds and shorebirds, such as common eider, purple sandpipers, leach's storm-petrel and great cormorant (Hastings et al., 2014).

Of particular significance are the abundant eelgrass beds. Eelgrass has been recognised as an ecologically significant species by Fisheries and Oceans Canada (DFO, 2009). A highly productive ecosystem, eelgrass beds are found in the sheltered shallow bays around Owls Head. As well as improving water quality, they provide nursery habitat for the juvenile life stage of many fish species, including commercially important species such as American lobster and Atlantic cod (Joseph et al., 2013). Eelgrass beds can also help mitigate the impacts of climate change, by buffering the coastline from storm surge and erosion, and sequestering large amounts of atmospheric CO₂ (Walter et al., 2020).

Terrestrial Surveys

Bird Surveys

CPAWS-NS undertook a series of bird surveys with a team of volunteer birders at Owls Head on June 20th-21st, 2020. The survey team included birding experts Katie Studholme, Dr. Sebastian Pardo, Lucas Berrigan, and Laura Achenbach. Surveys were completed both on land and on the coastal waters. The terrestrial team set out in the early hours to do surveys on foot at Owls Head, targeting identified priority bird habitat from satellite imagery. The map below shows the route of one of the terrestrial surveys in June 2020.



Route of bird survey (Lucas Berrigan)

The coastal birding team used sea kayaks to paddle from Little Harbour wharf to Owls Head wharf on June 20th, 2020. Birds were identified using audio and visual cues, and all sightings were recorded on eBird (eBird, 2015). eBird is an online public database of bird abundance and distribution. This tool allows birders, naturalists and scientists from around the world to record and share details of their bird sightings.

A total of 32 species of birds were identified by volunteers on June 20th-21st, 2020. Sightings included several species of conservation significance including greater yellowleg, willet, Canada jay, purple finch, common eider, pine sisikin, red crossbill, blackpoll warbler, American kestrel and ruddy turnstone (see Appendix A). Volunteers returned to Owls Head for additional bird surveys in June 2020, August 2020, September 2020, and June 2021. All observations contributed to a growing list of 92 bird species recorded at Owls Head on eBird, including endangered barn swallows, endangered Canada warbler, vulnerable evening grosbeak, red-breasted merganser, American robin, boreal chickadee and bay-breasted warbler.



Spruce grouse at Owls Head (left), coastal birding surveys (middle) and terrestrial birding surveys (right) (Photos: Sebastian Pardo and Katie Studholme)

Plant Surveys

The EPIC Lab at St. Mary's University has undertaken significant plant surveys at Owls Head. Information for our review was provided by researcher Caitlin Porter. In 2011, the EPIC Lab conducted a study of the variability of plant biodiversity in coastal barren ecosystems in Nova Scotia, and selected Owls Head as one of 20 sites (Lundholm & Porter, 2020). The study utilized standardized transects (grid of 5x300m) along 1500m of ocean coastline and quadrats (1x1m) for plot identification during the 2011 growing season. Approximately 80 plant species were identified, including 70 species of vascular plants and 10 species of non-vascular plants (see Appendix B).

The study also identified the globally rare Broom Crowberry Coastal Dwarf Heathland plant community, which was significant due to the limited range of the species. One of only a handful of sites in Nova Scotia to support this ecosystem, Owls Head provides the exposed bedrock ridges, proximity to the coast and thin soils that the Broom Crowberry shrub seeks. This species is endemic to northeastern North America, but has only been commonly identified in Nova Scotia (Porter, Basquill & Lundholm, 2020).



