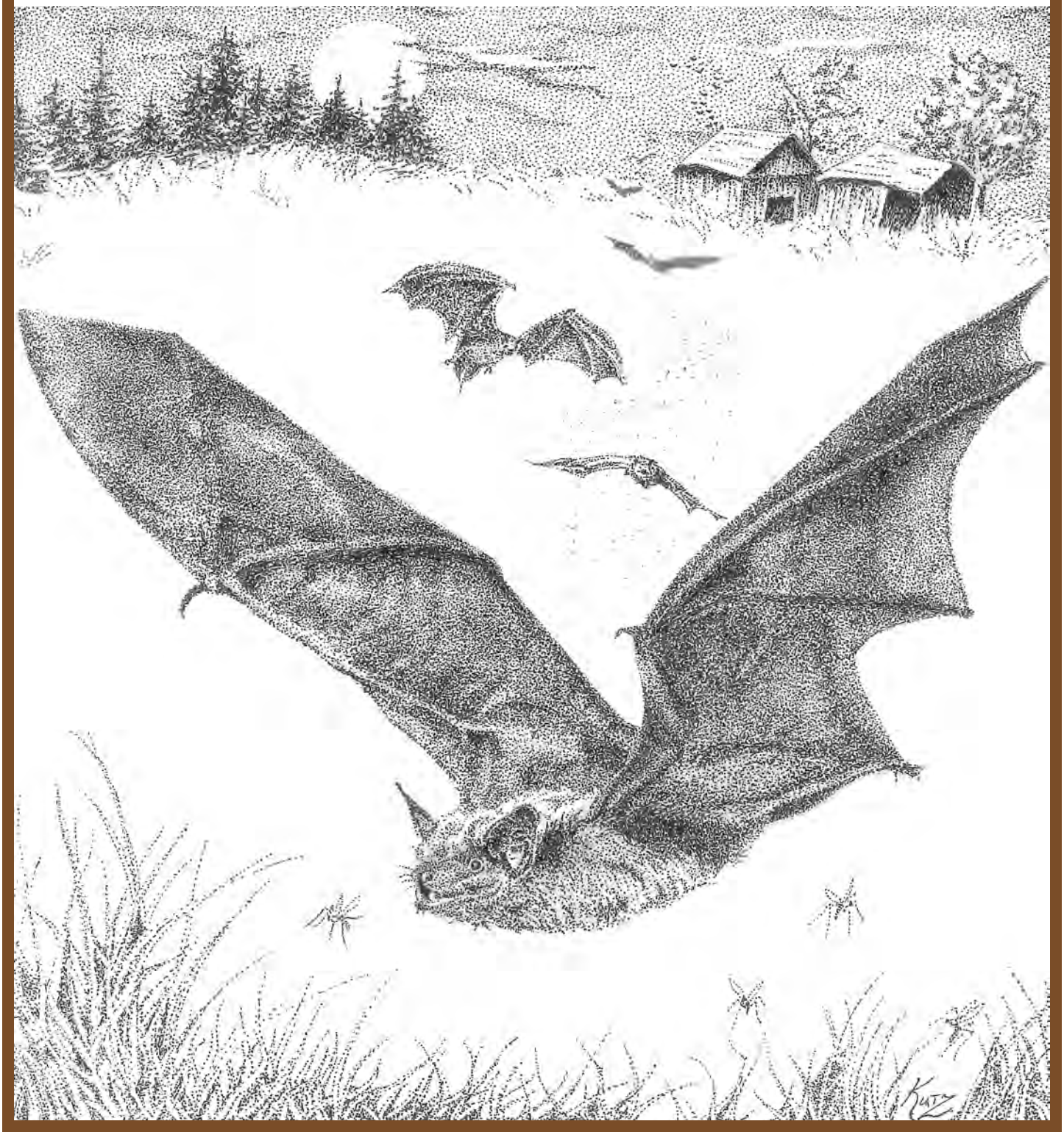
MAINE DEPARTMENT OF INLAND FISHERIES AND WILDLIFE
Chandler E. Woodcock, Commissioner

Research & Management Report 2014



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These studies are financed in part through Federal Aid in Wildlife Restoration Funds under Projects 81D, 82R, and 83C, and through the Endangered Species Conservation Act.

MAINE'S STATE WILDLIFE GRANT PROGRAM
10 YEARS OF ENHANCED WILDLIFE CONSERVATION

The State Wildlife Grant (SWG) Program was established by Congress in 2001 to help states develop and implement management programs that benefit wildlife and their habitats, including species that are not hunted or fished. Beginning with the approval of Maine's first Wildlife Action Plan in 2005, an amazing breadth and diversity of conservation work has been conducted by MDIFW and its conservation partners. Funding from SWG provides critical support to *Beginning with Habitat*, which is Maine's premier habitat conservation outreach program, providing habitat maps and assistance with open-space planning to municipalities, land trusts, and landowners. MDIFW has also directed significant portions of SWG funding to monitoring, research, and restoration efforts for sensitive wildlife species across the state.

Ten years have passed since the state's conservation partners and MDIFW prepared Maine's first Wildlife Action Plan. Together, we have accomplished much for wildlife, but we know more remains to be done. Maine's traditional "outdoor" values and its rural economy depend upon thriving wildlife populations. Continued habitat loss and fragmentation and a changing climate also present a challenge to much that we value. Some examples of the accomplishments of the past decade that have been supported by SWG funding include:

- Ecoregional surveys of rare, threatened, and endangered fauna
- Lake habitat inventory program
- Status of the brook floater freshwater mussel in portions of the midcoast, central, and eastern Maine
- Maine Butterfly Atlas
- Status of the spicebush swallowtail butterfly
- Status of the ringed boghaunter dragonfly
- Cobblestone tiger beetle conservation
- River surveys and analysis of wood turtle populations
- Northern black racer conservation
- Timber rattlesnake habitat surveys
- New England cottontail conservation
- Bald eagle monitoring and habitat conservation
- Peregrine falcon monitoring
- Status and monitoring of Maine owls
- Piping plover and least tern management
- Enhancing shorebird conservation in Casco Bay
- Survey and mapping of important shorebird habitats
- Enhancing the value of shorebird migration monitoring
- Identification of important wintering areas for purple sandpipers
- Maine Seabird Atlas
- Monitoring of roseate tern nesting activity
- Tern and great cormorant monitoring in Penobscot and Jericho Bays
- Black tern and inland-nesting seabird surveys
- Aerial surveys of common loons in northern and downeast Maine
- Aerial census of nesting great blue herons and other colonial wading birds
- Harlequin duck and purple sandpiper surveys in Outer Penobscot, Jericho, Blue Hill, and Frenchman's Bays
- Wintering surveys of Barrow's goldeneye
- Field survey of grassland birds in southern Maine
- Studies of sea run brook trout in two Maine streams
- Lake whitefish
- Environmental factors associated with unique lake communities in Maine
- Effects of dam removal and relocation on yellow lampmussels and tidewater muckets


Monarch Butterfly

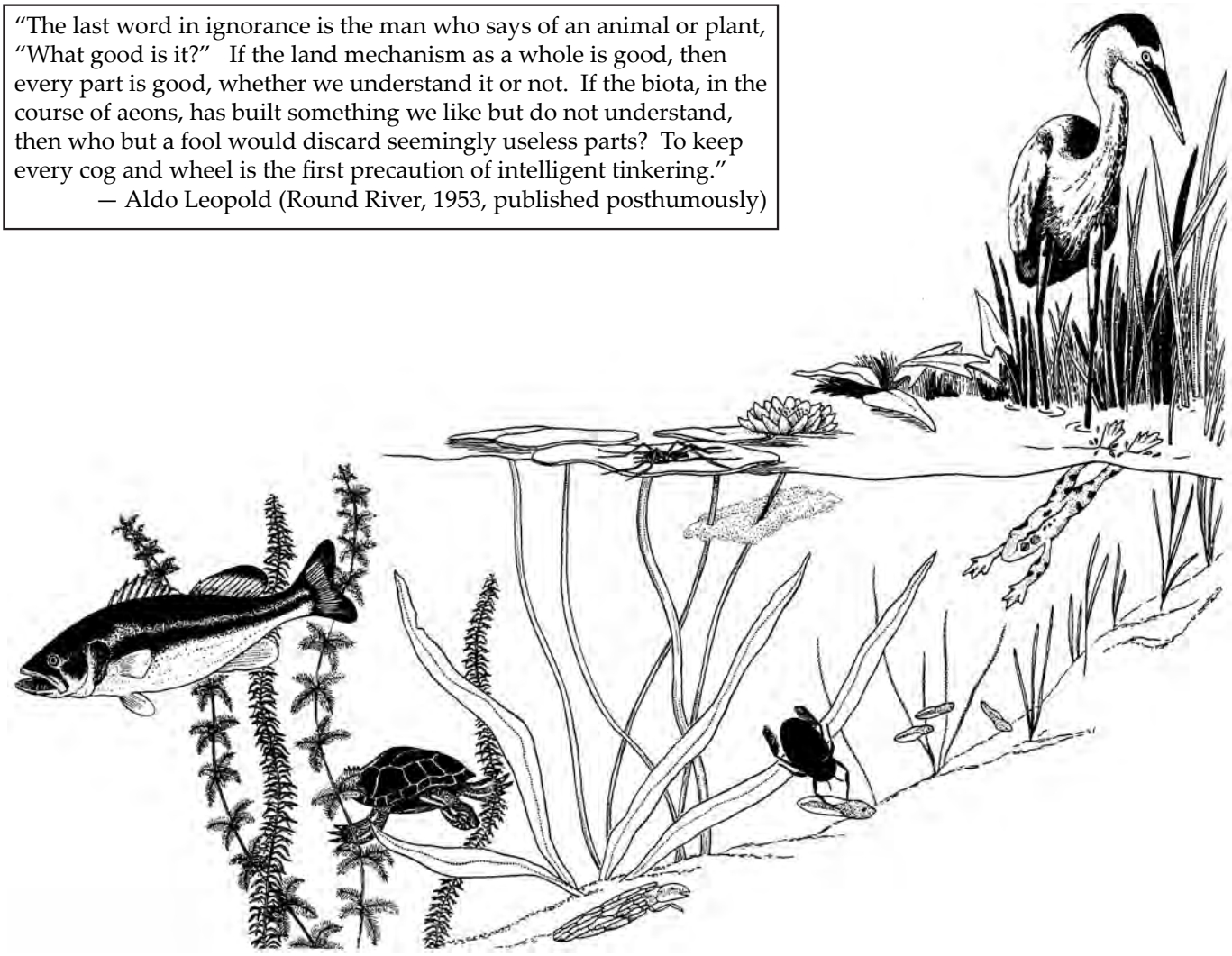
- Conservation genetics of Clayton's copper butterfly
- Habitat and distribution of the arrowhead spiketail dragonfly in Maine
- Blandings turtle road mortality research
- Canada lynx ecology and conservation
- Risk assessment of saltmarsh passerines to mercury contamination
- Effects of tidal restriction on the breeding ecology of saltmarsh sparrows
- Conservation genetics of saltmarsh sparrow populations
- Nesting ecology of rusty blackbirds
- Foraging behavior of razorbills

Through the summer and fall of 2014, MDIFW biologists have been working to develop a prioritized list of Species of Greatest Conservation Need (SGCN) to be eligible for research, assessment, and conservation funding through the federal SWG grant program. Our Habitat Group is working to develop a relational database that will tie SGCN to their spatially explicit habitats and to threats, potential conservation actions, monitoring plans, and reporting results. Congress would like to see greater transparency in this annually-allocated granting program, and States aim to deliver just that. We are working with our local conservation partners throughout this entire process and are due to report a final State Wildlife Action Plan to the U.S. Fish and Wildlife Service by October 2015.

For a complete summary of the accomplishment of the State Wildlife Grant Program in Maine over the past 10 years, please visit our website at http://www.maine.gov/ifw/wildlife/reports/wap.html.

"The last word in ignorance is the man who says of an animal or plant, "What good is it?" If the land mechanism as a whole is good, then every part is good, whether we understand it or not. If the biota, in the course of aeons, has built something we like but do not understand, then who but a fool would discard seemingly useless parts? To keep every cog and wheel is the first precaution of intelligent tinkering."

