



2019-20
RESEARCH &
MANAGEMENT
REPORT

**Endangered and Threatened
Species Conservation In Maine**

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2019-20 RESEARCH & MANAGEMENT REPORT

Maine Department of Inland Fisheries and Wildlife protects and manages Maine’s fish and wildlife and their habitats, promotes Maine’s outdoor heritage, and safely connects people with nature through responsible recreation, sport, and science.

Endangered and Threatened Species Conservation In Maine

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Compiled and edited by Diana Harper and Lauren McPherson

Maine Department of Inland Fisheries & Wildlife

284 State Street
41 State House Station
Augusta, ME 04333-0041
207-287-5202

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ENDANGERED AND THREATENED SPECIES CONSERVATION IN MAINE

Charlie Todd, Shevenell Webb, Phillip deMaynadier, and Brad Allen

A Mandate to Conserve Wildlife Diversity in Maine

The 107th State Legislature enacted Maine's Endangered Species Act (MESA) in 1975. Its primary directive reads:

"The Legislature finds that various species of fish or 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" (Title 12, Maine Revised Statutes § 12801).

The Legal Framework Behind Listing Species Under Maine's Endangered Species Act

In Maine, state-listing of any animal species as Endangered or Threatened (E/T) requires that the Legislature review and adopt changes proposed by the responsible agency. The Maine Department of Inland Fisheries and Wildlife (MDIFW) holds that authority for all terrestrial animals, all birds (regardless of habitat), and all fauna that inhabit freshwater systems. The Maine Department of Marine Resources has jurisdiction for animals (except birds) that occur in tidal waters. Maine's Natural Areas Program in the Department of Agriculture, Conservation, and Forestry maintains the State list of E/T plants.

MDIFW biologists and administrators review potential changes to the E/T list internally, then open them up to further scrutiny from peer scientists. Next, we present proposals, first to the MDIFW Advisory Council, then at legally mandated public hearings. A formal 30-day comment period follows, in compliance with Maine's Administrative Procedures Act. Finally, we present our

recommendations as a bill to the Maine Legislature's Joint Standing Committee on Inland Fisheries and Wildlife. When the bill goes in front of the committee, the public has yet another opportunity to provide input.

Maine's state E/T listing process is quite different from other states. Whereas we adopt changes in statute via the legislature in response to agency recommendations, other states typically do this by agency rulemaking alone. This extra legislative oversight has perhaps averted legal petitions and court challenges that sometimes confound endangered species conservation.

To designate fauna as E/T, MDIFW biologists review the best available information on the distribution and status of populations and habitats combined with objective listing criteria to judge species vulnerability. These criteria include low population abundance, dramatic declines, limited distribution or loss of range, significant fragmentation of populations or habitat, endemism, E/T status under the U.S. Endangered Species Act, and regional conservation status in the Northeast. Threats are secondary considerations, and do not trigger listing unless they present additional hazards to already-vulnerable species.

The MDIFW thresholds for listing Maine species rely mostly on combinations of risks. These listing guidelines (see <https://www.maine.gov/ifw/docs/listingHandbook.pdf>) have successfully guided MDIFW and the Legislature's state-listing decisions since 1996. The last time the state E/T list changed was 2015, and the next update is due by 2023.

This scorecard shows the current status of 52 species listed by MDIFW since MESA was enacted in 1975, and whether each species has experienced improvements, setbacks, or no significant change in the following three categories:

- **Population** (based on indices of abundance, number of occupied sites, or trends)
- **Research and monitoring** that contributes to species conservation
- **Habitat security** (from conservation status, land management, or stewardship programs)



FIGURE 1. A SCORECARD FOR SPECIES LISTED BY MDIFW UNDER MAINE ESA, 1975 - 2020

- SIGNIFICANT IMPROVEMENTS
- NO SIGNIFICANT CHANGES
- SETBACKS OR NEW LIMITATIONS

BIRDS (CLASS AVES)



