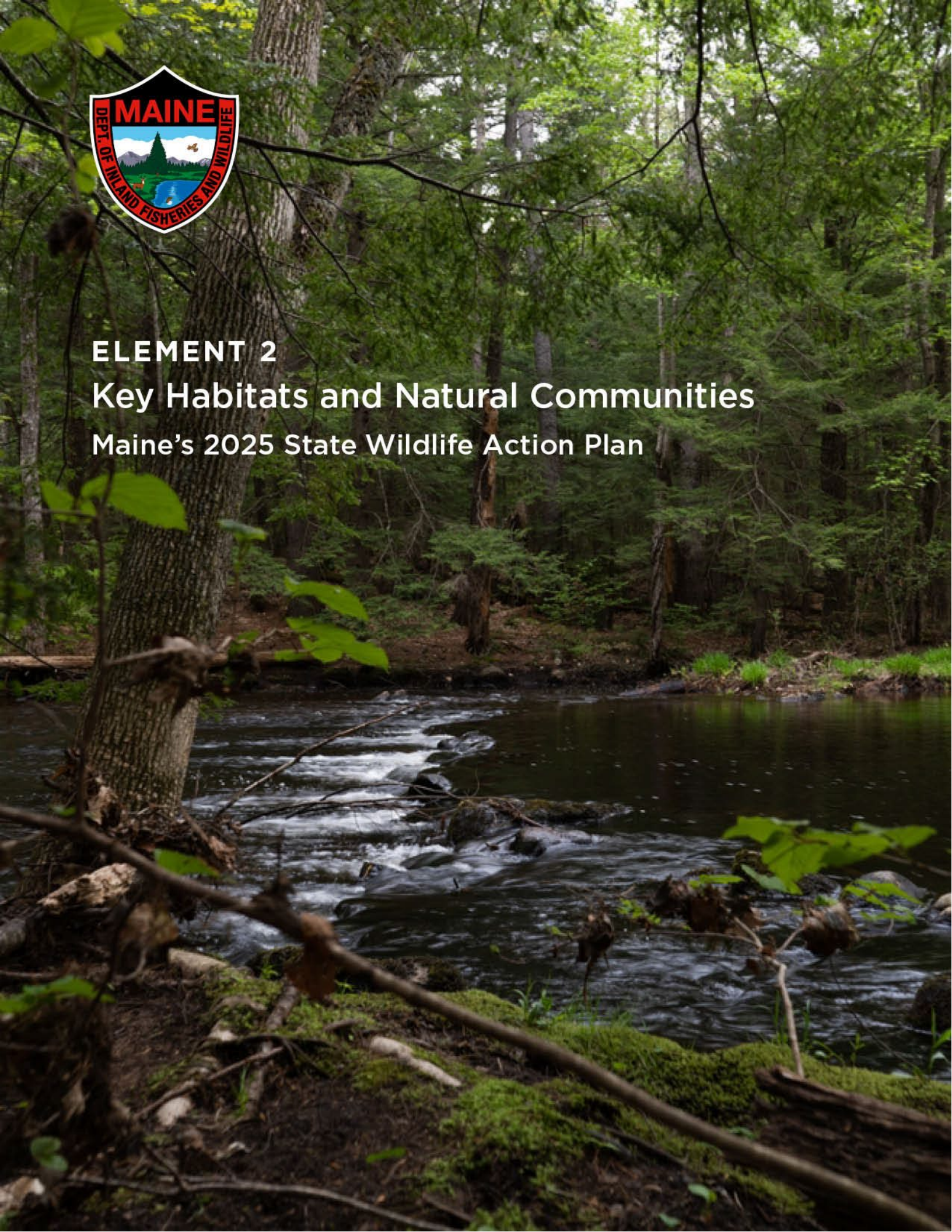

ELEMENT 2

Key Habitats and Natural Communities

Maine's 2025 State Wildlife Action Plan

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Key to Acronyms

IUCN	International Union for the Conservation of Nature
MAHCS	Maine Aquatic Habitat Classification System
MDIFW	Maine Department of Inland Fisheries and Wildlife
MDMR	Maine Department of Marine Resources
MNAP	Maine Natural Areas Program
NEAHCS	Northeast Aquatic Habitat Classification System
NETHCS	Northeast Terrestrial Habitat Classification System
SGCN	Species of Greatest Conservation Need
TNC	The Nature Conservancy

Prepared by Maine Department of Inland Fisheries and Wildlife in Collaboration with Maine Departments of Agriculture, Conservation, and Forestry and Marine Resources, and Key Conservation Partners

Element 2: Key Habitats and Natural Communities

2.0 Abstract

Element 2 identities the extent and condition of wildlife habitats and community types essential to the conservation of Species of Greatest Conservation Need (SGCN). Maine's Wildlife Action Plan employs The Northeast Terrestrial Habitat Classification System (NETHCS) to identify the extent of habitats and community types essential to the conservation of SGCN. The basic layer within NETHCS is the habitat 'system', which corresponds to the national Ecological Systems classification. There are approximately 114 Ecological Systems in Maine. MDIFW and conservation partners used the more general 'Macrogroup' level of this hierarchical system for assigning threats (Element 3) and some analyses; there are 42 habitat macrogroups in Maine. Maine further consolidated the macrogroups into three broad habitat categories to facilitate development of conservation actions and ease of Plan use by conservation partners. The broad categories are Coastal and Marine Habitats, Terrestrial and Freshwater Wetlands Habitats, and Freshwater Aquatic Habitats (Rivers, Lakes, and Ponds).

Maine's diverse landscape ranges from alpine summits to extensive freshwater tidal wetlands, patterns of which are driven by climate, elevation, geology, and vegetation types. Different ecological regions ("ecoregions") help stratify the landscape at a coarse scale, and natural communities and ecosystems help identify those patterns for use in conservation planning, management, funding, and more. This 2025 plan incorporates a new mapping system for freshwater aquatic habitats, updates to coastal and marine habitat assessment, and the inclusion of vascular plants as SGCN, all of which improve the identification and prioritization of conservation actions for Maine's biodiversity. Our analysis found that the importance of various macrogroups and systems to SGCN is not directly correlated to their statewide abundance; habitats such as pine barrens, open freshwater wetlands, and rivers and streams are disproportionately important compared to many other habitat types. It is estimated that there are presently just over 4.4 million acres of conservation land in Maine, accounting for nearly 22.6% of the State. Much of this conserved land lies within Focus Areas of Statewide Ecological Significance, which have been identified to help prioritize conservation of Maine's landscape for SGCN and other habitat values (Element 4). Yet gaps remain in conservation of some important SGCN habitats.

2.1 Introduction

Maine's Wildlife Action Plan employs The Northeast Terrestrial Habitat Classification System (NETHCS) to identify the extent of habitats and community types essential to the conservation of SGCN. Federal and state agencies in the Northeast have endorsed the NETHCS as a tool for assessing habitat distribution and composition on a regional scale. The specific version of the NETHCS used in Maine includes a number of modifications made by the Maine Department of Marine Resources (MDMR), the Maine Natural Areas Program (MNAP), and the Maine Department of Inland Fisheries and Wildlife (MDIFW) to reflect Maine's terrestrial, wetland, freshwater aquatic, and coastal features. The basic layer within NETHCS is the habitat 'system', which corresponds to the national Ecological Systems classification. There are approximately 114 Ecological Systems in Maine. MDIFW and conservation partners used the more general 'Macrogroup' level of this hierarchical system for assigning threats (Element 3) and some analyses; there are 42 habitat macrogroups in Maine.

2.1.1 Significant Differences from Maine's 2015 Plan

Maine's 2015 Plan employed the NETHCS developed by The Nature Conservancy (TNC) in collaboration with fish and wildlife agencies. Habitat associations for SGCN are made at the finest level with 'systems'. Federal and state programs in the Northeast have endorsed the NETHCS as a standard that is compatible with nationwide classifications (http://www.landfire.gov/). The 2025 Plan is also based on the NETHCS and parsed into three distinct segments, broadly related to Terrestrial and Wetland Habitats, Coastal and Marine Habitats, and Freshwater Aquatic Habitats. Minor adjustments and classification additions to the NETHCS are described below.

Important changes in Element 2 of the 2025 State Wildlife Action Plan (SWAP) include:

- Terrestrial and Freshwater Wetland Habitat classification: MDMR and MDIFW made several modifications to the NETHCS for use in the 2025 SWAP in order to improve classification of some of Maine's terrestrial, wetland, and coastal features. One of the more significant changes was to add Coastal Islands as a separate Habitat System within the newly described North American Atlantic Coastal Dune, Grassland & Rocky Headland macrogroup.

- Freshwater Aquatic Habitat classification: The Northeast Aquatic Habitat Classification System (NEAHCS) was found to not work well for Maine given the broad scale of habitat distinctions and inadequate consideration of temperature regime. Additionally, Maine now has current, relevant statewide data on water temperature compared to what is included in the NEAHCS. For the 2025 Plan IFW convened a subcommittee to develop a Maine Aquatic Habitat Classification System (MAHCS) with the goal of producing a statewide, consistent classification. There are 19 systems grouped within 2 macrogroups: Lentic and Lotic.

- Standard habitat mapping: for the 2015 SWAP, NatureServe and TNC developed seamless GIS coverage to assess habitat distribution and composition of terrestrial and wetland systems in the Northeast. For Maine's 2025 Plan the mapping associated with the NETHCS is supplemented with new spatial data for the Maine Aquatic Habitat Classification System made specifically for the SWAP process.

- Plants in Maine SWAP: Plant species were first included as SGCN in a 2022 SWAP Amendment. The 2025 Plan includes 301 tracheophytes, assigned to systems and macrogroups and grouped into habitat guilds for the purposes of identifying conservation actions.

- Habitat emphasis: for the 2025 SWAP a slightly greater emphasis was placed on habitats rather than the individual SGCN. This allows for more effective conservation for a larger number of SGCN at once by focusing on habitats that contain multiple SGCN. It also acknowledges and relies on the relationships among species and their effects on one another for more successful threat identification and conservation actions. Individual SGCN also still have individual conservation actions where appropriate.

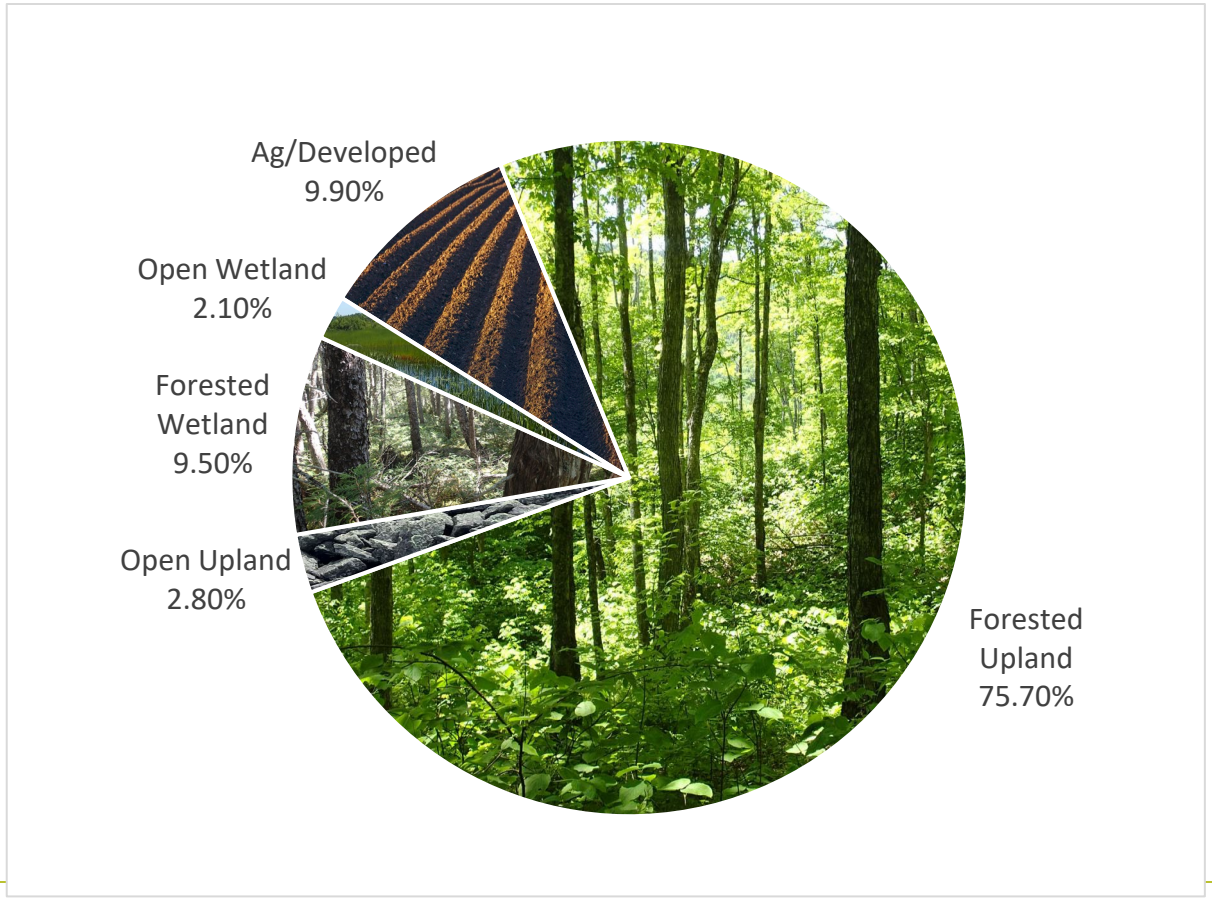
- Guilds: Plant and animal SGCN were organized into Guilds for the purposes of identifying conservation actions that applied to associated groups of species. The approach for applying guilds varied, however all

plants and some animal SGCN were assigned to habitat guilds such as Alpine or Subalpine, Hardwood to Mixed Forest, or Grasslands. There are 69 identified guilds in the 2025 SWAP, approximately 1/3 of which are based on habitats.

2.2 Landscape Overview of Maine

Maine encompasses approximately 21 million acres of land and water, from the dramatic coastline to the heights of Mount Katahdin. Maine is as large as the remaining New England states combined, and more than 31,800 miles of streams and rivers and 5,600 lakes and ponds dot the landscape. Maine's scenic, rock-bound coast is 4,100 miles long and embraces 4,613 islands between Kittery and Eastport. Roughly one quarter of the state consists of freshwater wetlands, including hardwood floodplains, freshwater marshes, and dense assemblages of vernal pools. At nearly 90% forest cover, Maine is the most heavily forested state in the United States, but it also contains some of the most significant grassland and farmlands in the Northeast. Maine's broad habitat types are shown in Figure 2-1.

Figure 2- 1 Broad breakdown of terrestrial and wetland habitat types in Maine (Source: NatureServe International Vegetation Classification Groups V1.0, 2025). Freshwater aquatic habitat types are not included here but are listed in Table 2-3.



