

MAINE'S WILDLIFE ACTION PLAN

Element 1: Maine's Fish and Wildlife

MDIFW LOGO

MDMR LOGO

MDACF LOGO

ELEMENT 1: Table of Contents

1.1 Abstract 1

1.2 Introduction 1

1.3 An Overview of Maine’s Fauna and SGCN 2

Terrestrial and Freshwater Species (MDIFW jurisdiction)..... 3

1.3.1 Mammals..... 4

1.3.2 Birds 5

1.3.3 Reptiles and amphibians 8

1.3.4 Fish 9

1.3.5 Invertebrates..... 10

Marine Fauna (MDMR jurisdiction)..... 13

1.3.6 Marine fauna..... 13

1.4 Distribution of Maine’s SGCN and associated habitats 15

1.4.1 Methodology for mapping Element 1 – SGCN distributions..... 16

1.4.2 Methodology for mapping Element 2 – habitat distributions 17

1.4.3 Species conservation range maps..... 18

1.4.4 SGCN distribution synthesis 18

1.5 Criteria to identify Maine’s SGCN 22

1.5.1 Priority 1 (highest priority) SGCN 22

1.5.2 Priority 2 (high priority) SGCN 23

1.5.3 Priority 3 (moderate priority) SGCN 24

1.6 Maine’s 2015 SGCN..... 27

1.7 Literature Cited..... 57

ELEMENT 1: List of Figures

Figure 1-1. Examples of conservation range maps by USGS sub-watersheds for aquatic SGCN and by Maine townships for terrestrial SGCN..... 19

Figure 1-2. Examples of SGCN summaries by taxa class and habitat associations for USGS sub-watersheds and by Maine townships..... 21

ELEMENT 1: List of Tables

Table 1-1. Diversity of fauna, SGCN, and E/T listings in Maine by major taxa groups 3

Table 1-2. Vulnerability concepts and criteria for selecting Maine SGCN..... 27

Table 1-3. Maine’s 2015 SGCN and scale of conservation concerns..... 32

ELEMENT 1: List of Abbreviations and Acronyms

ESA	U.S. Endangered Species Act
E/T	Endangered and/or Threatened
MDACF	Maine Department of Agriculture, Conservation and Forestry
MDIFW	Maine Department of Inland Fisheries and Wildlife
MDMR	Maine Department of Marine Resources
MESA	Maine Endangered Species Act
NMFS	National Marine Fisheries Service
SC	Special Concern
SGCN	Species of Greatest Conservation Need
SoC	Species of Concern
SWG	State Wildlife Grants
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WNS	White-nose syndrome

ELEMENT 1: List of Appendices

Appendix 1-1. Maine’s list of state-designated endangered / threatened plants administered by MNAP 58

Appendix 1-2. Maine’s list of state-designated endangered / threatened inland fish and wildlife administered by MDIFW 60

Appendix 1-3. Maine’s list of state-designated endangered / threatened marine fauna (except birds) administered by MDMR 62

Appendix 1-4. Maine’s list of federally designated endangered / threatened species administered by USFWS / NMFS) 63

Appendix 1-5. SGCN previously recognized in Maine that are removed from the 2015 Wildlife Action Plan. 64

The Legislature finds that various species of fish and wildlife have been and are in danger of being rendered extinct within the state of Maine, and that these species are of esthetic, ecological, educational, historical, recreational and scientific value to the people of the State. The Legislature, therefore, declares that it is the policy of the State to conserve, by according such protection as is necessary to maintain and enhance their numbers, all species of fish or wildlife found in the State, as well as the ecosystems upon which they depend.

107th Maine Legislature, 1975: preface to Maine's Endangered Species Act (MESA)

1.1 ABSTRACT

A critical dilemma facing conservation biologists and managers worldwide is the need to allocate limited dollars, staff, and programmatic resources toward an ever-growing list of conservation challenges. Foundational to this prioritization process in Maine's State Wildlife Action Plan is the development of a list of species of greatest conservation need (SGCN). Biologists from Maine Department of Inland Fisheries and Wildlife (MDIFW) and Maine Department of Marine Resources (MDMR), with cooperation from conservation partners and species experts, developed a suite of objective criteria for designating SGCN that is intended to be transparent and science-based, and recognizes that species conservation concerns can be identified at global, regional, and local scales. The primary themes for SGCN prioritization include risk of extirpation, population trend, endemism, and regional conservation concerns. Secondary themes for SGCN prioritization include climate change vulnerability, survey knowledge, and indigenous cultural significance. Maine's 2005 list of SGCN totaled 213 species grouped into two priority levels. To help further advance the challenge of species prioritization, Maine's 2015 list of 376 SGCN are assigned to three species priority levels: Priority 1 (Highest; 58 SGCN), Priority 2 (High; 131 SGCN), and Priority 3 (Moderate; 187 SGCN), all of which are eligible for State Wildlife Grant (SWG) assistance from the U.S. Fish and Wildlife Service. The 2015 process for reviewing and identifying Maine SGCN included both species deletions (34) and additions (197) to the 2005 list. The net increase in SGCN is driven primarily from a) additional conservation science designation criteria, b) scrutiny of more invertebrate taxa, c) significantly greater attention to marine fauna in the Gulf of Maine, and d) more explicit recognition of climate change vulnerability. It is our hope that identifying a relatively comprehensive, prioritized suite of SGCN will help MDIFW, MDMR, and conservation partners implement meaningful conservation actions for some of Maine's most vulnerable and valued wildlife resources over the coming decade.

1.2 INTRODUCTION

Agencies and conservation partners have long faced the dilemma of allocating limited funds to address the critical needs of species designated as Endangered or Threatened (E/T). The much larger number of vulnerable species at risk of being listed E/T is even more problematic. The Conservation and Reinvestment Act in the U.S. (2001) and a similar Species at Risk Act in Canada (2002) emphasize the role and established funding for states and provinces to address an array of biodiversity risks within their borders beyond a focus on E/T species. Conservation challenges solved at these local and regional scales are less likely to escalate into national or

international crises. Additional benefits of working proactively with locally or regionally vulnerable species include a greater likelihood of success and minimal reliance on regulations.

An approved State Wildlife Action Plan is a requisite for receipt of federal SWG funding. The primary targets of these plans are SGCN populations and habitats. Each state has considerable flexibility for SGCN designations and resulting SWG expenditures, though there is foundational guidance offered in the Wildlife Conservation and Restoration Act that SWG funds are intended "...for the benefit of a diverse array of wildlife and associated habitats, including species that are not hunted or fished, to fulfill unmet needs of wildlife within the States." Maine's 2015 Plan relies on objective criteria to identify and prioritize SGCN. Specifically, MDIFW and Plan partners emphasize the following five general concepts for SGCN eligibility:

- 1) **Acute Vulnerability:** State, federal or international agencies formally designate the risk of species extirpation. We also acknowledge those species experiencing recent, dramatic population declines and likely to be listed E/T in the near future.
- 2) **Regional Conservation Priority:** One or more scientific partners have identified the species as a high regional concern in the Northeast. We include regional endemics and species with disproportionate range occurrences in Maine or neighboring states / provinces.
- 3) **Data Deficient:** Some understudied taxa require further survey and research to accurately determine conservation status.
- 4) **Climate Change Sensitivity:** Northeastern climate change projections indicate a species will face significant risks in the near future.
- 5) **Cultural Significance:** Maine tribes identified some SGCN based on special values to tribal heritage in combination with emerging ecological vulnerabilities.

Some states develop Wildlife Action Plans that reflect the scope of the jurisdiction in the wildlife agency that legally administers SWG allocations to states. Maine's 2015 Plan includes other natural resource agencies. MDIFW is the lead agency for any terrestrial or freshwater wildlife species (including all birds). MDMR has primary authority for all fauna (except birds) in coastal waters. The Maine Coastal Program in the state's Department of Agriculture, Conservation and Forestry (MDACF) also considers conservation issues in the Gulf of Maine. The Maine Natural Areas Program in MDACF has sole responsibility for rare plants. While flora are not directly eligible for SWG funds in Maine's 2015 Plan, Maine's Endangered and Threatened Plants (Appendix 1-1) are considered in the Plan's habitat-based conservation strategies. Finally, we acknowledge that participation by Maine's diverse alliance of conservation partners (private, public and tribal) is essential to effective Plan implementation.

1.3 AN OVERVIEW OF MAINE'S FAUNA AND SGCN

The diversity and health of Maine's natural resources is a priority for both residents and visitors. Maine's varied landscape, rural character, and traditional resource-based economy heighten public familiarity and appreciation for fish and wildlife. Regular exposure to fauna in the everyday livelihoods of most Maine citizens reinforces concern for the state's natural heritage generally, and species-at-risk in particular.

The variety of wildlife is also key to the allure because Maine is a mixing zone of northern species allied with boreal systems prevalent in neighboring Canada that yield to southern species typical of Appalachian habitats that predominate further south in New England and

beyond. Examples of northern fauna include Canada Lynx (*Lynx canadensis*), Arctic Charr (*Salvelinus alpinus*), Mink Frog (*Lithobates septentrionalis*) and Atlantic Puffin (*Fratercula arctica*); all approach southernmost range limits in the state. Southern fauna that are near the northern edge of their range in Maine include New England Cottontail (*Sylvilagus transitionalis*), Roseate Tern (*Sterna dougalli*), Black Racer (*Coluber constrictor*), Loggerhead Sea Turtle (*Caretta caretta*) and Monarch Butterfly (*Danaus plexippus*).

The composition of Maine's animal and plant communities shifts considerably from south-to-north, in both terrestrial and aquatic habitats. Woodlands encompass nearly 85% of Maine's land area, but forests vary from deciduous and mixed forests prevalent in southern, western and central Maine to boreal conifers in northern and eastern regions or at higher elevations. Faunal associations shift accordingly as well. Surface waters cover almost 13% of the State and also offer diverse environments. Predominantly cool / cold lakes, rivers and streams yield to warmer waters in southwestern Maine. Maine's intricate coastline totals almost 3,500 miles, and the Gulf of Maine itself transitions into cooler waters along a west-to-east gradient proportionally to the extent of tidal mixing with the North Atlantic's Labrador Current.

Not surprisingly, our knowledge of Maine fauna has limitations. For example, many invertebrate taxa are not yet considered, let alone proportionately represented among Maine's SGCN. Nevertheless, Maine's 2015 Plan identifies 376 SGCN spanning 39 orders of vertebrates and 28 orders of invertebrates. A compilation by major taxa groups (Table 1-1) reveals both the sheer number and diversity of SGCN at present in Maine.

Table 1-1. Diversity of fauna, E/T listings and SGCN in Maine by major taxa groups.

Taxa Class Order	# Species			
	extant in Maine	federal E/T (ESA)	state E/T (MESA)	SGCN in 2015 Plan
Invertebrates ¹	>34,000	0	20	167
freshwater / terrestrial	>16,000	0	20	134
marine	>18,000	0	0	33
Vertebrates	840	18	40	209
Amphibians	18	0	0	4
Birds	423	3	20	129
Fish	291	3	3	43
freshwater	39	0	2	15
marine / diadromous	252	3	1	28
Mammals	85	8	10	22
marine	24	6	5	7
terrestrial	61	2	5	15
Reptiles	23	4	7	11
freshwater / terrestrial	17	0	4	7
marine	6	4	3	4
MAINE FAUNA TOTALS	>34,840	18	60	376

¹Total includes only described species; the actual number is much greater.

Sixty (16%) SGCN in Maine are state-listed E/T species (Appendices 1-2 and 1-3). Only 18 SGCN (<5%) are federally-listed as E/T (Appendix 1-4). Thus, the vast majority of Maine's SGCN, while characterized by distinct biological sensitivities, are not on the brink of extirpation or ecological crisis. This provides a strategic opportunity for MDIFW, MDMR, and a coalition of conservation partners to implement meaningful conservation interventions for some of Maine's most vulnerable and valued wildlife populations in advance of the necessity for ESA listings and regulatory implications.

1.3.1 MAMMALS (NON-MARINE)

General Overview

Maine's 61 species of non-marine mammals may be best characterized as a diverse mixture of boreal and temperate species. Maine encompasses three ecoregional provinces (Warm Continental Mountains, Warm Continental Division, and the Hot Continental Division) and is near the Subarctic Division in Canada. Maine's proximity to the Subarctic Division enables species, such as the Canada Lynx, that are typically found in boreal forests of Canada, to thrive in the mixed coniferous forests of northern Maine. Similarly, the Hot Continental Division's climate helps make it possible for species such as the New England Cottontail to persist at the northern extent of their range in southern Maine. While Maine's proximity to boreal and temperate regions may contribute to the diversity of mammals found in the state, this same proximity also raises a number of challenges for species that live near the edge of their range. Species on the southern edge of their range, like American Marten (*Martes americana*) and Canada Lynx may compete for resources with species more common to the south, such as Fisher (*Martes pennanti*) and Bobcat (*Lynx rufus*). Although we cannot say for certain how mammals in Maine will be affected by climate change, it will likely be the species at the edge of their range that will experience the greatest change.

Conservation Overview

The species comprising Maine's native mammals have remained fairly constant over the last 100 years, since extinction of the Sea Mink (*Mustela macrodon*) and Eastern Cougar (*Felis concolor*) as well as extirpation of Caribou (*Rangifer tarandus*) and Gray Wolf (*Canis lupus*). Today, Maine's mammals receive greater protection through regulatory measures and the conservation efforts carried out by MDIFW and a host of dedicated conservation partners.

Notwithstanding these conservation efforts, Maine mammals face a variety of challenges and threats. A total of 15 species (25%) of Maine's mammalian species are listed as SGCN in this Plan. Although Moose (*Alces alces*) and Muskrat (*Ondatra zibethicus*) are numerous in Maine, they were listed as SGCN because of their cultural significance to native tribes and recent changes in the populations of these species in the Northeast and elsewhere. The factors behind these changes are still under investigation.

Bats, as an order, perhaps face the most unified set of conservation threats. White-nose syndrome (WNS), a deadly fungal disease, has drastically reduced populations of *Myotis* spp. Because of this disease, Little Brown Bats (*Myotis lucifugus*) and Northern Long-eared Bats (*Myotis septentrionalis*) were state-listed as Endangered in 2015, and the Eastern Small-footed Bat (*Myotis leibii*) was newly state-listed as Threatened. These bat populations are not only threatened by WNS in Maine but throughout most of their U.S. range. Although WNS has primarily affected *Myotis* spp., Tri-colored Bats (*Perimyotis subflavus*) and Big Brown Bats (*Eptesicus fuscus*) are also affected. The impact of WNS on Maine's bat populations has

heightened concerns over the effects of other mortality factors, such as wind turbines, and the vulnerability of maternity colonies to disturbance. Our lack of knowledge about the habits of bats in Maine also poses a significant threat to the species. It is difficult to undertake effective conservation actions if we do not understand many of the basic habits of bats. In addition to the three bat species that have recently been listed E/T under MESA, Maine's five other species of bats are all considered species of Special Concern and/or SGCN.

The availability and structure of forest seral stages in Maine is a major factor determining the abundance of Maine's mammals. In southern Maine, the loss of early successional habitat through forest maturation and development has resulted in a 75% to 80% decline of suitable habitat for New England Cottontail. In York County, only 3% of the landscape can be characterized as early successional forest habitat. The lack of shrublands and young forests in southern Maine has not only endangered the New England Cottontail, but also poses a threat to several SGCN birds associated with scrub-shrub habitat. Conversely, in northern Maine, less than 3% of the landscape remains as ecologically mature forest that is suitable for deer wintering areas. This not only impacts Maine's White-tailed Deer (*Odocoileus virginianus*) but other mammals (e.g., American Marten, *Martes americana*) and birds that are dependent on mature interior forests. Unlike the interior boreal forests of Canada and Alaska, where natural wildfires play a major role in determining the pace of forest succession, commercial logging operations and market forces are major factors influencing the composition and structure of Maine's northern forests.

1.3.2 BIRDS

General Overview

Birds enrich our lives and reflect the quality and health of our environment. North America provides habitat for over 900 species of birds. The Maine Bird Records Committee considers 423 bird species (nearly half of all North American birds) to be positively documented within the state of Maine. Maine's diverse mosaic of habitats supports 225 species of nesting birds. Nearly 200 others visit Maine as either fall / spring migrants or winter residents.

Maine's landscape is used by at least 29 inland species that reach the northern limits of their breeding distribution in Maine, and 28 species reside here at their southern limits. In addition, many of Maine's island-nesting seabirds reach their southern breeding terminus on Maine's coastal islands. Several other species have expanded their breeding ranges into Maine over the past century. New arrivals include the Sandhill Crane (*Grus canadensis*) and most recently, the Eastern Screech Owl (*Megascops asio*). Two species, the Peregrine Falcon (*Falco peregrinus*) and the Wild Turkey (*Meleagris gallopavo*) have been reintroduced into Maine following prolonged extirpation. Both are now carefully monitored and managed.

Maine is strategically located at a constriction point of the funnel in the Atlantic Flyway, a migratory path along eastern North America that tapers from a wide swath over the eastern Canadian arctic southward along the east coast. The Atlantic Ocean has a channeling effect on these migratory movements as birds fly south in late-summer and fall. In addition, Maine's vast coastline and more than 4,000 coastal islands provide important stopover areas for millions of migrating birds. This flyway includes some of the continent's most productive ecosystems and is home to about a third of the U.S. human population. Conserving birds and their habitats in Maine's portion of this important flyway is a monumental task.

Conservation Overview

All of Maine's bird guilds are represented on Maine's official E/T List or the List of Species of Special Concern (SC). The latter is an administrative list of species that could become E/T without attention. The challenges for future conservation and stewardship are many. At least five bird species are documented as extinct or extirpated from Maine, emphasizing the importance of preventing any more erosion of the state's avian biodiversity. Among 423 birds documented in Maine, eleven are listed as state Endangered, nine are listed as state Threatened, and 129 are listed SC and/or SGCN. Thus, we have conservation concerns for 35% of the bird species known to inhabit Maine. Most attention is devoted to birds that breed, nest and raise their young in Maine. However two waterfowl, the Barrow's Goldeneye (*Bucephala islandica*) and Harlequin Duck (*Histrionicus histrionicus*), are state-listed as Threatened and winter in significant numbers in coastal Maine. Since a large percentage of the North Atlantic populations of these species winter here, Maine has a high regional management responsibility for these two waterfowl species.

Threats to bird populations are many and conservation challenges are equally diverse. Managers are tasked with protecting small numbers of ground-nesting Least Terns (*Calidris minutilla*) and Piping Plovers (*Charadrius melodus*) that struggle to co-habit southern Maine's sand beaches with tens of thousands of recreational users. Maine forest birds and many species of wetland birds may be faring well recently, but they too are threatened by cumulative impacts of development, habitat fragmentation, intensive forest practices, invasive species and various forest pests and diseases. While these species face numerous threats, vast areas of forest in Maine remain intact, presenting opportunities for large-scale conservation.