— Aldo Leopold (Round River, 1953, published posthumously)



FUNDING WILDLIFE AND HABITAT STEWARDSHIP

Many staff salaries and most of the administrative costs of the Wildlife Division's conservation and management programs for birds and mammals are funded by federal Pittman-Robertson Funds [FY13 $3,272,274]. Pittman-Robertson (PR) Funds are derived from an 11% federal excise tax on sporting arms, ammunition, and archery equipment, and a 10% excise tax on handguns. Pittman-Robertson Funds require state matching dollars at a ratio of 1:3 in our favor, which come from a portion of the hunting license revenues [FY13 $1,359,428].

The Wildlife Division also receives federal funding for the management of species of greatest conservation need in the form of State Wildlife Grants (SWG), originating from royalty payments made by petroleum industry operating on federal lands and waters [FY13 $477,284]. Also, there are the so-called "Section 6" funds from the U.S. Fish and Wildlife Service for the recovery of threatened and endangered species or to help recover a species before it becomes 'listed' under the federal Endangered Species Act [FY13 $26,000].

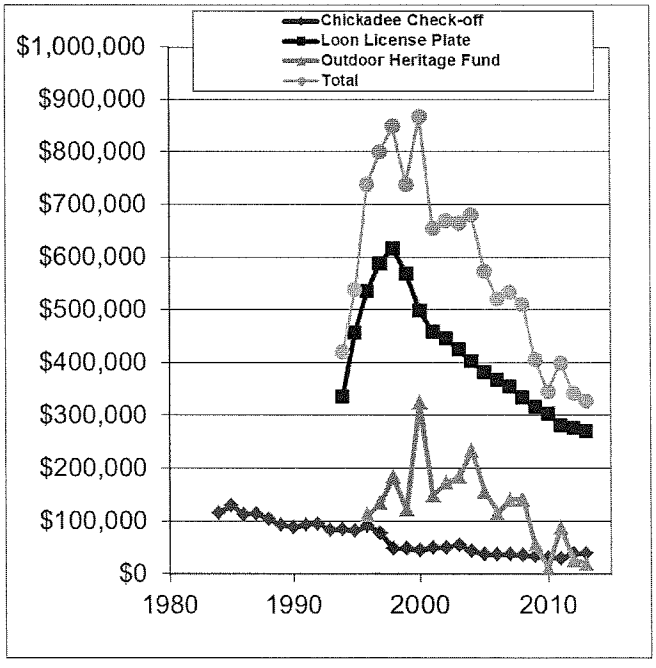
Volunteer contributions to the dedicated Endangered and Nongame Wildlife Fund via the tax-form "Chickadee Check-off" and purchases of Loon Conservation License Plates provide the core State funding for Maine's nongame and endangered species programs [CY/TY13 $308,804]. All donated money is deposited into the dedicated Maine Endangered and Nongame Wildlife Fund, which is a special, interest-bearing account from which money can only be spent for the conservation of Maine's nongame wildlife that includes rare, threatened, or endangered species (Table 1). This dedicated Fund is used to match and spend the federal SWG grants, just as revenues from hunting licenses and tags are used to match and leverage PR-grant $s for the conservation and management of birds and mammals.

The Maine Outdoor Heritage Fund, derived from the sale of conservation instant-scratch lottery tickets, can also provide an important source of "State" funding for Maine's wildlife conservation programs. The Division also receives funding from the Oil Spill Conveyance Fund [FY13 $21,506], which is used for oil spill preparedness and response.

Throughout the pages of the *2014 Research & Management Report* is a summary of last year's accomplishments with much help from our conservation partners. You will see how efficiently we can assess fish and wildlife resources and habitats using cooperative partnerships, volunteer assistance, and new techniques and technologies. There is always cause to do more.

Table 1. A history of income derived from the "Chickadee Check-off," Loon Plate, and Maine Outdoor Heritage Funds to benefit wildlife programs.

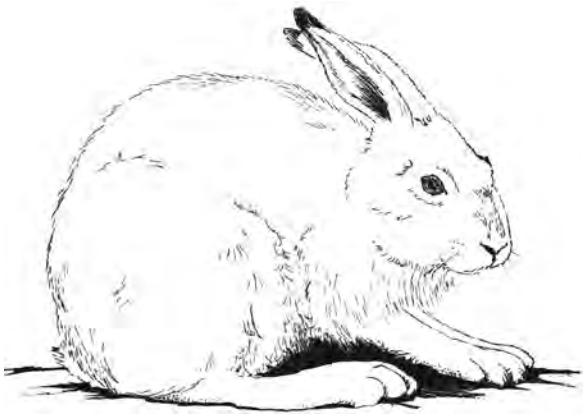
	Chickadee Check-off				Loon License Plate		Maine Outdoor Heritage Fund	
Year	Total Given (TY)	Number of Givers	Average Donation	Percent of Taxpayers Giving	Income to MDIFW	Number of Registrations	Income to MDIFW	Number of Projects Funded
1984	$115,794	25,322	$4.57	5.3%				
1985	$129,122	29,200	$4.42	6.0%				
1986	$112,319	26,904	$4.17	5.4%				
1987	$114,353	26,554	$4.31	5.2%				
1988	$103,682	24,972	$4.15	4.8%				
1989	$93,803	20,322	$4.62	3.6%				
1990	$88,078	18,332	$4.80	3.2%				
1991	$92,632	19,247	$4.81	3.4%				
1992	$95,533	18,423	$5.18	3.2%				
1993	$82,842	15,943	$5.20	2.8%				
1994	$84,676	10,863	$7.79	2.0%	$335,042	59,829		
1995	$81,775	10,014	$8.17	1.8%	$457,307	81,662		
1996	$90,939	11,024	$8.25	2.0%	$535,679	95,657	$112,232	3
1997	$77,511	8,686	$8.92	1.5%	$588,364	105,065	$133,971	5
1998	$48,189	4,065	$11.85	0.7%	$617,484	110,265	$184,109	7
1999	$47,908	3,775	$12.69	0.7%	$569,610	101,716	$121,436	5
2000	$44,496	3,297	$13.50	0.6%	$499,486	89,194	$323,884	11
2001	$49,348	3,713	$13.29	0.6%	$458,057	81,796	$148,408	5
2002	$50,412	3,661	$13.77	0.6%	$446,342	79,704	$172,191	8
2003	$55,348	3,792	$14.60	0.6%	$425,147	75,919	$184,129	5
2004	$43,158	3,234	$13.35	0.6%	$402,695	69,615	$234,126	10
2005	$36,769	2,931	$12.54	0.5%	$381,948	67,814	$154,656	7
2006	$36,865	2,924	$12.60	0.5%	$367,791	65,677	$116,121	6
2007	$37,209	2,852	$13.04	0.5%	$355,180	63,425	$141,526	6
2008	$34,929	2,757	$12.67	0.4%	$333,536	59,560	$141,059	7
2009	$33,751	2,688	$12.56	0.4%	$316,148	56,455	$56,128	3
2010	$31,466	2,423	$12.99	0.4%	$303,121	54,237	$10,906	2
2011	$29,454	2,357	$12.50	0.4%	$282,005	50,358	$88,398	8
2012	$38,623	3,021	$12.78	0.5%	$277,207	48,072	$26,500	2
2013	$38,678	3,055	$12.66	0.5%	$270,126	46,844	$19,810	3



THE RESEARCH AND ASSESSMENT SECTION:
AN IFW SOURCE FOR SCIENTIFIC INFORMATION

Another exciting year has passed, and we find ourselves amidst two infrequent planning processes, occurring about once every 8–10 years. We are working to update Maine's list of Endangered and Threatened species in accordance with the laws of Title 12. You may have heard of the plight of some of our bats by now, and if you haven't, you can read more about Maine's endangered and threatened (ET) species listing process in the following section by our ET Coordinator, and about bats specifically in the Mammal Group section. The bats are among a handful of other species (birds and invertebrates) whose legal conservation status is being reconsidered in light of new information. We are stepping up bat surveys, bat public outreach and education, and conservation recommendations for energy infrastructure projects that could pose a threat to species of bats.

We are also in the process of updating Maine's Wildlife Action Plan for species of greatest conservation need (SGCN). Ten years have passed since we last did this, and a deadline approaches in 2015 to have this process completed by all states, so that we may remain eligible to receive the federal State Wildlife Grant (SWG), which is mentioned on the financials page at the beginning of this report and its use demonstrated later in this report. This is an opportunity to bring our conservation partners, private stakeholders, and other state agencies back to the table for a discussion about what is working and what could stand to be improved. This is also a chance to reinvigorate Maine's Teaming With Wildlife (TWW) Coalition. Teaming With Wildlife is a national coalition whose mission is to secure permanent broad-based user-fee funding for the conservation of 'at-risk' species. They look to the States' TWW Coalitions every year for support when Congress proposes to decrease or cancel SWG funding, which happens to be an unauthorized appropriation program, unlike that which has housed our Pittman-Robertson grants for the conservation of birds and mammals since 1937.



Snowshoe Hare

All this leads us squarely back to the drawing board on the Bureau's more general species planning process, and we have some new talent on board, who are preparing to lead us through some challenges. This is where you'll be hearing more about our big game and furbearers with opportunities for public input. We're kicking off a grouse research project that should feed nicely into a new management system a few years down the road along with some new long-term monitoring. A similar process is happening for snowshoe hare, too. Snowshoe hare are an important component of Maine's northern forests because of their role in the food chain as prey for several species of birds and mammals. Anecdotally, we've been seeing and hearing of a lot of hare in the north woods this year, so we seem to be kicking off the collaborative long-term monitoring program, which is part of a continent-wide effort, at a pretty good time…this seems like a small investment, big return opportunity.

If our species planning process is one pillar of wildlife conservation and management success in Maine, our programs to conserve wildlife habitats are the other pillar. For Maine's citizens to continue to enjoy our rich natural heritage of fish and wildlife species, those animals must have homes, or habitats, in which to live and successfully procreate. We seek to find balance between the need for human homes and those for healthy fish and wildlife populations. We do this partly through a non-regulatory, collaborative municipal outreach program that has been called Beginning With Habitat [http://www.beginningwithhabitat.org/]. We can show you where the most valuable areas of wildlife habitats are in your town or county. We also conserve habitats by reviewing development projects and making recommendations that attempt to balance the objectives of the developer and our species conservation mission. Both programs are up and running strong with new and excellent staff as of 2013.

If you are ever in the area and would like extra copies of these annual research and management reports, swing by the Bangor office at the corner of Hogan Road and State Street in the back of the Dorothea Dix State Complex behind the bronze deer; we try to keep a few extra boxes on hand for our staff to distribute at public events. You can find them at regional offices and on our website too [http://www.maine.gov/ifw/wildlife/reports/research_management.html]. If you would like to feature your photography on our cover, send it our way, and if we use it we will give you credit. Enjoy.

--Shawn Haskell, Ph.D.
Research and Assessment Section Supervisor

Endangered and Threatened Species Conservation

On five previous occasions since 1984, MDIFW has initiated changes to the List of species recognized under the Maine Endangered Species Act (MESA). During the past year, staff biologists have reviewed six taxa groups for potential changes: amphibians, reptiles, birds, inland fish, invertebrates, and mammals. The following changes have been drafted for administrative approval, public comment, public hearings, and review by the MDIFW Advisory Council. The fully vetted proposal will be drafted for submission to the Maine legislature in 2015.

This sixth proposal by MDIFW for MESA changes features the addition of six new species to the List:

- 3 cave bats of the genus *Myotis* – all experiencing catastrophic declines due to widespread mortality from the pandemic disease White-nose Syndrome.
- 3 rare invertebrates that are each currently documented at only a single locality in Maine – a beetle, a butterfly, and a land snail.

Additional recommendations to the MESA List include four reclassifications of status for species already designated in the statute as well as one simple name change:

- 2 birds to be "up-listed to Endangered" from their current status as Threatened Species.
- 2 insects to be "down-listed to Threatened" from their current status as Endangered Species.
- name change for 1 bird, the Common Gallinule, previously known as the Common Moorhen.

Little Brown Bat

Available data are compiled to judge status against vulnerability concepts adapted from guidelines by the International Union for Conservation of Nature (IUCN): population size, population distribution, population trends, fragmentation of populations or habitats, endemism, or an overall population viability model. Threats related to habitat or range loss, over-utilization, disease, predation, inadequacy of existing regulations, and other natural or human-related factors are secondary considerations related to the objective thresholds based on the IUCN concepts. MESA listing guidelines are adopted in MDIFW regulations and policies; for more information, see http://www.maine.gov/ifw/pdfs/listingHandbook.pdf.