2.2.1 Climate

Maine's climate plays a major role in determining the plant and animal assemblages within the State. The National Weather Service separates Maine into three distinct climatological divisions – coastal, southern interior, and northern interior (Brandes 2001). The coastal division runs from Kittery to Eastport and about 20 miles inland. Here the ocean moderates the climate, making coastal winters warmer and summers cooler than the interior. The southern interior division, covering the bottom one-third of the state, has the warmest summer weather and the highest numbers of clear days, whereas the northern interior (upper two-thirds of the state) boasts a mixed bag of snowy winters, warm summers, and the state's lowest rainfall.

Observed and potential changes to Maine's climate, and their subsequent impacts on Maine's habitats and wildlife, have been the focus of recent, ongoing, long-term studies by the University of Maine, conservation groups, and state and federal agencies (e.g., Whitman et al. 2013, Fernandez et al. 2015, Peters et al. 2020, Whitehead et al. 2023, MCC STS 2024). These changes include rising seas, increasing coastal storms, altered natural disturbance processes (e.g., increased fire), changes in hydrology of wetlands and waterways, increasing non-native invasive species, pests and pathogens, increasing water temperatures, and transitions in forest composition. Despite uncertainties regarding the magnitude and timing of future changes in Maine's climate, there is a general understanding that high elevation habitats, boreal forests and peatlands, tidal marshes, and cold water fisheries are among Maine's more vulnerable habitats (Whitman et al. 2013). Climate change-related threats to SGCN and habitats are discussed in Element 3, Sections 3.2 and 3.3. Associated conservation actions are addressed throughout Element 4, and in-depth in Section 4.3.5.

2.2.2 Physiography

Maine's western border adjoining New Hampshire and Quebec is characterized by rugged terrain with numerous glacier-scoured peaks, lakes, and valleys. The Appalachian Mountain chain, formed nearly 500 million years ago, extends into Maine from New Hampshire, terminating at the 5,268-foot Mount Katahdin. South and east of mountain areas lie rolling hills, smaller mountains, and broad river valleys. Maine's coastline consists of long sand beaches interrupted intermittently by rocky promontories in the southwest, and a series of peninsulas, narrow estuaries, bays, and coves north and east of Portland. Tides along Maine's coast are among the highest in the world, running between 12 and 24 feet. More than 4,600 islands dot the coast, some no more than rock ledges; others are vegetated and home to fulltime and seasonal residents.

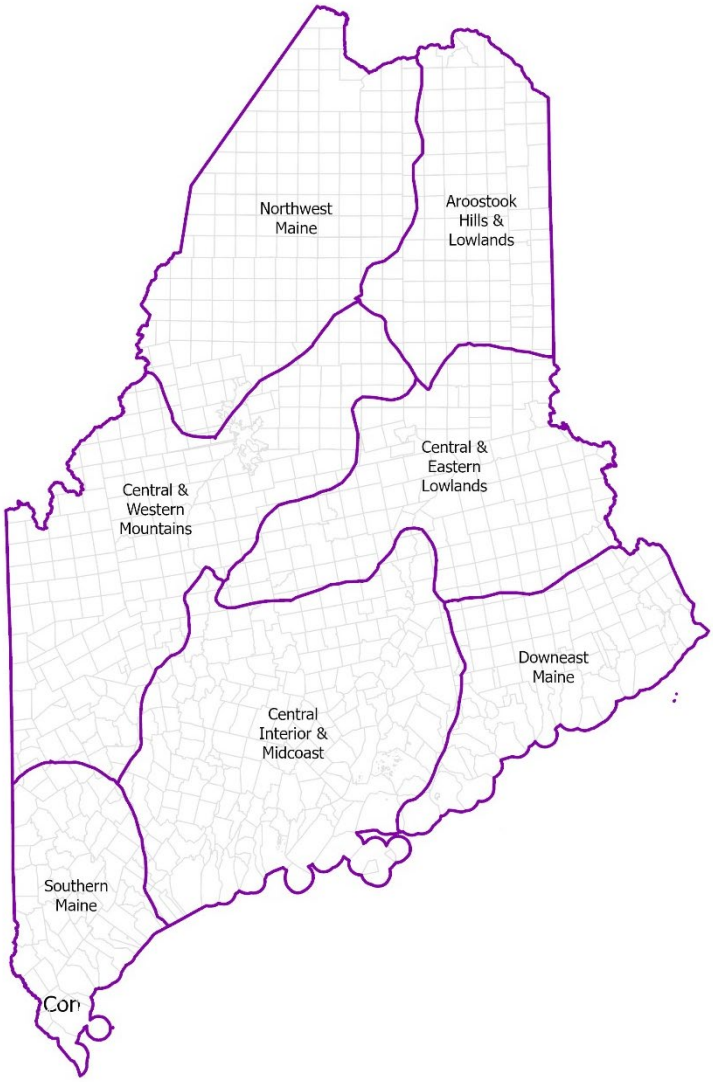
2.2.3 Ecoregions

Ecoregional classifications are used to delineate large scale patterns in geography, based on climate, geology, and major vegetation or habitat types. Ecoregions are regularly used in Maine for conservation planning (e.g. Schlawin et al 2021), field survey efforts, gap analysis, awarding grant funds (e.g. the Maine Natural Resources Conservation Program), and as part of Maine's natural community classification (Gawler and Cutko 2010). In general, they are a logical way of stratifying the landscape at a course scale and are referenced in the State Wildlife Action Plan SGCN species distribution maps. The ecoregions referenced here are at the 'section' level (Figure 2-2) and are drawn from various national and state classification efforts (e.g. Bailey 1995, Keys et al. 1995, and McMahon 1990). Because of the distinctive patterns of abiotic factors within each ecoregion, there are also related patterns in habitats and associated SGCN, as briefly described below.

- Aroostook Hills and Lowlands: This approximately 2.5 million-acre region in northeastern Maine includes the largest aggregation of agricultural lands in northern Maine (approximately 15% of the biophysical region's area). The majority is forested and transitional between temperate northern hardwoods and boreal spruce-fir forest, all included in the Acadian-Northern Appalachian Forest macrogroup. Because of the calcareous nature of the soils and bedrock in the region, there are more rare wetland types and numerous rare plant species that occur nowhere else in Maine. Circumneutral (i.e., nearly to slightly alkaline) fens and northern white cedar swamps are more common in this region than anywhere else in Maine. Forest ecosystems also tend to be more diverse here than in areas to the west, due to the bedrock geology (McMahon 1993).

- Northwest Maine: This region contains large stands of spruce-fir forest in valleys and poorly drained flats, with northern hardwoods on hills and drier uplands. Species diversity is lower relative to other Ecoregions, but by contrast the region supports the highest concentration of ribbed fens anywhere in Maine, balsam poplar replaces silver and red maple as the dominant tree in forested floodplains, and Northern white cedar seepage forests reach their greatest extent here. The rivershores along the northern Maine boundary support extensive circumneutral riverside seeps (and as a result, several rare and endemic species) and the eastern boundary of the region marks a transition line between more temperate vegetation to the east and boreal vegetation to the west.

Figure 2- 2 Map of Ecoregional Sections of Maine



- Central and Eastern Lowlands: This region of Maine hosts a transitional climate between the coastal zone and the cooler to temperate boreal climates of the interior regions to the north and west. As a result, several SGCN plants reach their range limits here, and the region marks a transition from the oak, pine, and mixed hardwood forests of the south to the spruce-fir-northern hardwood forests to the north. The low relief and low elevation (generally below 1000 feet) supports the largest proportion of wetlands of any of the ecoregions in the state, including the greatest variety of peatland systems, some of which are individually over 1000 acres in size. The result is a diversity of SGCN waterbirds and invertebrates which require large wetland complexes, high water quality, and cool water temperatures.

- Central and Western Mountains: This region contains the highest elevation points in the state and therefore supports subalpine, krummholtz, and alpine habitats. Disjunct plant species that occur nowhere else in Maine occur on these slopes and peaks, and there is a notable increase in woody species richness here. Spruce-fir and northern hardwood forests are the common types through much of the region but talus, cliff, and ledge habitats occur in small patches on steep and erodible bedrock slopes. Several of Maine's largest deep pelagic lakes occur in this region as well as high slope cold headwater rivers and streams.

- Downeast Maine: This region is marked by rocky headlands along the coastline and numerous headlands and coastal islands as well as Cobscook Bay and estuary, which sees tidal ranges up to 28-feet. Coastal spruce-fir forests and coastal raised peatlands are another unique feature, attributed to the cooler coastal temperatures and fog during the growing season, as well as low evapotranspiration. Several subarctic maritime plant species reach their southern range limits here. Across inland areas, sandy outwash soils have attracted decades of commercial blueberry operations, more than anywhere else statewide.

- Central Interior and Midcoast: This region spans from the low foothills of Maine's western mountains to the coastal peninsulas and islands of Merrymeeting and Penobscot Bay. Maine's largest tidal estuary and area of freshwater tidal wetlands occurs in this region, and the dune grasslands and coastal outcrops are a significant part of the region's biodiversity. Coastal spruce-fir forest reaches its southern extent here, thanks to fog and cooler summer temperatures. Inland, warmer temperate vegetation and habitats dominate, including oak-pine forests and mixed hardwoods, which give way to spruce-fir northern hardwoods moving from south to north.

- Southern Maine: Although Southern Maine has some of the highest levels of development (and fragmentation) in the state, it also has the highest concentration of rare plants and animals in the state. This region contains the Atlantic coastal plain with large sand beaches that give way to extensive tidal marshes, as well as significant areas of sandy glacial outwash. The draughty, acidic soils of the latter are conducive to fire-prone pitch pine barrens and their specialized plant and animal species but are also vulnerable to conversion. Hardwood forests and woodlands with southern-affinity species are a hallmark of the region, as are isolated wetlands and vernal pools that punctuate the glacial till and other depositional landforms that characterize the area.

2.3 Habitat Classifications

Fish and Wildlife Agencies in the Northeast have agreed to a regional standard for evaluating habitats within each State (Terwilliger and NEFWDTC 2023). This commitment not only eliminates the >900 classifications used individually by 13 northeastern states in 2005 plans, it aids regional conservation strategies across boundaries. In fact the North Atlantic Landscape Conservation Cooperative (NALCC; Anderson et al. 2015) recently extended this NETHCS coverage into the Canadian Maritime provinces and southern Quebec. Maine shares a longer border with both New Brunswick and Quebec than it does with the continental U.S. Therefore, many landscape analyses, SGCN assessments, and conservation efforts in Maine benefit from an international perspective with Atlantic Canada.

2.3.1 Northeast Terrestrial Habitat Classification System

The Northeast Terrestrial Habitat Classification System (NETHCS), initially developed by NatureServe and TNC, is a hierarchical framework for characterizing ecological systems and mapping habitats in the region (TNC and NatureServe 2011). TNC subsequently refined the classification system with collaboration and funding from the Regional Conservation Needs Grants administered by the Northeast Association of Fish and Wildlife Agencies and U.S. Fish and Wildlife Service (USFWS). NETHCS serves as a standard for assessing habitat distribution and

composition across the Northeast. The mapping effort is augmented by profiles of many common habitat systems (Anderson et al. 2013a), extent and condition analyses (Anderson et al. 2013b), and an evaluation of site resiliency (Anderson et al. 2011). Details of the NETHCS methodology are available at TNC' Conservation Gateway website: https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/reportsdata/terrestrial/habitatmap/Pages/default.aspx.

The specific version of the NETHCS used for Maine's SWAP includes a number of minor alterations and additions made by MDMR and MDIFW to reflect Maine's geography and aquatic and coastal features. State-based modifications include the creation of a Maine Aquatic Habitat Classification System (MAHCS), and finer-scaled marine classes identified by MDMR that reflect underlying substrate and biotic composition in the intertidal and subtidal areas.

The basic layer within NETHCS is the habitat 'system', which corresponds to the Ecological Systems classification. There are approximately 114 Ecological Systems in Maine, and all have been entered into the SWAP database. These include natural vegetated habitats ('Boreal Laurentian Bog'), freshwater aquatic systems from the MAHCS ('Moderate Slope Headwater'), marine systems ('Gastropod Reef'), and human-modified habitats ('Powerline Right of Way').

It is important to note that only about 50 of the 114 ecological systems are reflected in mapping data because of scale limitations or difficulty of distinguishing tidal and subtidal habitats.

It should also be noted that although the classification system can accommodate structural modifiers (e.g., early successional forest), the GIS layer upon which our analyses are based does not generally distinguish between successional stages of forest. Therefore, the 'Northern Hardwood and Conifer' macrogroup, for example, includes forest stands of all successional stages. Forest condition and structure (e.g., canopy closure, vertical layering) are important habitat characteristics for many SGCN. However, the NETHCS GIS habitat layer is not an effective source for this spatial information. Other sources of information on forest condition include the U.S. Forest Service's Inventory and Analysis Program and various remote sensing data sources such as Global Forest Change 2000-2019 (https://earthenginepartners.appspot.com/science-2013-global-forest/download_v1.7.html). A recent effort evaluating the use of LiDAR to identify potential late-successional forest in Maine offers an additional stratification of forest successional stages (Hagan et al. 2024).

The more general 'Macrogroup' level was used for several of our analyses. There are 42 habitat macrogroups in Maine, though not all of these are mapped (e.g., intertidal mollusc reef). Acreages for terrestrial, wetland, and freshwater macrogroups mapped in Maine are shown in Table 2-1 (shown in descending order of statewide acreage). Spatial mapping of all marine habitats is particularly challenging and has not been completed for the whole state.

Table 2- 1 Acreages of habitat macrogroups and proportions conserved in Maine. Sources: NatureServe Ecological Systems GIS map (2025) and Maine Conserved Lands Database (2025). Acreages are approximate based on NatureServe calculations and may be improved in the future with a forthcoming Miane Land Cover dataset. Conserved acreage of freshwater aquatic and marine habitat macrogroups cannot be determined.

Habitat Macrogroup	Acres in state	% of State	% Conserved
Acadian-Northern Appalachian Forest	14,574,829	73.9%	24.4%
Laurentian-Acadian Flooded & Swamp Forest	1,787,282	9.1%	23.1%
Developed	1,068,586	5.4%	7.7%
Agriculture	875,772	4.4%	4.1%
Ruderal Shrubland & Grassland	527,998	2.7%	18.8%
Appalachian Oak - Pine Forest & Woodland	343,125	1.7%	11.3%
Eastern North American Marsh, Wet Meadow & Shrubland	214,044	1.1%	20.9%
North American Boreal & Subboreal Bog & Acidic Fen	143,070	0.7%	32.9%
Central Hardwood Swamp Forest	83,024	0.4%	13.9%
North American Boreal & Subboreal Alkaline Fen	46,754	0.2%	24.5%
North Atlantic Coastal Forest & Woodland	17,943	0.1%	31.4%
Intertidal Tidal Marsh (peat-forming)	17,919	0.1%	47.0%
Coastal Plain Evergreen Hardwood - Conifer Swamp	12,256	0.1%	13.0%
Eastern North American Alpine Tundra	10,969	0.1%	81.0%
Laurentian-Acadian Acidic Rocky Scrub & Grassland	5,433	<.1%	67.7%
North American Atlantic Coastal Dune, Grassland & Rocky Headland	740	<.1%	63.0%
North American Atlantic Coastal Beach & Rocky Shore	536	<.1%	18.2%
Eastern North American Cliff, Talus & Rock	7	<.1%	63.6%
Total Land Area	**19,730,290**		**22.1%**

2.3.2 Coastal and Marine Classification System

Since the NETHCS focuses on habitats vegetated with vascular plants, the NETHCS marine and coastal habitat components had poor accuracy and low specificity, especially for intertidal and subtidal habitats. "Rocky coast," "coastal," and "tidal marsh" habitat macrogroups were retained from the NETHCS scheme because they have associated vegetation, but all intertidal and subtidal habitats were reclassified to increase the specificity and accuracy for these ecologically, culturally, and economically important habitats. Staff from MDMR and the Maine

Coastal Program (MCP) worked with other SWAP partners to generate a coastal and marine habitat classification scheme for Maine's marine and coastal environment (Table 2-2) that encompasses all areas from the high tide line to the boundary of state waters, which extend three nautical miles offshore.