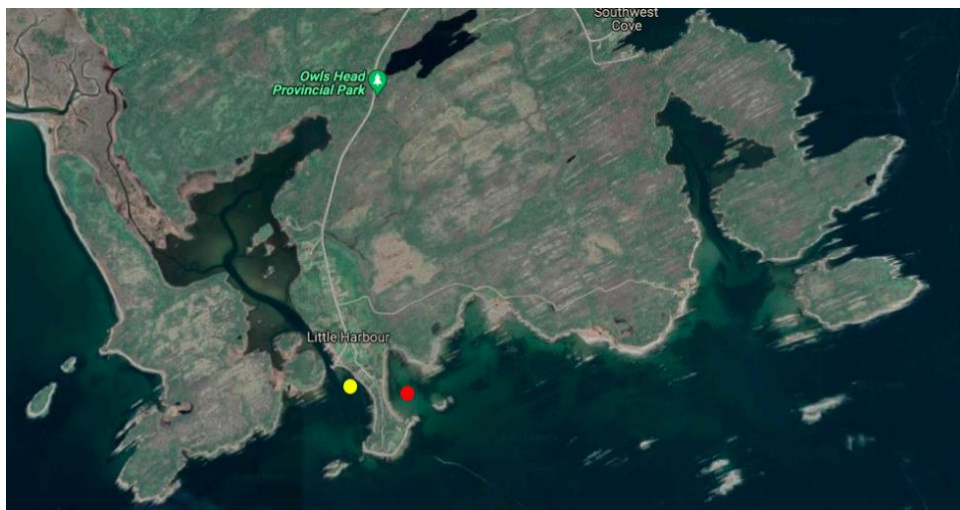
Coastal broom crowberry (on left) and blueberries (Photos: Caitlin Porter and Caitlin Grady)

With significant findings from plant and bird surveys at Owls Head, there is continued need for future terrestrial studies at this site. Ongoing efforts to collect baseline data and monitor the land-based ecosystems and species is important in ensuring the long-term health of Owls Head. Additional surveys could explore remaining data gaps relating to terrestrial species, including mammals, insects and amphibians in the area.

Marine Surveys

Eelgrass Transects

Led by Dr. Kristina Boerder from Dalhousie University, CPAWS-NS and a team of volunteers conducted snorkel transect surveys on eelgrass beds in the vicinity of Owls Head. The surveys took place over several days on September 5th, 19th and 20th, 2020 and August 22nd, 2021. Surveys occurred in Back Cove in 2020, and just south of Little Harbour wharf in 2021. Eelgrass has been observed in the shallow waters along the south coast of Owls Head, so the two survey locations were chosen based on accessibility.



Map of eelgrass surveys sites - red dot indicates location of 2020 surveys in Back Cove and yellow dot indicates location of 2021 surveys near Little Harbour wharf

At the survey sites, volunteers set up two 50m transect lines parallel to the shore, with markers every 5m. Half of the team measured canopy cover, shoot density, and the average height of eelgrass strands at 10m intervals, while the other half recorded observations of macrofauna on the transect lines at 10m intervals. A quadrat was placed by the interval markers and the percentage canopy cover, shoot density, strand height, and macrofauna observations were taken within the quadrat. The timing of the surveys depended on the tides, as the water depth over the eelgrass beds varied considerably.



Eelgrass at Owls Head (Photo: Nicolas Winkler)



Setting a transect line (Photo: Nicolas Winkler)



A transect line near Little Harbour Wharf (Photo: Nicolas Winkler)

In 2020, the volunteer teams completed six transect lines over a three-day period in Back Cove and, in 2021, two transects were completed in a single day near Little Harbour Wharf. Fig. 1 and 2 show the results of these surveys. While the shoot density at the Owls Head sites is relatively low, the high percentage of canopy cover and the average height indicate that the eelgrass beds are in good health.