NEW SPECIES LISTINGS PROPOSED UNDER MESA		
Invertebrates		
Cobblestone Tiger Beetle	(*Cicindela marginipennis*)	Proposed as Endangered
Frigga Fritillary	(*Boloria frigga*)	Proposed as Endangered
Six-whorl Vertigo	(*Vertigo morsei*)	Proposed as Endangered
Mammals		
Eastern Small-footed Bat	(*Myotis leibii*)	Proposed as Threatened
Little Brown Bat	(*Myotis lucifugus*)	Proposed as Endangered
Northern Long-eared Bat	(*Myotis septentrionalis*)	Proposed as Endangered
CHANGES PROPOSED FOR SPECIES CURRENTLY LISTED UNDER MESA		
Birds		
Black-crowned Night Heron	(*Nycticorax nycticorax*)	Change status: Threatened → Endangered
Common Gallinule	(*Gallinula galeata*)	Name change only for "Common Moorhen"
Great Cormorant	(*Phalacrocorax carbo*)	Change status: Threatened → Endangered
Invertebrates		
Clayton's Copper	(*Lycaena dorcas claytoni*)	Change status: Endangered → Threatened
Roaring Brook Mayfly	(*Epeorus frisoni)*	Change status: Endangered → Threatened

At present, 45 animals are listed as Endangered or Threatened by MDIFW:

Birds (Class Aves)		
American Pipit	(*Anthus rubescens*)	Endangered (1997)
Arctic Tern	(*Sterna paradisaea*)	Threatened (1997)
Atlantic Puffin	(*Fratercula arctica*)	Threatened (1997)
Bald Eagle	(*Haliaeetus leucocephalus*)	Endangered (1978) / Recovered (2009)
Barrow's Goldeneye	(*Bucephala islandica*)	Threatened (2007)
Black-crowned Night Heron	(*Nycticorax nycticorax*)	Threatened (2007)
Black Tern	(*Chlidonias niger*)	Endangered (1997)
Common Moorhen	(*Gallinula chloropus*)	Threatened (2007)
Golden Eagle	(*Aquila chrysaetos*)	Endangered (1987)
Grasshopper Sparrow	(*Ammodramus savannarum*)	Endangered (1987)
Great Cormorant	(*Phalacrocorax carbo*)	Threatened (2007)
Harlequin Duck	(*Histrionicus histrionicus*)	Threatened (1997)
Least Bittern	(*Ixobrychus exilis*)	Endangered (2007)
Least Tern	(*Sternula antillarum*)	Endangered (1984)
Peregrine Falcon	(*Falco peregrinus*)	Endangered (1975)
Piping Plover	(*Charadrius melodus*)	Endangered (1987)
Razorbill	(*Alca torda*)	Threatened (1997)
Roseate Tern	(*Sterna dougallii*)	Threatened (1987) / Endangered (1997)
Sedge Wren	(*Cistothorus platensis*)	Endangered (1987)
Short-eared Owl	(*Asio flammeus*)	Threatened (2007)
Upland Sandpiper	(*Bartramia longicauda*)	Threatened (1997)
Fish (Class Actinopterygii)		
Redfin Pickerel	(*Esox americanus americanus*)	Endangered (2007)
Swamp Darter	(*Etheostoma fusiforme*)	Threatened (1997)
Insects (Class Insecta)		
Boreal Snaketail	(*Ophiogomphus colubrinus*)	Threatened (2007)
Clayton's Copper	(*Lycaena dorcas claytoni*)	Endangered (1997)
Edwards' Hairstreak	(*Satyrium edwardsii*)	Endangered (1997)
Hessel's Hairstreak	(*Callophrys hesseli*)	Endangered (1997)
Juniper Hairstreak	(*Callophrys gryneus*)	Endangered (2007)
Katahdin Arctic	(*Oeneis polixenes katahdin*)	Endangered (1997)
Pine Barrens Zanclognatha	(*Zanclognatha martha*)	Threatened (1997)
Purple Lesser Fritillary	(*Boloria chariclea grandis*)	Threatened (2007)
Rapids Clubtail	(*Gomphus quadricolor*)	Endangered (2007)
Ringed Boghaunter	(*Williamsonia lintneri*)	Threatened (2007)
Roaring Brook Mayfly	(*Epeorus frisoni)*	Endangered (2007)
Tomah Mayfly	(*Siphlonisca aerodromia*)	Threatened (1997)
Twilight Moth	(*Lycia rachelae*)	Threatened (1997)
Sleepy Duskywing	(*Erynnis brizo*)	Threatened (2007)
Mammals (Class Mammalia)		
New England Cottontail	(*Sylvilagus transitionalis*)	Endangered (2007)
Northern Bog Lemming	(*Synaptomys borealis*)	Threatened (1987)
Molluscs (Class Bivalvia)		
Brook Floater	(*Alasmidonta varicosa*)	Threatened (2007)
Tidewater Mucket	(*Leptodea ochracea*)	Threatened (1997)
Yellow Lampmussel	(*Lampsilis cariosa*)	Threatened (1997)
Reptiles (Class Reptilia)		
Black Racer	(*Coluber constrictor*)	Endangered (1987)
Blanding's Turtle	(*Emydoidea blandingii*)	Threatened (1987) / Endangered (1997)
Box Turtle	(*Terrapene carolina*)	Endangered (1987)
Spotted Turtle	(*Clemmys guttata*)	Threatened (1987)

The last additions to the List were enacted into Maine law during 2007. In 2009, the Legislature also adopted a MDIFW recommendation to remove the Threatened Species status for Bald Eagles and reclassify them as a "Recovered Species" under MESA. Very few states designate Endangered and Threatened Species by statute. The current MESA List administered by MDIFW via the Maine Legislature identifies 22 animals as Endangered and 23 others as Threatened; see http://www.mainelegislature.org/legis/statutes/12/title12sec12803.html.

Other State agencies administer Lists of rare plants (Natural Areas Program - Maine Dept. of Agriculture, Conservation, and Forestry) and marine fauna (Maine Dept. of Marine Resources, except for seabirds that are under MDIFW jurisdiction). On a national level, the U.S. Fish and Wildlife Service (Dept. of Interior) and the National Marine Fisheries Service (National Oceanic and Atmospheric Administration - Dept. of Commerce) provide the lead for listings under the U.S. Endangered Species Act. While state and federal listings of Endangered and Threatened Species may overlap, they ultimately examine status at different scales with varying (albeit similar) policy guidance. Federal listings focus on status over all or a significant portion of the species range rather than risks within a single state unless there are biological or legal standards specific to a specific area. For more information on federally-listed species in Maine, see http://www.fws.gov/mainefieldoffice/Endangered_and_Threatened_Species.html and http://www.nmfs.noaa.gov/pr/conservation/states/maine.htm.

The Maine Endangered Species Act was first enacted in 1975. Its preamble clearly establishes a conservation ethic for the State's fish and wildlife heritage:

> "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."
> [excerpt from http://www.mainelegislature.org/legis/statutes/12/title12sec12801.html]

Maine's "Endangered Species" are fauna with significant risk of extirpation; they generally require special conservation attention to prevent disappearance from the State. "Threatened Species" are those that are vulnerable to becoming Endangered without appropriate management. MDIFW keeps an administrative list for "Species of Special Concern" that are at risk of becoming Threatened; they lack special protections afforded to those listed under the Maine Endangered Species Act. The Special Concern List is unchanged since 2011; see http://www.maine.gov/ifw/wildlife/endangered/specialconcern.htm.

Wildlife agencies increasingly focus at Species of Greatest Conservation Need (SGCN) identified in Wildlife Action Plans. SGCN include species "at risk" in the State with particular emphasis on emerging problems before jeopardy advances to the legal threshold of Endangered and Threatened Species. Animals for which Maine has a disproportionate conservation responsibility may also be designated as SGCN. Maine's Plan, first adopted in 2005, is now undergoing the required 10-year revision; for more information on this effort and State Wildlife Grants, see http://www.maine.gov/ifw/wildlife/reports/MWAP2015.html.

Recognition of species as Endangered or Threatened provides additional conservation options and priority. Recovery of listed species is never quick or simple. Species recovery often spans decades, must address an array of limiting factors, and may employ safeguards to populations or habitats. It may require coordinated efforts across state or international borders. MDIFW has to allocate limited resources strategically to earn the maximum conservation benefit. The only state funds available for this program are derived from these voluntary contributions to the Maine Endangered and Nongame Wildlife Fund:

- purchases / renewals of a vehicle Conservation Registration: each "Loon Plate" provides $5.60
- donations via the "Chickadee Check-off" on Schedule CP of state income tax returns
- renewals of Sportsman Registration plates for vehicles: each provides $1.80 + other MDIFW funds
- direct donations to the Fund at any time c/o MDIFW.

MDIFW personnel time is supported by federal aid funds from the Pittman–Robertson program for wildlife restoration and federal State Wildlife Grants for conservation of species "at risk", as well as state revenues from the Loon License Plate and Chickadee Check-off fund.

--Charlie Todd
Endangered and Threatened Species Coordinator

Habitat Group

Donald Katnik, Ph.D., Habitat Group Leader/Oil Spill Response Coordinator - Supervises Group activities and coordinates habitat-related projects with other Department staff and other State and Federal agencies. Coordinates oil spill response planning efforts for the Department including training, identifying and prioritizing sensitive areas, and developing spill response plans.

MaryEllen Wickett, Ph.D., Wildlife Biologist and Programmer/Analyst - Creates and maintains customized applications and tools for accessing and using the Department's fish and wildlife habitat data both within and outside the agency. Creates, analyzes, and maintains wildlife/habitat databases. Provides technical support and habitat data analyses for landscape planning efforts and development of species' habitat models.

Amy Meehan, Wildlife Biologist and GIS Specialist - Collects wildlife habitat data from Regional Wildlife Biologists and others. Creates and maintains computer databases. Conducts field inventories of wildlife habitat and provides Geographic Information Systems (GIS) support for a variety of projects.

Jason Czapiga, GIS Coordinator - Develops, maintains, and analyzes databases of wildlife observations and habitat. Provides assistance to other Division biologists to assess species' habitats on a statewide basis.

Information for Habitat Conservation and Management

Wildlife/Habitat Mapping – Why, What, and How?

Technologies like global positioning systems (GPS) now allow us to "think geographically" more than ever before. People don't want to know just "what," but "where" as well. Habitat Group's job is to provide the mapped data to support that. The increasing sophistication and availability of mobile devices, mapping "apps," and high resolution aerial photos are creating a constant demand for better accuracy of mapped data.

We use mapped data for regulatory reviews, oil spill response, species management, and conservation planning. These needs require different types of data. Regulatory maps are political/social compromises – they do not include every square foot of habitat in Maine and are limited to depicting what is described in legal definitions. In the regulatory world, an area is either regulated or it is not, thus the boundary line of a mapped habitat is "black and white." In contrast, oil spill response, species management, and conservation planning are processes that attempt to consider all of the habitat in Maine - or at least as much of it as we can map - and there can be subtle differences in habitat values across areas; a "shades of gray" perspective.

Providing the high level of accuracy needed for these mapped data requires more than one visual perspective. A field observer is better able to distinguish different types of habitat, whereas an aerial view is better for mapping the habitat's boundaries. So we use both. Remote sensing technologies have changed dramatically since the Department began mapping wildlife habitat. Aerial photos are much more available and detailed than before. Sensors like Light Detection and Ranging (LIDAR) provide 3D data "point clouds" that can even map forest understories. Although legal and privacy issues with drone aircraft need to be sorted out, there is no question that this technology will significantly reduce the cost of mapping habitat and eliminate the risks to human life that are associated with traditional flights.

This work is supported by federal State Wildlife Grants, the federal Pittman-Robertson Funds program, state revenues from the sales of hunting licenses, Loon Conservation Plate, and Chickadee Check-off Funds, and the Maine Coastal and Inland Surface Oil Clean-up Fund.