This habitat scheme was based on several existing classification systems that were either too detailed for our intended purpose or did not encompass the diverse breadth of habitats found in the coastal and marine regions in Maine (Coastal and Marine Ecological Classification Standard 2012; Brown 1993). Although this scheme was adapted to fit the particular needs of the Maine SWAP, it is written in generalized terms, where possible, in order to fit the needs of surrounding New England states. Additionally, it is possible to crosswalk this scheme with the other classification schemes listed above in order to compare existing habitat classification and maps for the limited regions where these data exist. During the initial development of this habitat scheme, several gaps in knowledge were identified, including the geographic locations and spatial extents of most marine and coastal habitats, the health and resiliency of these habitats, and past and projected ecosystem changes over time. Thus, mapping marine and coastal habitats and monitoring their changes over time were highlighted as priorities for the conservation of marine SGCN over the next 10 years. There has been progress to map and improve our understanding of marine and coastal habitats in the past 10 years, however, a large extent of intertidal and subtidal areas still remains unmapped making it difficult to accurately quantify marine and coastal habitat macrogroups. Further effort is needed to obtain reliable and accurate data at a resolution suitable for resource and habitat management.

There are five broad coastal and marine habitat formations associated with conservation actions (tidal marsh, rocky coast, coastal, intertidal, and subtidal). The tidal marsh formation includes all peat-forming tidal marshes. The rocky coast formation encompasses rocky habitats above the high tide line. The coastal formation encompasses coastal grasslands and shrublands. The intertidal and sub-tidal formations encompass all of the benthic and pelagic (water column) habitats from the littoral zone to the open ocean. These broad habitat groups were subdivided into 15 macrogroups based on wave energy and the resulting physical composition of the substrate for benthic habitats (e.g. tidal marsh, mud, sand, rock, etc.); pelagic habitats are classified separately (e.g. water column).

At the more specific habitat system level, additional biological and physical drivers that shape the ecosystem were incorporated into the classification scheme (e.g. presence of fauna and flora, relative nutrient concentration, desiccation and temperature stressors, etc.). In Maine, certain kinds of flora and fauna, such as eelgrass, kelp beds, and soft corals, form ecologically important habitats by creating a three-dimensional structure that rises above the substrate and serves as a nursery ground or can be used for protection by fishes and invertebrates. These habitats also tend to be vulnerable to environmental stressors. To highlight the importance and relative vulnerability of these habitats, the classification scheme lists these individually at the habitat system level. The language has been generalized to "submerged aquatic vegetation," "kelp bed," and "erect epifauna" to encompass additional flora and fauna that may exist throughout the northeast region in case other New England states elect to adopt this classification scheme. Additionally, in 2025 the habitat system of "Coastal Islands" was added given its unique isolation factor and the habitat functions it supports including migration, overwintering, and haul outs.

Table 2- 2 Coastal and marine habitat classification developed for the Maine Wildlife Action Plan. The Macrogroup names listed below are not the NVC names but are interpretations to help clarify / envision the habitat types.

Formation	Macrogroup	Habitat System
Tidal Marsh	Intertidal Tidal Marsh (peat-forming)	Acadian Coastal Salt Marsh
		Coastal Plain Tidal Marsh
Rocky Coast	Rocky Coast	Acadian-North Atlantic Rocky Coast
		North Atlantic Cobble Shore
		Coastal Islands
Coastal	Coastal Grassland & Shrubland	Northern Atlantic Coastal Plain Dune and Maritime Grassland
		Northern Atlantic Coastal Plain Sandy Beach
Intertidal	Intertidal Mudflat	Non-Vascular Mudflat
		Freshwater Tidal Marsh
		Submerged Aquatic Vegetation
	Intertidal Sandy Shore	Sand Flat
		Submerged Aquatic Vegetation
		Sand Beach
	Intertidal Mollusc Reefs	Oyster Reef
		Gastropod Reef
		Mussel Reef
	Intertidal Bedrock	High Intertidal
		Mid-Intertidal
		Low-Intertidal
	Intertidal Gravel Shore	High Intertidal
		Mid-Intertidal
		Lower Intertidal
	Intertidal Water Column	Confined Channel
		Embayment
		Exposed Shore
Subtidal	Subtidal Mud Bottom	Unvegetated
		Submerged Aquatic Vegetation
	Subtidal Sand Bottom	Unvegetated
		Submerged Aquatic Vegetation
	Subtidal Mollusc Reefs	Oyster Reef
		Gastropod Reef
		Mussel Reef
	Subtidal Bedrock Bottom	Bedrock
		Kelp Bed
		Erect Epifauna
	Subtidal Coarse Gravel Bottom	Coarse Gravel
		Kelp Bed
		Erect Epifauna
	Subtidal Pelagic (Water Column)	Nearshore
		Offshore
		Upwelling Zones
		Confined Channel

2.3.3 Freshwater Aquatic Habitat Classification System

The Northeast Aquatic Habitat Classification System (NEAHCS) is too coarse to adequately classify Maine's freshwater habitats. For instance, temperature regime is an important driver of ecological processes and structuring, especially within lotic (rivers and streams) ecosystems, but scale appropriate data were not available for inclusion in the NEAHCS. More relevant statewide temperature data are now available to map this important aspect of freshwater systems (Walker 2025). Fortunately, a wealth of information exists for lentic habitats (lakes and ponds) because they are such a focal feature of Maine's aquatic ecosystems, existing conservation frameworks, and among state agencies and partners. Due largely to the increase in available data, a Maine Aquatic Habitat Classification System (MAHCS) was developed as part of the SWAP update to more meaningfully classify statewide freshwater habitat. Corresponding MAHCS map data were produced to assist in implementing Maine's 2025 Action Plan.

IFW convened a subcommittee comprised of a diverse group of professionals and experts in aquatic resources, habitat management, conservation, and restoration to assist with this effort. The group met monthly from November 2024 – May 2025 to complete classification and mapping. Existing aquatic habitat classification efforts such as the NEAHCS and other tools or products in use in Maine were initially compared, and then the group arrived at a consensus framework for Lotic and Lentic habitats influenced by specific variables that have existing or calculable statewide data. This resulted in a consistent and science based statewide classification (Table 2-3). The full list of drivers and their designations are included in Appendix A. Influential factors for Lotic habitats include drainage area above the river reach, slope, monthly mean maximum water temperature, and water quality class as determined by Maine DEP. Lentic habitat data included elevation, acreage, maximum depth, a function of overall shoreline complexity referred to as "dominant habitat class", and water quality class as determined by Maine DEP.

Table 2- 3 Maine Aquatic Habitat Classification System (MAHCS) developed for the 2025 Wildlife Action Plan. This table identifies Macrogropus and Habitat Systems only. The full MAHCS is in Appendix A.

Macrogroup	Habitat System
Lotic	High Slope Headwater
	Moderate Slope Headwater
	Low Slope Headwater
	Cold Rivers
	Non-cold Large Rivers
	Transitional Small and Medium Rivers
	Warm Small and Medium Rivers
	Unknown Thermal Regime Small and Medium Rivers
	Compromised Water Quality
Lentic	High Elevation Lakes and Ponds
	Fishless Lakes and Ponds
	Ponds (<10 acres)
	Deep Littoral and Mixed Habitat Lakes
	Deep Pelagic Lakes

	Shallow and Intermediate Depth Littoral Lakes
	Shallow and Intermediate Depth Mixed Habitat Lakes
	Shallow and Intermediate Depth Pelagic Lakes
	Compromised Water Quality Lakes
	Lakes without Depth Data

Table 2- 4 Linear distance or surface areas of aquatic habitat macrogroups in Maine. Maine Aquatic Habitat Classification System (2025).

Macrogroup: Lotic			**Macrogroup: Lentic**		
Habitat System	**Miles**	**Kilometers**	**Habitat System**	**Acres**	**Km^2**
High Slope Headwater	9,553	15,374	**High Elevation Lakes and Ponds**	2,178	9
			Fishless Lakes and Ponds	394	2
			Ponds (<10 acres)	9,560	39
Moderate Slope Headwater	14,447	23,250	**Deep Littoral and Mixed Habitat Lakes**	15,460	63
Low Slope Headwater	15,619	25,137	**Deep Pelagic Lakes**	692,162	2,801
Cold Rivers	119	192	**Shallow and Intermediate Depth Littoral Lakes**	9,243	37
Non-cold Large Rivers	278	447			
			Shallow and Intermediate Depth Mixed Habitat Lakes	28,930	117
Transitional Small and Medium Rivers	2,256	3,631			
	749	1,205		140,273	568

Warm Small and Medium Rivers			**Shallow and Intermediate Depth Pelagic Lakes**		
Unknown Thermal Regime Small and Medium Rivers	1,881	3,027			
			Compromised Water Quality Lakes	58,158	235
Compromised Water Quality	565	910	**Lakes without Depth Data**	41,667	169

2.3.4 Maine Natural Communities, Ecosystems, and Flora

Natural Communities and Ecosystems

A natural community is "…an assemblage of interacting plants, animals, and their common environment, recurring across the landscape, in which the effects of human intervention are minimal." (Gawler and Cutko 2010). Aggregations of these natural communities within similar settings or with shared ecological processes are referred to as ecosystems. Natural communities occur at different scales on the landscape, from small patch to large patch, to matrix forming, and are primarily used as a "coarse filter" for identifying and protecting biodiversity. Protecting good, representative examples of natural communities conserves all its components, and ideally processes, to perpetuate the diversity of life – even species we do not know are there.

There are two broad classes of natural communities recognized as important for conservation: those that are rare and those that are common but in exemplary condition. There are currently 104 natural communities identified and defined in Maine. Of these, 59 are considered rare (ranked S1, S2, or S3). Some examples of rare types include Pitch Pine-Scrub Oak Barren, Atlantic White Cedar Swamp, Spartina Saltmarsh, and Jack Pine Forest. Of State-rare types, 10 are also considered *globally* rare. Examples include Hudsonia River Beach (a floodplain type) and Pitch Pine- Scrub Oak Barren (a wooded upland). Examples of *common* natural community types include Oak – Pine Forest, Red Maple – Sensitive Fern Swamp, and Acidic Cliff - Gorge. Most upland natural communities have been impacted by land use practices, and it is unusual to find relatively large, undisturbed examples of them. Size, landscape context, and condition are all considered when assessing the quality (or "exemplary" status) of common natural communities.

A Pitch Pine Woodland in coastal Maine, a rare natural community type. Maine Natural Areas Program.

Maine's natural community classification does not have a one-to-one association with other vegetation or ecosystem classifications however it can nest within those other categories or be cross-referenced to associated

types, including the National Vegetation Classification (NVC). Macrogroups, used in the State Wildlife Action Plan, are coarser than the natural communities and ecosystems described in Gawler and Cutko (2010). The Maine Natural Areas Program (part of the Maine Department of Agriculture, Conservation and Forestry) maintains the natural community and ecosystem classification for Maine. MNAP Ecologists investigate, map, assess, and review natural community mapping. Descriptions of all natural communities are located on MNAP's website at: https://www.maine.gov/dacf/mnap/features/community.htm

Rare Plants and SGCN Flora

> "The majority of SGCN plant taxa are restricted to specialized habitats which occupy an extremely small fraction of the state's land area."

Haines (2011) records 2,526 tracheophyte taxa (plants with structurally advanced vascular tissue, excluding mosses and relatives) in Maine, 1,630 of which are native to the state. The state's vascular plants include species at the northern edge of their range as well as boreal representatives at their southern limit (see Chapter 1.3.7 for further details). The majority of SGCN plant taxa are restricted to specialized habitats which occupy an extremely small fraction of the state's land area, with 39% restricted to wetlands and shores, and another 32% primarily restricted to alpine areas, cliffs, and rock outcrops. More than half (61%) of the species listed as Endangered have only one location where they are known to occur in the state. Six species, or 0.2% percent, of the plants native to Maine are rare throughout their worldwide range (e.g., ranked G1 or G2). The extent or "footprint" of rare plant populations is tremendously small. In fact, all known (and mapped) rare plant populations occupy a total of 73,586 acres in the state, representing only 0.4% of Maine's acreage.

The Official List of Endangered and Threatened Plants in Maine is a list of native vascular plant species whose populations within the state are highly vulnerable to loss. Species on the List are typically known from a very small number of sites within the state, and many require unique habitat for survival. The Endangered and Threatened Plants List is used to assist scientific research, environmental assessment, permit review, land management, and for educational purposes. The list is managed by the Maine Natural Areas Program (MNAP) and is under the jurisdiction of the Commissioner of the Department of Agriculture, Conservation and Forestry. Section 6 funding under the U.S. Endangered Species Act supports conservation and monitoring of federally listed plants in Maine, of which there are three species.

Slender rock-brake (Cryptogramma stelleri), which is a Threatened species in Maine. Maine Natural Areas Program

There is presently no statutory protection for native plants in Maine, thus the habitat in which these plants occur is important for their survival. Natural community and landscape level conservation will provide secondary (and critical) benefits to many rare and vulnerable SGCN plants and their associated habitats. Rare plants are often components of documented natural communities and can

be conserved in the context of these larger systems. However rare plant populations may also occur outside of documented MNAP-mapped rare and exemplary natural communities. Populations of rare plants outside of documented natural communities may require separate conservation actions that often address their related habitat as a whole.

2.4 Coastal and Marine Ecosystems

The Gulf of Maine watershed encompasses 69,115 square miles adjacent to Nova Scotia, New Brunswick, Maine, New Hampshire, Massachusetts, and Quebec. Maine is the only state or provincial jurisdiction located entirely within the watershed. The Gulf of Maine, largely created by glaciers 10,000 to 20,000 years ago, is a semi-enclosed sea bounded to the south and east by Browns Bank and Georges Bank and includes the Bay of Fundy. Underwater valleys plunge to depths of 1,500 feet. The Gulf of Maine coastal and marine ecosystem is one of the most productive ecosystems in the world due to the nutrient rich cold waters and the complex and diverse benthic and oceanographic characteristics of the region.

Tidal Marshes and Estuaries

Gulf of Maine tidal marshes and estuaries include salt marsh, rocky intertidal, and mudflat. The location and extent of these habitats are influenced by substrate, wave and tidal energy, tidal range, and slope. These habitats support several commercially important species as well as numerous SGCN.