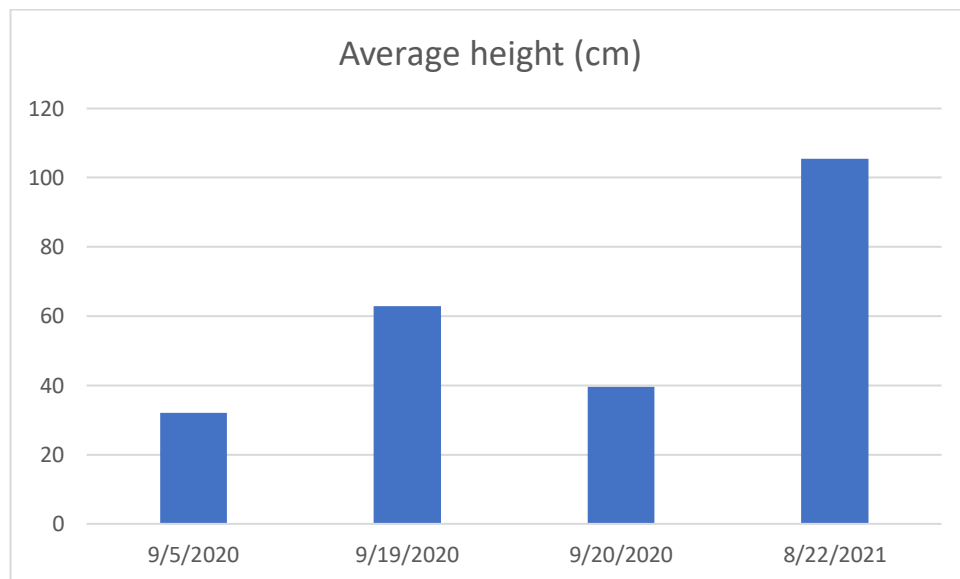


Fig. 1 - Average height of eelgrass blades at Owls Head

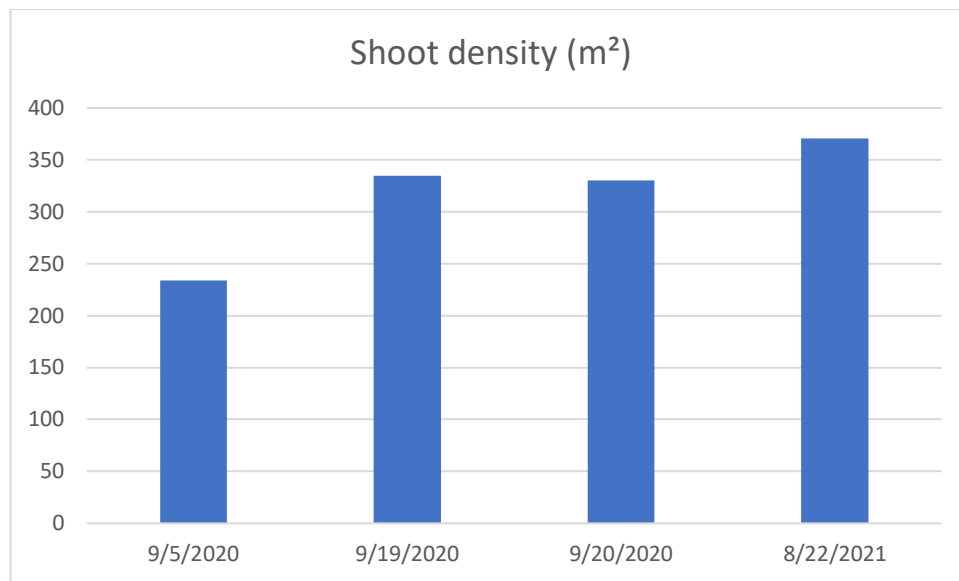


Fig. 2 - Shoot density of eelgrass at Owls Head

The team also recorded the benthic and mobile organisms observed in the vicinity of the transects, which included juvenile flatfish, periwinkles, tunicates and invertebrates including American lobster, and both European green crab and Atlantic rock crab. Further marine species observed at Owls Head are recorded in Appendix C.



Quadrat for measurements, and a European Green crab clinging to eelgrass (Photos: Nicolas Winkler)

Species Sightings

CPAWS-NS undertook several sea kayak trips to Owls Head during 2020 and 2021. On July 6th, 2021, an endangered leatherback sea turtle was observed approximately 20 feet from the shoreline. Six members on the CPAWS-NS expedition plus two guides from Coastal Adventures were present when the sea turtle was sighted. The observation occurred at the federal property at Owls Head near the lighthouse station between 2:45pm and 3:10pm. The sea turtle was relatively close to shore during that time and easily visible from the land, the conditions were calm and foggy but with good visibility.