Leveraging Technology for Better Tracking of Fish and Wildlife Species

The Department is responsible for over 1,000 species of fish and wildlife in Maine. Ideally, we need to track the population status, habitat associations, and management concerns for each one. Among other things, this information is used when the Department updates its list of Endangered/Threatened species and our 10-year State Wildlife Action Plan. Previously these data were scattered among dozens of tables in various reports, which made it time-consuming to use and difficult to modify. Jason Czapiga of the Research and Assessment Section (RAS) Habitat Group has been working with Charlie Todd, the Endangered Species Coordinator, and all of the RAS Species Specialists to build a relational database to provide much easier ways to search, summarize, and revise these data. A key part of updating our State Wildlife Action Plan is prioritizing our "Species of Greatest Conservation Need" (SGCN) list. This requires comparing the list of species Maine is responsible for with many other regional and national lists of species of concern. That sounds simple, but subtle differences in the taxonomical naming of species make it difficult for the database to determine whether

two similar names actually refer to the same species. Building the database also required "mining" all of the data from the old report tables. This tedious work, however, is a valuable investment that will greatly expedite meeting future needs.

This work is supported by federal State Wildlife Grants, the federal Pittman-Robertson Funds program, and state revenues from sales of hunting licenses, the Loon Conservation Plate, and Chickadee Check-off Funds.

Coastal/Tidal Wildlife Habitat

Salt marshes, tidal flats, eelgrass beds, and mussel bars all provide important habitat for wildlife. For the last several years, the Department has been working to develop a high resolution map of these habitats. The work to date has involved identifying what habitats need to be mapped and what can be identified from the low-tide aerial photos available from the Maine Department of Marine Resources (DMR). Field visits to hundreds of sites along Maine's coast have verified that fringe marsh down to ten feet across can be accurately mapped from these photos. They also demonstrated the importance of identifying where freshwater inflows increase the value of tidal habitats. This past year, Habitat Group staff met with species specialists from the Research and Assessment Section and regional biologists from the Wildlife Management Section to discuss what we have learned so far and to develop a set of mapping protocols to standardize what we will map as Coastal/Tidal Wildlife Habitat. We have now begun the process of working through DMR's coast-wide set of low-tide imagery to map habitat areas from them. When complete, this comprehensive data set will allow the Department to prioritize coastal/tidal habitats for oil spill response. This data set will also serve as a basis for updating the Department's regulatory "Tidal Waterfowl/Wading bird Habitat" layer. We expect to complete the coastal/tidal mapping by summer 2015.

This work is supported by federal Pittman-Robertson Funds program, sales of hunting licenses, and the Maine Coastal and Inland Surface Oil Clean-up Fund.

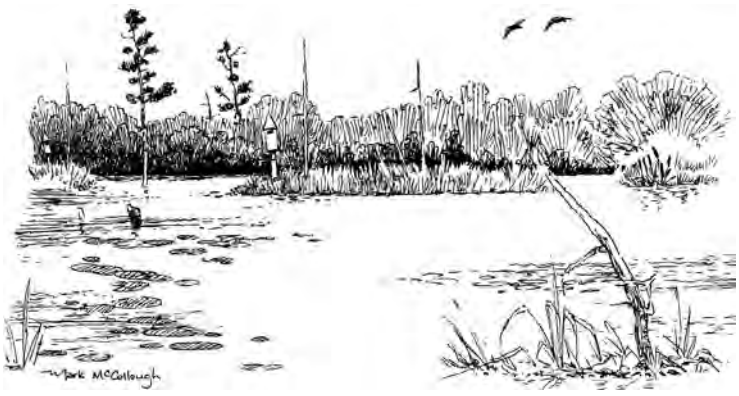
Oil Spill Response

As a state Natural Resource Trustee, MDIFW is obligated to respond to oil spills that affect wildlife or wildlife habitat. This year the oil spill response community began updating the "Area Contingency Plan," which was developed to guide spill response for southern Maine and New Hampshire. One section of this plan details how areas will be prioritized for protection during a spill response. Another section addresses the potential use of chemical dispersants. The ecological effects of the large quantities of chemical dispersants used in the "Deepwater Horizon" response in the Gulf of Mexico in 2010 are still being evaluated, but the effects of undispersed oil impacting sensitive wildlife habitats like salt marshes and tidal flats are known to be catastrophic. This section of the Area Contingency Plan attempts to proactively identify all of the known concerns for both using and not using chemical dispersants and includes a detailed worksheet that would guide decision-makers during a spill event in determining whether or not to use dispersants. As the Department's Oil Spill Response Coordinator, Don Katnik participated in this update process and provided input on both the protection prioritization scheme and the dispersant planning discussion.

This work is supported by the Maine Coastal and Inland Surface Oil Clean-up Fund.

Assessing Freshwater Wetlands

Maine has tens of thousands of freshwater wetlands. Since the 1990s, the Department has used a scoring method based on five wetland characteristics to evaluate them (i.e., wetland type, diversity, size, interspersion, and percent open water). Some of these landscape-scale characteristics are better assessed from an aerial perspective using high-resolution photos from multiple seasons. Other characteristics are better assessed by field observation, but the overwhelming number of wetlands in Maine, and the logistics of accessing them, limits how much field data we can collect on the ground. Habitat Group has been working with the Wildlife Management Section to evaluate the practicality of using helicopter surveys to collect more field data on Maine's wetlands. This approach allows field observers to assess multiple wetlands in a single day and provides a unique perspective combining both the landscape-view of photo interpretation and the ability to fly low enough to make detailed field observations.



This work is supported by federal State Wildlife Grants, the federal Pittman-Robertson Funds program, and state revenues from sales of hunting licenses, the Loon Conservation Plate, and Chickadee Check-off Funds.

Bird Group

The breadth of the Bird Group's programmatic responsibilities involve stewardship of 223 bird species that nest in Maine and many more that migrate through or winter in Maine. Several of Maine's birds occur statewide, but others occur only in portions of the state. Maine has a very diverse landscape and, consequently, a myriad of habitats suitable for various bird species. At least 29 inland species of birds reach the northern limits of their breeding distribution in Maine, 28 species at their southern limits, and 2 species at their eastern limits. In addition, many of Maine's island-nesting seabirds reach their southern breeding terminus on Maine's islands, like Atlantic puffins and razorbills. The peregrine falcon and wild turkey have been reintroduced back into Maine. The peregrine population is slowly increasing, and the wild turkey has expanded into areas beyond our expectations. Other species, such as the turkey vulture, blue-winged warbler, evening grosbeak, American oystercatcher, sandhill crane, and several species of wading birds have expanded their breeding range into Maine at various times over the past century.

Brad Allen, Bird Group Leader – Brad oversees group activities and budgets and recently concluded an adult common eider survival study and is now summarizing a 2014 aerial male eider survey. Brad also coordinates Department interests in seabird research and management activities which included a coast-wide gull and cormorant survey last year.

Danielle D'Auria, Wildlife Biologist – Danielle is the Department's species expert on marsh birds, wading birds, common loons, and black terns. Over the past three years, she has also devoted a great deal of effort to heron surveys and coordination of a volunteer heron monitoring program. Her other field-related duties include marsh bird surveys and research, black tern surveys, and inland seabird surveys.

Thomas Hodgman, Wildlife Biologist – Tom develops and implements programs and surveys to assess the status of songbirds in Maine and coordinates several priority bird research programs. Tom's recent focus is working with two graduate students studying saltmarsh sparrows and rusty blackbirds. Tom routinely provides technical assistance and advice to the Wildlife Management Section regarding a wide range of bird conservation issues.

Kelsey Sullivan, Wildlife Biologist – Kelsey coordinates IFW's waterfowl banding programs, surveys, and research to assess the status of game bird populations in Maine. Game bird species that Kelsey is responsible for include ruffed grouse, American woodcock, wild turkeys, ducks, and Canada geese. He is Maine's representative on the Atlantic Flyway Council Technical Section.

Lindsay Tudor, Wildlife Biologist – Lindsay coordinates the Department's shorebird program with current emphasis on shorebird habitat protection under the Natural Resources Protection Act and piping plover and least tern management. Lindsay's research involves shorebird movements within the Gulf of Maine, and her primary survey responsibilities include coastal shorebirds and harlequin ducks.

Erynn Call, Wildlife Biologist – Erynn focuses on the ecology and management of Maine's raptors. Her current research centers on rivers and river-associated birds including bald eagles and ospreys. Ongoing and newly initiated state-wide river bird monitoring programs will offer a greater understanding of habitat relationships, presence and removal of dams, and the importance of sea-run fishes to raptors. Other work includes review and collaboration on various raptor research and monitoring efforts of industry, universities, federal agencies, and nonprofits organizations.

The Bird Group would like to thank the following dedicated individuals who have assisted us with our bird conservation and management tasks over the last year: Diane Winn and Marc Payne, Avian Haven; Maine Warden Service pilot Charlie Later, Maine Forest Service pilots Jeff Miller, Chris Blackie and Lincoln Mazzei; USFWS pilot/biologist Mark Koneff; Shannon Buckley, Kate Ruskin, Mo Correll, Kate O'Brien, Lauren Gilpatrick, Douglas Haislet, John Morgan, Todd Jackson, Bill Carll, Soren Siren, Brian Lewia, Courtney Hagenaars, Brad Shepard, Tom Berube, Dave Hentosh, Glen Mittelhauser, John Drury, Dave Hiltz, Chris West, Don McDougal, Jim Dyer; Bill Hanson; Chris DeSorbo, Rick Gray, Wing Goodale, Lucas Savoy, Bruce Connery, Lesley Rowse; Joe Wiley, Bureau of Parks and Lands; Margo Knight, Don Mairs, Ron Joseph, Patrick Keenan, Bill Johnson, Bill Sheehan, Thomas Cochran; Susan Gallo, Maine Audubon; Don Reimer, Scott Kenniston, Dick Hutchinson, Libby Mojica, John Sewell, Sharon Fiedler, Sara Williams, Brittany Currier, Shannon Prescott, Ken Janes, Gordon Smith, Doug Suitor, Michael Fahay, Robin Robinson, Jill Glover, Julie Johnston, Brian Johnston, Unity College Capstone students, many Heron Observation Network volunteers, many River Bird Project volunteers, many private landowners who have granted us access to their property for surveys and monitoring, and IFW regional staff.

Fish Lead-Free: Get the Lead Out and Save Loons!

The common loon is a treasured species for many Maine residents and summer visitors. Despite the relatively healthy population of loons breeding statewide, they are continuously challenged by human activities – including shoreline development and water pollution; predators attracted to human garbage; collisions with boats; disturbance and nest washouts from boating wakes; and lead tackle and monofilament entanglement. In fact, one of the most significant threats to loon survival is lead poisoning. One-third of adult loons collected over the last twenty-five years died from lead poisoning, a direct result of the ingestion of lost or discarded lead sinkers and lead-headed jigs. Lead is highly toxic and loons die within about 2-4 weeks post-ingestion.

Maine's lead fishing tackle regulations were recently strengthened to reduce adult loon mortality by banning both the sale and use of lead sinkers up to one ounce, and by phasing in a ban on the sale and use of bare lead-headed jigs in 2016 and 2017. The success of the new law in reducing loon mortality will depend on getting the word out to anglers. This is where the Fish Lead-Free initiative comes in.

Fish Lead-Free is a cooperative partnership of the Maine Department of Inland Fisheries and Wildlife (IFW), Maine Audubon, Maine Lakes Society, Maine Bass Nation, and the Sportsman's Alliance of Maine. The goal of the initiative is to increase the use of lead-free tackle on Maine's lakes and ponds by providing alternative lead-free products, assisting anglers with options for lead recycling, and increasing awareness of Maine's current lead tackle laws. Three major aspects of this initiative in the summer of 2014 (and continuing in the summer of 2015) include:

- Lead Tackle Exchange Kits: We connected with organizations, groups and individuals interested in acting as hosts for lead tackle exchanges. Exchanges may be a one-time event or may be on-going. We supply a kit with informational brochures, an inventory of lead-free sinkers and jigs, and a collection container for lead tackle. For the summer of 2014, we have 18 exchange sites being set up across the state, with another 4 municipal transfer stations offering to collect lead tackle from anglers. We are in the process of establishing collection sites at IFW regional offices.
- Loon and Lead Outreach: We developed a 45-minute multi-media presentation that answers questions about loon habitat and behavior in Maine, and highlights the impacts of lead tackle, the availability of lead-free tackle, and the opportunity to take alternative tackle to try. For the summer of 2014, we have scheduled 11 talks across the state. We have also established a new website (fishleadfree.org) and developed several outreach pieces to go with the tackle exchange and collection programs as well as with wardens as they share the new lead regulations with anglers.
- Increased Loon Mortality Monitoring: A Tufts Veterinary School student is helping to collect and necropsy dead loons from around the state. She is checking the **"Dead Loon Hotline" (207-781-6180 ext. 275)** to track down carcasses that are found and connect with interested volunteers willing to transport dead loons to facilities in Gorham, where she is able to conduct necropsies to determine the cause of death.