Tidal marshes occur throughout the Gulf of Maine as large estuarine complexes or small fringe marshes. Of more than 5 million acres of wetlands in the state, approximately 157,500 acres are tidal (tidal flats, salt marsh, brackish marsh, aquatic beds, beach bars and reefs), including upwards of 31,000 acres of salt marsh and 21,666 acres of eelgrass *(Zostera marina*) (Colarusso et al. 2023, MDEP 1996, MEPC 1998, MNAP 2014). In fact, there are more tidal wetlands in Maine than in any state north of New Jersey (MEPC 1998) and Maine has 34% of all mapped eelgrass in the region (EPA 2023).

Despite harsh growing conditions and low plant diversity, tidal marshes are among the most productive ecosystems on earth. They provide food, shelter, spawning, and nursery areas for Striped Bass (*Morono saxatilis*), Winter Flounder (*Psudopleuronectes americanus*), and Mummichogs (*Fundulus heteroclitus*). Clams and Ribbed Mussels (*Geukensia granosissima*) inhabit tidal marshes and adjacent tidal flats, and birds rely on the rich food webs of tidal marshes for breeding and during migration. Tidal habitats including salt marsh and eelgrass beds also sequester a large amount of carbon for decades to centuries (McLeod et al., 2011). These tidal habitats in Maine store 1,689,965 metric tons of carbon in the top 30 cm of plant mass and sediment, equivalent to the emissions of 1,445,375 gas-powered cars driven for one year (EPA 2023).

Estuaries, places where freshwater rivers meet the ocean, receive high concentrations of nutrients that are exported from watersheds, particularly during late winter and early spring snowmelt. Land-derived nutrients combine with nutrients from tidal marshes, rockweeds, and oceanic sources to stimulate phytoplankton growth throughout the year. Eelgrass and other submerged aquatic vegetation sometimes grow in estuaries and provide a three-dimensional habitat that serve as critically important nurseries for larval and juvenile invertebrates and fish, and feeding and nesting areas for migratory fish and birds. In addition, these areas serve as coastal storm buffers and

filter sediments and pollutants before they reach coastal waters. Despite their importance, up to 50% of the region's original estuarine marshes have been lost through various human activities (MEPC 1998), and many eelgrass meadows have receded dramatically over the last few years due to a myriad of known and unknown causes. Between 2005 and 2023, the Midcoast Region of Maine lost 60% of its eelgrass and widgeon grass cover (MDEP 2024)

Coastal Islands, Beaches, and Dunes

Roughly 500 Maine islands support nesting wading birds, seabirds, and Common Eiders. Islands cause upwelling of deep, nutrient-rich water to the sea surface, enriching nearby waters. Currents driven by tidal action swirl around islands and surge through passages, "creating a funnel effect that increases the volume of feed available to filter feeders, as well as those species that prey on the filter feeders" (Conkling 1995). Because of the unique habitats, especially for sea birds, and distinct set of conservation actions, Maine's coastal islands are included as a new system within the North American Atlantic Coastal Dune, Grassland & Rocky Headland macrogroup (Table 2-7).

Nearly all of Maine's larger islands were cleared in the past, primarily for sheep or cattle pasture. Many islands were burned repeatedly to remove trees and increase hay production. Human use of the islands peaked roughly 100 years ago, and since early in this century, gradual abandonment of many islands has resulted in their reforestation. In the last few decades, recreational use and construction of seasonal homes have limited the ecological recovery of some islands (Table 2-5).

Table 2- 5 Development status of a subset of Maine islands (excluding "developed" islands and "bridged or ferried" islands). "Minimal Development" islands have 3 or fewer parcels and 1-5 principal structures. "Undeveloped" islands have no evidence of development from impervious surface or other landcover data (source MCHT Island Assessment, Sept. 25, 2018).

Island Size (acres)	# Undeveloped	# Minimal Development	Total #
0.1 to 1	777	4	781
1 to 10	663	88	751
10 to 100	252	121	373
100 to 1,000	31	46	77
Over 1,000	1	6	7
Overall	1724	265	1989

Beaches, pounded by an average of 8,000 waves a day, are high-energy, climatically extreme environments. They vary from long shorelines of fine-grained silt or sand to cobble shores and boulders. Because of geological differences between western and Downeast Maine, large sand beaches are mostly limited to southern Maine. Sand dunes, often located upslope of sand beaches, are hillocks of wind-blown sand originally brought to the rear of beaches by ocean waves and stabilized by beach grasses. Major sand dune systems in Maine are located at Scarborough Beach and Popham and Reid State Parks.

Intertidal Shores and Flats, and Subtidal Pelagic and Benthic

Intertidal and subtidal habitats in Maine support a variety of economically and ecologically important species. These habitats are diverse in their physical and biological characteristics. Coastal geomorphology, wave exposure, circulation patterns, depth, and tides influence their substrate composition and associated biological communities. Subtidal habitats consist of a variety of habitats including the water column, benthic substrate, biogenic reefs, and submerged aquatic vegetation. Subtidal benthic habitats are diverse, and distribution of these habitats vary by depth, grain size, and geology. Subtidal habitat is also three dimensional and includes the water column since many marine species have specific temperature, salinity, and dissolved oxygen needs to survive.

Intertidal mud, sand, and gravel flats are characterized along a gradient of sediment grain sizes. Coastal geomorphology, wave exposure, and tides influence their sediment composition and species distribution and abundance. Intertidal flats are inhabited by several benthic invertebrate species, making them important foraging habitats for migratory shorebirds. They also support commercially valuable fisheries for bivalves such as the soft-shell clam (*Mya arenaria*) and marine worms such as the sandworm (*Alitta virens*). Intertidal mussel (*Mytilus edulis*) reefs are a unique feature of some intertidal flats in Downeast Maine and support a diverse invertebrate community

within them. Being adjacent to shore, intertidal flats are subjected to land-based influences from polluted runoff and sedimentation. Warming waters have also driven the expansion of the invasive European green crab (*Carcinus maenas*), an intertidal predator considered to be a major factor in the statewide decline in soft shell clam abundance.

Intertidal rocky shores occur in areas of both high and low wave energy. These habitats exhibit distinct vertical zonation of biological communities based on species tolerance to exposure at low tide and inter-specific competition and predation. On wave-exposed shorelines, biota survive wave action through behavioral and morphological adaptations. In some parts of the state, these habitats support dense stands of blue mussels. In more sheltered waters, rocky shores support dense beds of rockweed (*Ascophyllum nodosum*) and other seaweed species. These seaweed beds protect invertebrates living within them from desiccation and thermal stress at low tide, and provide three-dimensional foraging and shelter habitat for fish and invertebrates (including commercially important juvenile species) at high tide.

Coastal and Marine Spatial Coverage

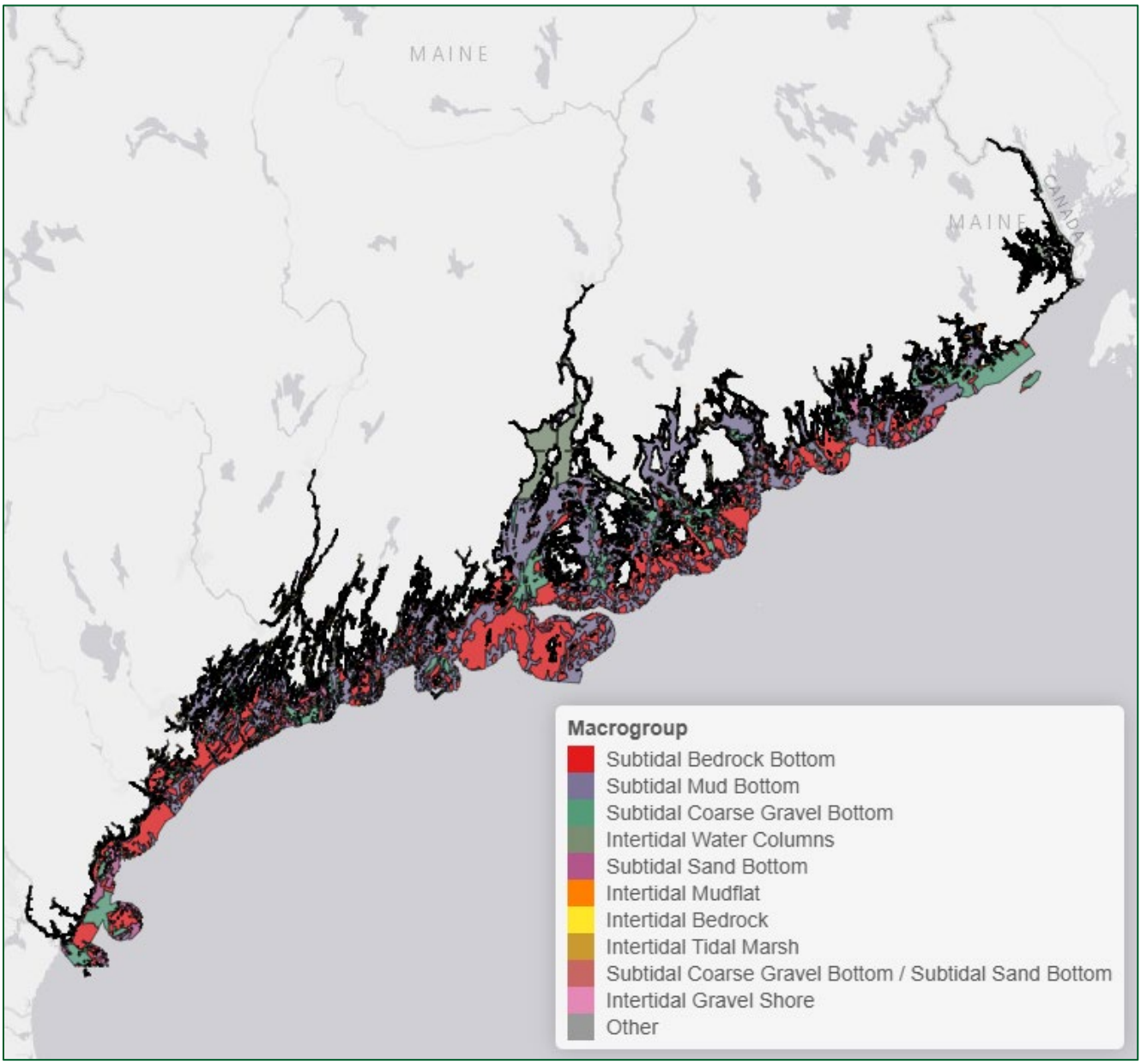
Quantifying intertidal and subtidal habitats is difficult due to the time, cost, and technology required to conduct bathymetric mapping with associated grab sampling or video surveys. Efforts are currently underway to quantify these habitats in Maine, however, they are not completed for the whole coast of Maine. Acreage estimates in Table 2-6 are based on the limited available data for benthic substrate in Maine state waters. However, this information is an estimate and accuracy of these estimates cannot be quantified. Current work is underway to quantify these habitats and needs to continue to provide accurate estimates of these SGCN habitats in future updates.

Table 2- 6 Estimates of coastal and marine macrogroup spatial coverage in Maine state waters (out to 3 nm). Data sourced from Maine Geological Survey (MGS). Intertidal data primarily from MGS Maine Coastal Marine Geologic Environments data layer, subtidal data primarily from MGS Maine Inner Continental Shelf Surficial Geology. Important note: existing spatial data available for Maine state waters does not align perfectly with SWAP macrogroups. For the purposes of this inventory some macrogroups were combined to better represent available data layers from MGS.

Coastal and Marine Macrogroup	Area (acres)	% of State Waters
Subtidal Bedrock Bottom	636,032.9	29.5
Subtidal Mud Bottom	581,077.7	27.0
Subtidal Coarse Gravel Bottom	229,040.3	10.6
Intertidal Water Columns	141,469.1	6.6
Subtidal Sand Bottom	68,574.4	3.2

Intertidal Mudflat	58,838.3	2.7
Intertidal Bedrock	36,261.5	1.7
Intertidal Tidal Marsh	26,732.2	1.2
Subtidal Coarse Gravel Bottom / Subtidal Sand Bottom	11,154.5	0.5
Intertidal Gravel Shore	10,100.7	0.5
Subtidal Bedrock Bottom/Subtidal Coarse Gravel Bottom	9,016.0	0.4
Intertidal Sandy Shore	7,251.1	0.3
Intertidal Mud Bottom	6,337.7	0.3
Intertidal Mud Bottom / Intertidal Sandy Shore	5,822.6	0.3
Coastal Grassland & Shrubland	4,956.0	0.2
Rocky Coast / Developed	3,328.9	0.2
Subtidal Mud Bottom / Subtidal Coarse Gravel Bottom	2,779.6	0.1
Subtidal Sand Bottom / Subtidal Mud Bottom	2,507.9	0.1
Intertidal Bedrock / Intertidal Gravel Shore	1,320.2	0.1
Subtidal Pelagic	1,258.0	<0.1
Intertidal Mollusc Reef	916.5	<0.1
Subtidal Coarse Gravel Bottom / Subtidal Mud Bottom	551.2	<0.1
Subtidal Bedrock Bottom / Subtidal Sand Bottom	344.4	<0.1
Intertidal Gravel Shore / Intertidal Sandy Shore	200.3	<0.1
Subtidal Mud Bottom / Subtidal Sand Bottom	26.7	<0.1
NA	730.3	<0.1

Figure 2- 3 Visual representation of coastal and marine macrogroup spatial coverage in Maine state waters (out to 3 nm). Associated acreage found in Table 2-6. Spatial coverage data is approximate given data gaps in coastal and marine macrogroup mapping. Intertidal data primarily from MGS Maine Coastal Marine Geologic Environments data layer, subtidal data primarily from MGS Maine Inner Continental Shelf Surficial Geology.



2.5 Freshwater Aquatic Ecosystems

Maine has more than 5,000 rivers and streams, encompassing 45,468 miles of flowing waters that compose nearly half of the Gulf of Maine watershed. These waterways and their riparian borders are important for Maine's fisheries and wildlife. They also serve as an important recreational resource for anglers, paddlers, and rafters. More of Maine's rivers and streams are undeveloped and free-flowing than any other state in the northeastern U.S.