The turtle undertook a series of shallow dives and appeared to be feeding. The dives were typically between 2 to 5 minutes in length. While kayaking shortly prior to the sighting, the CPAWS-NS team observed an abundance of lion's mane jellyfish in the nearshore waters, which is a known food source for leatherback sea turtles (COSEWIC, 2012). The world's largest reptile, Canadian coastal waters are known to be critical foraging habitat for the migratory species. The Atlantic species have been listed as 'Endangered' under the Species at Risk Act since 2003 (COSEWIC, 2012). The sighting was reported to the federal Department of Fisheries and Oceans and the Canadian Sea Turtle Network.



Leatherback Sea Turtle near Owls Head (Photo: CPAWS-NS)



Lion's mane jellyfish on the Eastern Shore (Photo: Nick Hawkins)

On September 22nd, 2021, CPAWS-NS led a group of Ocean Bridge ambassadors snorkelling near Little Harbour wharf, in the vicinity of Owls Head. Ocean Bridge hosts yearlong programs for ambassadors that focus on ocean health and conservation (Ocean Wise, 2022). The ambassadors explored a healthy eelgrass bed and identified a variety of marine species (see Appendix C), including American lobster, Atlantic rock crab, European green crab, sand shrimp, cunner, and various algae.



The Ocean Bridge snorkel team (Photo: CPAWS-NS), intertidal life on the Eastern Shore (Photo: Nick Hawkins)

Similar to the terrestrial landscape, additional marine surveys would be helpful in collecting baseline ecosystem data and monitoring coastal and marine species at Owls Head over time. More specifically, studies of plant and animal marine life, such as fish, molluscs, eelgrass and kelp beds, would provide new and valuable information in the campaign to protect Owls Head.

Final Remarks

The field surveys conducted at Owls Head in 2020 and 2021 document a rich biodiversity on the land and in the surrounding waters. These findings add to the growing body of research that highlights the ecological significance of this area, and the necessity of legally protecting the site. Many of the ecosystems and species described here, such as the eelgrass beds, are sensitive to anthropogenic disturbance. These ecosystems emphasize the importance of Owls Head in supporting biodiversity and providing services such as carbon storage, storm surge mitigation, and habitat protection for commercially-important species.

From the results of the biodiversity surveys, CPAWS-NS recommends that the lands and waters at Owls Head receive permanent legal protection. At the provincial level, the Nova Scotia government successfully designated Owls Head Provincial Park in 2022. At the federal level, the Canadian Wildlife Service should designate the federal property as a National Wildlife Area.

With the legal protection of Owls Head Provincial Park in place, additional biodiversity surveys can help regularly collect baseline data and monitor the health of terrestrial and marine ecosystems and species. Future surveys should fill gaps in biodiversity data at Owls Head. Research on terrestrial species, including mammals, insects, and amphibians, and on plant and animal life in the marine environment, such as fish, molluscs and kelp beds, would be most helpful.

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Appendices

Appendix A – Bird species list from eBird

Sightings recorded by CPAWS-NS team

*Conservation status information from Atlantic Canada Conservation Data Centre (ACCDC, 2022)