To learn more about the initiative, visit the following website: http://fishleadfree.org.

--Danielle D'Auria

6th Year for the Heron Observation Network

The Heron Observation Network, or HERON for short, is a group of volunteers who have adopted wading bird colonies across the state. Adoption includes the commitment to check on a colony at least once during the breeding season (May-July) to determine if the colony is active (i.e. being used by herons, egrets, or ibises) and the approximate number of active and inactive nests. Volunteers who have more time to contribute may visit a colony every couple of weeks in an effort to gauge the productivity of the colony (number of birds fledged per nesting pair) and a timeline for each of the nesting stages (incubation, nestling, and fledgling). Only colonies that can be viewed from a distance, which does not cause disturbance to the nesting birds, are monitored by volunteers during the breeding season.

In 2009 – HERON's first year – 47 volunteers adopted 68 wading bird colonies. By 2013, those numbers grew to 74 volunteers monitoring 96 colonies; and in 2014, 91 volunteers signed up to monitor 140 colonies! Most of these colonies are occupied by great blue herons, a species of Special Concern due to apparent population decline along the coast and possibly statewide. Other species that may nest in such colonies include black-crowned night-heron (State Threatened), snowy egret, glossy ibis, great egret, little blue heron, cattle egret, and tricolored heron.

Not all historic great blue heron colonies are monitored each year, nor are the same colonies monitored each year. From 2009-2013, 141 individual colonies were active for at least one year (Figure 1). If we look at the most recent survey data for each colony

(collected 2009 or later) and assume the activity remained the same at those sites that did not get surveyed, the data show a fairly steady population with an average of 1,079 nesting pairs each year (Figure 2). A dual-frame sampling aerial survey planned for 2015 should provide us with a more statistically valid population estimate for the entire state; and by repeating the methodology at regular intervals, we will be able to arrive at a population trend over time.

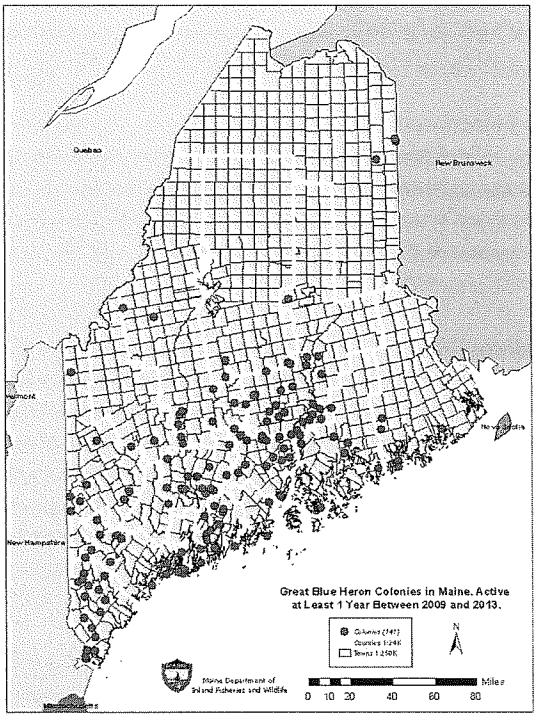


Figure 1. Great blue heron colonies in Maine, active at least one year between 2009 and 2013.

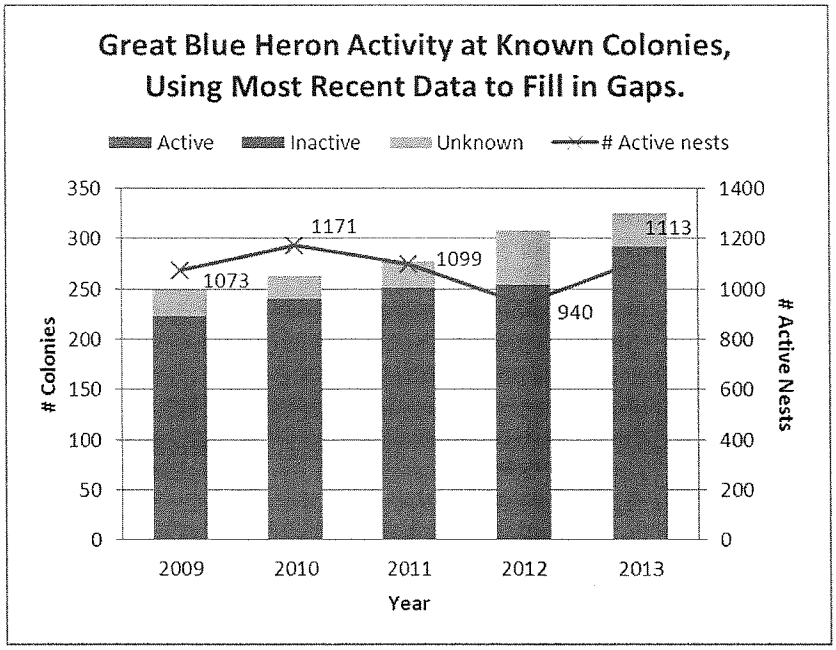


Figure 2. Great blue heron activity at known colonies, using most recent data to fill in gaps.

Since the conclusion of the 2009 aerial and ground survey effort, 100 new colonies have been reported, and there are likely more colonies to be discovered. If you know of a wading bird colony, please don't hesitate to report it. Or, if you'd like to join the Heron Observation Network and adopt a colony yourself, please contact Danielle D'Auria, danielle.dauria@maine.gov, (207) 941-4478. For more information on HERON, and Maine's colonial wading birds, visit http://maineheron.wordpress.com/.

This work is supported by volunteer assistance, the federal State Wildlife Grants program, state revenues from the Loon Conservation Plate, Chickadee Check-off Funds, and the Maine Outdoor Heritage Fund.

--Danielle D'Auria

Development of a Remote Sensing Tool for Predicting Tidal Marsh Communities

New England's tidal marshes are of particular importance to coastal settlements due to the ecosystem services they provide by buffering the land from the ocean. Among these is the maintenance of regional and global biodiversity through support of several vertebrate species that occur exclusively in tidal marshes, including the saltmarsh sparrow. This bird's global breeding range falls entirely within coastal marshes between Maine and Virginia, and is of significant conservation concern to state wildlife conservation agencies such as MDIFW. Although multiple conservation efforts are aimed at this sparrow's high-marsh breeding habitat (i.e., areas of primarily cordgrass flooded only during monthly high tides), there has been no coordinated regional effort to date, to locate and quantify large patches of their high marsh habitat within the northeast. Staff from IFW supported the work of Maureen Correll (University of Maine Doctoral Candidate) and Dr. Brian Olsen (University of Maine Assistant Professor) in conducting a series of analyses to identify high-marsh areas using satellite (Landsat Thematic Mapper) imagery and validating them against a regional vegetation database collected by the Saltmarsh Habitat and Avian Research Program (SHARP). We found that while previous efforts have been fruitful in classifying high-marsh and low-marsh areas on smaller scales, regional efforts to do the same have been largely unsuccessful. We explored classification schemes at smaller scales within our region of interest, and also used elevation data as a supplement to satellite imagery for classifying high marsh along a portion of our coastal study area. We found increased classification accuracy using LiDAR, a high resolution elevation dataset. We recommend development of a region-wide LiDAR dataset to support identification of high marsh areas for use in adaptive management planning for the Saltmarsh Sparrow, as well as in other coastal conservation efforts at the regional scale.

This summary was modified from a manuscript prepared for publication by: M. Correll, B. J. Olsen, T. P. Hodgman, W. Wiest, and S. A. Sader. 2014. Predicting Tidal Marsh Communities via Remote Sensing: A potential tool for adaptive coastal conservation.

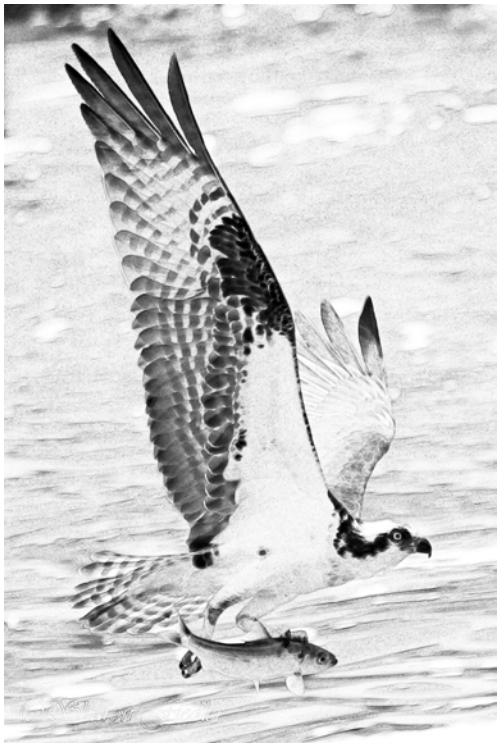
This work is supported by the federal State Wildlife Grants program, as well as state revenues from the Loon Conservation Plate, Chickadee Check-off Fund, and the University of Maine.

--Thomas Hodgman

The Importance of River Habitat and Sea-run Fishes to Bald Eagles and Ospreys

Each year, dozens of bald eagles and ospreys congregate along the Sebasticook River, stretching between Benton and Winslow to roost, nest, and take advantage of a seasonally abundant food resource – river herring – as they head upstream to spawn at inland lakes.

Populations of river herring (a term applied collectively to alewife and blueback herring) are drastically reduced compared to historic levels. The Sebasticook River is particularly important in maintaining populations and hosts the largest run on the East Coast, with over 4 million passed at the Benton Falls Dam fish lift in 2013. These fishes become concentrated within river corridors, provide a reliably available food source, and potentially play a large role in boosting survival and stabilizing wildlife populations.



Osprey with Alewife (Photo by Sharon Fiedler)

While the relationships between fisheries and wildlife are often recognized, no previous efforts have attempted to document the use of the Sebasticook River herring run by these target bird species. These observations will facilitate more informed decisions about river birds, river herring, and the critical habitats needed to support them. We hope to expand the scope of this sampling approach to other river herring runs throughout the state in subsequent years.

This year, in collaboration with the BioDiversity Research Institute, we will pursue two primary project goals: 1) quantify bald eagles and ospreys within the Sebasticook River between Benton Falls Dam and the confluence of the Kennebec River using ground (along the river bank) and aerial surveys during the river herring run from May through July and 2) collaborate with agencies, universities, colleges, nonprofits, land conservancies, towns, and any other organizations that would be interested in development of outreach material highlighting the value of river herring, associated uplands, and connections between rivers, river herring, river birds, and people.

Snowy Owl Irruption

A rare phenomenon not seen for more than a half century unfolded this past winter – a major snowy owl irruption. While it's not uncommon for these Arctic Tundra natives to visit northern regions of the contiguous U.S., this year was different. Owls appeared all around the Great Lakes, along the Atlantic Coast as far south as the Carolinas, and in balmy locales of Florida and Bermuda. In Maine, they were seen more frequently than normal, in many more locations than during a typical winter, and sometimes in exceptional numbers in one setting across the entire state from expansive farmlands in northern Aroostook County to York County beaches in southern Maine. According to Maine eBird, an online bird checklist program, observations peaked during the week of December 1st when 149 birds were documented throughout the state.

These impressive raptors are larger than a great horned owl, have a five-foot wing span, and prefer wide open spaces of shorelines, beachfronts, sand dunes, extensive marshes, and open fields. Field mice, voles, squirrels, and ducks are hunted day or night. Wildlife enthusiasts and photographers are encouraged to give a wide berth because even if the owl doesn't appear disturbed, their prey could be unlikely to emerge.