Songbirds are well represented in Maine given our diverse landscape. Because the state is so heavily forested, most forest-dwelling Passerines are doing well with only a few "vulnerable" exceptions for specialists such as Bicknell's Thrush (*Catharus bicknelli*). Abundance of some forest birds follows periodic boom and bust insect outbreaks. For example, Tennessee Warbler (*Oreothlypis peregrina*) and Evening Grosbeak (*Coccothraustes vespertinus*) peak during epidemics of Spruce Budworm (*Choristoneura fumiferana*). Overall, the health of Maine's forest songbirds is good, and their consideration as SGCN stems largely from disproportionate rangewide responsibility for them in Maine.

Grassland birds, in contrast, have struggled to maintain populations in Maine. Grasshopper Sparrows (*Ammodramus savannarum*) continue to occupy just a few sites in southern Maine, and Eastern Meadowlark (*Sturnella magna*) populations continue a long-term decline. Leading the declines however, are the aerial insectivores, mostly swallows, that by any measure are in rapid decline. Even populations of the widespread, locally abundant Tree Swallow (*Tachycineta bicolor*) have steadily declined over the last decade. Although causes remain speculative, most of these species are considered SGCN based on steep population declines.

In general, raptor populations have also fared well in Maine since the use of certain harmful pesticides were banned. Following years of intensive management to protect nests, Bald Eagles (*Haliaeetus leucocephalus*) were delisted in 2009 and populations continue to grow statewide. At a larger scale, threats to Maine's raptors can be better addressed by an improved understanding of habitat loss, changes in population status, disturbance during nesting, and exposure to environmental toxins. Habitat loss includes succession (e.g., grassland to forest), development, fragmentation, and alteration that lead to both direct and indirect effects. Collection of population survey data, potentially through citizen scientist initiatives, will greatly improve data deficiencies. Limiting disturbance from recreation and development provides additional protection during critical nesting periods. Documenting the status and implications of

toxins such as lead, pesticides, rodenticides, mercury, and PBDE, and promoting ways to limit exposure, is a priority for priority SGCN raptors.

Seabirds and salt marsh dependent birds face threats from pollution, over-fishing of important food items, and warming sea temperatures and rising sea levels caused by climate change. Rare seabirds and certain colonial waterbird populations remain vulnerable as high percentages of their statewide nesting populations occur on a just a handful of managed sites. The maintenance and enhancement of populations of focal species will require careful monitoring of breeding populations and management that addresses threats including: predation from gulls, habitat loss, changes in food availability in the Gulf of Maine, oil spills, incidental take during commercial fishing, and limiting human disturbance around breeding colonies.

Maine's numerous wetlands and riparian areas are critical to a large percentage of Maine birds, including shorebirds, wading birds, and waterfowl. Poorly planned development that is too close to wetlands put ecological functions at risk and lead to general habitat degradation, lower productivity, and eventual loss of birds. While the rate at which wetlands are lost has slowed since the 1980s, some of Maine's marsh birds (e.g., rails and bitterns) have become increasingly rare for unknown reasons. With rarity comes increased vulnerability to all stressors such as flooding associated with severe weather due to climate change; displacement of native vegetation by invasive species, human disturbance through recreation and development; and water regime changes at managed wetlands. Colonial wading birds such as Great Blue Herons (*Ardea herodias*) and Black-crowned Night Herons (*Nycticorax nycticorax*) have declined along the coast for unknown reasons; however disturbance, predators, and changes in food resources are all suspected. Continued surveys and monitoring are needed to shed light on the complex interspecific interactions as well as how species respond to changes in their local environment.

And finally, shorebirds that rely on coastal habitats for feeding and roosting during migration are negatively influenced by declining food resources and human disturbance. Recent data suggest that several Atlantic Flyway shorebird species have experienced declines of between 50% and 90% within the last three decades. Shorebird experts throughout the U.S. and Canada agree that the primary reason for shorebird declines is habitat loss from coastal development and human related disturbances. Thirty-eight shorebird species spend some portion of their annual life cycle in Maine including the federally listed Piping Plover and Red Knot (*Calidris canutus rufa*). Shorebirds are an important group for management consideration because large numbers of these birds concentrate in discrete areas of coastal habitat where they are highly susceptible to disturbance, habitat loss, and environmental contaminants. Conservation requires attention to these cumulative impacts.

Maine's diverse and abundant bird resource, like other wildlife species, face many natural challenges including starvation, predation, and severe weather. But the major threat for Maine birds remains habitat loss. Well-designed biological monitoring of Maine's bird resource is required to guide conservation strategies for priority birds. Conserving high value habitats and directing disturbance activities away from the most sensitive habitats will go a long way in ensuring a viable future for Maine birds and the people of Maine who enjoy watching them.

1.3.3 REPTILES AND AMPHIBIANS

General Overview

By eastern U.S. standards, Maine is a large and climatically diverse state. Thus, while North American reptiles and amphibians (herpetofauna) are richest at southern latitudes, Maine's relatively moderate southern and coastal climate permits a large number of species, especially snakes and turtles, to reach their northeastern range limit in the state. Only one species, the Mink Frog (*Rana septentrionalis*), reaches the southern edge of its range in Maine (and northern New Hampshire and Vermont). There are 36 species of herpetofauna known from Maine, including 18 amphibians and 18 reptiles, one of which is considered extirpated (Timber Rattlesnake, *Crotalus horridus*). Two others are introduced: a salamander (Mudpuppy, *Necturus maculosus*) and a turtle (Red-eared Slider, *Trachemys scripta elegans*). While Maine has a lower diversity of reptiles and amphibians than most eastern states, it provides some of the most extensive and intact remaining habitat for the species it hosts. Several are of regional and national conservation concern.

Conservation Overview

Reptiles and amphibians are two of the most imperiled vertebrate taxa worldwide, and this pattern of endangerment is also reflected in the status of Maine's fauna where a relatively large proportion of native reptile and amphibian species (33%) are listed as state Endangered or Threatened (four species), Special Concern (six species), Extirpated (one species), and/or SGCN (one additional species). This is in part due to the biogeography described above, whereby the area of greatest diversity, southern and coastal Maine, is also the most densely human populated with associated high rates of development, habitat loss and fragmentation, road mortality, predation, pollution, and illegal collection. The effect of climate change on the status of Maine's herpetofauna is uncertain, but given the group's limited dispersal capability and sensitivity to temperature and humidity gradients it is safe to expect significant changes in local distribution and abundance.

Reptiles (Snakes and Turtles)

Among Maine's vertebrates, reptiles are arguably the most imperiled, with eight of the state's native 17 species (47%) listed as Endangered, Threatened, Special Concern, Extirpated, and/or SGCN. The rarity of many of the state's snakes and turtles is partially attributed to the fact that nearly all reach or approach the northern edge of their range in Maine, but population viability for several species is further stressed by anthropogenic factors including most notably habitat loss, road kill, nest and hatchling loss to human-subsidized predators, and illegal collection. The globally rare and declining Wood Turtle (*Glyptemys insculpta*) is patchily distributed throughout the state, but the fate of Maine's other imperiled reptiles will likely be determined in just a few southern counties where the challenge is to conserve remaining high quality occurrences in a relatively densely human populated landscape.

Amphibians (Frogs, Toads and Salamanders)

Four of Maine's 18 amphibian species are listed as Special Concern and/or SGCN. As a group, Maine's amphibians are relatively secure compared to its reptiles, likely because of their greater fecundity, higher densities, lower sensitivity to adult mortality factors, and generally wider range distribution across the state. Two of Maine's salamanders are listed as SGCN largely because of their close breeding association with a specialized aquatic habitat that is vulnerable to loss and degradation – headwater streams (Spring Salamander; *Gyrinophilus porphyriticus*) and vernal pools (Blue-spotted Salamander; *Ambystoma laterale*).

1.3.4 FRESHWATER (NON-DIADROMOUS) FISH

General Overview

Maine's freshwaters host a variety of fishes including 39 native freshwater obligate species (live their entire lives in freshwater habitats) and 12 diadromous species that live part of their life in freshwaters. A significant proportion of fish fauna (diadromous or obligate freshwater species) that occur in Maine's inland waters is non-native: 19 species (27%). We include two whose exact status needs to be confirmed: Banded Sunfish (*Enneacanthus obesus*) and Emerald Shiner (*Notropis atherinoides*). As with other fauna, Maine sits at a biogeographic transition zone with some native fishes occurring at the northernmost extent of their natural distribution such as Redfin Pickerel (*Esox americanus americanus*), Swamp Darter (*Etheostoma fusiforme*) and American Brook Lamprey (*Lethenteron appendix*). Others are at the southern end of their range, like Brook Stickleback (*Culaea inconstans*), Lake Whitefish (*Coregonus clupeaformis*) and Lake Trout (*Salvelinus namaycush*). In addition, Maine maintains the only remaining U.S. populations of a regional endemic freshwater fish, a landlocked subspecies of Arctic Charr.

Conservation Overview

Freshwater and diadromous fishes of North America are among the most threatened taxonomic groups. The American Fisheries Society reports that approximately 39% of all described species are considered imperiled (Jelks et al. 2008). Five Maine species are E/T listed under either state (MESA) or federal law (ESA). Moreover, 51% (26/51) of Maine's native freshwater and diadromous fishes are listed as SGCN. Most fish require clean, clear waters and all are naturally restricted to movements within aquatic habitats. Hence their survival, reproduction, movement and dispersal capabilities are compromised by natural landscape features (ex. waterfalls, watershed divides) as well as anthropogenic infrastructure (e.g., dams, road/stream crossings, developed shorelines). In addition, Maine's native freshwater fishes are adapted to relative depauperate fish community conditions. Hence, many of Maine's native fishes compete poorly with the on-going invasions of non-native species whose presence can have potentially strong effects on local distribution and abundance.

Inland Coldwater Fishes (Salmon, Trout, Charr, Smelt and Whitefishes)

By physiological limitations, Maine's native salmonid fishes are at or near their southerly range extent and all seven native species have some level of conservation concern. Atlantic salmon (*Salmo salar*) are federally listed as Endangered in Maine. Arctic Charr, Lake Whitefish, and anadromous populations of Brook Trout (*Salvelinus fontinalis*) are designated as Special Concern and all, including Lake Trout, Round Whitefish (*Prosopium cylindraceum*) and anadromous Rainbow Smelt (*Osmerus mordax*) are SGCN. In addition to threats associated with water quality and impediments to dispersal and migration, coldwater fishes are likely to be significantly affected by climate change in Maine.

Rare Native Fishes (Minnows and others)

Redfin Pickerel and Swamp Darter are state-listed as Endangered and Threatened respectively. Both species occur at the northern extent of their natural range in Maine where they have highly restricted distributions and are subject to water quality degradation and overall habitat loss. Most other rare native fishes in Maine are listed as SGCN (10 species) because of a general lack of knowledge regarding their current abundance, population trend and distribution. Their habitat and ecological requirements are diverse. However identifying true threats is difficult at this time without a better understanding of their current status.

1.3.5 INLAND AND FRESHWATER INVERTEBRATES

As is true globally, invertebrates dominate Maine's biota, both in terms of richness and biomass. Based on available data, Gawler et al. (1996) conservatively estimated that Maine hosts a total of 15,000 non-marine invertebrate species, or nearly 98% of the state's animal species diversity. Like most other states, Maine's legal definition of "wildlife" (any species of the animal kingdom) includes invertebrates, thus challenging MDIFW and cooperators with a tremendous breadth and volume of species to protect and manage (McCollough 1997). One of the ways MDIFW triages its limited staff and program resources toward the conservation and management of invertebrates is to focus on those species and groups that are better-studied and with well documented declines or imperilment.

The best-studied phyla in Maine, as in most states, are the Mollusca (e.g. snails and mussels; ~200 species) and Arthropoda (e.g., insects, crustaceans, spiders; ~7,950 species). These two groups include all of the non-marine invertebrate species considered in the SWAP. Within these phyla, the state of knowledge on distribution, status, and life history is strongest for just three orders: the Unionoida (freshwater mussels), Odonata (damselflies and dragonflies), and Lepidoptera (butterflies and moths), or what some have referred to as the "charismatic microfauna." Accordingly, a large proportion (66%) of the priority invertebrate species determined to be SGCN are represented by members of these same groups (freshwater mussels – 6 species; Odonates – 36 species; and Lepidoptera – 47 species). Other invertebrate taxa also considered in the SWAP because of partial, but growing, knowledge include Gastropoda (snails; 8 species), Plecoptera (stoneflies; 3 species), Trichoptera (caddisflies; 4 species), Ephemeroptera (mayflies; 15 species), Hymenoptera (bumble bees; 10 species), Coleoptera (beetles; 4 species), and Decapoda (crayfish; 1 species).

Conservation Overview

Maine was one of the last states in New England to officially include invertebrates among its state-listed E/T species in 1997, but there have since been considerable efforts to improve our knowledge of the targeted groups highlighted above. As such, Maine has now assigned official conservation status to a total of 134 invertebrate species, including 20 species as /T, 78 species as SC, and 36 additional fauna as SGCN. Still, the list of Maine invertebrates of conservation concern remains very low as a proportion of the state's estimated non-marine species richness (<0.01%). It should be noted this is primarily because of a lack of knowledge, and not because invertebrates as a group are inherently more abundant or secure in Maine, as illustrated by the fact that over half (8 of 15 species) of all documented state wildlife extinctions and extirpations are comprised of invertebrates (Coleoptera and Lepidoptera). Undoubtedly, many more invertebrate losses remain undocumented. The conservation knowledge gap for Maine's invertebrates is significant compared to plants and vertebrates, and thus their representation on Maine's SGCN and other conservation status lists will inevitably grow as further knowledge is obtained on the population status, distribution, and trends of various at-risk taxa.

The following is a brief review of the conservation status and imperilment patterns for select groups of Maine invertebrate taxa that host most of the state's SGCN.

Snails (subclass: Pulmonata and Prosobranchia, class: Gastropoda, phylum: Mollusca)

According to Martin (1999, 2000), there are 76 species of terrestrial snails, and 45 species of freshwater snails, reported from Maine. At least five species are introduced, and the taxonomic status of several others is questionable. While a number of individual investigations of Maine's snails exist (Gleich and Gilbert 1976, Hotopp and Smith 1994, Martin 1999, Martin 2000,

systematic surveys targeting terrestrial (Nekola 2008) and aquatic (Hotopp 2012) species of potential conservation concern have only recently been initiated. Most Maine SGCN snails fall in the *Stagnicola* (aquatic) and *Vertigo* (terrestrial) genera and are thought to be limited by requirements for high water quality and/or extreme habitat specialization.

Freshwater Mussels (order: Unionoida, class: Bivalvia, phylum: Bivalvia)

Freshwater mussels are one of the few invertebrate taxa that have been a focus of intensive statewide survey efforts in Maine. From 1992 to present, MDIFW biologists systematically surveyed over 1,700 sites on the state's rivers, streams, lakes and ponds to document the distribution and status of mussels in Maine. Ten species are documented in Maine, all native, with the greatest diversity in the Kennebec and Penobscot River drainages, where all 10 species are often present in the same stretch of river (Nedeau et al. 2000). To date, the invasive zebra mussel (*Dreissena polymorpha*) has not been reported in Maine, but it occurs nearby in Vermont and Massachusetts. If introduced, this species can have substantial impacts on native mussels and other aquatic biota. While freshwater mussel diversity is relatively low in Maine, their levels of imperilment are high with 6 of 10 species assigned Threatened and/or SGCN status, a trend mirrored nationally where over 3/4 of U.S. species are considered imperiled by various states in their range. The group shares several life history characteristics (long-lived, benthic, sedentary, filter feeding) that increase their exposure to a suite of anthropogenic stressors including water pollution, eutrophication, sedimentation, dams, and the degradation of riparian integrity along forested rivers and streams.

Mayflies (order: Ephemeroptera), Stoneflies (order: Plecoptera), and Caddisflies (order: Trichoptera) = all class: Insecta, phylum: Arthropoda

At least 162 species of mayflies are reported from Maine (Burian and Gibbs 1991, S. Burian, pers. communication). While this group is relatively well studied compared to many other insects, comprehensive surveys have never been conducted in Maine, and information on mayfly diversity and status is incomplete. Maine has two species of regionally endemic mayflies listed as state Threatened and 13 additional species listed as Special Concern and/or SGCN. Most of Maine's mayflies of conservation concern have narrow geographic distributions and occupy riverine habitats, with many of these specialized to small, cold, headwater settings.

At least 94 species of stoneflies, representing all nine North American families, are reported from Maine (Mingo 1983; S. Burian, pers. Communication). Typically inhabiting cold, fast-flowing streams and rivers, stoneflies are likely more diverse than what is currently documented for Maine. Two of Maine's three SGCN stoneflies are globally rare species with only historic occurrence data emphasizing the need for further survey effort.

The species richness of caddisflies is higher in Maine than that of most regions of North America (Huryn 2000) with recent collections suggesting a total that exceeds 300 species (Huryn and Harris 2000). At least an additional 50 species of the lesser-known "micro caddisflies" in the family Hydroptilidae are also reported from the state (Blickle and Morse 1966, Huryn and Harris 2000). All of Maine's four SGCN species are considered globally rare with two species having only been described and documented (to date) from Maine.

Bees, Wasps, and Ants (order: Hymenoptera, class: Insecta, phylum: Arthropoda)

At least 52 families and 855 species of bees, wasps, and ants have been reported from Maine (Dearborn et al. 1983; Stubbs et al. 1995). These numbers are most certainly conservative estimates, as surveys specifically designed to assess species diversity for the Hymenoptera have never been conducted (Stubbs et al. 1995). With the help of NatureServe, MDIFW recently acquired sufficient information to begin assessing the conservation status of Maine's bumble

bees (*Bombus spp*), one of the state's most valuable pollinators of wild plants and cultivated crops. Of the 17 species of bumble bees documented from Maine, ten are considered SGCN due to the lack of modern records or range-wide declines. Habitat loss, introduced diseases and parasites, pesticides, and intensive agricultural practices are all believed to have played a role in bumble bee declines in Maine and across North America. A recently launched citizen-science atlas effort (<http://mainebumblebeeatlas.umf.maine.edu/>) is designed to increase our knowledge of bumble bee distribution and status in Maine.