SPECIES COMMON NAME (SCIENTIFIC NAME)	MAINE ESA LEGAL STATUS	RECENT POPULATION CHANGES	RESEARCH & MONITORING	HABITAT MANAGEMENT & CONSERVATION
American Pipit (<i>Anthus rubescens</i>)	ENDANGERED (SINCE 1997)			
Arctic Tern (<i>Sterna paradisaea</i>)	THREATENED (SINCE 1997)			
Atlantic Puffin (<i>Fratercula arctica</i>)	THREATENED (SINCE 1997)			
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	DELISTED (SINCE 2009)			
Barrow's Goldeneye (<i>Bucephala islandica</i>)	THREATENED (SINCE 2007)			
Black-crowned Night Heron (<i>Nycticorax nycticorax</i>)	ENDANGERED (SINCE 2015)			
Black Tern (<i>Chlidonias niger</i>)	ENDANGERED (SINCE 1997)			
Common Gallinule (<i>Gallinula galeata</i>)	THREATENED (SINCE 2007)			
Golden Eagle (<i>Aquila chrysaetos</i>)	ENDANGERED (SINCE 1987)			
Grasshopper Sparrow (<i>Ammodramus savannarum</i>)	ENDANGERED (SINCE 1987)			
Great Cormorant (<i>Phalacrocorax carbo</i>)	THREATENED (SINCE 2007)			
Harlequin Duck (<i>Histrionicus histrionicus</i>)	THREATENED (SINCE 1997)			
Least Bittern (<i>Ixobrychus exilis</i>)	ENDANGERED (SINCE 2007)			
Least Tern (<i>Sternula antillarum</i>)	ENDANGERED (SINCE 1984)			
Peregrine Falcon (<i>Falco peregrinus</i>)	ENDANGERED (SINCE 1975)			
Piping Plover (<i>Charadrius melodus</i>)	ENDANGERED (SINCE 1987)			
Razorbill (<i>Alca torda</i>)	THREATENED (SINCE 1997)			
Roseate Tern (<i>Sterna dougallii</i>)	ENDANGERED (SINCE 1997)			
Sedge Wren (<i>Cistothorus platensis</i>)	ENDANGERED (SINCE 1987)			
Short-eared Owl (<i>Asio flammeus</i>)	THREATENED (SINCE 2007)			
Upland Sandpiper (<i>Bartramia longicauda</i>)	THREATENED (SINCE 1997)			

FISH (CLASS ACTINOPTERYGII)















































Redfin Pickerel (<i>Esox americanus americanus</i>)	ENDANGERED (SINCE 2007)			
Swamp Darter (<i>Etheostoma fusiforme</i>)	THREATENED (SINCE 1997)			



-  SIGNIFICANT IMPROVEMENTS
-  NO SIGNIFICANT CHANGES
-  SETBACKS OR NEW LIMITATIONS













INSECTS (CLASS INSECTA)



SPECIES COMMON NAME (SCIENTIFIC NAME)	MAINE ESA LEGAL STATUS	RECENT POPULATION CHANGES	RESEARCH & MONITORING	HABITAT MANAGEMENT & CONSERVATION
Boreal Snaketail (<i>Ophiogomphus colubrinus</i>)	THREATENED (SINCE 2007)			
Clayton's Copper (<i>Lycaena dorcas claytoni</i>)	THREATENED (SINCE 2015)			
Cobblestone Tiger Beetle (<i>Cicindela marginipennis</i>)	ENDANGERED (SINCE 2015)			
Edwards' Hairstreak (<i>Satyrium edwardsii</i>)	ENDANGERED (SINCE 1997)			
Frigga Fritillary (<i>Boloria frigga</i>)	ENDANGERED (SINCE 2015)			
Hessel's Hairstreak (<i>Callophrys hesseli</i>)	ENDANGERED (SINCE 1997)			
Juniper Hairstreak (<i>Callophrys gryneus</i>)	ENDANGERED (SINCE 2007)			
Katahdin Arctic (<i>Oeneis polixenes katahdin</i>)	ENDANGERED (SINCE 1997)			
Pine Barrens Zanclognatha (<i>Zanclognatha martha</i>)	THREATENED (SINCE 1997)			
Purple Lesser Fritillary (<i>Boloria chariclea grandis</i>)	THREATENED (SINCE 2007)			
Rapids Clubtail (<i>Gomphus quadricolor</i>)	ENDANGERED (SINCE 2007)			
Ringed Boghaunter (<i>Williamsonia lintneri</i>)	THREATENED (SINCE 2007)			
Roaring Brook Mayfly (<i>Epeorus frisoni</i>)	THREATENED (SINCE 2015)			
Sleepy Duskywing (<i>Erynnis brizo</i>)	THREATENED (SINCE 2007)			
Tomah Mayfly (<i>Siphonisca aerodromia</i>)	THREATENED (SINCE 1997)			
Twilight Moth (<i>Lycia rachelae</i>)	THREATENED (SINCE 1997)			