Species Name	Count	Common Name	Conservation status
<i>Mergus merganser</i>	1	Common Merganser	S5
<i>Archilochus colubris</i>	1	Ruby-throated Hummingbird	S5
<i>Tringa melanoleuca</i>	1	Greater Yellowlegs	S3, S4
<i>Tringa semipalmata</i>	3	Willet	S3
<i>Pandion haliaetus</i>	2	Osprey	S4S5
<i>Colaptes auratus</i>	1	Northern Flicker	S5
<i>Empidonax flaviventris</i>	8	Yellow-bellied Flycatcher	S4, S5
<i>Empidonax alnorum</i>	8	Alder Flycatcher	S5
<i>Vireo solitarius</i>	1	Blue-headed Vireo	S5
<i>Perisoreus canadensis</i>	2	Canada Jay	S3
<i>Corvus corax</i>	1	Common Raven	S5
<i>Regulus satrapa</i>	1	Golden-crowned Kinglet	S5
<i>Sturnus vulgaris</i>	25	European Starling	Not applicable
<i>Haemorhous purpureus</i>	2	Purple Finch	S3S4, S4S5
<i>Loxia curvirostra</i>	12	Red Crossbill	S3S4
<i>Melospiza melodia</i>	2	Song Sparrow	S5
<i>Mniotilta varia</i>	6	Black-and-white-warbler	S5
<i>Leiothlypis ruficapilla</i>	3	Nashville Warbler	S4, S5
<i>Geothlypis trichas</i>	14	Common Yellowthroat	S5
<i>Setophaga ruticilla</i>	7	American Redstart	S5
<i>Setophaga magnolia</i>	8	Magnolia Warbler	S5
<i>Setophaga petechia</i>	2	Yellow Warbler	S5
<i>Setophaga striata</i>	4	Blackpoll Warbler	S3, S5
<i>Setophaga palmarum</i>	8	Palm Warbler	S5
<i>Setophaga coronata</i>	7	Yellow-rumped Warbler	S5
<i>Sitta canadensis</i>	5	Red-breasted Nuthatch	S4S5
<i>Circus hudsonius</i>	3	Northern Harrier	S4S5
<i>Buteo jamaicensis</i>	1	Red-tailed hawk	S5
<i>Phasianus colchicus</i>	1	Ring-necked Pheasant	Not applicable
<i>Falco sparverius</i>	1	American Kestrel	S3, S4S5
<i>Branta canadensis</i>	8	Canada Goose	S4S5

<i>Arenaria interpres</i>	3	Ruddy Turnstone	S3
<i>Actitis macularius</i>	2	Spotted Sandpiper	S3S4, S5
<i>Larus marinus</i>	9	Great Black-backed Gull	S4S5
<i>Sterna hirundo</i>	7	Common Tern	S3
<i>Haliaeetus leucocephalus</i>	2	Bald Eagle	S5
<i>Corthylio calendula</i>	1	Ruby-crowned Kinglet	S4, S5
<i>Troglodytes hiemalis</i>	1	Winter Wren	S5
<i>Melospiza lincolni</i>	8	Lincoln's Sparrow	S4, S5
<i>Melospiza georgiana</i>	1	Swamp Sparrow	S5
<i>Quiscalus quiscula</i>	1	Common Grackle	S5
<i>Canachites canadensis</i>	1	Spruce Grouse	S4
<i>Vireo olivaceus</i>	1	Red-eyed Vireo	S5
<i>Setophaga virens</i>	3	Black-throated Green Warbler	S5
<i>Somateria mollissima</i>	3	Common Eider	S3
<i>Cephus grylle</i>	14	Black Guillemot	S4
<i>Gavia immer</i>	1	Common Loon	S4
<i>Tachycineta bicolor</i>	4	Tree Swallow	S4
<i>Megaceryle alcyon</i>	1	Belted Kingfisher	S4S5
<i>Dumetella carolinensis</i>	1	Grey Catbird	S4
<i>Spinus pinus</i>	2	Pine Siskin	S3
<i>Passerculus sandwichensis</i>	2	Savannah Sparrow	S4S5
<i>Agelaius phoeniceus</i>	1	Red-winged Blackbird	S4
<i>Leiostyris celata</i>	6	Orange-crowned Warbler	Unranked