Beetles (order: Coleoptera, class: Insecta, phylum: Arthropoda)

There are at least 96 families and 2,871 species of beetles reported from Maine (Majka et al. 2011). Generally recognized as the largest order of insects, the Coleoptera have not been systematically surveyed in Maine and there are likely hundreds of state species records yet to be discovered (D. Dearborn, pers. communication). The best studied group of beetles in Maine, and probably North America, is the tiger beetles (family Carabidae, subfamily Cicindelinae). Three of Maine's four SGCN beetles are Cicindelids, including a newly discovered state species record, the Cobblestone Tiger Beetle (*Cicindela marginipennis*) known from only one riverine population in the western foothills. The federally-endangered American Burying Beetle (*Nicrophorus americanus*) is known historically from southwestern and central Maine, but is now believed to be state extirpated.

Butterflies and Moths (order: Lepidoptera, class: Insecta, phylum: Arthropoda)

Colorful, conspicuous, and ecologically important, butterflies are among the few insect groups that have benefited from considerable attention by early Maine naturalists (collections exist from as far back as 1870) and recent citizen scientist efforts through the Maine Butterfly Survey (<http://mbs.umf.maine.edu/>). There are 123 documented species of butterflies and skippers, representing five families, in Maine (Webster and deMaynadier 2005). Of special note is the relatively high proportion (20%) of Maine butterflies that are listed as Extirpated (five species), Endangered or Threatened (eight species), Special Concern and/or SGCN (12 species), a result consistent with global trends elsewhere for the group (Stein et al. 2000, Thomas et al. 2004). Primary threats to Maine's butterflies include habitat loss and degradation to development, succession, and aerial pesticides. Most of Maine's rarest butterflies are associated with three habitat types: swamps, peatlands, and dry barrens, with the latter especially vulnerable to multiple threats in southern Maine.

There are at least 17 families and 1,152 species of moths (macro) reported from Maine (Brower 1974). An additional 41 families and 1,720 species of "micro-moths" are also documented to occur in the state (Brower 1983, 1984, D. Dearborn, pers. communication). Much of this information is based on historic collections and the focused efforts of a few individual researchers. Comprehensive statewide surveys and species assessments have never been done for this taxon with especially pronounced knowledge gaps for the micro Lepidoptera. Much of what we know about the conservation status of moths in Maine comes from NatureServe, which tracks 108 species from the state, of which 18 are ranked as globally rare. Currently Maine lists two species of moth as Threatened and 24 species as SC and/or SGCN, with several more likely to be extirpated (D. Schweitzer, pers. communication). Like the butterflies, several of Maine's rarest moths are associated with pitch pine-scrub oak barrens and peatlands and are especially sensitive to any threats to these habitats.

Dragonflies and Damselflies (order: Odonata, class: Insecta, phylum: Arthropoda)

Like butterflies, dragonflies and damselflies are a popular and conspicuous insect group that have attracted significant attention from both scientists and the general public. Much of what is currently known about Maine's Odonates is the result of an assessment of historic records, MDIFW targeted surveys, and the recently completed Maine Dragonfly and Damselfly Survey (MDDS) (<http://mdds.umf.maine.edu/>). These efforts have led to a list of 158 species of dragonflies and damselflies known from Maine and considerable knowledge on distribution, habitat relationships, and conservation status of most species (Brunelle and deMaynadier 2005). Three of Maine's Odonata are listed as Endangered or Threatened and 25 species as Special Concern and/or SGCN. A recent assessment of high priority Odonata for conservation action in the Northeast identified 21 species in Maine because of high regional responsibility (narrow geographic ranges centered in the Northeast) and/or moderate to high imperilment due to habitat vulnerabilities and potential population declines (White et al. 2015). Most of Maine's most vulnerable Odonata are associated with northern peatlands, lakes, and moderate to large, free-flowing forested rivers.

1.3.6 MARINE FAUNA (EXCEPT BIRDS)

General Overview

There are approximately 1800 known marine animal species in the Gulf of Maine, but it is estimated that far more are still undiscovered, especially in the invertebrate and chordate groups (2015 Gulf of Maine Census). Maine state waters (<3 nautical miles offshore) host a wide array of species including invertebrates, diadromous fishes, groundfish, marine mammals, sea birds, pelagic finfishes, and more. The diversity of habitat within coastal and marine waters, the geographic location between the Arctic and Temperate zones, as well as complex coastal circulation patterns all provide Maine with unique and delicately balanced species assemblages.

Maine is the southern extent for some marine fauna. Polar Lebbeid Shrimp (*Lebbeus polaris*), Sea Strawberry (*Gersemia rubiformis*), and Atlantic Great Piddock (*Zirfaea crispata*) are SGCN from 3 different invertebrate classes that are restricted to waters from Maine northward. Conversely, others are at the northernmost range limits in Maine. The Horseshoe Crab (*Limulus polyphemus*) and Leatherback Sea Turtle (*Dermochelys coriacea*) are SGCN with distributions that range southward from the Gulf of Maine.

Some marine fauna have undergone severe population reductions in recent years. Maine waters host some of the last remaining, sizeable populations in the U.S. Notable SGCN examples include Atlantic Salmon (*Salmo salar*) and Rainbow Smelt (*Osmerus mordax*). Several marine SGCN have large oceanic ranges or are highly migratory as adults: Atlantic Bluefin Tuna (*Thunnus thynnus*), Atlantic Salmon, all whales, and all sea turtles. The majority of marine species have highly dispersive juvenile stages. Taken together, these attributes contribute to a unique balance of species assemblages, with each species relying on the suite of others for prey, prey buffering, habitat (e.g., mollusk reefs), and nutrients transfer.

Conservation Overview

Aside from the Sea Mink (Section 1.2.1), only one marine species is known to have gone extinct in the Gulf of Maine: the Eelgrass Limpet (*Lottia alveus*). The Eelgrass Limpet, a marine gastropod, was estimated to have gone extinct in the 1930s due to massive die-offs of eelgrass which served as its primary habitat (Carlton et al. 1991).

A small number of marine species are protected via federal listing as E/T: three diadromous fish, six whales and four sea turtles. Eleven of these are also state-listed under MESA. The National Marine Fisheries Service (NMFS) designates some fauna as Species of Concern (SoC): three diadromous fishes, three groundfish and two elasmobranchs. However, numerous other species warrant conservation attention. State-listing of marine fauna under MESA is limited by statute to those federally listed as E/T.

While many marine species are subject to commercial and recreational fisheries, or being caught indirectly as bycatch, some of these species warrant conservation measures beyond fisheries management plans. The 2015 Maine Wildlife Action Plan lists 71 Species of Greatest Conservation Need: nine diadromous fish, six groundfish, a pelagic fish (Bluefin Tuna, *Thunnus thynnus*), one ammodyte (American Sand Lance, *Ammodytes americanus*), five sharks, four skates, four sea turtles, six whales, one porpoise, and 34 invertebrates (= eight bivalves, one brachiopod, two Cnidaria, 11 echinoderms, seven gastropods, and five arthropods).

The following is a brief review of the conservation status and imperilment patterns for select groups of marine taxa that host significant numbers of the state's SGCN.

Marine Invertebrates

Although a large proportion of the known marine animal species in the Gulf of Maine are invertebrates (~80%), less than half of the marine SGCN are invertebrates (34 species, 48% of SGCN). This is primarily due to a lack of knowledge about the status, distribution, or abundance of these species. Marine invertebrates face many of the same research challenges as terrestrial invertebrates, including their small size, and small niches/habitats; additionally, financial and logistical challenges specific to working in the marine environment compound these issues. Since 24% of the marine SGCN are commercially or recreationally harvested, some may have existing monitoring programs in place. However, there is a need for increased knowledge about population trends and reasons for decline for many of the invertebrate SGCN.

Marine invertebrates vary in life history and are thus subject to a variety of stresses. Most juvenile invertebrates are found in the water column as zooplankton, and some species are sessile during at least part of their life cycle. Sessile organisms can be slow to recolonize an area after an event that reduces their abundance. Many invertebrates can be sensitive to changes in water quality including non-point source pollution and thermal changes. Calcareous invertebrates may be susceptible to changes in water pH resulting from increased dissolved carbon dioxide in the water. SGCN vulnerable to ocean acidification include Softshell Clam (*Mya arenaria*) and Gaper Clam (*Mya truncata*). With recent and sometimes rapid changes in coastal development, increases in sea surface temperature, and decreases in ocean pH, understanding if and how these species are adapting and how their ranges and habitat is affected is imperative for developing successful conservation strategies.

Finfish: Diadromous, Groundfish, and Ocean Migratory Fish

There are over 50 commonly found finfish species in Maine waters, most of which have experienced population declines in the past 10-50 years. A total of 16 finfish species have been identified as SGCN for Maine, and 11 of those species have experienced recent, significant declines in abundance. Overfishing has been attributed to the decline of many of these species, including Atlantic Cod (*Gadus morhua*) and Haddock (*Melanogrammus aeglefinus*).

Some SGCN declines may be due to environmental changes and habitat alterations: e.g., Atlantic Wolfish (*Anarhichas lupus*) and Spotted Wolffish (*Anarhichas minor*). Fish populations can be slow to rebound after marked declines even after fishing pressure has been reduced.

This may be due to populations having been reduced past a critical threshold, combined with changes in habitat including increasing water temperature, reduction of bottom structure following trawling, and changes in predator-prey abundances. Key to the conservation of these species are efforts to identify spawning locations, migration patterns, habitat use, impacts of changing water chemistry and temperature, as well as how changing species assemblages will affect predator-prey relationships.

Diadromous fishes face a unique set of threats as they migrate between marine and freshwater. Obstructions to rivers and streams, alterations in water flow, and water runoff contamination and high nutrient inputs have all led to the reduction of species' populations. While some of these species respond well to existing management strategies like improving fish passage and seed-stocking (e.g., Alewives, *Alosa pseudoharengus*), others continue to maintain only small populations despite conservation efforts (e.g., Atlantic Salmon). Continuing to improve fish passage and water quality is necessary to recover these species. Additionally, recent research has shown the importance of interspecific relationships. For example, the timing of spawning and migration patterns may provide prey-buffering for species of reduced numbers: schools of river herring may reduce predation of Atlantic Salmon smolts.

Whales and Sea Turtles

There are at least 22 species of marine mammals and turtles that are known to frequent the waters of the northern Gulf of Maine. Many are SGCN in this Plan, including six species of large whales federally-listed as Endangered since 1970: North Atlantic Right (*Eubalaena glacialis*), Humpback (*Megaptera novaeangliae*), Finback (*Balaenoptera physalus*), Sei (*Balaenoptera borealis*), Sperm (*Physeter macrocephalus*), and Blue (*Balaenoptera musculus*). There are four species of federally-listed sea turtles: Kemp's Ridley (*Lepidochelys kempii*), Leatherback (*Dermochelys coriacea*), Green (*Chelonia mydas*), and the Northwest Atlantic Ocean distinct population segment of Loggerhead turtles. All range widely in international waters with some presence in state jurisdiction in the Gulf of Maine.

The North Atlantic Right whale, with a population now estimated over 400 is considered one of the most endangered of the large whales. For decades, since the end of commercial whaling, the right whale has shown slow recovery. The lack of right whale recovery has been linked to collisions with ships, entanglement in specific fishing gear, habitat degradation, and disturbance from vessels. Additionally, the Maine gillnet and lobster fisheries are documented as causing serious injury and mortality to this SGCN, as well as to other bycatch. Consequently MDMR, in collaboration with Maine's commercial fishing industries, developed a Comprehensive Marine "Wildlife Conservation Strategy for Large Whales and Sea Turtles" to reduce the risk posed by these fisheries to North Atlantic Right whales and other protected resources. MDMR has a strategic role to balance commercial lobster and gillnet fisheries within State waters and impacts to large whales and sea turtles. The State of Maine is fully committed to the protection of Atlantic large whales and sea turtles, while at the same time protecting the economic and operational realities of the State's fisheries.

1.4 DISTRIBUTION OF MAINE'S SGCN AND ASSOCIATED HABITATS

Best management practices for State Wildlife Action Plan updates (AFWA 2012) recommend compiling information on the distribution of each SGCN and its associated habitats to help prioritize areas within the state for conservation actions. Range, distribution, and observations

all describe geographic arrangements of elements (species and habitats) across a landscape. However, these terms have different meanings. Range is the broadest geographic extent across which an element could be found. The distribution of an element is the spatial pattern of its occurrence within its range and may be scattered, random, clustered, or regular depending on the population/community dynamics of the element and the heterogeneity of the landscape. Further, individual observations of an element may or may not be evidence of a viable or persistent population.

The sampling unit used for a spatial analysis should be appropriate to the scale and resolution of the input data and the needs it is intended to meet. We chose Maine's municipal township boundaries (for non-aquatic SGCN) and United States Geological Survey (USGS) HUC12 sub-watersheds (for aquatic SGCN) as the sampling units for this analysis. Both are familiar to the Maine conservation community and the general public and can easily be generalized to broader scales (e.g., counties, watersheds, or ecoregions).

We used our best available information to develop "species conservation range maps" for SGCNs in Maine. These maps are intended to identify within Maine the broadest geographic extent across which conservation actions might benefit each SGCN. These maps are not meant to convey the ecological ranges or distributions of these species. Because we used habitat to qualify these maps, however, for some species the maps may approximate their ecological distribution subject to 1) accuracy and resolution of the habitat mapping, 2) generalization of observation data to the sub-watershed/township scale, and 3) the existence of undocumented areas occupied by the species.

1.4.1 METHODOLOGY FOR MAPPING ELEMENT 1 – SGCN DISTRIBUTIONS

Our primary source of observation data was MDIFW's "Endangered, Threatened, and Special Concern" (ETSC) database, which includes observations on some, but not all of Maine's SGCNs. We supplemented MDIFW's ETSC data with SGCN observations from the following:

- Maine Damselfly and Dragonfly Atlas
(http://www.maine.gov/ifw/wildlife/species/invertebrates/damselfly_dragonfly.html)
- Maine Butterfly Survey
(http://www.maine.gov/ifw/wildlife/species/invertebrates/butterfly_survey.html)
- Maine Mussel Survey
(http://www.maine.gov/ifw/wildlife/species/invertebrates/freshwater_mussels.html)
- Maine Amphibian and Reptile Atlas Project
(http://www.maine.gov/ifw/wildlife/species/reptiles/atlasing_project.html)
- North American Breeding Bird Survey (<https://www.pwrc.usgs.gov/bbs/>)
- Essential Wildlife Habitats mapped under Maine's Endangered Species Act
- MDIFW radio-telemetry locations and track surveys for Canada Lynx
- Shorebird Areas mapped under Maine's Natural Resources Protection Act
- MDIFW vernal pool locations with Blue-spotted Salamander observations
- MDIFW fish data sets
- eBird
- Maine Bumblebee Database
- Maine Mayfly Database
(http://www.maine.gov/ifw/wildlife/species/invertebrates/rare_mayflies.html)

These data sets varied greatly in data format. Some data sets were geospatial (i.e., GIS files), whereas others stored only attributes but included geographic coordinates that we used to generate geospatial representations. Most were point data but some linked observations to unmapped sites along survey transects and others mapped observations as polygons. Thus our first step in generating SGCN distributions was to standardize and assimilate these data sets. We then used all of these observations to determine which Maine townships and sub-watersheds each SGCN occurred in. We did not attempt to count observations of an SGCN within a township or sub-watershed or to estimate densities because sampling effort varied geographically and among data sets. Some observations also may have been duplicated across data sets. Although an observation from any of the data sets could indicate presence of the SGCN in a particular township or sub-watershed, we presented the data sets as separate GIS layers so users could compare the data sources or view them collectively for an SGCN.

1.4.2 METHODOLOGY FOR MAPPING ELEMENT 2 – HABITATS

We used a modified version of the Northeast Ecological Systems, 2014 Update (Ferree and Anderson 2013, <http://northatlanticlcc.org/data/regional-spatial-data/terrestrial/tnc-terrestrial-habitat/ne-terrestrial-habitat-map>) mapped by the North Atlantic Landscape Conservation Cooperative (NALCC), the Northeast Association of Fish and Wildlife Agencies, and The Nature Conservancy to map habitats for each SGCN. We updated their map for habitat classes for which we had and/or required more accurate/higher resolution spatial data including:

- Rivers and streams classified by MDIFW to small, medium, or large river or headwater/creek
- Lakes and ponds classified by MDIFW to oligotrophic, eutrophic, mesotrophic/intermediate, or dystrophic
- Tidal flats classified by substrate type by the National Wetlands Inventory
- Tidal marshes as mapped/classified by the Maine Natural Areas Program
- Lake and river shores classified by the National Wetlands Inventory
- Intertidal and subtidal habitats as mapped/classified by the Maine Department of Marine Resources

Using the resulting habitats, species specialists from MDIFW, with input from conservation partners, associated each SGCN with each ecological system and habitat macrogroup it was believed to use. We then identified the townships and sub-watersheds where these associated habitats occurred for each SGCN. Part of our goal was to identify unoccupied habitats or areas of undocumented SGCN presence. Some habitats, however, extended beyond the range of an SGCN and therefore presented an unrealistic estimate of its potential distribution. As part of our 2005 SWAP conservation actions, Maine divided the state into ecoregions and surveyed them for a variety of species including many SGCN. This work was the source for many of the SGCN observations in MDIFW's ETSC database. The species specialists associated each SGCN with each ecoregion where it was believed to occur and we then used those ecoregional associations to constrain the habitat mapping to more realistic extents.

The Maine GAP Analysis (Krohn et al. 1988) used a similar process (i.e., combining observation data with habitat maps) to estimate distributions for vertebrate species in Maine. We included the GAP data in our species conservation range maps, calling it "potential habitat." Despite

having fewer observations to work with and a much simpler habitat data set, the GAP distributions are quite similar to our updated distributions for many SGCNs.

1.4.3 SPECIES CONSERVATION RANGE MAPS

Our large number of SGCN, observation data sets, and habitat associations precluded mapping by hand. Instead, we used our SWAP database and a series of custom Python programs to automate map production. This approach will allow maps to be updated with relative ease for additional SGCNs, as new observation data becomes available, our understanding of habitat relationships improve, or if the habitat map changes. The process generates a series of data tables linking SGCNs to townships and sub-watersheds based on observations of the SGCN and mapping of its associated habitats. Data for each SGCN then is used to update a map template that produces a PDF document in which the various input data sets can be toggled on or off according to user preference.

All of the SGCN species conservation range maps will be served to conservation partners and the public as digital files and/or via a web mapping service. Figure 1-1 illustrates some static images of a few SGCN example maps illustrating some of the variation in distribution patterns such as edge-of-range, rare but scattered, concentrated (e.g., coastal, mountainous), and ubiquitous.