The cause of this owl surge appears to be a recent superabundance of food on the breeding grounds. Female owls are capable of producing up to 9 eggs when food is plentiful. Lemmings are a foundation prey of Arctic ecosystems and follow a boom-bust cycle. A photograph of a nest surrounded by heaps of lemmings provided a stunning example of the banner lemming year that led to a large number of owlets experiencing high survival rates. As the Arctic winter set in and lemmings found safe haven under deep snow, the pulse of owls dispersed across Eastern North America to find areas of sparse snow cover and prominent perches to spot their next meal.

A collaborative research effort, Project SNOWstorm, was initiated to learn from this historical irruption. To learn more visit www.projectsnowstorm.org.

This work is supported by the federal State Wildlife Grants program and state revenues from the Loon Conservation Plate and Chickadee Check-off Funds.

--Erynn Call

Piping Plovers

Piping plovers are small, sand-colored shorebirds that nest on sandy beaches and dunes along the Atlantic Coast from Newfoundland to South Carolina. Habitat loss, lack of undisturbed nest sites, and predation are the primary factors jeopardizing populations of piping plovers. With less than 2,000 nesting pairs on the Atlantic coast the piping plover is federally listed as Threatened and is listed as Endangered in Maine. Maine's population of piping plovers has been monitored annually since 1981. Until recently the overall population trend has been one of increase.

With only 24 pairs of piping plovers returning to nest in 2008 and the realization that we were very close to losing this species from our state; municipalities, landowners, government agencies, and private organizations combined efforts to protect nesting piping plovers and attempt to reverse the declining population trend. IFW, Maine Audubon, Maine's Bureau of Parks and Lands, Rachel Carson National Wildlife Refuge, USDA APHIS Wildlife Services, The Nature Conservancy, and Bates College have a long-standing collaboration regarding piping plover management. The towns of Wells, Ogunquit, Old Orchard Beach, and Scarborough are committed to managing their beaches using guidelines established with IFW that provide recreational opportunities for beachgoers and still protect plover broods. These towns have included funds in their budgets to hire plover volunteer coordinators. Plover volunteer coordinators recruit and coordinate volunteers who monitor and help protect plover nests and chicks during the nesting season.

Funding from USFWS Landowner Incentive Program and grants from Maine Outdoor Heritage Fund and National Fish and Wildlife Foundation provided increased efforts in law enforcement, predator management, and outreach at certain plover beaches. Such efforts resulted in productivity rates increasing to a level needed to sustain and grow the population. Maine's piping plover population and distribution has steadily increased from 24 pairs nesting on 11 beaches in 2008 to 50 pairs nesting on 19 beaches in 2014!

IFW is asking for help from all beachgoers to protect these remarkable birds by observing these simple guidelines:

- Avoid fenced areas marked with "Restricted Area" signs.
- Observe birds and chicks only from a distance, with binoculars.
- Keep pets off the beach or leashed from mid-April to mid-September.
- Don't fly kites near posted areas. They resemble hawks and can keep birds away from nests.
- Take your food scraps and trash off the beach when you leave; it attracts nest predators such as skunks and raccoons.
- Call the Maine Warden Service to report harassment of birds. It's a federal offense to harm an Endangered Species.

This work is supported by volunteer assistance, the federal State Wildlife Grants program, and Section 6 Funding, as well as state revenues from the Loon Conservation Plate and Chickadee Check-off Funds.

--Lindsay Tudor

Semipalmated Sandpipers

The semipalmated sandpiper is a small, abundant North American shorebird, somewhat drab in appearance, but capable of flying great distances, making migratory journeys from high Arctic breeding grounds in Canada to their South American wintering areas. Though they stop at specific staging areas to refuel along their migratory routes, most "semis" are capable of flying 1,200 to 3,000 mile segments of their journey nonstop. During southward migration, Maine hosts thousands of semis, providing these weary travelers with the necessary fats and proteins to fuel the next leg of their journey, a nonstop, transoceanic flight to South America (2,000 miles or more).

According to the 2012 North American Bird Conservation Initiative report, northern breeding populations of shorebirds, as a group are in decline. Recent surveys indicate the eastern population of semipalmated sandpipers may have declined by as much as 50% over the past three decades. Habitat loss and degradation along migratory routes and in wintering areas located in South America are believed to be major factors in this decline. Because the Gulf of Maine region is a major flyway for semipalmated sandpiper populations, it plays a critical role in supporting these birds during migration. Understanding the movements of these individuals as they migrate through the region is key to identifying and preserving important stopover sites.

Until recently, tracking individuals across large distances was only feasible for large species. However, recent development of tiny VHF tracking devices called “nanotags” combined with automated receiver towers allows for tracking local movements of shorebirds, as well as long distance, as researchers throughout the Atlantic coast install receiver towers. This newly established Atlantic Seaboard Digital Tracking Array was founded by Dr. Phil Taylor at Acadia University with partners in the Northeast Regional Migration Monitoring Network (NRMMN), which includes University of Maine, IFW, Maine Coastal Islands National Wildlife Refuge, Rachel Carson National Wildlife Refuge, and Bird Studies Canada.

Beginning in July 2013 and continuing in 2014, IFW partnered with University of Maine and Maine Natural History Observatory to capture and place nanotags on semipalmated sandpipers feeding and roosting on coastal habitats in Harrington and Addison. Our objectives were to determine local movements related to shorebird foraging and roosting behaviors, information on length of stay by individual birds, and combined with existing survey data, to determine population status of shorebirds using the Harrington - Addison staging areas. Knowledge of departure weights and condition indicators, along with knowledge of invertebrate concentrations and availability throughout the migration window, will be used to determine whether Maine staging sites are providing migrating shorebirds with resources needed for successful migration.

Shorebirds (Photo by Jonathan Mays)

Our research team installed two automated radio-telemetry stations located at the outlets of the Pleasant and Harrington rivers. These stations were sited in partnership with private landowners, and consisted of a tower with fixed antennas, and an automated telemetry sensor, which continuously recorded detections from radio transmitter tags. Towers were strategically placed near feeding flats where birds using the Mill River, Harrington River, and Pleasant River could be detected during their stay. Over 100 shorebirds were captured in 2013 during the months of August and September. Nanotags were attached to 30 semipalmated sandpipers. All birds were weighed, measured, and color banded. Researchers also collected blood samples from birds without nanotags to check triglyceride levels to determine if birds were gaining fat and to check for blood parasites.

In 2013, birds were tracked through the end of September. The receiver towers recorded over 91,000 detections of tagged birds! The mean detection period for adult semipalmated sandpipers was 12 days, and for the juveniles, 17 days. These detection periods represent a minimum known time that each individual stayed in the stopover area, and are very useful for informing adjustments to methodology for ongoing regional shorebird monitoring programs. Individual birds were documented using offshore islands to roost during high tide and traveling up the Pleasant, Harrington, and Mill Rivers to feed on the mudflats, flying five to ten miles from their roosts with the falling tide.

Further, we can extend the geographic range of tracking beyond the two receiver units deployed in downeast Maine by capitalizing on the integration of this project with those similarly deployed in Canada and southern New England by other NRMMN partners. In 2014, as many as 50 automated telemetry stations will be strategically placed from Newfoundland, the Gulf of St. Lawrence, around the Bay of Fundy, along the Maine coast, and into Massachusetts, essentially encompassing major shorebird staging areas in the Northeast.

In 2014, systematic measures of food availability (invertebrates) in intertidal sediments and visual shorebird surveys will be conducted regularly throughout the migration period. Comparison of invertebrate samples collected at feeding areas with high use by shorebirds, versus invertebrate samples collected at feeding areas with low use by shorebirds, will provide a better understanding of interactions between habitat quality (food availability, level of disturbance) and movement within and between feeding areas.

This work is supported by Maine Outdoor Heritage Fund, federal State Wildlife Grants program, and Eastern Maine Conservation Initiative, as well as state revenues from the Loon Conservation Plate and Chickadee Check-off Funds.

--Lindsay Tudor

Game Birds

Migratory Game Birds

IFW collaborates with the USFWS in assessing migratory game bird populations and harvests. To assess populations, several surveys are conducted throughout the year that target specific migratory bird species groups such as sea ducks and dabbling ducks. Following each migratory bird hunting season, harvest is measured using: 1) the Harvest Information Program (HIP), with data on total estimated harvest, an estimate of the number of active hunters, and the estimated number of days afield; 2) the Wing-collection Survey, where hunters contribute one wing from each harvested bird (this serves as a measure of productivity from the past spring); and, 3) analysis of band recoveries from numbered metal bands placed on birds prior to the fall hunting season that provide estimates of harvest rates and overall survivorship of a species.

American Woodcock

American woodcock are managed on the basis of two regions or populations, referred to as the Eastern and Central Regions. These woodcock populations are basically located east and west of the Appalachian Mountains. Maine is one of the most important states for breeding woodcock within the Eastern Management Region.

Each spring, beginning in 1968, a coordinated survey called the Singing-ground Survey (SGS) is conducted in all states with woodcock populations. Each survey participant records the number of singing male woodcock they hear in the spring along specific routes distributed throughout Maine. Fifty-five routes were conducted in Maine in 2014 by IFW staff, USFWS staff, and a number of volunteers. The long-term trend of number of males heard per route (1968 to 2014) indicates an overall decline in American woodcock numbers across their range. This long-term decline is believed to be caused by an overall loss in woodcock habitat in the east. In 2014, the average number of males heard on Maine's SGS routes was 3.49. Last year the average number of males heard on Maine survey routes was 3.69. The 10-year Maine average is 3.73 males/route.

Woodcock

Woodcock hunting season

Based on data from HIP, approximately 2,200 woodcock hunters harvested an estimated 5,800 woodcock in Maine in 2013. This was a decrease in harvest compared to the previous year. The recruitment index of 2.0 immature (young of the year) to one adult female in the 2013 harvest was close to the long-term average of 1.7 young/adult female (1963–2013) and suggestive of pretty good production in 2013. The recruitment index is a measure of the ratio of immature woodcock per adult female derived from the Wing-collection Survey described above. Maine hunters provided 1,054 woodcock wings from the 2013 hunting season for that survey.

Waterfowl

Waterfowl harvest metrics are also derived from the Harvest Information Program. Harvest estimates for the 2006 to 2013 waterfowl seasons are listed in the following table (Table 2).

Table 2. Maine Waterfowl Harvest 2006-2013.

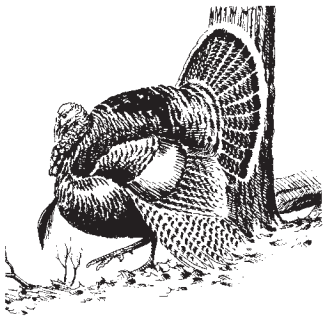
Species	2006	2007	2008	2009	2010	2011	2012	2013
American Black Duck	5,387	5,000	4,683	5,364	3,377	2,133	3,300	3,500
Mallard	12,231	12,700	11,265	12,711	8,379	7,441	14,000	10,200
Green-Winged Teal	4,309	6,100	7,872	4,923	3,189	2,042	2,300	4,600
Wood Duck	5,577	5,400	3,461	7,641	8,567	5,989	6,700	6,500
Ring-necked Duck	1,300	300	747	1,763	1,688	454	600	1,200
Common Goldeneye	2,091	1,600	2,307	1,469	313	318	600	700
Total (all regular ducks included)	29,895	31,100	30,335	33,871	39,100	31,500	39,900	36,000
Canada Goose	9,800	9,100	13,800	4,700	9,194	3,717	9,500	8,800
Sea Ducks								
Common Eider	18,133	13,100	11,143	4,355	4,505	6,400	5,200	3,100
Long-tailed Duck	1,779	1,000	4,305	656	2,321	2,695	No Data	200
Scoter	2,288	1,700	4,052	890	1,092	674	3,200	1,800
Total Sea Duck Harvest	22,200	15,800	19,500	5,901	7,918	9,769	8,400	5,100
Total Waterfowl Harvest	61,895	56,000	63,635	44,472	42,625	44,986	57,800	49,900

Resident Game Birds

Wild turkeys and ruffed grouse are two species of game birds that spend their annual life cycle within the State of Maine. For this reason, all management authority and responsibility remain within IFW.