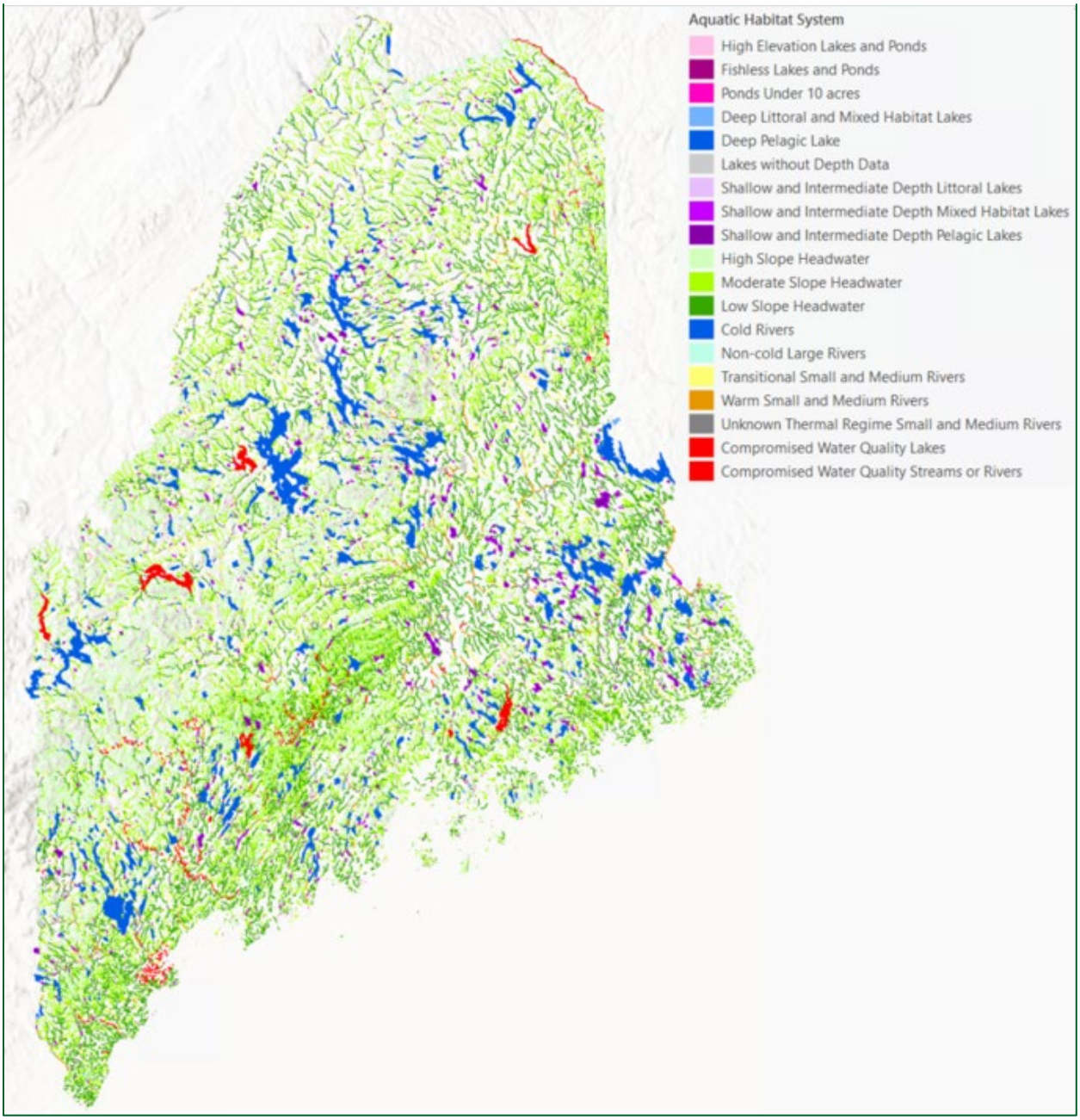
(Bennett 1988). The state's major rivers include the Penobscot (350 mi), the St. John (211 mi), the Androscoggin (175 mi), the Kennebec (150 mi), the Saco (104 mi), and the St. Croix (75 mi).

However, the overwhelming majority of flowing water mileage in Maine is in headwater streams (Figure 2-5). Cold headwater streams and small rivers are vital habitat for Maine's Brook Trout (*Salvelinus fontinalis*) and many other species. Maine has the most extensive remaining distribution and abundance of Brook Trout habitat throughout their native range in the U.S.

Maine also boasts more than 5,600 lakes and ponds, more than any other state in the Northeast. Moosehead Lake, covering about 117 mi^2, is the state's largest lake, and Sebago Lake is the deepest at 316 ft (40 ft below sea level).

The availability of nutrients and oxygen at different lake depths have important implications for fish habitat, and for the purposes of this Action Plan, Maine's lakes have been classified primarily by elevation, acreage, maximum depth, relative shoreline complexity, and water quality class as determined by Maine DEP. Most iconic Maine lakes providing coldwater habitat for many native species fall in the Deep Pelagic Lake class. Maine also has a small number of fishless ponds, considered important for a variety of invertebrate and amphibian species, and these are also a unique habitat system within the classification (Figure 2-5).

Figure 2- 4 Maine Aquatic Habitat Classification System (2025)



2.6 Terrestrial and Wetland Ecosystems

Upland Forests

Maine falls in the transition between the deciduous forest region to the south and the boreal forest region to the north. Maine's forests cover more than 17 million acres, making Maine the most heavily forested state in the nation. Unlike other regions where forest cover has been almost completely lost due to conversion to agriculture or other uses, Maine retains or has regrown much of its forest cover. Sixty-seven woody plant species reach their range limits in south-central Maine, and an additional 44 woody plant species define a coastal-inland transition zone,

reaching their western range limits in a southwest- northeast belt bisecting the state (McMahon 1990). *Natural Landscapes of Maine* (Gawler and Cutko, 2010) describes 104 Natural Community types that are linked to the NatureServe's National Vegetation Classification and the Ecological Systems.

At the macrogroup level, Maine's most abundant forest type is Acadian-Northern Appalachian Forest, which accounts for approximately 74% of the state and extends from York to Aroostook County. This macrogroup consists of a mosaic of northern hardwood, spruce-fir, and mixed forest types featuring Sugar Maple, American Beech, Yellow Birch, White Ash, Red Spruce, Balsam Fir, and Eastern Hemlock. The Appalachian Oak-Pine Forest and Woodland macrogroup, characterized by dry site oak and pine species, typically has White Pine and Red Oak or White Oak, and is the second most abundant upland forest type, accounting for less than 2% of the state, mostly in southernmost Maine. The other most common forest type is forested wetland, part of the Laurentian-Acadian Flooded Swamp and Forest macrogroup. At 9% of Maine's landcover, this forested wetland type is widespread and may contain either hardwoods or a mixed cover of Red Maple, Yellow Birch, Black Ash, Northern White Cedar, Red Spruce, and Hemlock.

Forest structure and condition are important attributes for many wildlife species. Both early- (young) and late-successional (old) forests are uncommon in parts of Maine. Statewide, Maine's older forests (stand age of more than 150 years) account for less than 4% of the state (Hagan et al. 2024), and true old growth may be as little as 0.1% of the state (Barton et al. 2012). Maine's conserved lands, in particular those classified as Gap 1 and 2, are an important contributor to the retention and natural development of older forest.

Early Successional Habitats

In southern Maine, young forest is also uncommon. In York and Cumberland counties, forests younger than 40 years old account for less than 6% of the landscape (U.S. Forest Service 2021). In the Northeast U.S., and especially in Maine, terrestrial openings are most often the result of disturbances, whether by human activity or, historically, by wildfires (Askins et al. 2007). Open habitats increased greatly in the 18th and 19th centuries as settlers converted forests for agriculture (Todd 1940). By 1880, approximately 34% of Maine was cleared for farming (Day 1954), but that pattern reversed dramatically via reforestation during the 1900s (Powell and Dickson 1984). By 1997, only 6% of the state's land area was in agricultural use (National Agricultural Statistics 2009). That proportion has changed little during the past 30 years, but remaining farms are often row-crop agriculture. Pastures declined by 97% in the past 135 years as former pastures have re-grown. Wildfire suppression and reversion of fallow fields to forests have further reduced grasslands and shrublands.

Freshwater Wetland Ecosystems

Approximately 39% of Maine's SGCN plants are associated with one of the many diverse types of wetlands and shores across the state.

Freshwater wetlands including open water habitats account for roughly one quarter of the surface area of Maine (Calhoun 2001), four times the wetland area of the other New England States combined. Forested wetlands include red maple swamps, spruce flats, and cedar swamps, while non-forested wetlands range from large peatlands to emergent meadows created by beavers. In particular, Maine's diversity of peatland types is unequaled in the United States (Davis et al. 1983). The state's latitudinal, altitudinal, and coastal-inland gradients are all reflected in the

varying peatland morphologies and vegetation composition. Some Maine peatland types are rare in the state (maritime slope bogs, coastal plateau bogs, circumneutral fens, patterned fens, and eccentric bogs), while others are more common (unpatterned fens, level bogs, kettlehole bogs and ponds, and some streamshore ecosystems).

Freshwater wetlands support many species of fish and wildlife that thrive only in wetland habitat. In addition, they support other species that do not inhabit wetlands but feed upon fish and wildlife that originate in wetlands. Wetlands may host a different array of species depending on the time of year, the amount and depth of open water, the species, height, and structure of the vegetation, and their proximity to other wetland, upland, or coastal habitats. Certain wetland types are vital to rare plants and animals, including the black tern which nests in emergent marshes and the Blanding's turtle which inhabits vernal pool complexes within large, forested tracts. Many species of endangered invertebrates, including dragonflies and butterflies, also require wetlands for survival. Several species of rare plants require the saturated conditions of peatlands or contact with nutrient rich ground and surface water to survive, such as the carnivorous slender leaved-sundew (*Drosera linearis*) or white adder's-mouth orchid (*Malaxis monophyllos ssp. brachypoda*). Approximately 39% of Maine's SGCN plants are associated with one of the many diverse types of wetlands and shores across the state.

2.7 Importance of Habitats to SGCN

Maine identified 729 SGCN in this Plan. MDIFW, MNAP and MDMR staff, in consultation with species experts and stakeholders, identified the primary and secondary habitats important to the lifecycle of each of Maine's SGCN when known. However, habitat requirements for some SGCN (especially invertebrates) are not well understood. In those cases, staff used professional knowledge to identify habitat. All Priority 1 and Priority 2 SGCN were associated with the finest scale 'habitat systems' in the hierarchical classification. Habitat assignments for Priority 3 SGCN were at the mid-scale 'habitat macrogroup' since many of the flora and fauna in that category are poorly studied and/or disadvantaged by scant information.

Figure 2- 5 Total number of SGCN by broadly grouped macrogroups. Many of Maine's 729 SGCN rely on more than one macrogroup at some point in their life cycle or habitat requirements, as is displayed here.

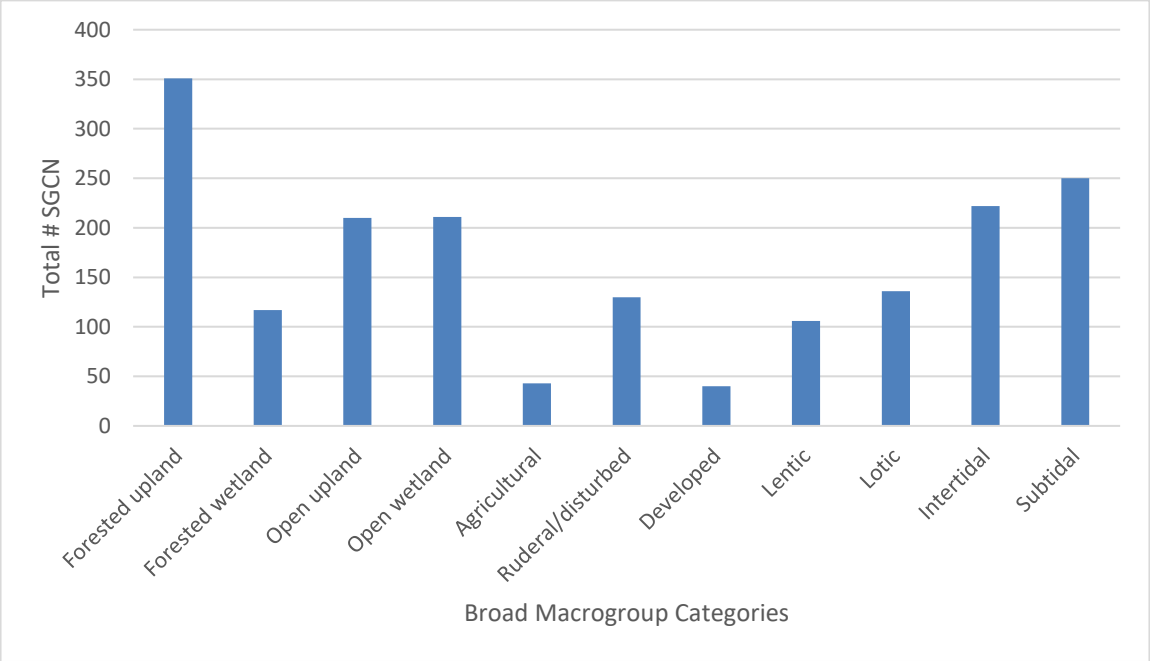


Table 2-7 and Figure 2-6 summarize the importance of various habitat macrogroups to SGCN and also demonstrates how the importance of each habitat type to SGCN varies and is not proportional to their statewide acreage. Acadian-Northern Appalachian Forests support 167 SGCN, more than any other type. This is not surprising, given that this habitat type is the most abundant in the state, covering nearly 74% of Maine. Conversely, Appalachian Oak-Pine Forest and Woodland provide habitat for 85 SGCN but covers *less than 2% of the state.* Forested and open vegetated wetlands together provide habitat to 328 SGCN (45% of Maine's total) and are often only one piece of a species' life history requirements, underscoring the need for healthy wetland habitats and connectivity with other habitat types.

All of the Coastal and Marine Macrogroups support multiple SGCN, but the Subtidal Pelagic (water column) macrogroup is home to the most Priority 1 coastal or marine SGCN as well as total SGCN. Many marine fauna have complex life histories with varying habitat affinities at different stages of development.

Notably, habitats that are moderately to significantly altered by humans also provide habitat for numerous SGCN. In particular, agricultural areas support 43 SGCN, and significant numbers of SGCN are also supported by Ruderal Grasslands and Shrublands, Urban/Suburban – Built, and Modified – Managed Marshes. Reforestation of former

agricultural lands and the near demise of some types (e.g., old fields and pastures) has become a critical limitation for many SGCN.

Table 2- 7 SGCN associations with NETHCS habitat macrogroups. Note: Many SGCN are associated with more than one macrogroup. Click on a macrogroup name to launch a full summary report of associated SGCN and for each habitat macrogroup.