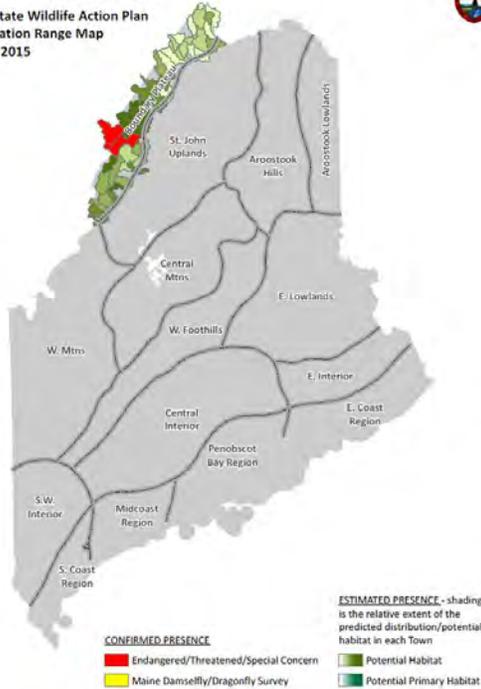
1.4.4 SGCN DISTRIBUTION SYNTHESIS

Summarizing SGCN patterns statewide was a primary goal of mapping species conservation ranges to determine where conservation actions would be best applied to benefit the most species. One summary method is by taxonomic class—for example, all birds. This approach benefits conservation partners interested in working with certain groups of SGCN. Other groups might be interested in SGCN associated with particular habitats (e.g., emergent marshes), especially when a specific conservation action is tied to a habitat type (e.g., improved riparian buffer conservation). As with the species conservation ranges, we based our SGCN summaries on USGS subwatersheds for aquatic SGCN classes and habitats and on Maine townships for non-aquatic SGCN classes and habitats. Our goal is to present these summaries in an interactive map format where users can select which SGCN classes, habitats, and landscape units to use. For purposes of this static document, we have included a few possible examples (Figure 1-2).

Figure 1-1. Examples of conservation range maps by USGS sub-watersheds for aquatic SGCNs and by Maine townships for terrestrial SGCNs. Red/yellow shaded areas indicate an SGCN's presence based on observation data; green/blue indicates presence of potential habitats associated with the SGCN.

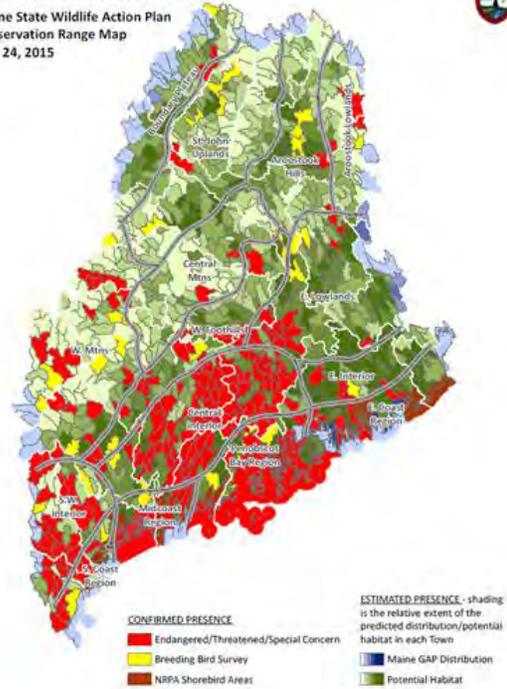
Sedge Darter (*Aeshna juncea*)

Maine State Wildlife Action Plan
Conservation Range Map
Mar 23, 2015



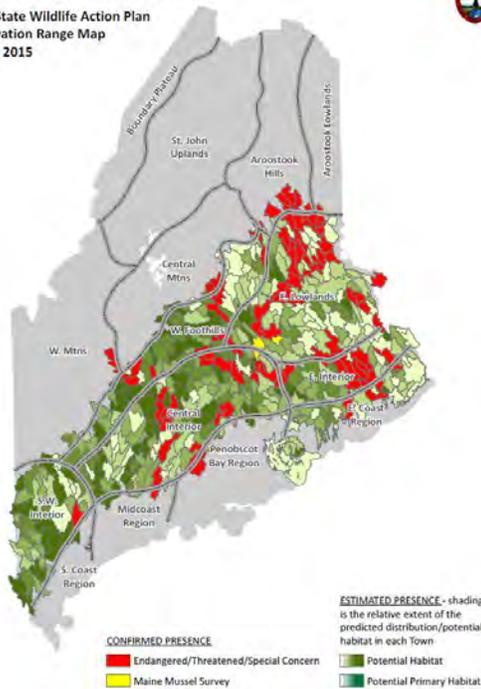
Great Blue Heron (*Ardea herodias*)

Maine State Wildlife Action Plan
Conservation Range Map
Mar 24, 2015



Brook Floater (*Alasmidonta varicosa*)

Maine State Wildlife Action Plan
Conservation Range Map
Mar 23, 2015



Canada Warbler (*Cardellina canadensis*)

Maine State Wildlife Action Plan
Conservation Range Map
Mar 24, 2015

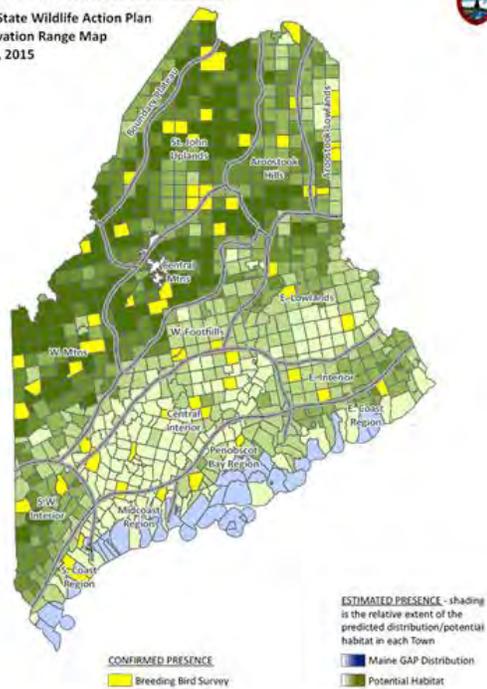
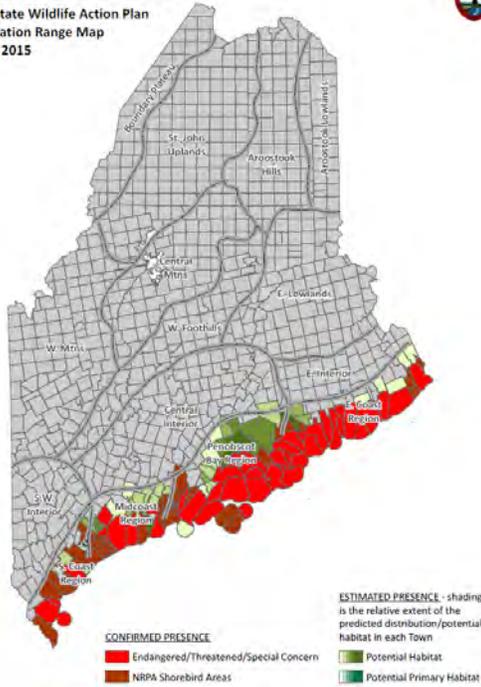


Figure 1-2. continued - page 2 of 2.

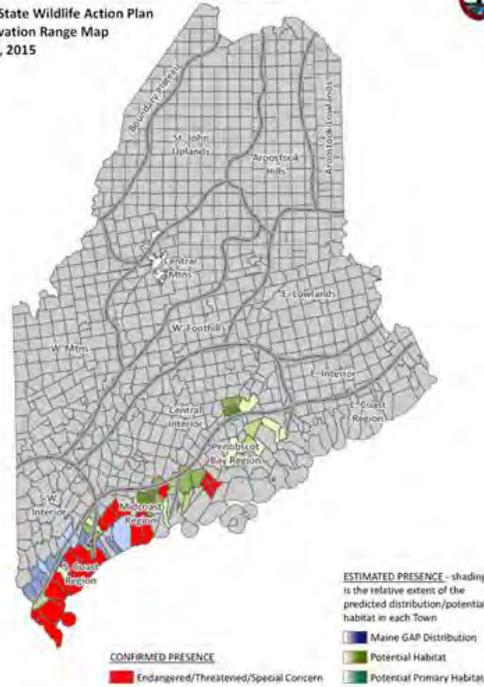
Purple Sandpiper (*Calidris maritima*)

Maine State Wildlife Action Plan
Conservation Range Map
Mar 24, 2015



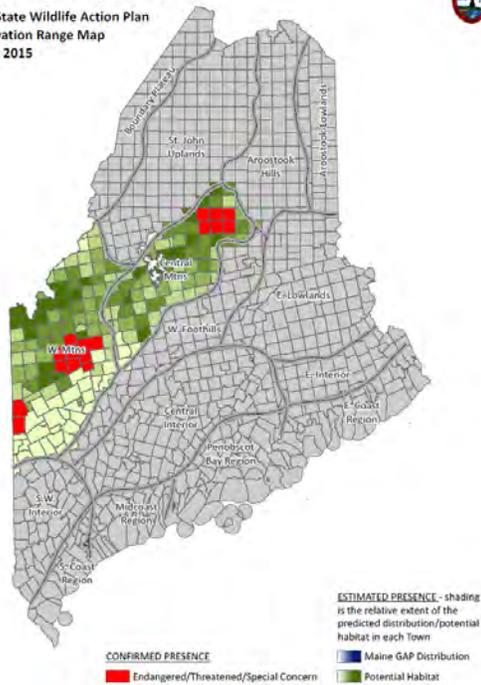
Saltmarsh Sparrow (*Ammodramus caudacutus*)

Maine State Wildlife Action Plan
Conservation Range Map
Mar 24, 2015



Bicknell's Thrush (*Catharus bicknelli*)

Maine State Wildlife Action Plan
Conservation Range Map
Mar 24, 2015

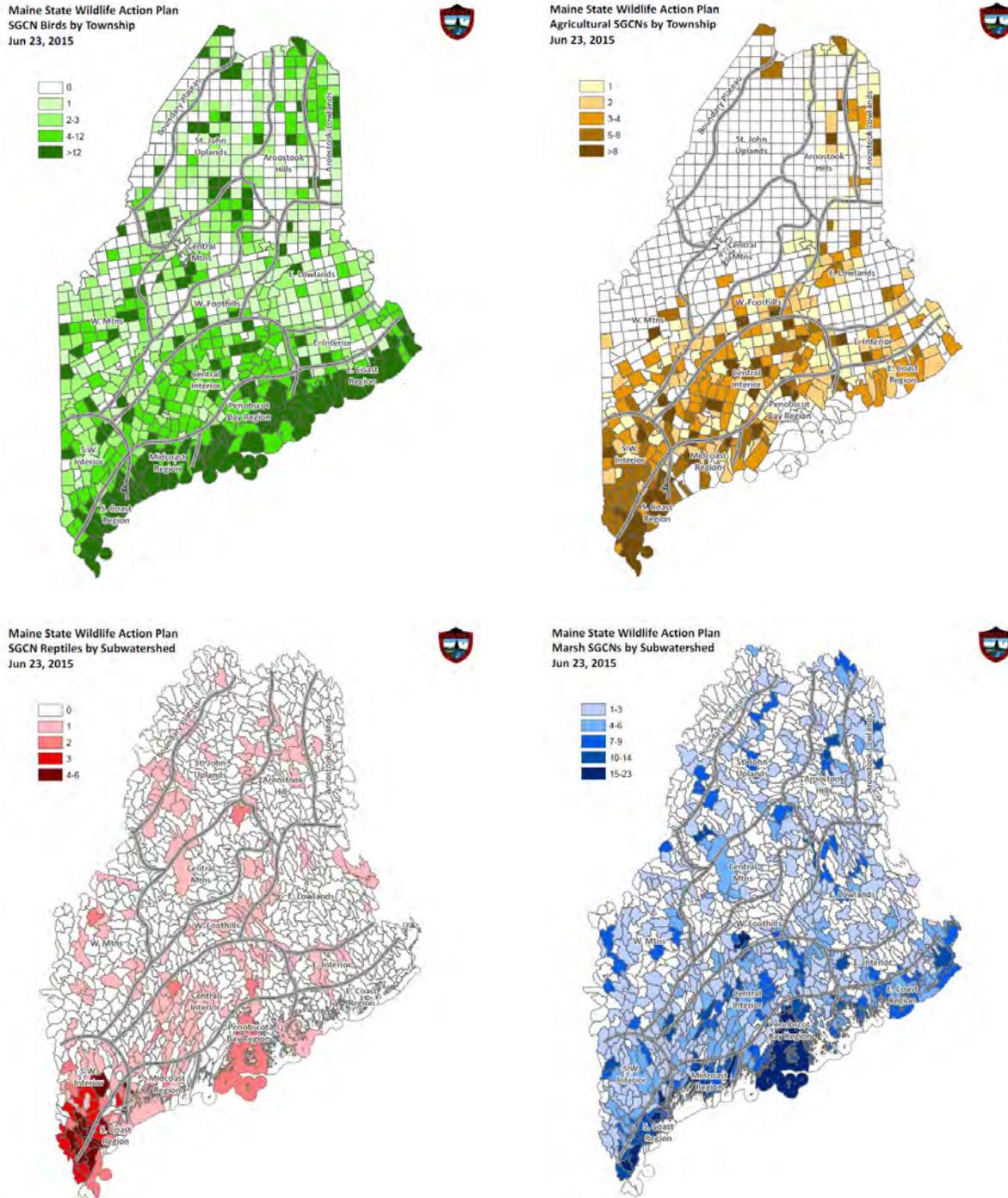


Cobblestone Tiger Beetle (*Cicindela marginipennis*)

Maine State Wildlife Action Plan
Conservation Range Map
Mar 24, 2015



Figure 1-2. Examples of SGCN summaries by taxa class and habitat associations for USGS sub-watersheds and Maine townships.



1.5 DESIGNATION CRITERIA FOR MAINE'S SGCN - 2015

MDIFW biologists, with review and cooperation from conservation partners and species experts, offer the following criteria (and subcriteria) for designating Maine's eligible Species of Greatest Conservation Need (SGCN). The criteria and process for selecting SGCN are intended to be comprehensive, transparent, and based on best available science for prioritizing species of conservation concern at local, regional, and global scales. As proposed, fish and wildlife species (and subspecies) designated as priority 1 or 2 or 3 qualify as SGCN, and are thus eligible for SWG funding. The primary themes for SGCN prioritization include risk of extirpation, population trend, endemism, and regional conservation responsibility. Secondary themes for SGCN prioritization include climate change vulnerability and survey knowledge (Table 1-2).

1.5.1 PRIORITY 1 (HIGHEST PRIORITY) SGCN

Generally, Priority 1 species include those that meet two or more of the following criteria:

1. **Risk of Extirpation** – Have current (or proposed) state or federal E/T status, or global endangerment status (International Union for the Conservation of Nature [IUCN])
2. **Recent Significant Declines** – A species is currently (within 15 years) undergoing steep population decline statewide or regionally, which has already led to, or if unchecked is likely to lead to, local extinction and/or significant range contraction.
3. **Regional Endemic** – A species whose global geographic range is at least 90% contained within the area defined by USFWS Region 5, the Canadian Maritime Provinces, and southeastern Quebec (south of the St. Lawrence River).
4. **High Regional Conservation Priority** -- Identified as a high regional or global species of conservation concern by one of the following species assessment authorities (see Table 1 for Priority 1 subcriteria):
 - a. Northeast Endangered Species and Wildlife Diversity Technical Committee [NESWDTC] (all vertebrates and freshwater mussels) – Therres 1999
 - b. Northeast Regional Synthesis [RSGCN] (all vertebrates, freshwater mussels, and tiger beetles) – Terwilliger 2013
 - c. NatureServe (all taxa) – NatureServe 2014
 - d. Partners in Flight (land birds). Partners In Flight Science Committee 2012 Species Assessment Database, version 2012.
 - e. North American Waterbird Conservation Plan [NAWCP] (all waterbirds) – Kushlan et al. 2002 and 2006 (marsh birds)
 - f. North Atlantic Regional Shorebird Plan [NARSP] (shorebirds) – Clark and Niles 2000
 - g. U.S. Shorebird Conservation Plan [USSCP] (shorebirds) – U.S. Shorebird Conservation Plan 2004
 - h. Birds of Conservation Concern (all birds) – USFWS 2008
 - i. Northeast Partners In Amphibian and Reptile Conservation [NEPARC] (herpetofauna) – NEPARC 2010
 - j. American Fisheries Society (freshwater & diadromous fish) – Jelks et al. 2011

- k. Atlantic States Marine Fisheries Commission Stock Assessments [ASMFC] - ASMFSC 2012
- l. Eastern Brook Trout Joint Venture [EBTJV] - EBTJV 2005
- m. Northeast Odonate Assessment (damselflies & dragonflies) – White et al. 2014

Note: Priority 1 designation is not intended for:

- species who have expanded their range into Maine within the past 50 years OR
- species with only historic documentation (in most cases prior to mid-1970s)

1.5.2 PRIORITY 2 (HIGH PRIORITY) SGCN

Generally, Priority 2 species include:

- all other current or proposed State (Endangered, Threatened, or Proposed), Federal (Endangered, Threatened, Candidate, or Proposed) or Global (IUCN Critically Endangered or Threatened) risk of extirpation species, OR
- those that meet at least two of the following criteria:
 1. **Global Vulnerability** – A species designated as Vulnerable under the International Union for the Conservation of Nature [IUCN]
 2. **State Special Concern** – Listed as a current or proposed species of Special Concern in Maine.
 3. **Recent Significant Declines** – A species is currently (within 30 years) undergoing steep population decline statewide or regionally, which has already led to, or if unchecked is likely to lead to, local extinction and/or significant range contraction.
 4. **Regional Endemic** – A species whose global geographic range is at least 90% contained within the area defined by USFWS Region 5, the Canadian Maritime Provinces, and southeastern Quebec (south of the St. Lawrence River).
 5. **High Climate Change Vulnerability** – Whitman et al. 2013 and Galbraith et al. 2014 (or other published source)
 6. **Historical** -- Species currently listed as state (SH) or global (GH) Historical (by MDIFW or NatureServe) that have reasonable probability of rediscovery with further survey.
 7. **High Regional Conservation Priority** -- Identified as a high regional or global species of conservation concern by one of the following authorities (see Table 1 for Priority 2 subcriteria):
 - a. Northeast Endangered Species and Wildlife Diversity Technical Committee [NESWDTC] (all vertebrates and freshwater mussels) – Therres 1999
 - b. Northeast Regional Synthesis [RSGCN] (all vertebrates, freshwater mussels, and tiger beetles) – Terwilliger 2013
 - c. NatureServe (all taxa) – NatureServe 2014
 - d. Partners in Flight (land birds). Partners In Flight Science Committee 2012 Species Assessment Database, version 2012.