MAMMALS (CLASS MAMMALIA)












Eastern Small-footed Bat (<i>Myotis leibii</i>)	THREATENED (SINCE 2015)			
Little Brown Bat (<i>Myotis lucifugus</i>)	ENDANGERED (SINCE 2015)			
New England Cottontail (<i>Sylvilagus transitionalis</i>)	ENDANGERED (SINCE 2007)			
Northern Bog Lemming (<i>Synaptomys borealis</i>)	THREATENED (SINCE 1987)			
Northern Long-eared Bat (<i>Myotis septentrionalis</i>)	ENDANGERED (SINCE 2015)			







-  SIGNIFICANT IMPROVEMENTS
-  NO SIGNIFICANT CHANGES
-  SETBACKS OR NEW LIMITATIONS

MOLLUSCS (CLASS BIVALVIA)

SPECIES COMMON NAME (SCIENTIFIC NAME)	MAINE ESA LEGAL STATUS	RECENT POPULATION CHANGES	RESEARCH & MONITORING	HABITAT MANAGEMENT & CONSERVATION
Brook Floater (<i>Alasmidonta varicosa</i>)	THREATENED (SINCE 2007)			
Tidewater Mucket (<i>Leptodea ochracea</i>)	THREATENED (SINCE 1997)			
Yellow Lampmussel (<i>Lampsilis cariosa</i>)	THREATENED (SINCE 1997)			

REPTILES (CLASS REPTILIA)

Black Racer (<i>Coluber constrictor</i>)	ENDANGERED (SINCE 1987)			
Blanding's Turtle (<i>Emydoidea blandingii</i>)	ENDANGERED (SINCE 1997)			
Box Turtle (<i>Terrapene carolina</i>)	ENDANGERED (SINCE 1987)			
Spotted Turtle (<i>Clemmys guttata</i>)	THREATENED (SINCE 1987)			

SNAILS (CLASS GASTROPODA)

Six-whorled Vertigo (<i>Vertigo morsei</i>)	ENDANGERED (SINCE 2015)			
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MEET THE BIOLOGISTS WORKING WITH ENDANGERED & THREATENED SPECIES



Charlie Todd, *Endangered & Threatened Species Coordinator*
Retired September 2020

Charlie has been involved with endangered species conservation in Maine since 1976. After 9 years of research and recovery efforts on bald eagles at the University of Maine, he joined MDIFW in 1986 to continue eagle duties and spearhead similar work on peregrine falcons and golden eagles. In 2012, Charlie became the Department's Endangered / Threatened Species Coordinator: a position that supports the full array of staff working on Maine's most vulnerable wildlife, including the species specialist and group leaders below.



Shevenell Webb, *Wildlife Biologist*
Furbearers and Small Mammals

Shevenell oversees the management of furbearers and small mammals, work that involves monitoring populations, recommending trapping regulations, conducting research on small mammals, and serving as the departmental spokesperson for furbearers. Shevenell is participating in several research projects with the University of Maine and University of New England, including a study to determine the most effective way to monitor Maine's marten and fisher populations and a study to develop a new DNA survey technique for northern bog lemmings. She shares bat management responsibilities with Sarah Boyden, Assistant Regional Biologist in MDIFW's Strong Office.



Phillip deMaynadier, Ph.D., *Wildlife Biologist and Group Leader*

Phillip supervises reptile-amphibian-invertebrate Group activities and serves as one of the Department's lead biologists on issues related to reptile, amphibian, and invertebrate conservation and endangered and nongame policy. Some of his recent projects include: a) participation on the lead team for Maine's 2015 State Wildlife Action Plan, b) coordination of MDIFW's program for protecting high value vernal pools, c) coordination of state butterfly, dragonfly, amphibian, and reptile atlas efforts, and d) advising landowners on management practices for rare and endangered species. Phillip is also a Graduate Faculty member at the University of Maine's Department of Wildlife Ecology.



Brad Allen, *Wildlife Biologist and Bird Group Leader*

Brad oversees bird group activities and budgets and continues to investigate the lives and times of the common eider, focusing currently on a collaborative duckling survival study. Brad also coordinates Department interests in seabird research and management activities.