Macrogroup Name		Priority 1 SGCN	Priority 2 SGCN	Priority 3 SGCN	Total # SGCN
Coastal and Marine					
Intertidal Bedrock		4	10	5	19
Intertidal Gravel Shore		1	21	12	34
Intertidal Mollusc Reefs		3	3	3	9
Intertidal Mudflat		11	17	17	45
Intertidal Sandy Shore		10	10	9	29
Intertidal Tidal Marsh (peat-forming)		12	19	12	43
Intertidal Water Column		16	7	7	30
Subtidal Bedrock Bottom		1	16	1	18
Subtidal Coarse Gravel Bottom		4	33	11	48
Subtidal Mollusc Reefs		2	5	1	8
Subtidal Mud Bottom		7	19	10	36
Subtidal Pelagic (Water Column)		46	35	26	107
Subtidal Sand Bottom		6	20	7	33
Temperate Atlantic Intertidal Shore		4	6	3	13
Freshwater Aquatic					
Lentic		35	37	34	106
Lotic		53	39	44	136
Terrestrial and Wetland					
Terrestrial	Acadian-Northern Appalachian Forest	29	62	76	167
	Agricultural	17	17	9	43
	Appalachian Oak - Pine Forest & Woodland	15	33	37	85
	Eastern North American Alpine Tundra	35	9	4	48
	Eastern North American Cliff & Rock Vegetation	26	1	2	29
	Exotic Upland Forest	4	2	2	8
	Extractive	9	2	2	13
	Laurentian-Acadian Acidic Rocky Scrub & Grassland	5	6	3	14
	Laurentian-Acadian Calcareous Scrub & Grassland	18	5	1	24
	Maintained Grasses and Mixed Cover	11	12	4	27
	North American Atlantic Coastal Beach & Rocky Shore	1	2	3	6
	North American Atlantic Coastal Dune, Grassland & Rocky Headland	14	20	17	51

	North American Freshwater Coastal Beach & Rocky Shore	18	17	3	38
	North Atlantic Coastal Forest & Woodland	13	45	41	99
	Plantation and Ruderal Forest	6	9	12	27
	Ruderal Shrubland & Grassland	21	23	24	68
	Urban-Suburban Built	10	9	8	27
Wetland	Atlantic & Gulf Coastal Plain Wet Prairie & Marsh	5	7	8	20
	Central Hardwood Swamp Forest	8	5	11	24
	Coastal Plain Evergreen Hardwood - Conifer Swamp	7	2	3	12
	Eastern North American Marsh, Wet Meadow & Shrubland	21	40	31	92
	Laurentian-Acadian Flooded & Swamp Forest	13	24	21	58
	Modified-Managed Marsh	7	10	11	28
	North American Boreal & Subboreal Alkaline Fen	6	6	2	14
	North American Boreal & Subboreal Bog & Acidic Fen	13	26	18	57
	North American Boreal Conifer Poor Swamp	2	13	8	23

2.8 Assessing Habitat Condition at Multiple Scales

Most SGCN species in Maine are dependent on multiple habitat types and the connections between these habitats. Additionally, many SGCN have large home ranges. For example, male Canada lynx have home ranges of over 18 square miles; Moose have home ranges of 8-12 square miles; Blanding's turtles are known to travel over a mile between wetland habitats; and Brook trout are recorded as travelling more than 50 stream miles. Other SGCN require large, connected habitat to maintain and sustain viable populations. Northwestern Maine has been identified as a globally Important Bird Area by the National Audubon Society for its importance for nesting migratory songbirds, i.e. a 'Baby Bird Factory.' Landscape scale habitat units are necessary tools to conserve and restore habitats at the scale that most species require to sustain viable populations, and to provide places for species to move or respond as a result of climate change. Coarse filter conservation actions for these wide-ranging species require tools identifying suitable habitats at the landscape scale.

2.8.1 Beginning with Habitat Program Mapping and Tools

The Beginning with Habitat Program (BwH) within MDIFW works with partners at MNAP (Department of Agriculture, Conservation and Forestry), the Department of Marine Resources, Department of Environmental Protection, and others to aggregate and share species and habitat information for implementation of conservation actions at a regional and landscape scale. Mapped resources, including the Beginning with Habitat web viewer can be found at www.beginningwithhabitat.org. The Beginning with Habitat Program serves landscape and regional scale habitats and data layers digitally and on three thematic maps (Water Resources and Shoreland Habitats, High Value Plant and Animal Habitats, Habitat Connectivity) and two web maps (Beginning with Habitat Map Viewer, Maine Stream Habitat Viewer).

Water Resources and Shoreland Habitats

Beginning with Habitat's Water Resources map aggregates habitat information for the conservation of aquatic resources. Resources on this map include important fish habitats, coastal habitats, wetlands, and barriers to fish passage. This map helps plan for aquatic resources at a municipal and regional scale (Figure 2-7).

High Value Plant and Animal Habitats

Beginning with Habitat's Water Resources map aggregates habitat information for the conservation of at-risk plant and animal species. Resources on this map include rare plant and animal occurrences, rare and exemplary natural communities, and significant wildlife habitats. This map helps plan for conservation of rare species at a municipal and regional scale (Figure 2-8).

Habitat Connectivity

The Habitat Connectivity map includes landscape scale data served by the Beginning with Habitat Program developed in partnership with other state agencies and external partners. These include Large Undeveloped Habitat Blocks, Habitat Block Connectors and Focus Areas of Statewide Ecological Significance (Figure 2-9).

Large Undeveloped Habitat Blocks

Recognizing that many SGCN species depend on large, intact areas of core habitat, MDIFW and external partners have created a map that helps identify habitats for these species. Large Undeveloped Habitat Blocks are areas of habitat buffered by 250-500', with buffer distances depending on development intensity. These mapped resources are important for conservation and natural resource planning for private landowners, municipalities, and conservation organizations.

Habitat Connectors

Roads pose barriers to the movement of many terrestrial species. Habitat Connectors are modeled areas where terrestrial wildlife species are most likely to cross roadways. Habitat Connectors are areas where both sides of a road have intact habitat providing cover for terrestrial wildlife species.

Focus Areas of Statewide Ecological Significance

Beginning with Habitat Focus Areas of Statewide Ecological Significance are areas to prioritize collaborative, non-regulatory conservation actions that benefit biodiversity in Maine. These areas contribute to MDIFW's Conservation Opportunity Areas. Focus Areas have become integrated into a number of conservation and restoration programs such as the Land for Maine's Future, Maine Natural Resources Conservation Program and the Forest Legacy Program.

Focus Area Update 2020-2023

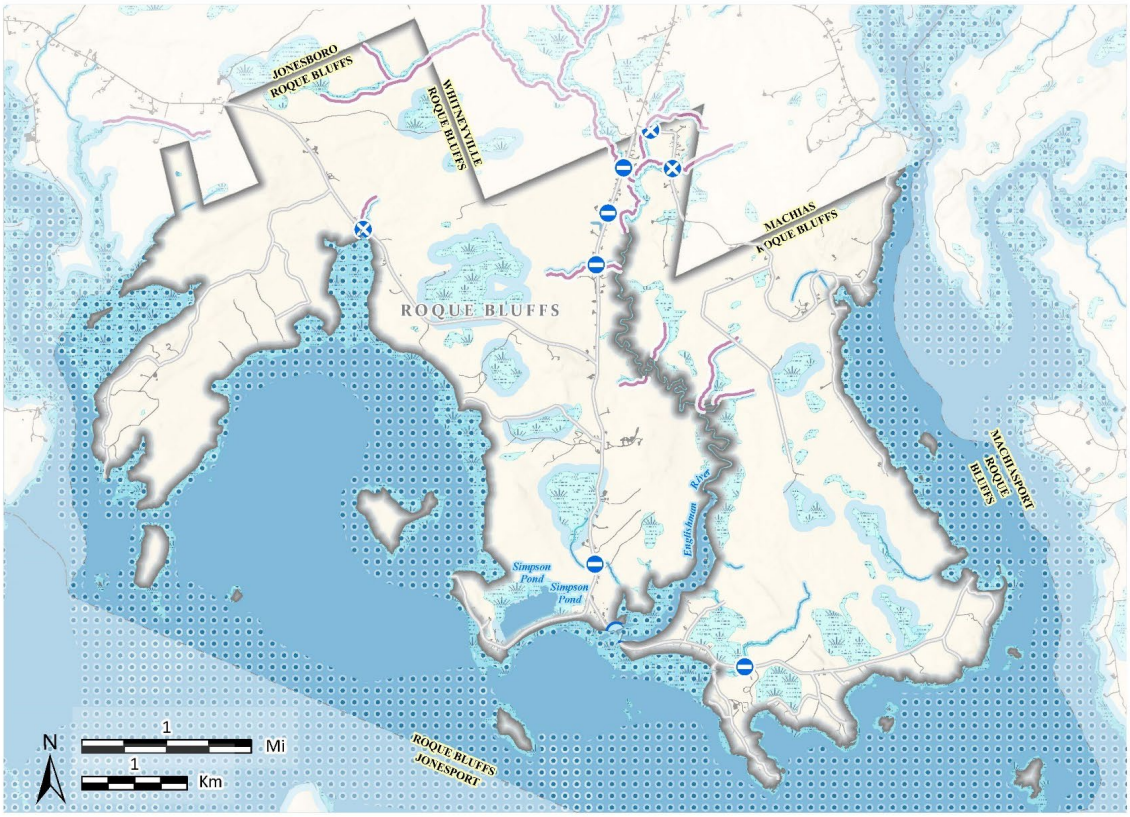
Between 2020-2023, MDIFW partnered with MNAP, MDMR, USFWS and TNC to identify concentrations of rare species, including many SGCN, and high-quality habitats across Maine. Using confirmed survey data, rarity indicators, and landscape condition (size and integrity), project partners took an objective approach to update the over 140 Beginning with Habitat Focus Areas of Statewide Ecological Significance ('Focus Areas') across Maine.

Focus Areas were mapped to highlight natural areas of statewide biodiversity importance and contain high concentrations of at-risk species and habitats. Though Focus Areas occupy only about 11.5% of Maine's land area, collectively they include examples of over 85% of rare, threatened, and endangered plant and animal species and high-quality examples of all natural community types. For more information, see https://www.maine.gov/ifw/fish-wildlife/wildlife/beginning-with-habitat/about/focus-areas.html

Figure 2- 6 Roque Bluffs Water Resources and Shoreland Habitats Map

Roque Bluffs

Water Resources and Shoreland Habitats



This map is nonregulatory and is intended for planning purposes only

Organized Towns

Wild Brook Trout Priority Conservation Areas — Reflects surveys on selected Maine streams.

Shellfish Growing Areas — Distributions of molluscan shellfish species.

Wetlands — National Wetlands Inventory (NWI) uses aerial photographs to approximate wetland locations. NWI data typically under represents the presence of wetlands on the landscape.

Shoreland Areas — Areas are delineated by ME Dep. of Environmental Protection's Mandatory Shoreland Zoning Act, which includes areas within 250 feet of great ponds, rivers, and wetlands, and within 75 feet of streams. The regulations within each shoreland zone depends on the town, and towns may regulate greater areas than what is shown here. For more information, please visit: https://www.maine.gov/dep/land/slz/

Developed — Impervious surfaces including buildings and roads.

TOWNSHIP BOUNDARIES - Maine Office of GIS (2020)
ROADS - ME Office of GIS, ME Dept of Transportation (2021)
HYDROLOGY -USGS National Hydrography Dataset (2016)
DEVELOPED - CCAP NOAA Impervious land cover (2022)
NATIONAL WETLANDS INVENTORY - U.S. Fish & Wildlife Service (2020)
SHORELAND AREAS - ME Office of GIS, ME Natural Areas Pgm(2011)
BROOK TROUT PRIORITY CONSERVATION AREAS - ME Dept of Inland Fisheries & Wildlife (2020)
MAINE HERITAGE FISH WATERS - ME Dept of Inland Fisheries & Wildlife (2022)
ATLANTIC SALMON HABITAT - ME Dept of Marine Resources (2024)
SHELLFISH - ME Dept of Marine Resources (2010)
ME ROAD STREAM HABITAT CROSSINGS - ME Dept of Inland Fisheries & Wildlife, US Fish and Wildlife Service (2022)

Beginning with Habitat (BwH) equips Maine communities, landowners, and conservation partners with tools to protect, restore, and connect important habitats and ecosystems in a changing climate. *www.beginningwithhabitat.org*

April 2025

Figure 2- 7 Roque Bluffs High Value Plant and Animal Habitats Map

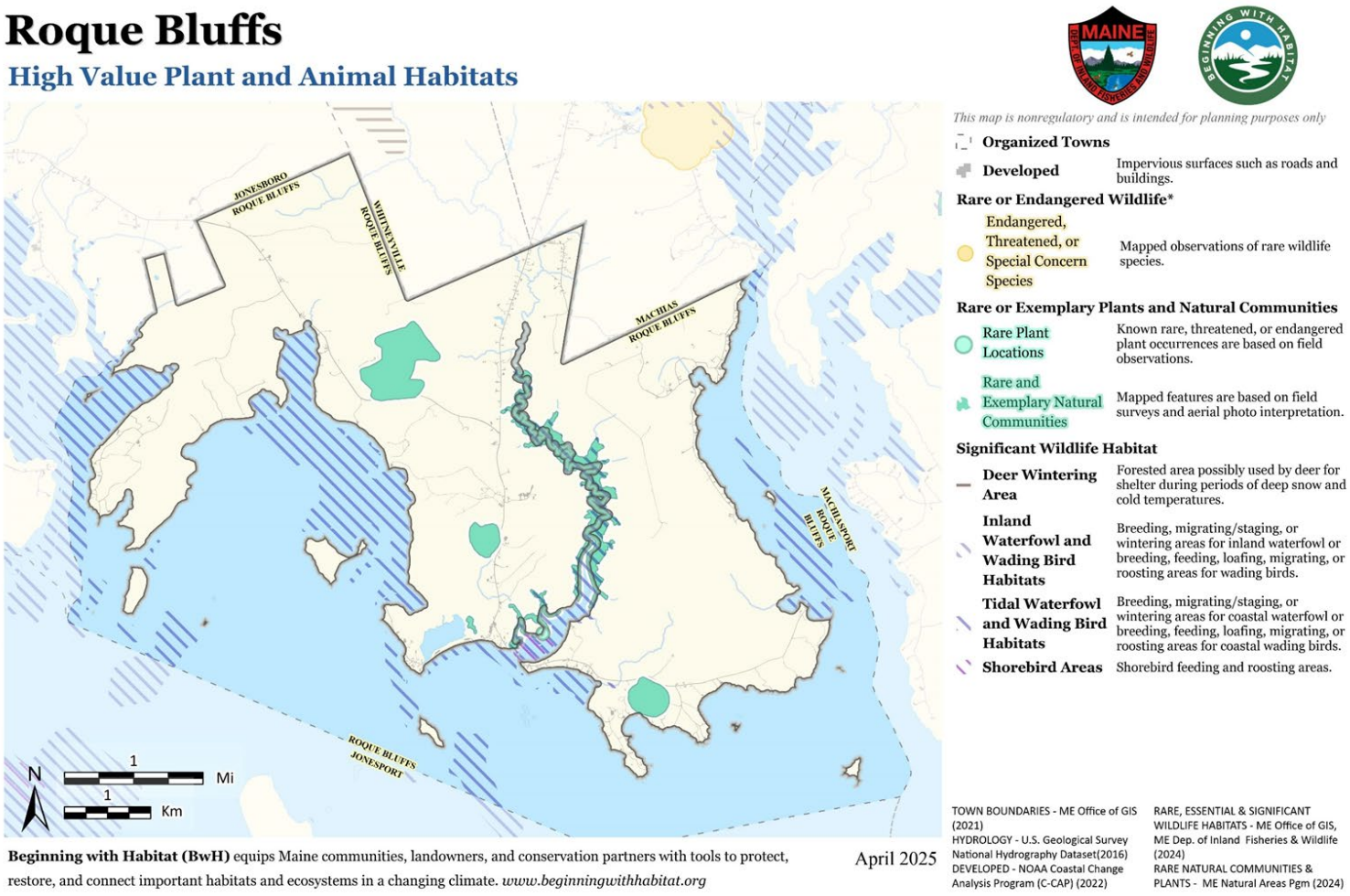
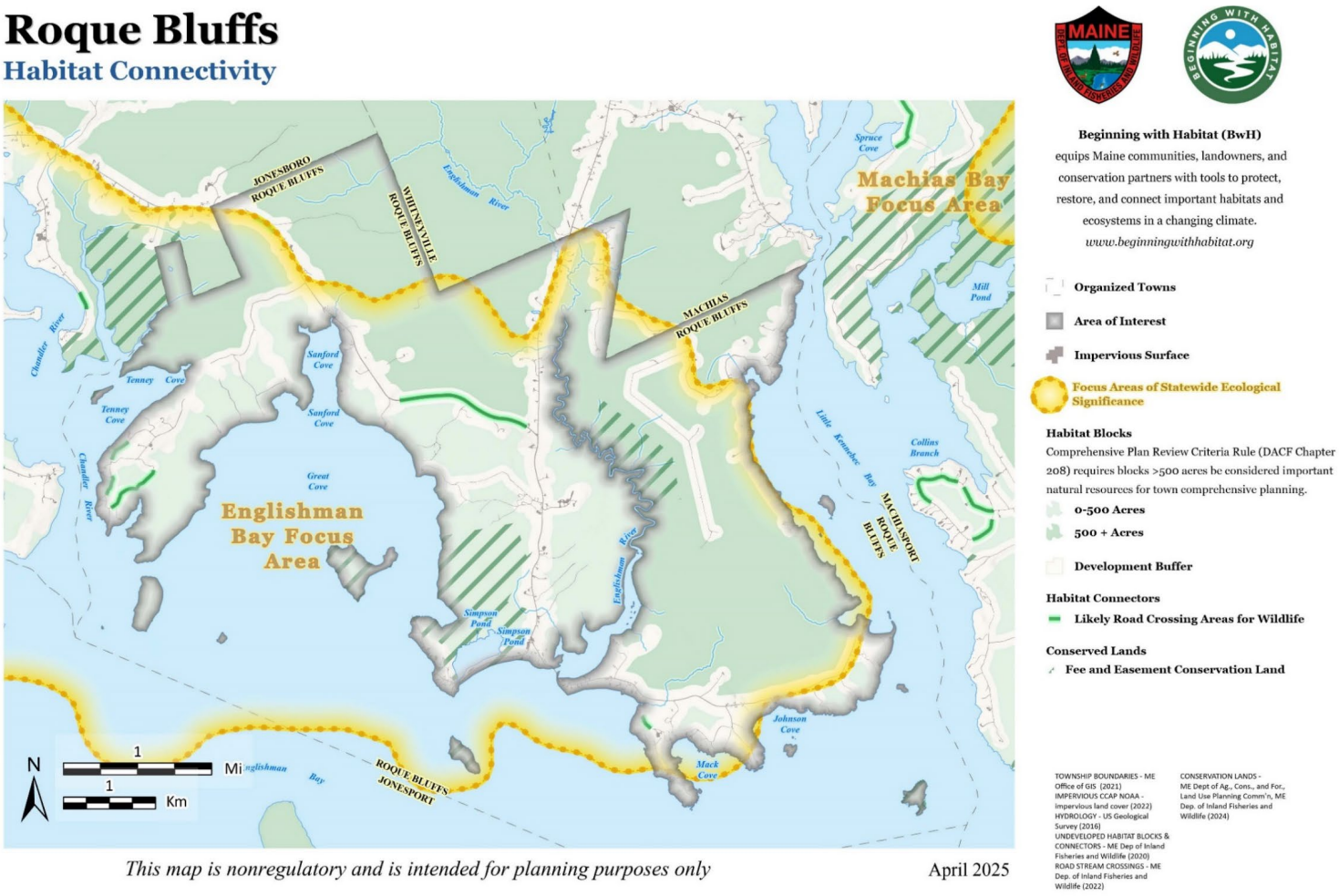