- e. North American Waterbird Conservation Plan [NAWCP] (all waterbirds) – Kushlan et al. 2002 and 2006 (marsh birds)
- f. North Atlantic Regional Shorebird Plan [NARSP] (shorebirds) – Clark and Niles 2000
- g. U.S. Shorebird Conservation Plan [USSCP] (shorebirds) – U.S. Shorebird Conservation Plan 2004
- h. Birds of Conservation Concern (all birds) – USFWS 2008
- i. Northeast Partners In Amphibian and Reptile Conservation [NEPARC] (herpetofauna) – NEPARC 2010
- j. American Fisheries Society (freshwater & diadromous fish) – Jelks et al. 2011
- k. Atlantic States Marine Fisheries Commission Stock Assessments [ASMFC] - ASMFSC 2012
- l. Eastern Brook Trout Joint Venture [EBTJV] - EBTJV 2005
- m. Northeast Odonate Assessment (damselflies & dragonflies) – White et al. 2014
- n. Committee on the Status of Endangered Wildlife in Canada [COSEWIC] (all taxa) – COSEWIC 2013

Note: Priority 2 designation is not intended for species that have expanded their range into Maine within the past 25 years.

1.5.3 PRIORITY 3 (MODERATE PRIORITY) SGCN

Generally, Priority 3 species include those that meet at least one of the following criteria:

1. **Global Vulnerability** – A species designated as Vulnerable under the International Union for the Conservation of Nature [IUCN])
2. **State Special Concern** – Listed as a current or proposed species of Special Concern in Maine.
3. **Recent Significant Declines** – A species is currently (within 30 years) undergoing steep population decline statewide or regionally, which has already led to, or if unchecked is likely to lead to, local extinction and/or significant range contraction.
4. **Regional Endemic** – A species whose global geographic range is at least 90% contained within the area defined by USFWS Region 5, the Canadian Maritime Provinces, and southeastern Quebec (south of the St. Lawrence River).
5. **High Climate Change Vulnerability** – Whitman et al. 2013 and Galbraith et al. 2014 (or other published source)
6. **Understudied Rare Taxa** -- Recently documented or poorly surveyed rare species for which risk of extirpation is potentially high (e.g. few known occurrences) but insufficient data exist to conclusively assess distribution and status.
7. **Historical** -- Species currently listed as state (SH) or global (GH) Historical (by MDIFW or NatureServe) that have reasonable probability of rediscovery with further survey.

8. **High Regional Conservation Priority** -- Identified as a high regional or global species of conservation concern by one of the following authorities (see Table 1 for Priority 2 subcriteria):
- a. Northeast Endangered Species and Wildlife Diversity Technical Committee [NESWDTC] (all vertebrates and freshwater mussels) – Therres 1999
 - b. Northeast Regional Synthesis [RSGCN] (all vertebrates, freshwater mussels, and tiger beetles) – Terwilliger 2013
 - c. NatureServe (all taxa) – NatureServe 2014
 - d. Partners in Flight (land birds). Partners In Flight Science Committee 2012 Species Assessment Database, version 2012.
 - e. North American Waterbird Conservation Plan [NAWCP] (all waterbirds) – Kushlan et al. 2002 and 2006 (marsh birds)
 - f. North Atlantic Regional Shorebird Plan [NARSP] (shorebirds) – Clark and Niles 2000
 - g. U.S. Shorebird Conservation Plan [USSCP] (shorebirds) – U.S. Shorebird Conservation Plan 2004
 - h. Birds of Conservation Concern (all birds) – USFWS 2008
 - i. Northeast Partners In Amphibian and Reptile Conservation [NEPARC] (herpetofauna) – NEPARC 2010
 - j. American Fisheries Society (freshwater & diadromous fish) – Jelks et al. 2008
 - k. Atlantic States Marine Fisheries Commission Stock Assessments [ASMFC] - ASMFSC 2012
 - l. Eastern Brook Trout Joint Venture [EBTJV] - EBTJV 2005
 - m. Northeast Odonate Assessment (damselflies & dragonflies) – White et al. 2014
 - n. Committee on the Status of Endangered Wildlife in Canada [COSEWIC] (all taxa) – COSEWIC 2013

Note: Priority 3 designation is not intended for species that have expanded their range into Maine within the past 10 years.

Table 1-2. Vulnerability concepts and criteria for designating Maine's SGCN.

Vulnerability Factor	Authority (Source)	Metric	Potential Priority	Primary Taxa
Extirpation	IUCN	CR or EN	1-2	all
Extirpation	IUCN	VU	1-3	all
Extirpation	ESA (USFWS)	E or T	1-2	all
Extirpation	MESA	E or T	1-2	all
Potential Extirpation	MDIFW	Special Concern (or PSC)	2-3	all
Potential Extirpation	NMFS	Species of Concern - SoC	2-3	Marine species
Recent Decline	MDIFW (multiple)	Steep declines < 15 yrs	1	all
Recent Decline	MDIFW (multiple)	Steep declines < 30 yrs	2-3	all
Regional Endemics	MDIFW (multiple)	>90% of geographic range in the Northeast	1-3	all
Specialist Group Assessment	NEFWDC (Therres 1999)	> 1: Risk, Data, Area, Spec, Federal	1-3	vertebrates & mussels
Specialist Group Assessment	RSGCN (Terwilliger 2013)	High Resp AND Very High Concern	1	vertebrates
Specialist Group Assessment	RSGCN (Terwilliger 2013)	High Resp AND High Concern	2-3	vertebrates
Specialist Group Assessment	(NatureServe 2014)	G1-G2 (vertebrates) G1 (invertebrates)	1	all
Specialist Group Assessment	(NatureServe 2014)	G3 (vertebrates) G2 (invertebrates)	2-3	all
Specialist Group Assessment	(COSEWIC 2013)	E or T	2-3	all
Specialist Group Assessment	(Partners in Flight 2012)	US & CA Concern, Regional Concern, or Stewardship Species	1-3	landbirds
Specialist Group Assessment	NAWCP (Kushlan et al. 2002, 2006)	High Concern	1-3	waterbirds
Specialist Group Assessment	(USSCP 2004; Clark & Niles 2000)	Highly Imperiled OR Species of High Concern	1-3	shorebirds
Specialist Group Assessment	(USFWS 2008)	Listed in BCR 14 or 30	1-3	all birds
Specialist Group Assessment	(NEPARC 2010)	High Resp AND High Concern (Red list)	1-3	reptiles & amphibians
Specialist Group Assessment	American Fisheries Soc. (Jelks et al. 2008)	Imperiled	1-3	fish
Specialist Group Assessment	(ASMFC 2012)	Decreasing, Unstable/decreasing, or Local subpopulation	1-3	marine fish

1.6 MAINE'S 2015 SGCN

Vulnerability concepts and criteria (Table 1-2) adopted in this Plan identified 376 SGCN in Maine. This number is significantly greater than the 213 SGCN recognized in the 2005 Plan; of that number, 34 SGCN have lost SGCN eligibility in 2005 (Appendix 1-5). The net expansion of the SGCN list between 2005 and 2015 mostly reflects changes in SGCN designation criteria, recent significant declines for some species, more scrutiny of invertebrate taxa not assessed in 2005, and much greater attention to marine fauna now at risk in the Gulf of Maine.

For example, Maine's 2005 CWCS identified only 13 marine SGCN (five finfish, five whales, and three sea turtles) of which 11 were federally-listed as E/T. All 13 retain their SGCN status, but the 2015 Plan identifies 62 additional fauna in the Gulf of Maine as SGCN, a tally that does not consider species (especially marine invertebrates) for which there are no data to evaluate vulnerability. MDMR, the lead state agency for marine fauna (except birds), focused SGCN designations at species with reliable abundance indices and/or significant stressors.

The 2015 compilation of Maine's SGCN (Table 1-3) includes 376 fauna. Each cell for a species is linked to a SGCN Report that summarizes qualification criteria, habitat associations (Element 2), significant stressors to the species or its habitats (Element 3), potential conservation actions (Element 4), and conservation range maps. Click on the cell with the scientific name / common name to view these details for each SGCN, including data (e.g., range) that can be updated during the life of the Plan.

Priority tiers of SGCN in this Plan ultimately are based on the degree of vulnerability for each species. Tier 1 SGCN receive utmost concern throughout the various Plan elements, but higher SGCN priority levels do not necessarily infer they are absolute priority conservation targets. Instead, habitat-based conservation actions, or those that address a guild of several SGCN, may be more significant than a strategy that benefits a single Tier 1 SGCN. Feasibility, outcomes, and cost of conservation actions also influence Plan priorities. Among the 376 SGCN recognized in this Plan, the total number of SGCN by priority level separate as follows:

- Tier 1 (Highest Priority) – 58 SGCN
- Tier 2 (High Priority) – 131 SGCN
- Tier 3 (Moderate Priority) – 187 SGCN

Table 1-3. Maine's SGCN (by taxa class) and qualifying factors. Click on a species name to launch a full SGCN report summarizing associated habitats, stressors, and conservation strategies for that species.

CLASS Order Scientific name (Common name)	Maine SGCN Tier		Scale of Conservation Concern				Other Factors
	2005	2015	State	Regional	National	Global	
ACTINOPTERYGII (ray-finned fishes; N = 33)							
Acipenseriformes (sturgeons and paddlefishes; N = 2)							
Acipenser brevirostrum Shortnose sturgeon	1	1	E	yes	E	VU	
Acipenser oxyrinchus Atlantic sturgeon	1	1		yes	T		culturally significant
Anguilliformes (true eels; N = 1)							
Anguilla rostrata American Eel	1	2	SC	yes			recent significant decline, culturally significant
Clupeiformes (herrings; N = 3)							
Alosa aestivalis Blueback Herring	no	1		yes	SoC	VU	recent significant decline, culturally significant
Alosa pseudoharengus Alewife	no	2		yes	SoC		recent significant decline, culturally significant
Alosa sapidissima American Shad	2	1		yes			understudied taxa, recent significant declines, culturally significant
Cypriniformes (carps, minnows, loaches and allies; N = 7)							
Catostomus catostomus Longnose Sucker	2	3					understudied taxa
Erimyzon oblongus Creek Chubsucker	no	3	SC				understudied taxa
Hybognathus regius Eastern Silvery Minnow	no	3					understudied taxa
Margariscus margarita Pearl Dace	no	3					understudied taxa
Notropis bifrenatus Bridle Shiner	no	2	SC	yes			
Notropis heterolepis Blacknose Shiner	no	3					understudied taxa
Rhinichthys cataractae Longnose Dace	no	3	SC				understudied taxa
Esociformes (pikes and mudminnows; N = 1)							
Esox americanus americanus Redfin Pickerel	1	2	E				

ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

Table 1-3. continued: page 2 of 26

CLASS Order Scientific name (Common name)	Maine SGCN Tier		Scale of Conservation Concern				Other Factors
	2005	2015	State	Regional	National	Global	
ACTINOPTERYGII (ray-finned fishes; N = 33)							
Gadiformes (cods, haddocks, grenadiers; N = 4)							
Brosme brosme Cusk	no	2		yes	SoC		recent significant decline
Gadus morhua Atlantic Cod	no	1		yes		VU	
Lota lota Burbot	2	3					understudied taxa
Melanogrammus aeglefinus Haddock	no	1		yes		VU	
Gasterosteiformes (sticklebacks; N = 1)							
Culaea inconstans Brook Stickleback	no	3	SC				understudied taxa
Osmeriformes (smelts and allies; N = 1)							
Osmerus mordax Rainbow Smelt	2	1		yes	SoC		regional endemic, recent significant declines, culturally significant
Perciformes (perch-like fishes; N = 6)							
Ammodytes americanus American Sand Lance	no	3		yes			
Anarhichas lupus Atlantic Wolffish	no	2			SoC		understudied taxa, recent significant declines
Anarhichas minor Spotted Wolffish	no	3		yes			understudied taxa
Etheostoma fusiforme Swamp Darter	1	2	T				
Morone saxatilis Striped Bass	no	2		yes			recent significant decline, culturally significant
Thunnus thynnus Atlantic Bluefin Tuna	no	2		yes	SoC	EN	
Pleuronectiformes (flatfish; N = 1)							
Pseudopleuronectes americanus Winter Flounder	no	2		yes			recent significant decline

ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

Table 1-3. continued: page 3 of 26

CLASS Order Scientific name (Common name)	Maine SGCN Tier		Scale of Conservation Concern				Other Factors
	2005	2015	State	Regional	National	Global	
ACTINOPTERYGII (ray-finned fishes; N = 33)							
Salmoniformes (salmon, trout, and whitefish; N = 6)							
Coregonus clupeaformis Lake Whitefish	1	2	SC				climate change, recent significant declines
Prosopium cylindraceum Round Whitefish	2	2		yes			climate change
Salmo salar Atlantic Salmon	1	1		yes	E		culturally significant
Salvelinus alpinus oquassa Arctic Charr	1	1	SC	yes			regional endemic
Salvelinus fontinalis Brook Trout	2	3		yes			culturally significant
Salvelinus namaycush Lake Trout	1	3					understudied taxa
AMPHIBIA (amphibians; N = 4)							
Anura (frogs and toads; N = 2)							
Lithobates pipiens Northern Leopard Frog	no	2	SC	yes			
Lithobates septentrionalis Mink Frog	no	3					climate change
Caudata (salamanders; N = 2)							
Ambystoma laterale Blue-spotted Salamander	2	2	SC	yes			
Gyrinophilus porphyriticus Northern Spring Salamander	no	2	SC	yes			
ANTHOZOA (corals, sea pens, sea fans, sea anemones; N = 2)							
Alcyonacea (soft corals; N = 2)							
Alcyonium digitatum Dead Man's Fingers	no	3					understudied taxa, climate change
Gersemia rubiformis Sea Strawberry	no	2					understudied taxa, climate change, recent significant declines

ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

Table 1-3. continued: page 4 of 26

CLASS Order Scientific name (Common name)	Maine SGCN Tier		Scale of Conservation Concern				Other Factors
	2005	2015	State	Regional	National	Global	
ASTEROIDEA (sea stars; N = 5)							
Forcipulatida (sea stars; N = 3)							
Asterias forbesi Forbes's Starfish	no	2					understudied taxa, climate change, recent significant declines
Asterias rubens Common Sea Star	no	2					understudied taxa, climate change, recent significant declines
Stephanasterias albula White Sea Star	no	2					understudied taxa, climate change, recent significant declines
Valvatida (N = 2)							
Crossaster papposus Common Sun Star	no	2					understudied taxa, climate change, recent significant declines
Solaster endeca Purple Sunstar	no	2					understudied taxa, climate change, recent significant declines
AVES (birds; N = 129)							
Accipitriformes (hawks, kites, eagles, and allies; N = 3)							
Aquila chrysaetos Golden Eagle	2	2	E	yes			
Buteo platypterus Broad-winged Hawk	no	3		yes			
Circus cyaneus Northern Harrier	no	3	SC				
Anseriformes (waterfowl; N = 4)							
Aythya marila Greater Scaup	2	2	SC				recent significant decline
Bucephala islandica Barrow's Goldeneye	2	1	T				regional endemic
Clangula hyemalis Long-tailed Duck	no	3				VU	
Histrionicus histrionicus Harlequin Duck	2	1	T	yes			regional endemic

ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

Table 1-3. continued: page 5 of 26

CLASS Order Scientific name (Common name)	Maine SGCN Tier		Scale of Conservation Concern				Other Factors
	2005	2015	State	Regional	National	Global	
AVES (birds; N = 129)							
Apodiformes (swifts and hummingbirds; N = 1)							
Chaetura pelagica Chimney Swift	2	2	SC	yes			recent significant decline
Caprimulgiformes (nightjars; N = 2)							
Antrostomus vociferus Eastern Whip-poor-will	2	2	SC	yes			
Chordeiles minor Common Nighthawk	2	3		yes			
Charadriiformes (plovers, sandpipers, and allies; N = 30)							
Alca torda Razorbill	2	2	T				climate change
Arenaria interpres Ruddy Turnstone	2	2		yes			climate change, recent significant declines
Bartramia longicauda Upland Sandpiper	1	1	T	yes			
Calidris alpina Dunlin	no	3					climate change
Calidris canutus rufa Red Knot	2	1	SC	yes	T		recent significant decline
Calidris maritima Purple Sandpiper	2	1		yes			regional endemic, recent significant declines
Calidris minutilla Least Sandpiper	no	3					climate change
Calidris pusilla Semipalmated Sandpiper	2	2	SC	yes			climate change, recent significant declines
Charadrius melodus Piping Plover	1	1	E	yes	T		
Chlidonias niger Black Tern	1	2	E				climate change
Chroicocephalus philadelphia Bonaparte's Gull	2	3	SC				
Fratercula arctica Atlantic Puffin	2	2	T				climate change

ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

Table 1-3. continued: page 6 of 26

CLASS Order Scientific name (Common name)	Maine SGCN Tier		Scale of Conservation Concern				Other Factors
	2005	2015	State	Regional	National	Global	
AVES (birds; N = 129)							
Charadriiformes (plovers, sandpipers, and allies; N = 30)							
Haematopus palliatus American Oystercatcher	1	3	SC	yes			climate change
Leucophaeus atricilla Laughing Gull	no	3	SC				
Limnodromus griseus Short-billed Dowitcher	no	3		yes			climate change
Numenius phaeopus Whimbrel	2	2	SC	yes			climate change
Phalaropus fulicarius Red Phalarope	no	3					climate change
Phalaropus lobatus Red-necked Phalarope	2	2	SC				climate change, recent significant declines
Pluvialis squatarola Black-bellied Plover	no	3					climate change
Scolopax minor American Woodcock	2	3					climate change
Sterna dougallii Roseate Tern	1	1	E	yes	E		
Sterna hirundo Common Tern	2	2	SC	yes			
Sterna paradisaea Arctic Tern	2	1	T	yes			
Sternula antillarum Least Tern	1	1	E	yes			
Tringa flavipes Lesser Yellowlegs	no	1	SC	yes			recent significant decline
Tringa melanoleuca Greater Yellowlegs	2	3					climate change
Tringa semipalmata Willet	2	3					climate change
Tringa solitaria Solitary Sandpiper	no	2		yes			climate change
Uria aalge Common Murre	2	3	SC				climate change

ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

Table 1-3. continued: page 7 of 26

CLASS Order Scientific name (Common name)	Maine SGCN Tier		Scale of Conservation Concern				Other Factors
	2005	2015	State	Regional	National	Global	
AVES (birds; N = 129)							
Coraciiformes (kingfishers and allies; N = 1)							
Megaceryle alcyon Belted Kingfisher	no	3		yes			
Cuculiformes (cuckoos; N = 2)							
Coccyzus americanus Yellow-billed Cuckoo	no	2	SC	yes			
Coccyzus erythrophthalmus Black-billed Cuckoo	2	3		yes			
Falconiformes (caracaras and falcons; N = 2)							
Falco peregrinus Peregrine Falcon	1	1	E	yes			
Falco sparverius American Kestrel	no	3		yes			
Galliformes (grouse, quail, and allies; N = 1)							
Falcipennis canadensis Spruce Grouse	no	3					understudied taxa, climate change
Gaviiformes (loons; N = 2)							
Gavia immer Common Loon	2	3					climate change
Gavia stellata Red-throated Loon	no	3		yes			
Gruiformes (cranes and rails; N = 4)							
Coturnicops noveboracensis Yellow Rail	2	2	SC	yes			climate change
Fulica americana American Coot	2	3	SC				
Gallinula galeata Common Gallinule	2	2	T				climate change
Porzana carolina Sora	no	3		yes			
Passeriformes (perching birds; N = 59)							
Ammodramus caudacutus Saltmarsh Sparrow	1	1	SC	yes		VU	regional endemic
Ammodramus nelsoni Nelson's Sparrow	2	2	SC	yes			climate change

ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

Table 1-3. continued: page 8 of 26

CLASS Order Scientific name (Common name)	Maine SGCN Tier		Scale of Conservation Concern				Other Factors
	2005	2015	State	Regional	National	Global	
AVES (birds; N = 129)							
Passeriformes (perching birds; N = 59)							
Ammodramus savannarum Grasshopper Sparrow	2	1	E	yes			
Anthus rubescens American Pipit	2	2	E				climate change
Cardellina canadensis Canada Warbler	2	2	SC	yes			
Catharus bicknelli Bicknell's Thrush	1	1	SC	yes		VU	regional endemic
Catharus fuscescens Veery	2	2	SC	yes			
Catharus ustulatus Swainson's Thrush	no	3					climate change
Cistothorus platensis Sedge Wren	1	1	E	yes			
Coccothraustes vespertinus Evening Grosbeak	no	2	SC	yes			climate change
Contopus cooperi Olive-sided Flycatcher	2	2	SC	yes			
Contopus virens Eastern Wood-Pewee	no	2	SC	yes			
Dolichonyx oryzivorus Bobolink	2	3		yes			
Empidonax flaviventris Yellow-bellied Flycatcher	no	3					climate change
Empidonax minimus Least Flycatcher	no	3	SC				
Eremophila alpestris Horned Lark	2	3	SC				
Euphagus carolinus Rusty Blackbird	2	1	SC	yes		VU	
Geothlypis philadelphia Mourning Warbler	no	3					climate change
Haemorhous purpureus Purple Finch	2	3		yes			

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Table 1-3. continued: page 9 of 26

CLASS Order Scientific name (Common name)	Maine SGCN Tier		Scale of Conservation Concern				Other Factors
	2005	2015	State	Regional	National	Global	
AVES (birds; N = 129)							
Passeriformes (perching birds; N = 59)							
<i>Hirundo rustica</i> <i>Barn Swallow</i>	2	2	SC	yes			recent significant decline
<i>Hylocichla mustelina</i> <i>Wood Thrush</i>	2	1	SC	yes			recent significant decline
<i>Icterus galbula</i> <i>Baltimore Oriole</i>	2	3		yes			
<i>Icterus spurius</i> <i>Orchard Oriole</i>	no	3	SC				
<i>Loxia curvirostra</i> <i>Red Crossbill</i>	2	3					climate change
<i>Loxia leucoptera</i> <i>White-winged Crossbill</i>	no	3					climate change
<i>Melospiza lincolni</i> <i>Lincoln's Sparrow</i>	no	3					climate change
<i>Mniotilta varia</i> <i>Black-and-white Warbler</i>	2	2	SC	yes			
<i>Oreothlypis peregrina</i> <i>Tennessee Warbler</i>	no	2	SC				climate change
<i>Parkesia motacilla</i> <i>Louisiana Waterthrush</i>	2	3		yes			
<i>Passerella iliaca</i> <i>Fox Sparrow</i>	no	3	SC				
<i>Perisoreus canadensis</i> <i>Gray Jay</i>	no	3					climate change
<i>Petrochelidon pyrrhonota</i> <i>Cliff Swallow</i>	no	3					recent significant decline
<i>Pheucticus ludovicianus</i> <i>Rose-breasted Grosbeak</i>	2	3		yes			
<i>Pinicola enucleator</i> <i>Pine Grosbeak</i>	no	3					climate change
<i>Pipilo erythrophthalmus</i> <i>Eastern Towhee</i>	2	2	SC	yes			
<i>Piranga olivacea</i> <i>Scarlet Tanager</i>	2	3		yes			

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Table 1-3. continued: page 10 of 26

CLASS Order Scientific name (Common name)	Maine SGCN Tier		Scale of Conservation Concern				Other Factors
	2005	2015	State	Regional	National	Global	
AVES (birds; N = 129)							
Passeriformes (perching birds; N = 59)							
<i>Poecile hudsonicus</i> <i>Boreal Chickadee</i>	no	2		yes			climate change
<i>Progne subis</i> <i>Purple Martin</i>	2	2	SC				understudied taxa
<i>Regulus calendula</i> <i>Ruby-crowned Kinglet</i>	no	2					climate change, recent significant declines
<i>Riparia riparia</i> <i>Bank Swallow</i>	no	1		yes			recent significant decline
<i>Setophaga americana</i> <i>Northern Parula</i>	2	3					climate change
<i>Setophaga caerulescens</i> <i>Black-throated Blue Warbler</i>	2	3		yes			
<i>Setophaga castanea</i> <i>Bay-breasted Warbler</i>	2	3		yes			
<i>Setophaga discolor</i> <i>Prairie Warbler</i>	2	2	SC	yes			
<i>Setophaga fusca</i> <i>Blackburnian Warbler</i>	2	3		yes			
<i>Setophaga pensylvanica</i> <i>Chestnut-sided Warbler</i>	2	2	SC	yes			
<i>Setophaga petechia</i> <i>Yellow Warbler</i>	no	3	SC				
<i>Setophaga ruticilla</i> <i>American Redstart</i>	no	2	SC	yes			
<i>Setophaga striata</i> <i>Blackpoll Warbler</i>	no	3					climate change
<i>Setophaga tigrina</i> <i>Cape May Warbler</i>	2	3					climate change
<i>Setophaga virens</i> <i>Black-throated Green Warbler</i>	2	3		yes			
<i>Spizella pusilla</i> <i>Field Sparrow</i>	2	3		yes			

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Table 1-3. continued: page 11 of 26

CLASS Order Scientific name (Common name)	Maine SGCN Tier		Scale of Conservation Concern				Other Factors
	2005	2015	State	Regional	National	Global	
AVES (birds; N = 129)							
Passeriformes (perching birds; N = 59)							
Stelgidopteryx serripennis <i>Northern Rough-winged Swallow</i>	no	3	SC				
Sturnella magna <i>Eastern Meadowlark</i>	2	2	SC	yes			
Tachycineta bicolor <i>Tree Swallow</i>	no	2	SC	yes			
Toxostoma rufum <i>Brown Thrasher</i>	2	2	SC	yes			
Tyrannus tyrannus <i>Eastern Kingbird</i>	2	2	SC	yes			
Vermivora cyanoptera <i>Blue-winged Warbler</i>	1	2	SC	yes			
Zonotrichia albicollis <i>White-throated sparrow</i>	no	3	SC				
Pelecaniformes (pelecan, herons, ibises, and allies; N = 6)							
Ardea herodias <i>Great Blue Heron</i>	2	2	SC				recent significant decline
Botaurus lentiginosus <i>American Bittern</i>	2	3		yes			
Egretta caerulea <i>Little Blue Heron</i>	2	3		yes			
Egretta thula <i>Snowy Egret</i>	2	3		yes			
Ixobrychus exilis <i>Least Bittern</i>	2	1	E	yes			
Nycticorax nycticorax <i>Black-crowned Night-heron</i>	2	2	E				
Piciformes (woodpeckers; N = 3)							
Colaptes auratus <i>Northern Flicker</i>	2	3		yes			
Picoides arcticus <i>Black-backed Woodpecker</i>	no	3					climate change

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Table 1-3. continued: page 12 of 26

CLASS Order Scientific name (Common name)	Maine SGCN Tier		Scale of Conservation Concern				Other Factors
	2005	2015	State	Regional	National	Global	
AVES (birds; N = 129)							
Piciformes (woodpeckers; N = 3)							
Picooides dorsalis American Three-toed Woodpecker	2	3					climate change
Podicipediformes (grebes; N = 2)							
Podiceps auritus Horned Grebe	no	3		yes			
Podilymbus podiceps Pied-billed Grebe	2	3		yes			
Procellariiformes (tubenoses; N = 2)							
Oceanodroma leucorhoa Leach's Storm-petrel	no	3	SC				
Puffinus gravis Great Shearwater	2	3		yes			
Strigiformes (owls; N = 4)							
Asio flammeus Short-eared Owl	1	2	T	yes			
Asio otus Long-eared Owl	2	3					understudied taxa
Megascops asio Eastern Screech-Owl	2	3	SC				understudied taxa
Tyto alba Barn Owl	no	3	SC				
Suliformes (frigatebirds, boobies, cormorants, darters, and allies; N = 1)							
Phalacrocorax carbo Great Cormorant	2	1	T	yes			recent significant decline
BIVALVIA (marine and freshwater molluscs; N = 14)							
Myoida (saltwater clams; N = 3)							
Mya arenaria Softshell Clam	no	3					climate change
Mya truncata Gaper Clam	no	3					rediscovery potential, understudied taxa, climate change, recent significant declines

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Table 1-3. continued: page 13 of 26

CLASS Order Scientific name (Common name)	Maine SGCN Tier		Scale of Conservation Concern				Other Factors
	2005	2015	State	Regional	National	Global	
BIVALVIA (marine and freshwater molluscs; N = 14)							
Myoida (saltwater clams; N = 3)							
Zirfaea crispata Atlantic Great Piddock	no	2					understudied taxa, climate change, recent significant declines
Mytiloida (mussels; N = 1)							
Mytilus edulis Blue Mussel	no	3					climate change
Ostreoida (oysters, scallops, and allies; N = 1)							
Crassostrea virginica Eastern oyster	no	3					understudied taxa, climate change
Pectinoida (N = 2)							
Chlamys islandica Icelandic Scallop	no	3					understudied taxa, climate change
Placopecten magellanicus Atlantic Sea Scallop	no	3					recent significant decline
Unionoida (freshwater mussels; N = 6)							
Alasmidonta undulata Triangle Floater	no	3		yes			
Alasmidonta varicosa Brook Floater	2	1	T	yes			
Anodonta implicata Alewife Floater	no	3		yes			
Lampsilis cariosa Yellow Lampmussel	1	1	T	yes		EN	
Leptodea ochracea Tidewater Mucket	1	1	T	yes			
Margaritifera margaritifera Eastern Pearlshell	no	3				EN	
Veneroida (veneroids; N = 1)							
Mercenaria mercenaria Hard-shelled Clam	no	3					climate change
CEPHALASPIDOMORPHI (lampreys; N = 1)							
Petromyzontiformes (lampreys; N = 1)							
Lethenteron appendix American Brook Lamprey	no	3		yes			

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Table 1-3. continued: page 14 of 26

CLASS Order Scientific name (Common name)	Maine SGCN Tier		Scale of Conservation Concern				Other Factors
	2005	2015	State	Regional	National	Global	
CHONDRICHTHYES (sharks, rays, and skates; N = 9)							
Carcharhiniformes (ground sharks; N = 2)							
Prionace glauca Blue Shark	no	3					
Sphyrna zygaena Smooth Hammerhead	no	3				VU	
Lamniformes (sharks, skates, and rays ; N = 3)							
Alopias vulpinus Common Thresher Shark	no	3				VU	
Isurus oxyrinchus Shortfin Mako	no	2		yes		VU	
Lamna nasus Porbeagle	no	2		yes	SoC	VU	
Rajiformes (rays; N = 4)							
Amblyraja radiata Thorny Skate	no	2			SoC	VU	
Dipturus laevis Barndoor Skate	no	2		yes		EN	
Leucoraja ocellata Winter Skate	no	2				EN	
Malacoraja senta Smooth Skate	no	2				EN	
ECHINOIDEA (sea urchins; N = 1)							
Camarodonta (sea urchins; N = 1)							
Strongylocentrotus droebachiensis Green Sea Urchin	no	2					climate change, recent significant declines
GASTROPODA (aquatic and terrestrial snails; N = 15)							
Basommatophora (air-breathing freshwater snails; N = 2)							
Stagnicola mighelsi Bigmouth Pondsnaill	2	1	SC	yes			regional endemic
Stagnicola oronoensis Obese Pondsnaill	no	3					understudied taxa
Littorinimorpha (N = 2)							
Arrhoges occidentalis American Pelican Foot	no	2					understudied taxa, climate change, recent significant declines

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Table 1-3. continued: page 15 of 26

CLASS Order Scientific name (Common name)	Maine SGCN Tier		Scale of Conservation Concern				Other Factors
	2005	2015	State	Regional	National	Global	
GASTROPODA (aquatic and terrestrial snails; N = 15)							
Littorinimorpha (N = 2)							
Limneria undata Wavy Lamellaria	no	3					understudied taxa, climate change
Neotaenioglossa (mostly sea snails; N = 5)							
Boreotrophon clathratus Clathrate Trophon	no	2					understudied taxa, climate change, recent significant declines
Boreotrophon truncatus Murex	no	2					understudied taxa, climate change, recent significant declines
Colus pygmaeus Colus Snail	no	2					understudied taxa, climate change, recent significant declines
Floridobia winkleyi New England Silt Snail	no	3					understudied taxa, regional endemic
Ptychatractus ligatus Spindle Shell	no	2					understudied taxa, climate change, recent significant declines
Stylommatophora (air-breathing snails land snails; N = 5)							
Appalachina sayana Spike-lip Crater	no	3					understudied taxa
Neohelix dentifera Big-tooth Whitelip	no	3					understudied taxa
Vertigo malleata Malleated Vertigo	no	3	SC				understudied taxa
Vertigo morsei Six-whorl Vertigo	2	1	E				understudied taxa, climate change
Vertigo paradoxa Mystery Vertigo	2	2	SC				
Thecosomata (sea butterflies; N = 1)							
Limacina helicina Limacina Snail	no	3					climate change

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Table 1-3. continued: page 16 of 26

CLASS Order Scientific name (Common name)	Maine SGCN Tier		Scale of Conservation Concern				Other Factors
	2005	2015	State	Regional	National	Global	
HOLOTHUROIDEA (sea cucumbers; N = 4)							
Dendrochirotida (sea cucumbers; N = 4)							
Cucumaria frondosa Orange-footed Sea Cucumber	no	2					climate change, recent significant declines
Psolus fabricii Psolus	no	2					understudied taxa, climate change, recent significant declines
Psolus phantapus Psolus	no	2					understudied taxa, climate change, recent significant declines
Thyonidium drummondii Sea Cucumber	no	2					understudied taxa, climate change, recent significant declines
INSECTA (insects; N = 119)							
Coleoptera (beetles; N = 4)							
Cicindela ancocisconensis White Mountain Tiger Beetle	no	2	SC	yes			understudied taxa
Cicindela marginata Salt Marsh Tiger Beetle	no	2	SC				climate change
Cicindela marginipennis Cobblestone Tiger Beetle	no	1	E	yes			understudied taxa
Nebria nivalis gaspesiana Gaspé Gazelle Beetle	no	3					understudied taxa
Ephemeroptera (mayflies; N = 15)							
Ameletus browni A Mayfly	no	3	SC				understudied taxa
Baetisca berneri A Mayfly	no	3	SC				understudied taxa
Baetisca carolina A Mayfly	no	3	SC				understudied taxa
Baetisca lacustris A Mayfly	no	3	SC				understudied taxa
Baetisca rubescens A Mayfly	2	3	SC				understudied taxa, climate change
Epeorus frisoni Roaring Brook Mayfly	1	1	T	yes			regional endemic

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Table 1-3. continued: page 17 of 26

CLASS Order Scientific name (Common name)	Maine SGCN Tier		Scale of Conservation Concern				Other Factors
	2005	2015	State	Regional	National	Global	
INSECTA (insects; N = 119)							
Ephemeroptera (mayflies; N = 15)							
Hexagenia rigida <i>A Mayfly</i>	no	3	SC				understudied taxa
Metretopus borealis <i>A Mayfly</i>	no	3	SC				understudied taxa
Nixe horrida <i>A Mayfly</i>	2	3	SC	yes			understudied taxa
Pameletus midas <i>A Mayfly</i>	no	3	SC				understudied taxa
Rhithrogena undulata <i>A Mayfly</i>	no	3	SC				understudied taxa
Siphonisca aerodromia <i>Tomah Mayfly</i>	1	1	T				regional endemic
Siphonurus barbaroides <i>A Mayfly</i>	no	3	SC				understudied taxa
Siphonurus barbarus <i>A Mayfly</i>	no	2	SC	yes			understudied taxa
Siphonurus demaryi <i>A Mayfly</i>	2	2	SC	yes			understudied taxa, regional endemic
Hymenoptera (ants, bees, wasps and sawflies; N = 10)							
Bombus affinis <i>Rusty-patched Bumble Bee</i>	no	1	SC	yes			recent significant decline
Bombus ashtoni <i>Ashton's Cuckoo Bumble Bee</i>	no	2	SC				rediscovery potential, recent significant declines
Bombus citrinus <i>Lemon Cuckoo Bumble Bee</i>	no	3	SC				understudied taxa
Bombus fernaldae <i>Fernald's Cuckoo Bumble Bee</i>	no	3	SC				understudied taxa
Bombus fervidus <i>Yellow Bumble Bee</i>	no	3	SC				understudied taxa
Bombus griseocollis <i>Brown-belted Bumble Bee</i>	no	3	SC				understudied taxa

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Table 1-3. continued: page 18 of 26