Endangered Species Conservation Strategies

There are no easy fixes or shortcuts for species on the brink of extirpation (disappearing from Maine). Reversing the fate of a species (recovery) almost always requires decades of attention. Management strategies need to not only address the initial factor(s) that led to species rarity, but they also need to adapt to new threats that arise once populations and/or habitats are compromised and vulnerable.

As an example, in the mid-1940s, persistent byproducts of the insecticide DDT began to greatly depress the nesting success of raptors, especially fish-eating birds. By 1978, the bald eagle—our national symbol!—was endangered or threatened in all 48 contiguous states.

During that time, in addition to contaminant influences, Maine's bald eagles also faced increasing habitat threats and nest disturbances. MDIFW began monitoring bald eagle populations in 1962. We initiated four decades of contaminants research in 1967, and started intense habitat protection efforts in 1972. Our agency and others addressed habitat threats by forging cooperative agreements with landowners of key eagle habitats over the course of 18 years. Over the following 19 years, we enacted special regulations for the oversight of land use permitting decisions by designating Essential Habitat. MDIFW did not de-list bald eagles until 2009, when enough conservation lands and easements had been established to create a safety net to protect traditional nesting habitat from future threats.

Now, let's apply those lessons to the future of cave bats, which were newly listed in 2015 as Endangered or Threatened in Maine. Over the span of just a few years, Maine's little brown bat and northern long-eared bat populations declined by roughly 90%. First detected in 2006, White Nose Syndrome (caused by an exotic fungus spreading from a cave in New York) has killed millions of bats across the U.S. That's equivalent to reversing all the progress that bald eagles have made over the past forty years at a rate of change 10 times more rapid. At best, bats face a very slow comeback dictated by their life history (raising only one pup each year).

As we do with most newly listed species, Maine's biologists have started monitoring and researching our bat populations to guide evolving conservation strategies. Biologists will also need to address additive risks like recreational cave use, disruption of maternity colonies, and incidental bat losses from low-speed wind turbines operating at night. In 2020, biologists had to curtail some in-person research

and monitoring to avoid potentially exposing bats to the virus that causes COVID-19, which could pose another mortality risk.

Some listed species are highly specialized to habitats with limited availability; and in those cases, the key conservation focus is habitat maintenance or enhancement. One of the best examples of this in Maine is the six-whorled vertigo, a land snail reliant on calcareous fens typically found only in areas of limestone bedrock. Granite underlies most of the state, resulting in primarily acidic soils and waters that are not suitable for the vertigo. Since this limitation is unlikely to change, conservation of specific sites is the only practical strategy for this species and others whose habitats are similarly limited. The primary mandate of Maine ESA is to avoid losses of the State's biodiversity. With that in mind, while it is not always possible to fully recover listed species as self-sustaining populations or to delist some species with naturally limited habitats, we do have the tools to minimize their extirpation risk.

For some species, the condition of suitable habitats is the limiting factor. In other words, habitat quality (rather than abundance) is the bottleneck. Take the brook floater: Maine's extensive waterways seem to offer ample riverine habitat for this threatened freshwater mussel. However, water quality and connectivity barriers render some streams and rivers unsuitable for this species. The species is also an example of ongoing conservation efforts across state boundaries. Maine has contributed brook floaters for captive hatchery propagation and subsequent reintroduction to restored waters throughout the Northeast. It's possible that unsuitable stream habitat can be remediated by restoring riparian buffers and paying careful attention to watershed land use practices.



Brook floater photo by Ethan Nadeau

Some endangered wildlife rely on transient habitats, such as grasslands, old fields, shrublands, and young forests. A few such state-listed species include upland sandpipers, grasshopper sparrows, black racers, juniper hairstreak butterflies, and New England cottontails. Without active management, transient habitats naturally transition into forest, rendering a site unsuitable for these species. Connectivity can also be a challenge – without a large block, or mosaic, of early successional habitats, a setting can become too fragmented. For these species, thoughtful land management and incentives to create and enhance transient habitats can be more beneficial than regulatory MESA provisions.

Another variation on this theme are habitats that once rejuvenated themselves naturally, but no longer do, such as the Northeast’s dry pine barrens. These habitats emerged in sandplains left by the retreat of glaciers, and persisted in part due to naturally occurring wildfires, a phenomenon that has been largely short-circuited by smaller barren patch sizes (from development) and fire suppression. A pattern of wildfires favors fire-resistant vegetation like the pitch pine and scrub oak, which provide essential habitat to many vulnerable butterflies and moths including four state-listed species: Edward’s hairstreak, sleepy duskywing, pine barrens Zanclognatha, and the twilight moth. By contrast, fire suppression allows other trees to establish and out-compete them. In lieu of fire, pine barren habitat on conservation lands is now maintained by using prescribed fire and silviculture.