Figure 2- 8 Roque Bluffs Habitat Connectivity Map



Beginning with Habitat Map Viewer

The Beginning with Habitat Map Viewer is an on-line adaptation of BwH's collection of natural resource information provided by state, federal, and non-profit conservation partners. This information can help land-use decision makers balance growth and management goals with conservation of Maine's fish and wildlife and natural places. The web-viewer is an online depiction of the regional and landscape scale habitat resources displayed on BwH thematic maps. This resource can be accessed at: https://webapps2.cgis-solutions.com/beginningwithhabitat/mapviewer/

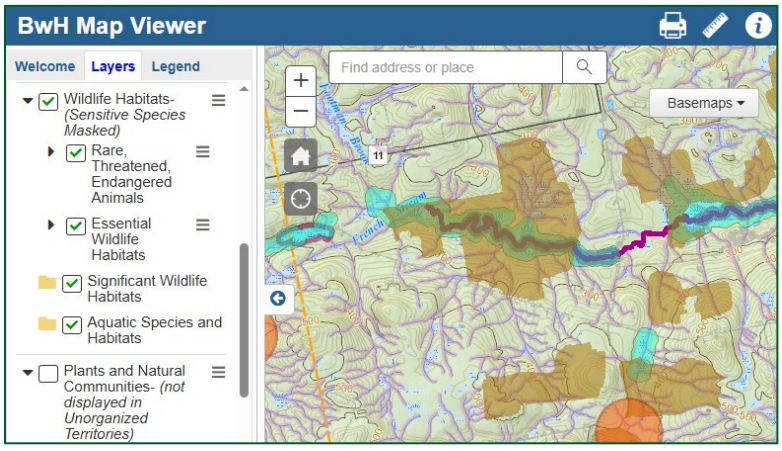


Figure 2- 9 Example view of the Beginning with Habitat Map Viewer.

Maine Stream Habitat Viewer

The Stream Habitat Viewer (https://webapps2.cgis-solutions.com/MaineStreamViewer/) is a tool to enhance statewide stream restoration and conservation efforts. The Viewer provides a starting point for towns, private landowners, and others to learn more about stream habitats, fish passage barriers, and road crossings in inland, non-tidal areas across the state. The Maine Stream Habitat Viewer is the product of the Maine Stream Connectivity Work Group, a partnership of state, federal, industry and non-government organizations working to improve Maine's stream restoration efforts. This viewer helps make landscape scale decisions on stream habitat restoration and aquatic connectivity. Beginning with Habitat has also produced a story map of landscape scale restoration success stories that utilizing the Maine Stream Habitat Viewer.

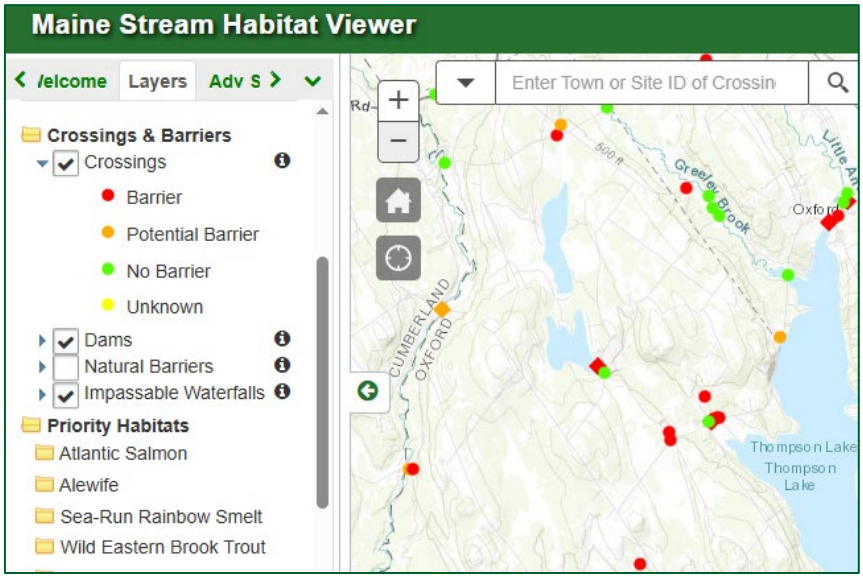


Figure 2- 10 Example view of the Maine Stream Habitat Viewer.

Maine Tidal Restriction Atlas

The Maine Coastal Program (within the Maine Office of Community Affairs) and multiple coastal partners created the Maine Tidal Restriction Atlas for communities, road owners, conservation groups, and others who plan for coastal resilience and tidal connectivity. The Atlas is based on the Maine Coastal Program's statewide Tidal Restriction Assessment, and helps identify culverts, bridges, dams, and other structures that are currently tidal or will likely become tidal in the future. The Atlas is meant to complement use of The CoastWise Approach for tidal road crossing design. The Tidal Restriction Atlas shows where roads, railroads, dams, and other structures cross tidal streams, marshes, and other tidal wetlands and helps visualize impacts from sea level rise and storm surge on both human communities and coastal wildlife populations. Atlas is available here: (https://www.maine.gov/dmr/programs/maine-coastal-program/habitat-restoration-tools/tidal-restriction-atlas).

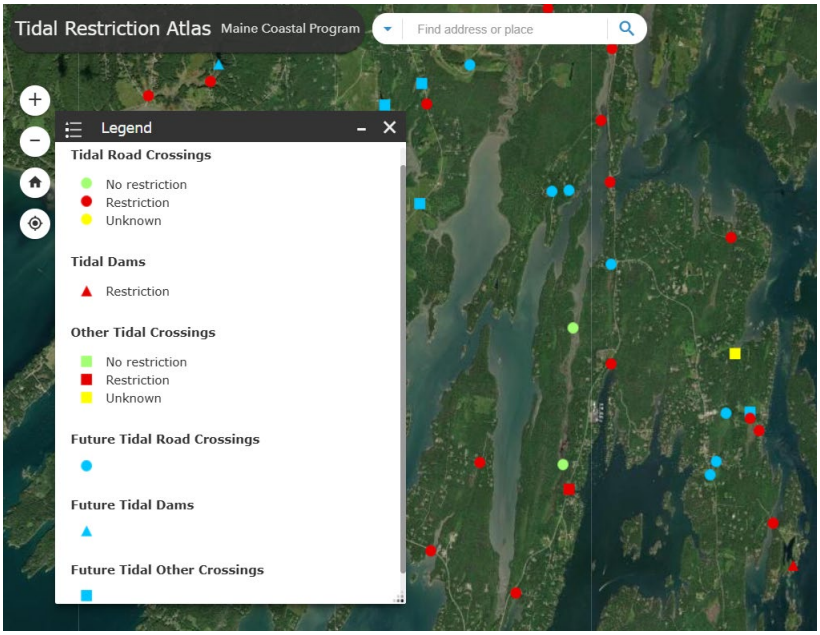


Figure 2- 11 Example view of Maine Tidal Restriction Atlas.

2.8.1 Landscape and habitat gaps in land conservation

There are 4,443,228 acres of conservation land in Maine, accounting for nearly 22.6% of the State (Figure 2-13). This includes easements, public lands managed for multiple uses, private conservation lands, state Ecological Reserves, and others. There are approximately 969,000 acres of land that are considered 'Gap 1 or Gap 2' according to the USFWS classification of conserved lands. These Gap 1 and Gap 2 lands are managed for non-extractive uses (i.e., off limits to timber harvesting, gravel extraction, etc.) and account for 21% of Maine's conservation land. Much of Maine's conserved land lies within Focus Areas of Statewide Ecological Significance, which have been identified to help prioritize conservation of Maine's landscape for SGCN and other habitat values.

A key habitat conservation action identified in this plan is land protection, including both working forest conservation fee or easements as well as ecological reserves where timber harvesting does not occur (see Element 4). Recent work to identify habitat gaps in land protection was led by the Maine Natural Areas Program in partnership with the Maine Department of Inland Fisheries and Wildlife, the Maine Bureau of Parks and Lands, and the Land for Maine's Future Program. Habitat gaps in conservation are summarized below by coastal systems, aquatic/riparian, and terrestrial/wetland (Schlawin et al, 2021. Full report at https://www.maine.gov/dacf/mnap/publications/LAPAC_2021techrept.pdf).

Coastal

Over the next 100 years, it is likely that we will see between 1.2' and 6.1' of sea level rise in Maine. The Maine Climate Council recently recommended that the state consider "committing to manage" for 1.5 ft. of relative sea level rise by 2050, and 3.9 feet of sea level rise by 2100. This recommendation also urges the state to "prepare to manage" for 3.0 ft. of relative sea level rise by 2050 and 8.8 feet by 2100 (relative to 2020 levels). Maine's future tidal marshes are likely to be in existing estuaries, and the future arrangement of tidal marshes is likely to include the space currently occupied by tidal marshes and newly flooded areas (depending on rates of sea level rise and sediment accretion).

Maine currently has approximately 22,000 acres of tidal marshes, including 17,700 acres of salt and brackish marsh and 4,300 acres of freshwater tidal marsh. With 6.1' of sea level rise, newly tidal areas in estuaries is roughly equivalent (21,000 acres) to the area of current tidal marshes. It is unknown to what extent this newly tidal area could support tidal marshes. Approximately 2,500 (12%) acres of this migration space is currently developed.

24% of Maine's coastline length is in permanent land conservation. Similarly, there is 23% conservation within the first 250' of upland buffering Maine's coast. Coastal land conservation is proportional among rocky coastline and estuarine wetland habitats. Conservation is greatest in southern Maine and eastern Maine. Coastal portions of

Midcoast Maine have more limited land protection, especially areas on the west side of Penobscot Bay. Statewide, approximately 26% of potential marsh migration space is conserved through land protection.

Maine has over 2,400 islands over 1 acre, of which nearly 1,900 are undeveloped. Conservation plays a significant role in maintaining the character of Maine's coastal islands. Over 900 islands (40%) are permanently conserved through fee or easement, and another 77 islands (3%) benefit from partial conservation. Most of the conserved islands are less than 10 acres in size. Based on Beginning with Habitat and Maine IF&W data, 321 islands have mapped high habitat value. Of these islands with high habitat value, roughly 2/3 are conserved.