Wild Turkey

The spring wild turkey hunting season is the season of choice for the majority of turkey hunters. During the spring, male turkeys are particularly responsive to hunters' calls. Over the last four years, participation in the spring turkey season has remained relatively stable, with a slight increase in 2013. At the same time, the harvest success rate remains high, at over 30%. The fall turkey season saw significant changes with the opening of the season for most of the month of October with shotgun hunting. This is reflected in the increase in the fall harvest (Table 3).



Wild Turkey

Table 3. Wild Turkey Spring (2001-2013) and Fall (2002-2013) Registered Harvests.

Season	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Spring	2,544	3,391	3,994	4,839	6,236	5,931	5,984	6,348	6,043	6,077	5,445	6,079	6,553
Fall	NA	151	246	204	157	198	1,843	685	712	1,205	667	958	2,182

Ruffed Grouse

Beginning in 1994, moose hunters have been asked to report the number of ruffed grouse they, and their party, see or harvest during the moose hunting season. Data are compiled by geographic region, and MDIFW calculates the number of grouse seen per 100 hours of moose hunting effort (Table 4). Based on survey results, the statewide average of grouse seen per 100 hours of moose hunting was down compared to the previous four years.

Ruffed Grouse

Table 4. Grouse Seen or Harvested/100 hours of Moose Hunter Effort in Maine for the last 15 years (1999-2013).

Location	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Northeast	41	30	53	23	35	27	11	26	37	31	48	47	59	44	30
Northwest	47	50	55	43	50	56	24	45	44	51	101	101	81	93	62
Eastern Lowlands	30	25	55	29	29	24	8	20	53	23	34	34	30	34	30
West & Mountains	29	28	30	25	26	30	13	25	44	19	36	36	32	50	38
Downeast	-	-	-	13	21	20	9	22	19	28	30	29	15	13	15
Statewide	37	33	48	27	32	31	13	28	39	30	50	49	43	47	35

This work is supported by the federal Pittman-Robertson Fund, revenue from the sales of hunting licenses, and from volunteer assistance.

--Kelsey Sullivan

Maine Great Black-backed and Herring Gull Population Trends

During 2013, several colleagues of mine who work on seabird nesting islands conducted a coast-wide gull survey identical to one we did in 2008. We believe 5-year survey intervals are appropriate for coast-wide population assessments for these species. Several such surveys have been conducted during my career with IFW. The status and trends of Maine's island-nesting great black-backed gull (*Larus marinus*) and herring gull (*Larus argentatus*) populations have changed dramatically over the last century. In more recent times, we used aerial photographs to photograph and count gulls at all colonies along the coast of Maine during 2008 and 2013. We assessed population trends by comparing current census data to results from historical surveys.

Herring Gull with Nest (Photo by Erynn Call)

The breeding population of great black-backed gulls in Maine was estimated at 6,934 pairs nesting on 191 islands during 2013 and 10,094 pairs nesting on 197 islands during 2008. This represents an annual decline of 6.3% in the number of nests in Maine. The breeding population of herring gulls in Maine was estimated at 21,488 pairs nesting on 180 islands during 2013 and 24,302 pairs nesting on 180 islands during 2008. This represents an annual decline of 2.3% in the number of nests in Maine. Nesting populations for both species appeared to have peaked in the 1980s. When compared to nest-count results from 1977, our 2013 data suggest that the number of nesting pairs of great black-backed gulls has declined by 30%. Herring gull populations also declined between 1977 and 2013, with a 17% decline in the number of nests. The exact causes for these population declines in nesting gulls on the coast of Maine are unknown, but we speculate that these declines may be related to changing food availability around island colonies and increased predation rates primarily by bald eagles.

The food resources available to gulls undoubtedly have changed considerably over the last 50 years. Recently, scientists report a greater than 2 degree rise in the ocean temperature in the Gulf of Maine. This rise in temperature may have an effect on many of the gull's important food resources. In fact, the temperature change may be affecting the entire marine food web. Human refuse and fish (fish often from scavenging from lobster bait waste) can make up a significant portion of the gulls diet and may be affected by change in lobstermen's attitudes about discarding used bait in the presence of gulls. Most, if not all, of Maine's open landfills, once used as feeding sites by gulls, are now closed.

Maine's bald eagle (*Haliaeetus leucocephalus*) population is currently experiencing unprecedented growth. Once decimated by DDT and listed as a federal and state endangered species, bald eagles were delisted in 2009, and their population continues to increase. Also, last year IFW conducted an intensive eagle nest survey and 630 active nests were recorded. This burgeoning eagle population has been observed taking gulls, cormorants, waterfowl, and Great Blue Herons. How eagle predation affects adult and juvenile survival of gulls is a factor that has not been quantitatively measured, but suffice to say that the food web in the Gulf of Maine is very complex. I would like to acknowledge my colleagues who helped collect and analyze these seabird data, and they are Glen Mittlehauser, Jordan Chalfant, Rick Schauffler, Brian Benedict, Linda Welch, and Bob Houston. We also thank all of the volunteers and field assistants who spent many hours collecting nest count data over the years. We are grateful to the College of the Atlantic GIS Lab and Gordon Longsworth for letting us use their GIS lab for some of our work. Financial assistance and support for this effort was provided by USFWS's Maine Coastal Islands National Wildlife Refuge and the Gulf of Maine Coastal Program, the Maine Natural History Observatory, and IFW's Pittman-Robertson Funds.

This work is also supported by the revenues from the sales of hunting licenses.

--Brad Allen

Mammal Group

The Mammal Group is one of five groups in the Research and Assessment Section (RAS) in the Bangor Office. We develop and oversee the implementation of all management systems for Maine's mammals, conduct surveys, and collect a variety of biological information. We address public and departmental informational needs through the development of research programs, monitoring protocols, species assessments, and public presentations. Finally, we assist in the formulation of harvest regulations by analyzing biological data, meeting with regional biologists in the Wildlife Management Section, and by making harvest recommendations to the Wildlife Division Director.

Wally Jakubas, Ph.D., Mammal Group Leader – Supervises mammal group personnel, oversees all group activities, writes grant proposals, manages the group's budgets, serves as the lead biologist for New England cottontail, represents the Department on the technical and executive committees for the Regional New England Cottontail Initiative, and is an external member of the graduate faculties for the University of Maine and University of New Hampshire. Wally is the departmental spokesperson on New England cottontail, wolf, and cougar issues.

Randy Cross, Wildlife Biologist – Supervises field crews in radiocollaring bears and collecting biological information, compiles these data, and writes reports for the Department's long-term (39-years) bear monitoring program. Randy also oversees the processing and aging of moose, deer, and bear teeth, and gives numerous talks to the public. Randy is a highly experienced field biologist who has worked for the Department's bear monitoring program for over 30 years. During Randy's tenure, he has shared his enthusiasm and knowledge of bears and bear management with many students, legislators, and members of the general public.

John DePue, Wildlife Biologist – Oversees the management of furbearers and small mammals. John reviews and proposes changes to Maine's trapping regulations, designs small mammal and furbearer surveys, writes grant proposals, monitors white-nose syndrome in bats, assesses the impact windpower projects have on mammals, and serves as departmental spokesperson on furbearer and small mammal issues. John is one of the principal responders for releasing lynx that have been incidentally trapped. He is currently collaborating on marten research with the University of Maine Coop. Unit, and with Maine Audubon on monitoring Maine's bat populations.

Lee Kantar, Wildlife Biologist – Oversees the management of Maine's moose population – the largest moose population in any state south of our Canadian neighbors. Lee's work includes developing and conducting aerial surveys, collecting biological data, leading a team of biologists in making annual recommendations on moose hunting permits, and serving as departmental spokesperson on moose issues. Lee started a major moose survival study this year in western Maine (WMD 8). Results from this study will help identify the factors that limit moose population growth in Maine and will help IFW estimate year-to-year changes in moose numbers.

Kyle Ravana, Wildlife Biologist – Oversees the management of Maine's white-tailed deer population. Kyle works closely with a team of regional biologists in making annual recommendations on the allocation of Any-deer permits, collects biological data on deer, assists in conducting deer population surveys, organizes IFW's monitoring efforts for chronic wasting disease, and serves as the Departmental spokesperson on white-tailed deer issues. Kyle is planning a winter survival study on white-tailed deer starting the winter of 2014-2015. Kyle will use information from this study to update our estimates on how winter severity affects deer survival rates. IFW's winter severity index is arguably the most important index for predicting year-to-year changes in deer numbers.

Jennifer Vashon, Wildlife Biologist – Oversees the management of black bear and lynx and is the departmental spokesperson on lynx and bear issues. Jen designs and implements surveys and monitoring efforts for bears and lynx, analyzes biological data, and writes grant proposals, annual reports, and planning documents. Jen analyzes harvest data and makes annual recommendations for harvesting black bears, provides technical support on nuisance bears and oversees the Department's efforts to monitor incidental capture of lynx by licensed trappers, including responding to these captures.

2013-14 Contract Workers & Volunteers – Bear Project: Christine Basnar, Lisa Bates, Jake Feener, Mitch Jackson, Ethan Lamb, John Wood, Mike Latti, Meagan Taylor, Connor Griffin; **Deer Project:** Lisa Bates, Nicole Bellerose, and the students at Unity College; **Moose Project:** Lisa Bates, Christine Basnar, Brittany Currier, Matt O'Neal, Alexej Siren, Jonathan Trudeau, and John Wood.

We deeply appreciate the dedication and hard work we receive from our contract workers and volunteers!

White-tailed Deer

2013 Deer Harvest

Season Dates and Structure

Maine Deer hunters had the opportunity to hunt white-tailed deer over a period of 86 days within the structure of five different hunting seasons during 2013: expanded and regular (October) archery, rifle, muzzleloader, and youth day.

2013 Doe Quotas, Any-Deer Permits, and Applicants

The Department distributed 46,710 Any-deer Permits amongst 16 WMDs in order to meet its doe harvest objective of 5,700 does in 2013. The doe harvest is not a one-to-one relationship with the number of Any-deer Permits issued. As such, the state annually applies an expansion factor to its doe quotas at the WMD level resulting in more permits issued than does expected to be harvested. 2013 permit allocations ranged from zero in 13 WMDs (1, 2, 4, 5, 8-11, 14, 18, 19, 27, and 28), to 9,700 permits in WMD 20. The top 5 WMDs receiving Any-deer Permits on a per 100 mi2 basis were WMD 21 (1,716 permits), WMD 20 (1,670 permits), WMD 24 (1,436 permits), WMD 22 (757 permits), and WMD 23 (690 permits). In 2013, Maine residents drew 36,500 permits (78% of the total), landowners (comprised of residents and non-residents) drew 7,167 permits (15%), nonresidents drew 2,234 permits (5%), and Superpack permittees won 809 permits (2%). Overall, 71,145 people applied for Any-deer Permits for the 2013 hunting season (66,296 residents, 8,871 landowners (comprised of residents and non-residents), 4,849 nonresidents and 1,482 Superpack license holders. Only residents can apply for a Superpack license; therefore, Superpack license holders were tallied with the rest of the resident applicants for Any-deer permits.

Statewide Statistics for 2013

During the 2013 hunting season, 24,795 deer were registered. The registered harvest by hunting season was 1,717 deer for expanded archery, 408 for regular archery, 781 for youth day, 20,810 for regular firearms, and 1,055 for the muzzleloader season (Table 5). There were 3,234 more deer harvested in 2013 than in 2012, representing a 15% increase over the 2012 hunting season.

Table 5. Statewide sex and age composition of the 2013 deer harvest in Maine by season type and week. Records were corrected and/or adjusted to account for registration errors.

Season	Sex/Age Class				Total Deer	Total Antlerless Deer	Percent by Season and Week		
	Adult		Fawn						
	Buck	Doe	Buck	Doe			Total	Buck	Antlerless
Archery	790	932	179	224	2,125	1,335	9%	5%	17%
Expanded	595	780	150	192	1,717	1,122	7%	4%	14%
October	195	152	29	32	408	213	2%	1%	3%
Youth Day	335	280	83	83	781	446	3%	2%	6%
Regular Firearms	14,990	3,792	1,106	922	20,810	5,820	84%	90%	72%
Opening Saturday	1,624	485	155	125	2,389	765	10%	10%	10%
November 4-9	3,385	992	331	238	5,546	1,561	22%	24%	19%
November 11-16	3,771	743	238	184	4,936	1,165	20%	23%	14%
November 18-23	3,106	593	167	144	4,010	904	16%	19%	11%
November 25-30	2,504	979	215	231	3,929	1,425	16%	15%	18%
Muzzleloader	621	304	61	69	1,055	434	4%	4%	5%
December 2-7	339	122	31	27	519	180	2%	2%	2%
December 9-14	282	182	30	42	536	254	2%	2%	3%
Unknown[1]					24				
Total	16,736	5,308	1,429	1,298	24,795	8,035	100%	100%	100%

[1] Registration information with missing information may inhibit our ability to assign the data to a particular sex, and/or season.