One of our most successful endangered species conservation efforts is ongoing. The piping plover is a resident shorebird that nests only on front dunes and uppermost reaches of sandy beaches. Not only is its habitat extremely limited in Maine, but its nesting sites are also subject to intense recreational use. Decades of management efforts by MDIFW, Maine Audubon, state parks, USFWS, USDA Wildlife Services, and municipalities have led to a rebound in plover abundance, but long-term stewardship is crucial. Coastal beaches naturally erode, accrue and shift, presenting problems for nesting birds and their young. And climate-change-driven issues like rising sea levels and major storm events present additional threats. Fortunately, we can create suitable habitat through careful deposition of spoils from coastal dredging projects.

Maine is a natural ecoregional transition zone, and as such hosts a blend of species that mostly reside further north or south. Species listed under MESA that are at their northernmost range limit in Maine include Blanding’s turtle,

spotted turtle, northern black racer, grasshopper sparrow, and New England cottontail. Those at their southernmost range limit in Maine (whose future here is threatened by climate change) include Atlantic puffin, razorbill, Arctic tern, great cormorant, frigga fritillary butterfly, and northern bog lemming. Species with low mobility and exacting habitat requirements need extra attention — not only to secure existing habitat, but also to allow for potential shifts in geographic range associated with climate change.

Brief Updates on Species Listed Under Maine ESA

- **No extirpations:** No Endangered or Threatened Species in Maine have disappeared from the state since listing.
- **“Up-listing”:** Three species originally designated as Threatened in Maine have been reclassified as Endangered, owing to further setbacks in their status: Blanding’s turtle, roseate tern, and black-crowned night heron.
- **“Down-listing”:** The status of three species once considered Endangered in Maine improved sufficiently to reclassify them as Threatened: Clayton’s copper, Roaring Brook mayfly, and bald eagle. Bald eagles were eventually “de-listed” (removal from the State list of E/T Species) after a full recovery.

MDIFW staff in the Wildlife Research and Assessment Section (WRAS) are tasked with developing surveys, research, and conservation strategies. We have three taxa teams: one focused on birds, another on mammals, and a third on reptiles, amphibians, and invertebrates. A fourth WRAS team focuses on habitats and data management. Regional wildlife biologists in the Management Section often assume prominent roles in implementing strategies and conducting environmental reviews. Unlike most state wildlife agencies, where a small staff assumes all these duties, nearly the entire Department participates in Maine’s endangered species programs.



Box turtle photo by Derek Yorks

Birds

- **Golden eagles** have been an endangered species in Maine since 1987 and remain on the brink of extirpation. Maine is the only eastern U.S. state where they can be seen every month of the year, but they no longer nest here (the last active nest remaining in Maine was abandoned in 1998). That could change, as recent population increases in northern Quebec may provide a natural source for repopulation. Most of Maine’s traditional golden eagle nests were on cliffs that are protected habitats. Today, nearly half of those cliffs support nesting peregrine falcons.
- Intensive management of **pipng plovers** over the years has yielded record numbers of piping plovers on Maine’s southern beaches: 98 nesting pairs fledged 197 fledgling plovers in 2020. These statistics greatly surpass even the all-time records set in 2019! More than 60% of this year’s plover nests were at locations where MDIFW has established beach management agreements for plover stewardship. We thank the towns of Ogunquit, Old Orchard Beach, Scarborough, and Wells, as well as the Maine state parks and the Prouts Neck Association.
- **Least terns** may nest on some of these same beaches. Often concentrated in a few small colonies, they are quite vulnerable to predators and tidal overwash. Rachel Carson National Wildlife Refuge has championed efforts to safeguard the species for many years, and year 22 appears to have been a good year for least tern production.
- Two colonial nesting seabirds listed under Maine ESA have remained stable or increased slightly over time:

Atlantic puffin and razorbill. Three others have struggled with food availability and predation: **Arctic tern**, **roseate tern**, and great cormorant. Bald eagles have proven to be key predators at great cormorant colonies. Maine Coastal Islands National Wildlife Refuge, National Audubon, and the Gulf of Maine Seabird Working Group conduct rigorous annual monitoring and colony management for Maine’s remarkable assemblage of island nesting seabirds.