CLASS Order Scientific name (Common name)	Maine SGCN Tier		Scale of Conservation Concern				Other Factors
	2005	2015	State	Regional	National	Global	
INSECTA (insects; N = 119)							
Hymenoptera (ants, bees, wasps and sawflies; N = 10)							
<i>Bombus insularis</i> <i>Indiscriminate Cuckoo</i> <i>Bumble Bee</i>	no	2	SC				rediscovery potential, understudied taxa
<i>Bombus pensylvanicus</i> <i>American Bumble Bee</i>	no	2	SC				rediscovery potential, recent significant declines
<i>Bombus sandersoni</i> <i>Sanderson's Bumble Bee</i>	no	3	SC				understudied taxa
<i>Bombus terricola</i> <i>Yellowbanded Bumble Bee</i>	no	3	SC				recent significant decline
Lepidoptera (butterflies, skippers, and moths; N = 47)							
<i>Atrytonopsis hianna</i> <i>Dusted Skipper</i>	no	3	SC				understudied taxa
<i>Boloria chariclea grandis</i> <i>Purple Lesser Fritillary</i>	2	2	T				understudied taxa, climate change
<i>Boloria frigga saga</i> <i>Frigga Fritillary</i>	2	1	E				understudied taxa, climate change
<i>Callophrys gryneus</i> <i>Juniper Hairstreak</i>	2	2	E				understudied taxa
<i>Callophrys hesseli</i> <i>Hessel's Hairstreak</i>	1	1	E				understudied taxa
<i>Callophrys lanoraieensis</i> <i>Bog Elfin</i>	no	3					regional endemic
<i>Catocala similis</i> <i>Similar Underwing</i>	no	3	SC				understudied taxa
<i>Chaetagnaea cerata</i> <i>A Noctuid Moth</i>	2	2	SC				rediscovery potential
<i>Chaetagnaea tremula</i> <i>Barrens Chaetagnaea</i>	no	3	SC				understudied taxa
<i>Citheronia sepulcralis</i> <i>Pine Devil</i>	2	2	SC				rediscovery potential
<i>Cucullia speyeri</i> <i>A Moth</i>	2	3					rediscovery potential
<i>Cupido amyntula maritima</i> <i>Western Tailed Blue</i>	no	3					understudied taxa

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Table 1-3. continued: page 19 of 26

CLASS Order Scientific name (Common name)	Maine SGCN Tier		Scale of Conservation Concern				Other Factors
	2005	2015	State	Regional	National	Global	
INSECTA (insects; N = 119)							
Lepidoptera (butterflies, skippers, and moths; N = 47)							
<i>Danaus plexippus</i> <i>Monarch</i>	no	3					recent significant decline
<i>Erora laeta</i> <i>Early Hairstreak</i>	2	2	SC				rediscovery potential
<i>Erynnis brizo</i> <i>Sleepy Duskywing</i>	2	2	T				
<i>Hemaris gracilis</i> <i>Graceful Clearwing</i>	2	3	SC				understudied taxa
<i>Hemileuca lucina</i> <i>New England Buckmoth</i>	no	3					regional endemic
<i>Hemileuca maia maia</i> <i>Eastern Buckmoth</i>	2	2	SC				understudied taxa
<i>Hesperia leonardus</i> <i>Leonard's Skipper</i>	2	3	SC				
<i>Hesperia metea</i> <i>Cobweb Skipper</i>	2	3	SC				understudied taxa
<i>Lapara coniferarum</i> <i>Southern Pine Sphinx</i>	no	3	SC				understudied taxa
<i>Lepipolys perscripta</i> <i>A Moth</i>	no	3	SC				understudied taxa
<i>Lithophane lepida lepida</i> <i>Pine Pinion</i>	2	2	SC	yes			understudied taxa, regional endemic
<i>Lycaena dorcas claytoni</i> <i>Clayton's Copper</i>	1	2	T	yes			
<i>Lycia rachelae</i> <i>Twilight Moth</i>	1	2	T				understudied taxa
<i>Metarranthis apiciaria</i> <i>Barrens Metarranthis Moth</i>	no	2	SC	yes			rediscovery potential
<i>Nepytia pellucidaria</i> <i>A Moth</i>	2	3	SC				understudied taxa
<i>Oeneis polixenes katahdin</i> <i>Katahdin Arctic</i>	1	1	E	yes			regional endemic
<i>Paonias astylus</i> <i>Huckleberry Sphinx</i>	no	3	SC				understudied taxa

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Table 1-3. continued: page 20 of 26

CLASS Order Scientific name (Common name)	Maine SGCN Tier		Scale of Conservation Concern				Other Factors
	2005	2015	State	Regional	National	Global	
INSECTA (insects; N = 119)							
Lepidoptera (butterflies, skippers, and moths; N = 47)							
Papilio brevicauda gaspeensis <i>Short-tailed Swallowtail</i>	no	3	SC				understudied taxa
Papilio troilus <i>Spicebush Swallowtail</i>	2	3	SC				
Plebejus idas <i>Northern Blue</i>	no	2	SC				understudied taxa, climate change
Plebejus idas empetri <i>Crowberry Blue</i>	2	2	SC				regional endemic
Polygonia satyrus <i>Satyr Comma</i>	no	3	SC				understudied taxa
Psectraglaea carmosa <i>Pink Sallow</i>	2	2	SC				rediscovery potential, understudied taxa
Satyrium edwardsii <i>Edwards' Hairstreak</i>	2	2	E				understudied taxa
Satyrium titus <i>Coral Hairstreak</i>	2	3	SC				
Satyroides appalachia <i>Appalachian Brown</i>	no	3	SC				
Spartiniphaga inops <i>Spartina Borer Moth</i>	no	3					rediscovery potential
Speranza exonerata <i>Barrens Itame</i>	2	2	SC				understudied taxa, regional endemic
Thorybes bathyllus <i>Southern Cloudywing</i>	no	3	SC				understudied taxa
Xylena thoracica <i>Acadian Swordgrass Moth</i>	no	3	SC				
Xylotype capax <i>Broad Sallow</i>	no	3	SC				understudied taxa
Xystocheilus rufago <i>Red-winged Sallow</i>	no	3	SC				understudied taxa
Zale lunifera <i>Bold-based Zale Moth</i>	2	3	SC				understudied taxa
Zale obliqua <i>Oblique Zale</i>	no	3	SC				understudied taxa

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Table 1-3. continued: page 21 of 26

CLASS Order Scientific name (Common name)	Maine SGCN Tier		Scale of Conservation Concern				Other Factors
	2005	2015	State	Regional	National	Global	
INSECTA (insects; N = 119)							
Lepidoptera (butterflies, skippers, and moths; N = 47)							
Zanclognatha martha Pine Barrens Zanclognatha	2	1	T				understudied taxa, regional endemic
Odonata (dragonflies and damselflies; N = 36)							
Aeshna juncea Sedge Darner	2	2	SC	yes			understudied taxa, climate change
Aeshna sitchensis Zigzag Darner	no	3	SC	yes			
Anax longipes Comet Darner	no	3	SC				understudied taxa
Argia translata Dusky Dancer	2	3	SC				understudied taxa
Arigomphus furcifer Lilypad Clubtail	no	3	SC				
Celithemis martha Martha's Pennant	no	3		yes			regional endemic
Cordulegaster obliqua Arrowhead Spiketail	2	3	SC	yes			
Enallagma carunculatum Tule Bluet	2	3	SC				understudied taxa
Enallagma durum Big Bluet	2	3	SC				understudied taxa
Enallagma laterale New England Bluet	no	2		yes			regional endemic
Enallagma pictum Scarlet Bluet	2	2	SC	yes			regional endemic
Epiaeschna heros Swamp Darner	2	3	SC				understudied taxa
Erythrodiplax berenice Seaside Dragonlet	no	3		yes			
Gomphus quadricolor Rapids Clubtail	1	2	E				
Gomphus vastus Cobra Clubtail	2	3	SC				understudied taxa
Ischnura hastata Citrine Forktail	2	3	SC				understudied taxa

ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

Table 1-3. continued: page 22 of 26

CLASS Order Scientific name (Common name)	Maine SGCN Tier		Scale of Conservation Concern				Other Factors
	2005	2015	State	Regional	National	Global	
INSECTA (insects; N = 119)							
Odonata (dragonflies and damselflies; N = 36)							
<i>Ischnura ramburii</i> <i>Rambur's Forktail</i>	2	3	SC				understudied taxa
<i>Lanthus vernalis</i> <i>Southern Pygmy Clubtail</i>	no	2	SC				regional endemic
<i>Leucorrhinia patricia</i> <i>Canada Whiteface</i>	2	2	SC	yes			climate change
<i>Libellula needhami</i> <i>Needhams Skimmer</i>	no	3	SC				understudied taxa
<i>Libellula semifasciata</i> <i>Painted Skimmer</i>	no	3	SC				
<i>Nannothemis bella</i> <i>Elfin Skimmer</i>	no	3		yes			
<i>Neurocordulia michaeli</i> <i>Broad-tailed Shadowdragon</i>	no	3		yes			
<i>Ophiogomphus anomalus</i> <i>Extra-striped Snaketail</i>	no	3		yes			
<i>Ophiogomphus colubrinus</i> <i>Boreal Snaketail</i>	2	1	T	yes			
<i>Ophiogomphus howei</i> <i>Pygmy Snaketail</i>	2	2	SC	yes			
<i>Progomphus obscurus</i> <i>Common Sanddragon</i>	no	3	SC				
<i>Rhionaeschna mutata</i> <i>Spatterdock Darner</i>	1	3	SC				understudied taxa
<i>Somatochlora albicincta</i> <i>Ringed Emerald</i>	no	3	SC				
<i>Somatochlora brevicincta</i> <i>Quebec Emerald</i>	2	2	SC	yes			climate change
<i>Somatochlora incurvata</i> <i>Incurvate Emerald</i>	no	3	SC	yes			
<i>Somatochlora minor</i> <i>Ocellated Emerald</i>	no	3		yes			
<i>Stylurus spiniceps</i> <i>Arrow Clubtail</i>	2	3	SC				

ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

Table 1-3. continued: page 23 of 26

CLASS Order Scientific name (Common name)	Maine SGCN Tier		Scale of Conservation Concern				Other Factors
	2005	2015	State	Regional	National	Global	
INSECTA (insects; N = 119)							
Odonata (dragonflies and damselflies; N = 36)							
Tramea carolina Carolina Saddlebags	no	3	SC				understudied taxa
Tramea lacerata Black Saddlebags	no	3	SC				understudied taxa
Williamsonia lintneri Ringed Boghaunter	1	1	T	yes		VU	regional endemic
Plecoptera (stoneflies; N = 3)							
Alloperla voinae A Stonefly	no	3					regional endemic
Neoperla mainensis A Stonefly	2	3	SC	yes			rediscovery potential
Pteronarcys comstocki Spiny Salmonfly	no	3					rediscovery potential
Trichoptera (caddisflies; N = 4)							
Hydroptila blicklei A Caddisfly	no	3	SC	yes			understudied taxa, regional endemic
Hydroptila parachelops A Caddisfly	no	3	SC	yes			understudied taxa, regional endemic
Hydroptila tomah A Caddisfly	2	3	SC	yes			understudied taxa, regional endemic
Ochrotrichia denningi A Caddisfly	no	3					rediscovery potential, understudied taxa
MALACOSTRACA (crustaceans; N = 4)							
Decapoda (decapods; N = 4)							
Lebbeus groenlandicus Spiny Lebbeid Shrimp	no	2					understudied taxa, climate change, recent significant declines
Lebbeus polaris Polar Lebbeid Shrimp	no	2					understudied taxa, climate change, recent significant declines
Orconectes limosus Spinycheek Crayfish	no	3					regional endemic
Pandalus borealis Northern Shrimp	no	1		yes			regional endemic, recent significant declines

ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

Table 1-3. continued: page 24 of 26

CLASS Order Scientific name (Common name)	Maine SGCN Tier		Scale of Conservation Concern				Other Factors
	2005	2015	State	Regional	National	Global	
MAMMALIA (mammals; N = 22)							
Artiodactyla (even-toed ungulates; N = 1)							
<i>Alces alces americanus</i> <i>Moose</i>	no	3					culturally significant
Carnivora (carnivores; N = 1)							
<i>Lynx canadensis</i> <i>Canada Lynx</i>	2	2	SC		T		climate change
Cetacea (whales; N = 7)							
<i>Balaenoptera borealis</i> <i>Sei Whale</i>	1	2	E	yes	E	EN	
<i>Balaenoptera musculus</i> <i>Blue Whale</i>	no	2		yes	E	EN	
<i>Balaenoptera physalus</i> <i>Finback Whale</i>	1	2	E	yes	E	EN	
<i>Eubalaena glacialis</i> <i>North Atlantic Right Whale</i>	1	1	E	yes	E	EN	
<i>Megaptera novaeangliae</i> <i>Humpback Whale</i>	1	1	E	yes	E		
<i>Phocoena phocoena</i> <i>Harbor Porpoise</i>	no	2					
<i>Physeter macrocephalus</i> <i>Sperm Whale</i>	1	2	E	yes	E	VU	
Chiroptera (bats; N = 8)							
<i>Eptesicus fuscus</i> <i>Big Brown Bat</i>	no	2	SC				recent significant decline
<i>Lasionycteris noctivagans</i> <i>Silver-haired Bat</i>	no	2	SC	yes			
<i>Lasiurus borealis</i> <i>Eastern Red Bat</i>	no	3	SC				
<i>Lasiurus cinereus</i> <i>Hoary Bat</i>	no	3	SC				
<i>Myotis leibii</i> <i>Eastern Small-footed Myotis</i>	2	1	T	yes			
<i>Myotis lucifugus</i> <i>Little Brown Bat</i>	no	1	E				recent significant decline
<i>Myotis septentrionalis</i> <i>Northern Long-eared Myotis</i>	no	1	E	yes	T		recent significant decline

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Table 1-3. continued: page 25 of 26

CLASS Order Scientific name (Common name)	Maine SGCN Tier		Scale of Conservation Concern				Other Factors
	2005	2015	State	Regional	National	Global	
MAMMALIA (mammals; N = 22)							
Chiroptera (bats; N = 8)							
Perimyotis subflavus Tri-colored Bat	no	2	SC	yes			
Lagomorpha (rabbits, hares, and pikas; N = 1)							
Sylvilagus transitionalis New England Cottontail	1	1	E	yes	C	VU	regional endemic, recent significant declines
Rodentia (rodents; N = 3)							
Microtus pennsylvanicus shattucki Penobscot Meadow Vole	1	2	SC	yes			
Ondatra zibethicus Muskrat	no	3					culturally significant
Synaptomys borealis sphagnicola Northern Bog Lemming	2	1	T	yes			
Soricomorpha (shrews and relatives; N = 1)							
Sorex dispar Long-tailed Shrew	no	3		yes			
MAXILLOPODA (crustaceans; N = 1)							
Calanoida (calanoid copepods; N = 1)							
Calanus finmarchicus A Copepod	no	3					climate change
MEROSTOMATA (horseshoe crabs and sea scorpions; N = 1)							
Xiphosurida (horseshoe crabs; N = 1)							
Limulus polyphemus Horseshoe Crab	no	1		yes			recent significant decline
OPHIUROIDEA (brittle stars; N = 1)							
Euryalida (basket stars; N = 1)							
Gorgonocephalus arcticus Northern Basket Starfish	no	2					understudied taxa, climate change, recent significant declines

ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

Table 1-3. continued: page 26 of 26

CLASS Order Scientific name (Common name)	Maine SGCN Tier		Scale of Conservation Concern				Other Factors
	2005	2015	State	Regional	National	Global	
REPTILIA (reptiles; N = 11)							
Squamata (lizards and snakes; N = 3)							
<i>Coluber constrictor</i> <i>constrictor</i> <i>Northern Black Racer</i>	2	1	E	yes			
<i>Storeria dekayi dekayi</i> <i>Northern Brownsnake</i>	no	2	SC				regional endemic
<i>Thamnophis sauritus</i> <i>Eastern Ribbon Snake</i>	no	2	SC	yes			
Testudines (turtles and tortoises; N = 8)							
<i>Caretta caretta</i> <i>Loggerhead Seaturtle</i>	no	2	T	yes	T	EN	
<i>Chelonia mydas</i> <i>Green Seaturtle</i>	no	2		yes	E	EN	
<i>Clemmys guttata</i> <i>Spotted Turtle</i>	2	1	T	yes		EN	
<i>Dermochelys coriacea</i> <i>Leatherback Seaturtle</i>	no	1	E	yes	E		
<i>Dermochelys coriacea</i> <i>Leatherback Seaturtle</i>	no	1	E	yes	E	VU	
<i>Emydoidea blandingii</i> <i>Blanding's Turtle</i>	1	1	E	yes		EN	
<i>Glyptemys insculpta</i> <i>Wood Turtle</i>	2	1	SC	yes		EN	
<i>Lepidochelys kempii</i> <i>Kemp's Ridley Seaturtle</i>	no	2	E	yes	E	CR	
<i>Terrapene carolina carolina</i> <i>Eastern Box Turtle</i>	1	2	E	yes		VU	
RHYNCHONELLATA (brachiopods; N = 1)							
Terebratulida (articulate brachiopods; N = 1)							
<i>Terebratulina septentrionalis</i> <i>Lamp Shell</i>	no	2					understudied taxa, climate change, recent significant declines

ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

1.7 LITERATURE CITED

- Association of Fish and Wildlife Agencies, Teaming With Wildlife Committee, State Wildlife Action Plan (SWAP) Best Practices Working Group. 2012. Best Practices for State Wildlife Action Plans - Voluntary Guidance to States for Revision and Implementation. Washington (DC): Association of Fish and Wildlife Agencies. 80pp.
- Blickle, R. L. and W. J. Morse. 1966. The caddisflies (Trichoptera) of Maine excepting the Family Hydroptilidae. Maine Agricultural Experiment Station Technical Bull. T-24. University of Maine, Orono. 12pp.
- Brower, A. E. 1974. A list of the Lepidoptera of Maine, Part I, The Macrolepidoptera. Maine Agricultural Experiment Station Technical Bull. 66. Univ. of Maine, Orono. 136pp.
- _____. 1983. A list of the Lepidoptera of Maine, Part 2, The Microlepidoptera, Section 1, Limacodidae through Cossidae. Maine Forest Service and Maine Agricultural Experiment Station Technical Bull. 109. University of Maine, Orono. 60pp.
- _____. 1984. A list of the Lepidoptera of Maine, Part 2, The Microlepidoptera, Section 2, Cosmopterigidae through Hepialidae. Maine Forest Service and Maine Agricultural Experiment Station Technical Bull. 114. University of Maine, Orono. 70pp.
- Brunelle, P.M., and P.G. deMaynadier. 2005. The Maine Damselfly and Dragonfly Survey: A Final Report. Technical report submitted to the Maine Department of Inland Fisheries and Wildlife, Bangor, ME.
- Burian, S. K. and K. E. Gibbs. 1991. Mayflies of Maine: An Annotated Faunal List. Technical Bulletin 142, Maine Agricultural Experiment Station, University of Maine, Orono, Maine. 109pp.
- Carlton, J.T., G. J. Vermeij, D. R. Lindberg, D. A. Carlton, and E.C. Dubley. 1991. The first historical extinction of a marine invertebrate in an ocean basin: the demise of the eelgrass limpet *Lottia alveus*. Biological Bulletin 180(1):72-80.
- Clark, K. E. and L. J. Niles. 2000. North Atlantic Regional Shorebird Plan. Endangered and Nongame Species Program, Woodbine, NJ. 17pp. plus appendices.
- Dearborn, R. G., R. Bradbury, and G. Russell. 1983. The forest insect survey of Maine: Order Hymenoptera. Maine Forest Service Entomology Division Tech. Rep. 202. Maine Department of Conservation, Augusta. 101pp.
- Ferree, C. and M. G. Anderson. 2013. A Map of Terrestrial Habitats of the Northeastern United States: Methods and Approach. The Nature Conservancy, Eastern Conservation Science, Eastern Regional Office. Boston, MA. 85pp.
- Gawler, S. C., J. J. Albright, P. D. Vickery, and F. C. Smith. 1996. Biological diversity in Maine – an assessment of status and trends in the terrestrial and freshwater landscape. Maine Natural Areas Program, Department of Conservation, Augusta, Maine. 80pp plus appendices.