Other bird sightings recorded at Owls Head on eBird

Species Name	Count	Common Name	Conservation status
<i>Zenaida macroura</i>	1	Mourning Dove	S5
<i>Larus argentatus</i>	6	Herring Gull	S5
<i>Nannopterum auritum</i>	6	Double-crested Cormorant	S5
<i>Ardea herodias</i>	1	Great Blue Heron	S4S5
<i>Dryobates pubescens</i>	1	Downy Woodpecker	S5
<i>Cyanocitta cristata</i>	1	Blue Jay	S5
<i>Corvus brachyrhynchos</i>	3	American Crow	S5
<i>Poecile atricapillus</i>	5	Black-capped Chickadee	S5
<i>Hirundo rustica</i>	4	Barn swallow	S3 - Endangered
<i>Catharus ustulatus</i>	1	Swainson's Thrush	S4, S5

<i>Catharus guttatus</i>	1	Hermit Thrush	S5
<i>Turdus migratorius</i>	7	American Robin	S5, S3
<i>Bombycilla cedrorum</i>	19	Cedar Waxwing	S5
<i>Spinus tristis</i>	5	American Goldfinch	S5
<i>Junco hyemalis</i>	1	Dark-eyed Junco	S4S5
<i>Zonotrichia albicollis</i>	1	White-throated sparrow	S4S5
<i>Anas rubripes</i>	25	American Black Duck	S5
<i>Aythya marila</i>	19	Greater Scaup	S4
<i>Bucephala albeola</i>	11	Bufflehead	S4
<i>Mergus serrator</i>	2	Red-breasted Merganser	S3S4, S5
<i>Bonasa umbellus</i>	1	Ruffed Grouse	S5
<i>Lophodytes cucullatus</i>	3	Hooded Merganser	S5
<i>Dryobates villosus</i>	1	Hairy Woodpecker	S5
<i>Poecile hudsonicus</i>	3	Boreal Chickadee	S3
<i>Loxia leucoptera</i>	2	White-winged Crossbill	S4S5
<i>Aix sponsa</i>	1	Wood Duck	S5
<i>Columba livia</i>	1	Rock pigeon	Not applicable
<i>Strix varia</i>	1	Barred Owl	S5
<i>Sphyrapicus varius</i>	1	Yellow-bellied Sapsucker	S5
<i>Empidonax minimus</i>	1	Least Flycatcher	S4S5
<i>Passer domesticus</i>	1	House Sparrow	Not applicable
<i>Coccothraustes vespertinus</i>	1	Evening Grosbeak	S3 - Vulnerable
<i>Seiurus aurocapilla</i>	1	Ovenbird	S5
<i>Setophaga americana</i>	1	Northern Parula	S5
<i>Setophaga castanea</i>	1	Bay-breasted Warbler	S3S4, S4S5
<i>Setophaga pensylvanica</i>	1	Chestnut-sided Warbler	S5
<i>Setophaga caerulea</i>	1	Black-throated Blue Warbler	S5
<i>Cardellina canadensis</i>	1	Canada Warbler	S3 - Endangered