- A new **grasshopper sparrow** nesting area was documented in Maine during 2020, and two other occurrences were discovered from 2017 to 2019. Prior to that, only five grasslands in Maine had any grasshopper sparrow activity since 1987, when the species was first listed as Endangered. Still, most sites need active habitat management and statewide population abundance is not increasing. Maine represents the northernmost limit of this species’ range.
- Record numbers of **peregrine falcons**, 39 pairs, nested in Maine during 2019. Peregrines that nest further north in Canada and Greenland always pass through Maine during fall migration, but the state’s breeding population disappeared from 1962 to 1986. During the period of 1984 to 1996, MDIFW reintroduced a total of 154 young falcons from captive breeding programs operated by The Peregrine Fund. Acadia National Park, Baxter State Park, Maine Bureau of Parks and Lands, and White Mountain National Forest were key partners in restoring the peregrine to Maine after its 24-year absence. Peregrines now nest in Maine’s urban areas as well as remote cliffs.



An Atlantic puffin with a flock of razorbills



Northern long-eared bat in flight catching a moth. Photo by Merlin Tuttle.

Mammals

- Bat research is underway in Maine on several fronts. Key partnerships with Acadia National Park, University of Maine, and Biodiversity Research Institute are focused on three cave bats listed under Maine ESA in 2015: **northern long-eared bat**, **little brown bat**, and **eastern small-footed bat**. MDIFW surveys have recently focused on the tri-colored bat, which will also be under consideration for both state and federal listing. In 2019, the Department established long-term acoustic monitoring stations across the state to monitor population trends.
- Substantial efforts continue in Maine and elsewhere in the Northeast to enhance habitats and bolster populations of **New England cottontails**. Suitable habitat for this species is patchily distributed in southern Maine but fragmented and limited overall, and population numbers have steadily declined. The state's current stronghold is in Cape Elizabeth, where the Sprague Family Corp. has periodically treated its lands to maintain shrublands and young forests with high stem density that this species needs. Elsewhere, remnant populations are isolated. Genetics research shows evidence of in-breeding, but reintroductions show potential for restoration.
- Maine is the only state in the Northeast that still has **northern bog lemmings**, and they have only been found at five localities across the Maine mountains. The species was listed as Threatened under Maine ESA in 1987, but has not yet received federal listing status. A researcher at the University of New England is developing tests to evaluate environmental traces of DNA that may greatly boost the efficiency of our searches for this elusive species.

Reptiles and Amphibians

- Regional conservation plans have been developed for the **Blanding's turtle** and **spotted turtle** in the Northeast. Both turtles were initially listed as Threatened in Maine during 1987, and Blanding's turtles were reclassified as Endangered in 1997. Federal listing petitions for each species are under review. These turtles often venture into upland areas from their freshwater wetland haunts, and fragmentation of upland areas by roads and developments jeopardizes local populations. Road mortality monitoring and cautionary signage are ongoing. A roadway with uniquely high mortality in southernmost York County now has wildlife fencing to divert turtles to a safer location. Survey efforts in the mid-coast region recently uncovered isolated spotted turtle populations deserving of conservation attention.
- **Box turtles** have been state-listed as Endangered since 1987. Several were discovered in Cumberland County during the 1980s, and a few single individuals have appeared in scattered localities since. Some of these are clearly released pets from elsewhere in the species' range. Turtles are long-lived and should not be relocated from their home range. Pet box turtles are not behaviorally adapted for life in the wild, may carry diseases, and are illegal to possess in Maine without a special permit.
- **Northern black racers** were listed as Endangered in Maine in 1987. These agile snakes favor open woods or shrubby areas with sandy soils. MDIFW staff have implanted radio transmitters to better improve our understanding of these snakes' movements and their overall habitat requirements. In the Kennebec Plains Wildlife Management Area, we have initiated habitat restoration to help improve black racer habitat conditions.



Black racer photo by Phillip deMaynadier



An Edwards hairstreak. Photo by Trevor Persons.