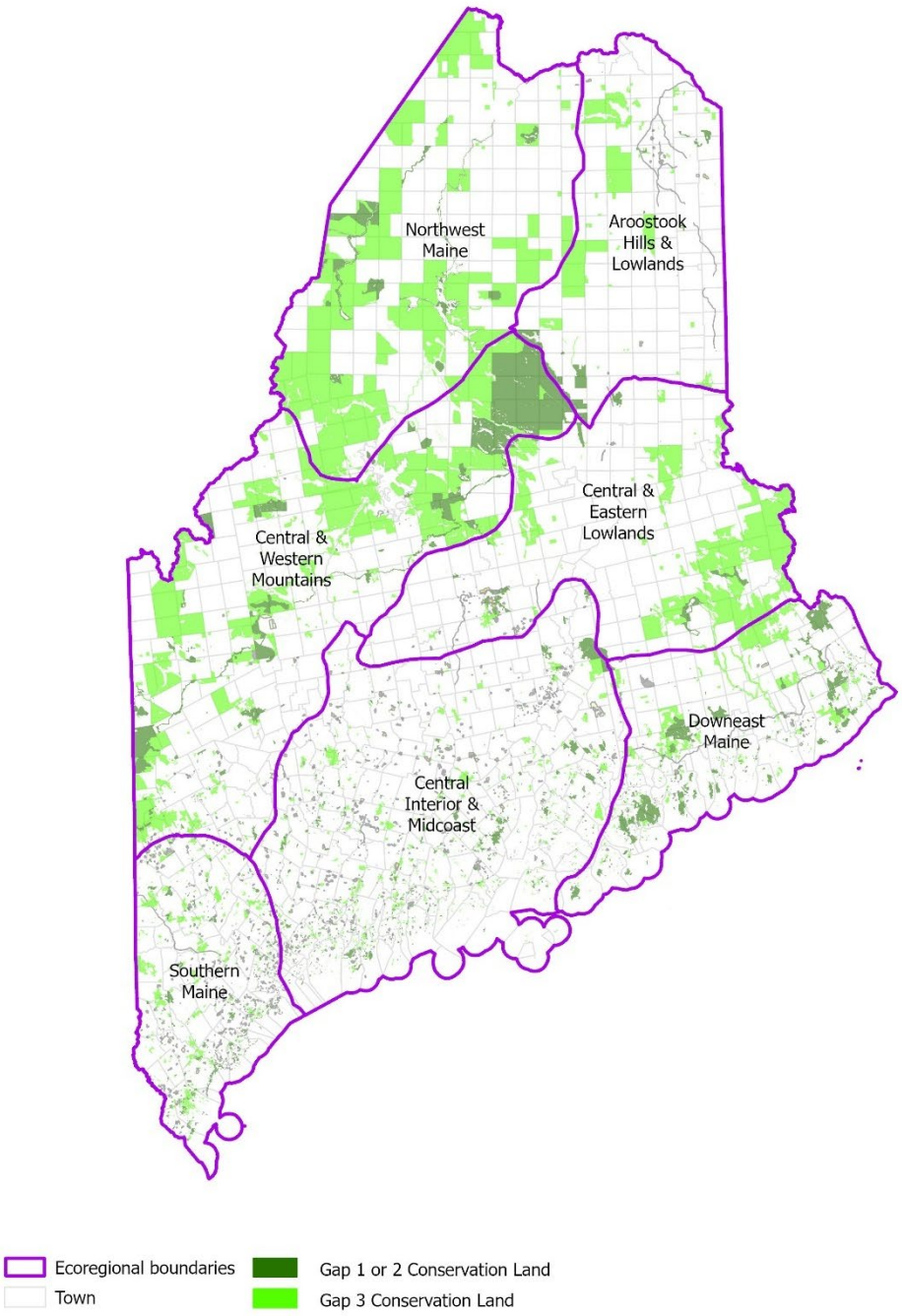


Figure 2- 12 Conserved lands in Maine. Dark green lands are Gap 1 or Gap 2 (off limits to extractive uses) and light green lands are considered Gap 3 (fee lands and conservation easements managed for forest products).

Aquatic/Riparian

Headwater streams

Maine has over 8,000 miles of headwater streams. A focus for land conservation has been placed on headwater streams and small creeks in the uppermost portions of Maine's watersheds because of their importance for cold water aquatic habitat. These streams are the most likely places within a watershed to retain cold water fisheries following different projections of climate change.

Approximately 22.4% of headwater streams occur in conservation lands, with the highest level of conservation in the Androscoggin, Kennebec and Penobscot River Watersheds. The lowest level of Maine headwater stream conservation is in the Saco River Watershed 12.6% which includes the drainages of the Saco, Presumpscot/Sebago Lake, Mousam, and Salmon Falls Rivers.

River shoreline

Maine has nearly 6,000 miles of river shoreline. Land conservation of river shoreline is highest in eastern Maine coastal watersheds (34%) with lower levels of conservation on the shoreline of rivers in the Kennebec, Androscoggin and Saco watersheds (~12-14%).

Pond and lake shoreline

Maine has over 2,300 named freshwater lakes and ponds over 10 acres, and nearly 11,000 miles of pond and lake shoreline. Nearly 30% of Maine's pond and lake shoreline is in land conservation, proportionally greater than the area of conservation in Maine as a whole (~22%). Conservation is lowest on shorelines of lakes and ponds in the Saco River watershed (~10%). Alkaline and circumneutral ponds are very rare in Maine and support specialized habitat for several SGCN plant species. There is minimal conservation of alkaline and circumneutral ponds.

Maine has 584 heritage fish waters, ponds and lakes with among the best cold-water pond habitat in the state. Roughly 44% of heritage fish waters are completely conserved (shorelines with >90% conservation).

Terrestrial/freshwater wetlands

Habitat Condition and Trends

Conservation in southern Maine has focused on biodiversity values. Approximately 25% of the land area of Beginning with Habitat Focus Areas of Statewide Significance in southern Maine is protected by land conservation (compared to 7% of the ecoregions as a whole). Although Focus Areas only include 11% of the total land area of southern Maine, 37% of conserved lands are within Focus Areas of Statewide Significance.

A number of common and rare habitat types are well represented in conserved lands in southern Maine, including:

- Vernal pools and swamps
- Peatlands
- Tidal wetlands
- Pitch pine – scrub oak barrens and other Pitch pine habitats
- Atlantic white cedar swamps

High quality examples of most common forest types are poorly represented on conservation lands in southern Maine, especially in ecological reserves. Large blocks of common forest types (regardless of current condition) are also poorly represented in conservation lands in southern Maine, and especially in ecological reserves.

Conserved lands in northern Maine coincide overwhelmingly with biodiversity hotspots within the region. 58% of the land area within Beginning with Habitat Focus Areas of Statewide Significance in northern Maine is protected by

land conservation (compared to 26% of the ecoregions as a whole). However, recent conservation in northern Maine has focused on landscape scale projects at the township or multiple township level and has not targeted biodiversity hotspots.

Most low elevation forest habitats are under-represented in ecological reserves or similarly managed lands that are set aside from timber harvesting. Additions to ecological reserves in northern Maine that could address these gaps would include forested habitats of low elevation calcareous or moderately calcareous settings, such as northern hardwoods forest and northern white cedar swamp and other low elevation forested habitats including spruce fir flats in northeastern Maine or hemlock, oak and pine forests in the foothills of Maine's central and western mountains.

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Appendix A. Maine Aquatic Habitat Classification System (MAHCS) developed for the 2025 Wildlife Action Plan. [*WQ= Water Quality]

Macrogroup	Habitat System	Factor	Class	Condition	Data Source
Lotic	High Slope Headwater	Water Quality Class	Good	WQ* Class AA, A or B	DEP Water Quality classification
		Drainage Area	Headwater	<64.7497 km^2	NHD 1:24 k Hi Res dataset Calculated as total drainage area above ReachID
		Slope	High	Slope>=0.03	Slope recalculated after combining NHDPlusIDs at ReachID level. Rise/Run ((MaxElevSmo-MinElevSmo)/SumOfSlopeLen)
	Moderate Slope Headwater	Water Quality Class	Good	WQ* Class AA, A or B	DEP Water Quality classification
		Drainage Area	Headwater	<64.7497 km^2	NHD 1:24 k Hi Res dataset Calculated as total drainage area above ReachID
		Slope	Moderate	Slope >=0.01 And <0.03	Slope recalculated after combining NHDPlusIDs at ReachID level. Rise/Run ((MaxElevSmo-MinElevSmo)/SumOfSlopeLen)
	Low Slope Headwater	Water Quality Class	Good	WQ* Class AA, A or B	DEP Water Quality classification
		Drainage Area	Headwater	<64.7497 km^2	NHD 1:24 k Hi Res dataset Calculated as total drainage area above ReachID
		Slope	Low	Slope <0.01	Slope recalculated after combining NHDPlusIDs at ReachID level. Rise/Run ((MaxElevSmo-MinElevSmo)/SumOfSlopeLen)

Lotic (cont.)	**Cold Rivers**	Drainage Area	Small River, Medium River or Large River	Small River >=64.7497 and < 517.998 km^2, Medium River >=517.998 and < 7769.964 km^2, or Large River >=7769.964 km^2	NHD 1:24 k Hi Res dataset Calculated as total drainage area above ReachID
		Temperature	Cold	Cold <18 C	EcoSheds/USGS High Resolution data modeled mean July temperature based on Maine Stream Temperature Monitoring Network data 2000-2020 of NHDPlusIDs within a reachID
	Non-cold Large Rivers	Drainage Area	Large River	Large River >=7769.964 km^2	NHD 1:24 k Hi Res dataset Calculated as total drainage area above ReachID
		Temperature	Transitional or Warm	Transitional >=18 C and <22 C, Warm >22 C	EcoSheds/USGS High Resolution data modeled mean July temperature based on Maine Stream Temperature Monitoring Network data 2000-2020 of NHDPlusIDs within a reachID
	Transitional Small and Medium Rivers	Drainage Area	Small or Medium	Small River >=64.7497 and < 517.998 km^2, Medium River >=517.998 and < 7769.964 km^2	NHD 1:24 k Hi Res dataset Calculated as total drainage area above ReachID
		Temperature	Transitional	Transitional >=18 C and <22 C	EcoSheds/USGS High Resolution data modeled mean July temperature based on Maine Stream Temperature Monitoring Network data 2000-2020 of NHDPlusIDs within a reachID

Lotic (cont.)	**Warm Small and Medium Rivers**	Drainage Area	Small or Medium	Small River >=64.7497 and < 517.998 km^2, Medium River >=517.998 and < 7769.964 km^2	NHD 1:24 k Hi Res dataset Calculated as total drainage area above ReachID
		Temperature	Warm	Warm >22 C	EcoSheds/USGS High Resolution data modeled mean July temperature based on Maine Stream Temperature Monitoring Network data 2000-2020 of NHDPlusIDs within a reachID
	Unknown Thermal Regime Small and Medium Rivers	Drainage Area	Small or Medium	Small River >=64.7497 and < 517.998 km^2, Medium River >=517.998 and < 7769.964 km^2	NHD 1:24 k Hi Res dataset Calculated as total drainage area above ReachID
		Temperature	Unclassified	No Data	EcoSheds/USGS High Resolution data modeled mean July temperature based on Maine Stream Temperature Monitoring Network data 2000-2020 of NHDPlusIDs within a reachID
	Compromised Water Quality	Water Quality Class	Fair or Impaired	Fair = WQ Class C or attaining Class C as determined by DEP, Impaired = streams identified by DEP as non-attainment of WQ class that limits aquatic life	Impaired = as defined and reviewed by DEP personel as areas where water quality class is Impaired or not attained due to factors that limit aquatic life

Lentic	**High Elevation Lakes and Ponds**	Elevation	High	High >=600 m	Highest point of lakes perimeter in meters from 10m DEM
	Fishless Lakes and Ponds	NoFish	NoFish	Lakes identified as fishless through previous efforts and referencing current stocking history and species inventory data	IFW, Academic survey records
	Ponds (<10 acres)	Size Class	Pond	Pond <10 acres	Geodesic Acreage calculation
	Deep Littoral and Mixed Habitat Lakes	Size Class	Small, Medium, Large, or Very Large Lakes	Small Lake >=10 and <100 acres, Medium Lake >=100 and <1000 acres, Large Lake>=1000 and <10000 acres, Very Large Lake >=<10000 acres	Geodesic Acreage calculation
		Depth Class	Deep	Deep >= 10m	Maximum depth in meters; if not availble from bathymetric data (MaxDepthBath) then Lake Survey Data (MAXDEPTH; converted from feet to meters)

Lentic (cont.)		Dominant Habitat Class	Mixed or Littoral	Mixed >=9.6 & <17.4, Littoral >17.4	Perimeter/(Acreage*0.00404686) for a measurement of complexity using km and km^2
	Deep Pelagic Lakes	Size Class	Small, Medium, Large, or Very Large Lakes	Small Lake >=10 and <100 acres, Medium Lake >=100 and <1000 acres, Large Lake >=1000 and <10000 acres, Very Large Lake >=<10000 acres	Geodesic Acreage calculation
		Depth Class	Deep	Deep >= 10m	Maximum depth in meters; if not availble from bathymetric data (MaxDepthBath) then Lake Survey Data (MAXDEPTH; converted from feet to meters)
		Dominant Habitat Class	Pelagic	Pelagic <9.6	Perimeter/(Acreage*0.00404686) for a measurement of complexity using km and km^2
	Shallow and Intermediate Depth Littoral Lakes	Size Class	Small, Medium, Large, or Very Large Lakes	Small Lake >=10 and <100 acres, Medium Lake >=100 and <1000 acres, Large Lake >=1000 and <10000 acres, Very Large Lake >=<10000 acres	Geodesic Acreage calculation
		Depth Class	Shallow and Intermediate	Shallow < 5m, Intermediate >=5 and <10	Maximum depth in meters; if not availble from bathymetric data (MaxDepthBath) then Lake Survey Data (MAXDEPTH; converted from feet to meters)

Lentic (cont.)		Dominant Habitat Class	Littoral	Littoral >17.4	Perimeter/(Acreage*0.00404686) for a measurement of complexity using km and km^2
	Shallow and Intermediate Depth Mixed Habitat Lakes	Size Class	Small, Medium, Large, or Very Large Lakes	Small Lake >=10 and <100 acres, Medium Lake >=100 and <1000 acres, Large Lake >=1000 and <10000 acres, Very Large Lake >=<10000 acres	Geodesic Acreage calculation
		Depth Class	Shallow and Intermediate	Shallow < 5m, Intermediate >=5 and <10	Maximum depth in meters; if not availble from bathymetric data (MaxDepthBath) then Lake Survey Data (MAXDEPTH; converted from feet to meters)
		Dominant Habitat Class	Mixed	Mixed >=9.6 & <17.4	Perimeter/(Acreage*0.00404686) for a measurement of complexity using km and km^2
	Shallow and Intermediate Depth Pelagic Lakes	Size Class	Small, Medium, Large, or Very Large Lakes	Small Lake >=10 and <100 acres, Medium Lake >=100 and <1000 acres, Large Lake >=1000 and <10000 acres, Very Large Lake >=<10000 acres	Geodesic Acreage calculation

Lentic (cont.)		Depth Class	Shallow and Intermediate	Shallow < 5m, Intermediate >=5 and <10	Maximum depth in meters; if not availble from bathymetric data (MaxDepthBath) then Lake Survey Data (MAXDEPTH; converted from feet to meters)
		Dominant Habitat Class	Pelagic	Pelagic <9.6	Perimeter/(Acreage*0.00404686) for a measurement of complexity using km and km^2
	Compromised Water Quality Lakes	Water Quality	Impaired	Identified by DEP as non-attainment of WQ that limits aquatic life	Impaired = as defined and reviewed by DEP personel as areas where water quality is Impaired or not attained due to factors that limit aquatic life
	Lakes without Depth Data	Size Class	Small, Medium, Large, or Very Large Lakes	Small Lake >=10 and <100 acres, Medium Lake >=100 and <1000 acres, Large Lake >=1000 and <10000 acres, Very Large Lake >=<10000 acres	Geodesic Acreage calculation
		Depth Class	Unclassified	No Data	Maximum depth in meters; if not availble from bathymetric data (MaxDepthBath) then Lake Survey Data (MAXDEPTH; converted from feet to meters)