Appendix B – Plant species list from EPIC lab

Species	#	Common name	Type	Vascular
<i>Kalmia angustifolia</i>	47	Sheep laurel	Flowering shrub	Vascular
<i>Gaylussacia baccata</i>	36	Black huckleberry	Shrub	Vascular
<i>Juniperus communis</i>	32	Common juniper	Tree	Vascular
<i>Bryophytes</i>	30.5		Mosses and liverworts	Non-vascular
<i>Cladonia spp.</i>	28.5		Moss-like lichen	Non-vascular
<i>Picea mariana</i>	25.5	Black spruce	Tree	Vascular
<i>Vaccinium angustifolium</i>	22	Low-bush blueberry	Shrub	Vascular
<i>Cornus canadensis</i>	18.5	Creeping dogwood	Flowering plant	Vascular
<i>Sphagnum spp.</i>	18	peat moss	Moss (bryophyte)	Non-vascular
<i>Rhododendron groenlandicum</i>	15	swamp tea	Shrub	Vascular
<i>Pteridium aquilinum</i>	14	common bracken	Fern	Vascular
<i>Ammophila brevifolius</i>	14	American beachgrass	Grass	Vascular
<i>Maianthemum canadense</i>	13.5	Wild lily-of-the-valley	Flowering plant	Vascular
<i>Pleurozium schreberi</i>	12.5	Red-stemmed feather moss	Moss	Non-vascular
<i>Rhododendron canadense</i>	12	Rhodora	Flowering shrub	Vascular
<i>Corema conradii</i>	11	Broom crowberry	Flowering plant	Vascular
<i>Viburnum nudum</i>	10.5	Wild raisin	Plant	Vascular
<i>Trientalis borealis</i>	9	Starflower	Woodland perennial	Vascular
<i>Potentilla anserina</i>	9	Silverweed	Flowering plant	Vascular
<i>grass specimen</i>	7			Vascular
<i>Kalmia polifolia</i>	6.5	Bog laurel	Shrub	Vascular
<i>Abies balsamea</i>	6	Balsam fir	Tree	Vascular
<i>Picea rubens</i>	6	Red spruce	Tree	Vascular
<i>Herb specimen</i>	6			
<i>Vaccinium oxycoccos</i>	5.5	Bog cranberry	Flowering plant	Vascular
<i>Gaultheria procumbens</i>	5	American wintergreen		Vascular
<i>Ilex mucronata</i>	5	Mountain holly		Vascular
<i>Sarracenia purpurea</i>	5	Purple pitcher plant	Carnivorous plant	Vascular
<i>Bazzania trilobata</i>	5	Greater whipwort	Liverwort	Non-vascular
<i>larix laricina</i>	5	Tamarack	Larch	Vascular
<i>Deschampsia flexuosa</i>	4	Wavy hair-grass	Grass	Vascular
<i>Juncus balticus</i>	4	Baltic rush	Flowering plant	Vascular
<i>Photinia melanocarpa</i>	3.5	Black chokeberry	Shrub	Vascular
<i>Coptis trifolia</i>	3.5	Threeleaf goldthread	Perennial plant	Vascular
<i>Chamaedaphne calyculata</i>	3.5	Leatherleaf	Shrub	Vascular
<i>Clintonia borealis</i>	3	Blue-bead lily	Forest plant	Vascular
<i>Photinia floribunda</i>	3	Purple chokeberry	Shrub	Vascular
<i>Alnus viridis</i>	3	Green alder	Shrub	Vascular
<i>Carex exilis</i>	3	Coastal sedge		Vascular