Invertebrates

- Conservation of invertebrates is an overwhelming challenge given the number of species and paucity of information. Staff have methodically worked through taxonomic groups composed of at-risk species in the Northeast to gather baseline data on species distributions and relative abundance. These groups include **freshwater mussels; dragonflies and damselflies; butterflies and moths; tiger beetles; and bumble bees**, among others. We often recruit citizen scientists to help extend our Department's capacity to gather knowledge about these and other understudied elements of our state's biodiversity.
- Freshwater mussels in Atlantic Slope drainages often have a small range in waters that have been compromised by dams (which fragment habitat) or that have experienced water quality problems from runoff and pollutants. Three freshwater mussel species are listed as Threatened in Maine: brook floater, tidewater **mucket**, and **yellow lampmussel**. Ironically, Maine is one of the best brook floater strongholds range-wide, and has contributed individuals to develop captive propagation programs in hatcheries for population restoration efforts elsewhere.
- Two mayflies that occur only in the Northeast are listed as Threatened in Maine: **Roaring Brook mayfly and Tomah mayfly**. As is often the case, the conservation focus that followed listing of these species has led to more survey efforts, additional discoveries, and improved habitat protections by partners helping to implement MDIFW's recommended best management practices.

- With 158 species in Maine, dragonflies and damselflies (Order: Odonata) are diverse and conspicuous sentinels of water quality. Two are classified as Threatened under Maine ESA (**boreal snaketail and ringed boghaunter**) and one is listed as Endangered (**rapids clubtail**). Six other species that reside in the state are not listed but have elevated conservation concern across the Northeast and are being monitored carefully. Maine is actively collaborating with the New Brunswick Museum to produce a comprehensive summary of the biology, distribution, and status of all Odonata in the Acadian region (Maine, New Brunswick, Nova Scotia, and Prince Edward Island).



Two boghaunters mating. Photo by Terry Chick.



Program funding is also a challenge!

State wildlife agencies were initially established to manage game species and sport fisheries, and were supported by federal aid programs. In Maine, license fees generate matching state funds. The Pittman-Robertson Act (1937) and Dingell-Johnson Act (1950) each generated dedicated income to carry out management for wildlife and fisheries, respectively.

Awareness and public interest in endangered species conservation now require traditional “fish and game” agencies to take on broader responsibilities for which there are no comparable funding programs. In 2020, Recovering America’s Wildlife Act (H.R. 3742) was passed in the House Committee on Natural Resources. If enacted, this legislation would stabilize and increase funding for at-risk species. In a challenging legislative year, the bill has not worked its way through Congress. If you value Maine’s diverse wildlife heritage, consider voicing your support to our Congressional delegation.

In the interim, most states typically seek voluntary contributions in the absence of general fund support. **The three major options that generate revenue for Maine’s Endangered and Nongame Wildlife Fund are:**

- The **Chickadee Checkoff** is an option on individual state income tax returns filed in Maine; see Schedule CP. Total revenue since 1984 now exceeds \$2,340,000. These funds are often used to leverage other grants. If only half of our taxpayers contributed the \$5 minimum on the Chickadee Checkoff, annual revenue would increase 500%.

- The **Loon Plate** is a vehicle license plate that has been available in Maine since 1994. Forty percent of the extra registration fee is deposited into the Endangered and Nongame Wildlife Fund, and the remainder supports state parks. The Loon Plate program generated more than \$10,670,000 for the Fund in its first 26 years, representing 80% of all the state income for this program. Other specialty plates that fund special programs have steadily reduced loon plate purchases.
- The **Sportsman Plate** was first issued in 2008. The entire extra registration fee goes to MDIFW programs, but only 10% of the \$18/plate renewal cost is earmarked for the Endangered and Nongame Wildlife Fund. Revenue in the first 11 years has totaled more than \$393,000.

We are grateful for these contributions, which enabled the startup of the Department’s endangered species programs. Donations naturally decline over time as each of these funding strategies (check-offs and license plates) are also utilized by competing state interests. Recent public surveys confirm that the vast majority of the public strongly supports E/T conservation carried out by MDIFW, but only a small minority are offering financial support to Maine’s Endangered and Nongame Wildlife Program.

Until funding support for endangered and at-risk nongame species improves, staff must triage efforts for our most vulnerable species. Endangered species conservation is now a necessary part of 21st century wildlife management. However, all parties agree that we should focus on at-risk species before they are highly jeopardized and in need of E/T listing. Maine and other state wildlife agencies have developed Action Plans that identify all “Species of Greatest Conservation Need,” but program funds remain well below program needs.

Annual Income to Maine's Endangered & Nongame Wildlife Fund