- Gleich, J. G. and F. F. Gilbert. 1976. A survey of terrestrial gastropods from central Maine. *Canadian Journal of Zoology* 54:620-627.
- Hotopp, K. C., 2012. Freshwater Snail Inventory of the Fish River Lakes. Report for Maine Outdoor Heritage Fund, Pittston, Maine. 55pp.
- Hotopp, K. P. and D. A. Smith. 1994. Notes on land snails near Big Reed Pond. Unpublished report to the Maine Chapter of The Nature Conservancy, Brunswick, Maine. 4pp.
- Huryn, A. D. and S. C. Harris. 2000. High species richness of caddisflies (Trichoptera) from a riparian wetland in Maine. *Northeastern Naturalist* 7:189-204.
- International Union for Conservation of Nature. 2014. IUCN Red List [web application]. Version 4.0. IUCN, Gland, Switzerland. Available at <http://www.iucnredlist.org/> (Accessed: January - April, 2014).
- Jelks, H. L., S. J. Walsh, N. M. Burkhead, S. Contreras-Balderas, E. Díaz-Pardo, D. A. Hendrickson, J. Lyons, N. E. Mandrak, F. McCormick, J. S. Nelson, S. P. Platania, B. A. Porter, C. B. Renaud, J. J. Schmitter-Soto, E. B. Taylor, and M. L. Warren, Jr. 2008. Conservation status of imperiled North American freshwater and diadromous fishes. *Fisheries* 33:372-407.
- Krohn, W. B., R. B. Boone, S. A. Sader, J. A. Hepinstall, S. M. Schaefer, and S. L. Painton. 1998. The Maine GAP Analysis Project, Final Report. University of Maine, Orono, Maine. 123pp plus appendices.
- Kushlan, J. A., M. J. Steinkamp, K. C. Parsons, J. Capp, M. Acosta Cruz, M. Coulter, I. Davidson, L. Dickson, N. Edelson, R. Elliot, R. M. Erwin, S. Hatch, S. Kress, R. Milko, S. Miller, K. Mills, R. Paul, R. Phillips, J. E. Saliva, B. Sydeman, J. Trapp, J. Wheeler, and K. Wohl. 2002. Waterbird Conservation for the Americas: The North American waterbird conservation plan, Version 1. Waterbird conservation for the Americas, Washington, DC. 78pp. <http://www.waterbirdconservation.org/pubs/complete.pdf>
- Majka, C. D., D. S. Chandler, and C. P. Donahue, 2011. Checklist of the Beetles of Maine, USA. Empty Mirrors Press, Halifax, Nova Scotia, Canada. 328pp.
- Martin, S. M. 1999. Freshwater snails (Mollusca: Gastropoda) of Maine. *Northeastern Naturalist* 6(1):39-88.
- _____. 2000. Terrestrial snails and slugs (Mollusca: Gastropoda) of Maine. *Northeastern Naturalist* 7(1):33-88.
- McCullough, M. A. 1997. Conservation of invertebrates in Maine and New England: perspectives and prognoses. *Northeastern Naturalist* 4(4):261-278.
- Mingo, T. M. 1983. An annotated checklist of the stoneflies (Plecoptera) of Maine. *Entomology News* 94(2):65-72.

- NatureServe. 2014. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, VA. Available at <http://www.natureserve.org/explorer> (Accessed: January - April, 2014).
- Nedeau, E. J., M. A. McCollough, and B. I. Swartz. 2000. The freshwater mussels of Maine. Maine Department of Inland Fisheries and Wildlife, State House Station #41, Augusta, ME. 118pp.
- Nekola, J. C., 2008. Land Snail Ecology and Biogeography of Eastern Maine. Report to the Maine Department of Inland Fisheries and Wildlife, Augusta, Maine. 119pp.
- NEPARC. 2010. Northeast Amphibian and Reptile Species of Regional Responsibility and Conservation Concern. Northeast Partners in Amphibian and Reptile Conservation (NEPARC). Publication 2010-1.
- Stubbs, C. S., E. A. Osgood, J. D. Dimond, and F. A. Drummond. 1995. Letter to Maine Natural Areas Program, Augusta. 6pp.
- Terwilliger Consulting, Inc. and the Northeast Fish and Wildlife Diversity Technical Committee. 2013. Taking action together: Northeast regional synthesis for state wildlife action plans. A report submitted to the Northeast Fish and Wildlife Association. Locustville, VA. 291pp.
- Therres, G. D. 1999. Wildlife species of regional conservation concern in the northeastern United States. *Northeast Wildlife* 54:93-100.
- Thomas, J. A., M. G. Telfer, D. B. Roy, C. D. Preston, J. D. Greenwood, J. Asher, R. Fox, R. T. Clarke, and J. H. Lawton. 2004. Comparative losses of British butterflies, birds, and plants and the global extinction crisis. *Science* 303:1879-1881.
- U.S. Fish and Wildlife Service. 2008. Birds of conservation concern - 2008. U.S. Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, VA. 85pp.
- Webster, R.P. and P.G. deMaynadier. 2005. A Baseline Atlas and Conservation Assessment of the Butterflies of Maine. A Technical Report submitted to the Maine Department of Inland Fisheries and Wildlife, Bangor, ME.
- White, E. L., P. D. Hunt, M. D. Schlesinger, J. D. Corser, and P. G. deMaynadier. 2014. A conservation status assessment of Odonata for the northeastern United States. New York Natural Heritage Program, Albany. 50pp.
- Whitman, A., A. Cutko, P. deMaynadier, S. Walker, B. Vickery, S. Stockwell, and R. Houston. 2013. Climate change and biodiversity in Maine: vulnerability of habitats and priority species. Manomet Center for Conservation Sciences (in collaboration with Maine Beginning with Habitat Climate Change Working Group) Report NCI-2013-03. 105pp. Brunswick, ME.

Appendix 1-1. Maine's list of state-designated endangered / threatened plants administered by the Maine Natural Areas Program.

UNDER DEVELOPMENT

Appendix 1-2. Maine's list of state-designated endangered / threatened inland fish and wildlife administered by the Maine Department of Inland Fisheries and Wildlife (12 MRSA, §12803).

<u>Taxa group (class)</u> Common name	Scientific name	Legal status (year listed)
<u>Birds (Class Aves)</u>		
American Pipit	<i>Anthus rubescens</i>	Endangered (1997)
Arctic Tern	<i>Sterna paradisaea</i>	Threatened (1997)
Atlantic Puffin	<i>Fratercula arctica</i>	Threatened (1997)
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Recovered (2009) / Threatened (1996) / Endangered (1978)
Barrow's Goldeneye	<i>Bucephala islandica</i>	Threatened (2007)
Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	Endangered (2015) Threatened (2007)
Black Tern	<i>Chlidonias niger</i>	Endangered (1997)
Common Moorhen	<i>Gallinula chloropus</i>	Threatened (2007)
Golden Eagle	<i>Aquila chrysaetos</i>	Endangered (1987)
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	Endangered (1987)
Great Cormorant	<i>Phalacrocorax carbo</i>	Threatened (2007)
Harlequin Duck	<i>Histrionicus histrionicus</i>	Threatened (1997)
Least Bittern	<i>Ixobrychus exilis</i>	Endangered (2007)
Least Tern	<i>Sternula antillarum</i>	Endangered (1984)
Peregrine Falcon	<i>Falco peregrinus</i>	Endangered (1975)
Piping Plover	<i>Charadrius melodus</i>	Endangered (1987)
Razorbill	<i>Alca torda</i>	Threatened (1997)
Roseate Tern	<i>Sterna dougallii</i>	Endangered (1997) / Threatened (1987)
Sedge Wren	<i>Cistothorus platensis</i>	Endangered (1987)
Short-eared Owl	<i>Asio flammeus</i>	Threatened (2007)
Upland Sandpiper	<i>Bartramia longicauda</i>	Threatened (1997)
<u>Fish (Class Actinopterygii)</u>		
Redfin Pickerel	<i>Esox americanus americanus</i>	Endangered (2007)
Swamp Darter	<i>Etheostoma fusiforme</i>	Threatened (1997)
<u>Insects (Class Insecta)</u>		
Boreal Snaketail	<i>Ophiogomphus colubrinus</i>	Threatened (2007)
Clayton's Copper	<i>Lycaena dorcas claytoni</i>	Threatened (2015) / Endangered (1997)
Cobblestone Tiger Beetle	<i>Cicindela marginipennis</i>	Endangered (2015)
Edwards' Hairstreak	<i>Satyrrium edwardsii</i>	Endangered (1997)
Frigga Fritillary	<i>Boloria Frigga</i>	Endangered (2015)
Hessel's Hairstreak	<i>Callophrys hesseli</i>	Endangered (1997)
Juniper Hairstreak	<i>Callophrys gryneus</i>	Endangered (2007)
Katahdin Arctic	<i>Oeneis polixenes katahdin</i>	Endangered (1997)
Pine Barrens Zanclognatha	<i>Zanclognatha martha</i>	Threatened (1997)
Purple Lesser Fritillary	<i>Boloria chariclea grandis</i>	Threatened (2007)
Rapids Clubtail	<i>Gomphus quadricolor</i>	Endangered (2007)

Appendix 1-2. continued: page 2 of 2.

<u>Taxa group (class)</u> Common name	Scientific name	Legal status (year listed)
<u>Insects (Class Insecta) continued</u>		
Ringed Boghaunter	<i>Williamsonia lintneri</i>	Threatened (2007)
Roaring Brook Mayfly	<i>Epeorus frisoni</i>	Threatened (2015) / Endangered (2007)
Sleepy Duskywing	<i>Erynnis brizo</i>	Threatened (2007)
Tomah Mayfly	<i>Lycia rachelae</i>	Threatened (1997)
Twilight Moth	<i>Erynnis brizo</i>	Threatened (2007)
<u>Mammals (Class Mammalia)</u>		
Eastern Small-footed Bat	<i>Myotis leibii</i>	Threatened (2015)
Little Brown Bat	<i>Myotis lucifugus</i>	Endangered (2015)
New England Cottontail	<i>Sylvilagus transitionalis</i>	Endangered (2007)
Northern Bog Lemming	<i>Synaptomys borealis</i>	Threatened (1987)
Northern Long-eared Bat	<i>Myotis septentrionalis</i>	Endangered (2015)
<u>Molluscs (Class Bivalvia)</u>		
Brook Floater	<i>Alasmidonta varicose</i>	Threatened (2007)
Tidewater Mucket	<i>Leptodea ochracea</i>	Threatened (1997)
Yellow Lampmussel	<i>Lampsilis cariosa</i>	Threatened (1997)
<u>Reptiles (Class Reptilia)</u>		
Black Racer	<i>Coluber constrictor</i>	Endangered (1987)
Blanding's Turtle	<i>Emydoidea blandingii</i>	Endangered (1997)
		Threatened (1987)
Box Turtle	<i>Terrapene carolina</i>	Endangered (1987)
Spotted Turtle	<i>Clemmys guttata</i>	Threatened (1987)
<u>Snails (Class Gastropoda)</u>		
Six-whorled Vertigo	<i>Vertigo morseii</i>	Endangered (2015)

Appendix 1-3. Maine's list of state-designated endangered / threatened marine fish and wildlife administered by the Maine Department of Marine Resources (12 MRSA §6975).

<u>Taxa group (class)</u>	Scientific name	Legal status (year listed)
Common name		
<u>Fish (Class Actinopterygii)</u>		
Atlantic Salmon (Gulf of Maine distinct population segment)	<i>Salmo salar</i>	Endangered (2007)
Atlantic Sturgeon	<i>Acipenser oxyrinchus</i>	Threatened (1997)
Short-nosed Sturgeon	<i>Acipenser brevirostrum</i>	
<u>Mammals (Class Mammalia)</u>		
Blue Whale	<i>Balaenoptera musculus</i>	Endangered (1978)
Humpback Whale	<i>Megaptera novaeangliae</i>	Endangered (1978)
North Atlantic Right Whale	<i>Eubalaena glacialis</i>	Endangered (1978)
Sei Whale	<i>Balaenoptera borealis</i>	Endangered (1978)
Sperm Whale	<i>Physeter macrocephalus</i>	Endangered (1978)
<u>Reptiles (Class Reptilia)</u>		
Leatherback Sea Turtle	<i>Dermochelys coriacea</i>	Endangered (1978)
Loggerhead Sea Turtle	<i>Caretta caretta</i>	Endangered (1978)
Kemp's Ridley Sea Turtle	<i>Lepidochelys kempii</i>	Endangered (1978)

Appendix 1-4. Maine's list of federally-designated endangered / threatened species administered by the U.S. Fish and Wildlife Service and National Marine Fisheries Service.

<u>Taxa group</u> Common name	Scientific name	Legal status (year listed)
FAUNA		
Birds (Class Aves)		
American Peregrine Falcon	<i>Falco peregrinus anatum</i>	Recovered (1999) / Endangered (1970)
Arctic Peregrine Falcon	<i>Falco peregrinus tundrius</i>	Recovered (1991) / Threatened (1984) / Endangered (1970)
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Recovered (2007) / Threatened (1995) / Endangered (1978)
Piping Plover	<i>Charadrius melodus</i>	Threatened (1985)
Roseate Tern	<i>Sterna dougallii</i>	Endangered (1987)
Red Knot	<i>Calidris canutus rufa</i>	Threatened (2015)
Fish (Class Actinopterygii)		
Atlantic Salmon (Gulf of Maine distinct population segment)	<i>Salmo salar</i>	Endangered (2000)
Atlantic Sturgeon (Gulf of Maine distinct population segment)	<i>Acipenser oxyrinchus</i>	Threatened (2012)
Short-nosed Sturgeon	<i>Acipenser brevirostrum</i>	Endangered (1967)
Mammals (Class Mammalia)		
Blue Whale	<i>Balaenoptera musculus</i>	Endangered (1970)
Canada Lynx	<i>Lynx canadensis</i>	Threatened (2000)
Finback Whale	<i>Balaenoptera physalus</i>	Endangered (1970)
Gray Wolf	<i>Canis lupus</i>	Endangered (1967)
Humpback Whale	<i>Megaptera novaeangliae</i>	Endangered (1970)
North Atlantic Right Whale	<i>Eubalaena glacialis</i>	Endangered (1970)
Northern Long-eared Bat	<i>Myotis septentrionalis</i>	Threatened (2015)
Sei Whale	<i>Balaenoptera borealis</i>	Endangered (1970)
Sperm Whale	<i>Physeter macrocephalus</i>	Endangered (1970)
Reptiles (Class Reptilia)		
Green Sea Turtle	<i>Chelonia mydas</i>	Threatened (1978)
Leatherback Sea Turtle	<i>Dermochelys coriacea</i>	Endangered (1970)
Loggerhead Sea Turtle	<i>Caretta caretta</i>	Threatened (1978)
Kemp's Ridley Sea Turtle	<i>Lepidochelys kempii</i>	Endangered (1970)
FLORA		
Eastern Prairie Fringed Orchid	<i>Platanthera leucophaea</i>	Threatened (1989)
Furbish Lousewort	<i>Pedicularis furbishiae</i>	Endangered (1978)
Small Whorled Pogonia	<i>Isotria medeoloides</i>	Threatened (1994) / Endangered (1982)

Appendix 1-5. SGCN previously recognized in Maine that are removed from the 2015 Wildlife Action Plan.

<u>Taxa group (class)</u> Common name	Scientific name	Factors contributing to loss of SGCN status in Maine (2005 → 2015)
<u>Birds (Class Aves)</u>		
American Black Duck	<i>Anas rubripes</i>	revised regional responsibility criteria species recovery + habitat safeguards revised regional responsibility criteria
Bald Eagle	<i>Haliaeetus leucocephalus</i>	
Barred Owl	<i>Strix varia</i>	
Blue-gray Gnatcatcher	<i>Poliophtila caerulea</i>	
Cattle Egret	<i>Bubulcus ibis</i>	
Common Eider	<i>Somateria mollissima</i>	
Glossy Ibis	<i>Plegadis falcinellus</i>	
Great Egret	<i>Ardea alba</i>	
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	
Loggerhead Shrike	<i>Lanius ludovicianus</i>	
Marsh Wren	<i>Cistothorus palustris</i>	
Ruddy Duck	<i>Oxyura jamaicensis</i>	
Sandhill Crane	<i>Grus canadensis</i>	
Tricolored Heron	<i>Egretta tricolor</i>	
Vesper Sparrow	<i>Pooecetes gramineus</i>	
Willow Flycatcher	<i>Empidonax traillii</i>	
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	
Yellow-throated Vireo	<i>Vireo flavifrons</i>	
<u>Insects (Class Insecta)</u>		
A Mayfly	<i>Nixe rusticalis</i>	long-term extirpation
A Mayfly	<i>Plauditus cestus</i>	
A Mayfly	<i>Procloeon mendax</i>	
A Mayfly	<i>Procloeon ozburni</i>	
A Mayfly	<i>Procloeon simplex</i>	
A Mayfly	<i>Siphonurus securifer</i>	
American Burying Beetle	<i>Nicrophorus americanus</i>	
Greenish Blue	<i>Plebejus saepiolus amica</i>	
Precious Underwing	<i>Catocala pretiosa pretiosa</i>	
<u>Mammals (Class Mammalia)</u>		
Gray Wolf	<i>Canis lupus</i>	long-term extirpation
<u>Reptiles (Class Reptilia)</u>		
Timber Rattlesnake	<i>Crotalus horridus</i>	long-term extirpation
<u>Snails (Class Gastropoda)</u>		
A Spire Snail	<i>Amnicola decisus</i>	
Pleistocene Catinella	<i>Catinella exile</i>	
Deep-throat Vertigo	<i>Vertigo nylanderi</i>	
Great Lakes Physa	<i>Physella magnalacustris</i>	
Lamellate Supercoil	<i>Paravitrea lamellidens</i>	