<i>Aralia nudicaulis</i>	2.5	Wild liquorice	Flowering plant	
<i>Leucobryum glaucum</i>	2.5	Pin cushion moss	Moss	Non-vascular
<i>Polytrichum juniprinum</i>	2.5	Juniper haircap	Moss	Non-vascular
<i>Symphyotrichum novi belgii</i>	2	New York aster	Flowering plant	Vascular
<i>Myrica gale</i>	2	Bog-myrtle	Flowering plant	Vascular
<i>Gaultheria hispidula</i>	2	Creeping snowberry	Perrenial plant	Vascular
<i>Hylocomium splendens</i>	2	Mountain fern moss	Moss	Non-vascular
<i>Poa compressa</i>	2	Canada bluegrass	Grass	Vascular
<i>Ilex verticillata</i>	2	Winterberry	Holly	Vascular
<i>Empetrum nigrum</i>	1.5	Black crowberry	Flowering plant	Vascular
<i>Sibbaldiopsis tridentata</i>	1.5	Wineleaf	Evergreen perrenial plant	Vascular
<i>Rubus chamaemorous</i>	1.5	Cloudberry	Herbaceous perennial	Vascular
<i>Melampyrum lineare</i>	1.5	Narrowleaf cow wheat	Herbaceous plant	Vascular
<i>Solidago semprevirens</i>	1.5	Seaside goldenrod		Vascular
<i>Morella pensylvanica</i>	1	Northern bayberry	Shrub	Vascular
<i>Gaylussacia bigelovana</i>	1	Dwarf huckleberry		Vascular
<i>Danthonia spicata</i>	1	Poverty grass	Grass	Vascular
<i>Osmunda cinamomea</i>	1	Cinnamon fern	Fern	Vascular
<i>Maianthemum trifolium</i>	1	Three-leaf Solomon's seal	Flowering plant	Vascular
<i>Solidago puberula</i>	1	Downey goldenrod		Vascular
<i>Amelanchier sp.</i>	1	Shadbush	Shrub	Vascular
<i>Cladonia boryi</i>	1		Lichen	Non-vascular
<i>Rubus pubescens</i>	1	Dwarf red blackberry	Herbaceous perennial	Vascular
<i>Phleum pratense</i>	1	Timothy grass	Grass	Vascular
<i>Carex stricta</i>	1	Upright sedge	Sedge	Vascular
<i>Galeopsis tetrahit</i>	1	Common hemp-nettle	Flowering plant	Vascular
<i>Mitchella repens</i>	1	Partridge berry	Shrub	Vascular
<i>Vaccinium vitis idaea</i>	0.5	Cowberry	Shrub	Vascular
<i>Carex nigra</i>	0.5	Common sedge	Sedge	Vascular
<i>liverwort spp</i>	0.5		Liverwort	Non-vascular
<i>Plantago maritima</i>	0.5	Sea plantain	Flowering plant	Vascular
<i>Drosera rotundifolia</i>	0.5	Common sundew	Carnivorous plant	Vascular
<i>Lathyrus japonicus</i>	0.5	Sea pea	Legume	Vascular
<i>Arctostaphylos uva ursi</i>	0.5	Bearberry		Vascular
<i>Iris versicolor</i>	0.5		Flower	Vascular
<i>Limonium carolinianum</i>	0.5	Sea-lavender		Vascular
<i>Lycopodium sp.</i>	0.5		Clubmoss	Vascular
<i>Eriophorum vaginatum</i>	0.5	Hare's-tail cottongrass	flowering plant	Vascular

<i>Lysimachia maritima</i>	0.5	Sea milkweed		Vascular
<i>Lycopodium annotinum</i>	0.5	Stiff clubmoss	Clubmoss	Vascular
<i>Rumex crispis</i>	0.5	Curly dock	Flowering plant	Vascular
<i>Epilobium specimen</i>	0.5		Flowering plant	Vascular

Appendix C – Marine species observed at Owls Head during eelgrass surveys and by the Ocea Bridge snorkel group

Species	Common Name
<i>Homarus americanus</i>	American lobster
<i>Cancer irroratus</i>	Atlantic Rock crab
<i>Carcinus maenas</i>	European Green crab
<i>Pagurus</i> spp.	Hermit crab
<i>Nucella lapillus</i>	Atlantic Dogwhelk
<i>Acmea testudinalis</i>	Tortoiseshell limpet
<i>Littorina</i> spp.	Periwinkles
<i>Crangon</i> spp.	Sand shrimp
<i>Tautoglabrus adspersus</i>	Cunner
<i>Myoxocephalus</i> spp.	Sculpin
<i>Halichoerus grypus</i>	Grey seal
<i>Dermochelys coriacea</i>	Leatherback Sea turtle
<i>Cyanea capillata</i>	Lions' mane jellyfish
<i>Pleurobrachia pileus</i>	Sea Gooseberry
<i>Botryllus schlosseri</i>	Golden star Tunicate
<i>Clathromorphum</i> spp.	Coralline-crust Algae
<i>Zostera marina</i>	Common Eelgrass
<i>Saccharina latissima</i>	Sugar kelp
<i>Codium fragile</i>	Dead man's fingers
<i>Fucus</i> spp.	Rockweed
<i>Ascophyllum nodosum</i>	Knotted Wrack
<i>Vertebrata lanosa</i>	Wrack Fringe Tubeweed