Buck Harvest

The 2013 statewide harvest of 16,736 antlered bucks is an 8% increase from the 2012 hunting season, in which hunters registered 15,385 adult bucks (Table 6). On average, Maine hunters harvested bucks at a rate of approximately 8.3 bucks per 100 square miles during the 2013 hunting season (Figure 3). Excluding WMD 29, the top 5 buck-producing (per mi2 basis) WMDs in 2012 were (in descending order), districts 24, 21, 22, 20, and 23. Department biologists estimate that approximately 47% (~7,865) of harvested antlered bucks were 1½ year old deer, sporting their first set of antlers. The 2013 yearling male frequency is below both the frequency of yearling males in 2012 (~51%) and the state's seven year average (~48%). A higher buck harvest in 2013, coupled with fewer yearling bucks represented in the harvest indicates an increased harvest of older more mature animals. Yearling male frequency (YMF) in the harvest is used as an estimate of annual all-cause (e.g., hunting mortality, road-kill, natural mortality) buck mortality. The relatively low YMF (approximately 47% statewide average) in Maine indicates that the state's buck population experiences a relatively low mortality rate and should have a healthy age structure.

Table 6. Sex and age composition, and harvest numbers, of the 2013 deer harvest in Maine by Wildlife Management District[1].

	Adult		Fawn		Total		Harvest Per 100 Adult Bucks		Harvest Per 100 Sq. Miles Habitat		
WMD	Buck	Doe	Buck	Doe	Antlerless Deer	All Deer	Adult Does	Antlerless	Adult Bucks[2]	All	Adult Does
1	158	0	0	0	0	158	0	0	11	11	0
2	130	3	0	1	4	134	2	3	11	12	0
3	178	17	7	2	26	204	10	15	20	23	2
4	167	0	1	0	1	168	0	1	9	9	0
5	225	1	2	0	3	228	0	1	15	15	0
6	424	64	21	3	88	512	15	21	30	36	4
7	451	34	11	7	52	503	8	12	32	36	2
8	392	5	7	0	12	404	1	3	20	21	0
9	157	0	1	0	1	158	0	1	17	18	0
10	137	0	0	0	0	137	0	0	14	14	0
11	440	2	4	0	6	446	0	1	27	27	0
12	524	134	34	29	197	721	26	38	57	79	15
13	461	116	33	26	175	636	25	38	82	113	21
14	382	11	8	5	24	406	3	6	52	55	2
15	962	453	126	110	689	1,651	47	72	103	177	49
16	1,014	355	103	81	539	1,553	35	53	131	201	46
17	2,072	675	185	176	1,036	3,108	33	50	155	232	50
18	367	7	12	3	22	389	2	6	30	32	1
19	169	0	1	0	1	170	0	1	14	15	0
20	1,035	733	171	172	1,076	2,111	71	104	178	364	126
21	1,021	654	160	169	983	2,004	64	96	212	416	136
22	830	370	86	85	541	1,371	45	65	192	316	85
23	1,348	487	154	140	781	2,129	36	58	173	273	62
24	517	358	93	92	543	1,060	69	105	236	484	163
25	1,016	339	79	72	490	1,506	33	48	145	215	48
26	1,155	228	66	54	348	1,503	20	30	128	167	25
27	463	1	6	0	7	470	0	2	63	64	0
28	262	1	0	0	1	263	0	0	24	24	0
29	308	259	55	70	384	692	84	125	212	477	178
Statewide	16,765	5,307	1,426	1,297	8,030	24,795	32	48	58	86	18

[1]Sex/age data were corrected for errors in the deer registrations
[2]Recorded BKI

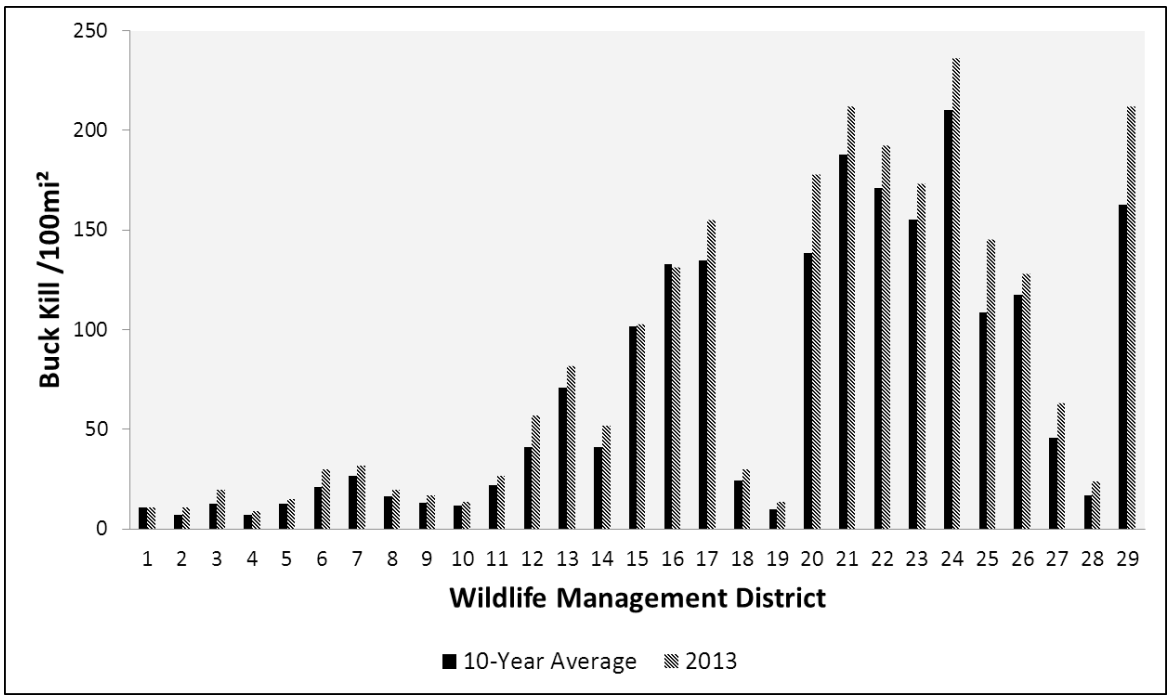


Figure 3. The 2013 buck-kill-index (BKI) exceeded the 10-year average BKI, in Maine. The BKI is used to assess white-tailed deer population trends within the state. Therefore, an increase in the BKI may be result of an increase in the abundance of deer on the Maine landscape.

Antlerless Deer Harvest

IFW closely regulates the annual harvest of does and fawns, commonly referred to as antlerless deer, in Maine. Excluding WMD 29, the statewide total harvest of adult (yearling and older) does during 2013 was 5,049 individuals, bringing the harvest to within 11% of the Department's recommended harvest of approximately 5,700 animals. During 2013, Any-deer Permittees tagged 1,992 fawns during the firearms seasons, while archers and youth day hunters tagged 403, and 166, young of the year, respectively. Overall, 8,035 antlerless deer were registered by hunters during the 2013 season.

Harvest by Season and Week

Approximately 84% of the total deer harvest occurred during the 4-week firearms season (Table 5). The total archery harvest increased by 11% from 2012, while the muzzleloader harvest increased by more than 15%. Youth day took place on Saturday, October 26th, resulting in the harvest of 335 adult bucks, and 446 antlerless deer. Overall, Maine's youth experienced an increase in their deer harvest by approximately 37% over the 2012 hunting season. Youth hunters continue to remain relegated to bucks only hunting within buck only WMDs but maintained either-sex opportunity in WMDs where Any-deer permits were allocated.

Harvest by Hunter Residency

Once again residents tagged approximately 91.5% (22,698 deer) of the total harvest during 2013 (Table 7). Among seasons, the proportion of the harvest registered by Maine residents was highest for archery (96.8%) and youth day (98.5%), followed by muzzleloader (96.5%), and firearms (90.5%). Regional differences occurred in the distribution of the harvest by residents and visitors to Maine (Table 8). In the more populous central and southern WMDs, most successful deer hunters were generally Maine residents (Table 9).

Table 7. Statewide deer registrations in Maine by season type and residence.

Season and Week	Residents	Nonresidents	Total	Percent by Residents
Archery	2,056	69	2,125	97%
Expanded	1,666	51	1,717	97%
October	390	18	408	96%
Youth Day	769	12	781	99%
Regular Firearms	18,827	1,978	20,805	91%
Opening Saturday	2,385	4	2,389	100%
November 4-9	4,972	569	5,541	90%
November 11-16	4,389	547	4,936	89%
November 18-23	3,484	526	4,010	87%
November 25-30	3,597	332	3,929	92%
Muzzleloader	1,018	37	1,055	97%
December 2-7	493	26	519	95%
December 9-14	525	11	536	98%
Unknown[1]	28	1	29	97%
Total	22,698	2,097	24,795	92%

[1] Missing records due to incomplete information.

Table 8. Deer registrations by hunter residence and county of kill in Maine during the 2013 hunting season.

County of Kill	County Residents	Non-resident Transient[1]	Nonresidents	Total	Percent by Residents
Androscoggin	975	238	32	1,245	78%
Aroostook	988	182	209	1,379	72%
Cumberland	1,763	448	74	2,285	77%
Franklin	605	223	139	967	63%
Hancock	857	157	46	1,060	81%
Kennebec	1,674	271	72	2,017	83%
Knox	770	196	30	996	77%
Lincoln	550	97	12	659	84%
Oxford	1,259	341	238	1,838	69%
Penobscot	2,179	408	233	2,820	77%
Piscataquis	450	418	259	1,127	40%
Sagadahoc	616	212	17	845	73%
Somerset	1,377	604	377	2,358	58%
Waldo	1,023	392	159	1,574	65%
Washington	707	74	50	831	85%
York	2,456	188	150	2,794	88%
Statewide	18,249	4,449	2,097	24,795	74%

[1]Non-resident transients are residents of the State of Maine who harvested a deer in a WMD in which they do not reside within.

Table 9. 2013 deer registrations by Wildlife Management District and hunter residence.

	Residents		Non-resident Transient[1]		Nonresidents		
WMD	Number	Percent	Number	Percent	Number	Percent	Total
1		0.0%	158	100%		0%	158
2	45	33.6%	59	44%	30	22%	134
3	153	75.0%	46	23%	5	2%	204
4	2	1.2%	101	60%	65	39%	168
5	21	9.2%	135	59%	72	32%	228
6	415	81.1%	66	13%	31	6%	512
7	142	28.2%	192	38%	169	34%	503
8	65	16.2%	171	43%	165	41%	401
9	32	20.3%	81	51%	45	28%	158
10	65	47.4%	46	34%	26	19%	137
11	196	43.9%	162	36%	88	20%	446
12	482	67.0%	154	21%	83	12%	719
13	313	56.0%	189	34%	57	10%	559
14	109	26.8%	187	46%	110	27%	406
15	1,128	72.0%	318	20%	120	8%	1,566
16	1,042	72.8%	331	23%	58	4%	1,431
17	2,094	67.4%	757	24%	256	8%	3,107
18	254	65.3%	90	23%	45	12%	389
19	92	54.1%	48	28%	30	18%	170
20	1,667	80.5%	286	14%	118	6%	2,071
21	1,354	70.3%	536	28%	37	2%	1,927
22	1,110	81.0%	239	17%	22	2%	1,371
23	1,405	66.2%	526	25%	192	9%	2,123
24	654	61.8%	382	36%	23	2%	1,059
25	1,249	88.8%	130	9%	28	2%	1,407
26	1,185	81.2%	230	16%	45	3%	1,460
27	400	85.1%	62	13%	8	2%	470
28	137	52.1%	115	44%	11	4%	263
29	296	44.2%	330	49%	44	7%	670
Statewide	16,107	53%	6,127	34%	1,983	13%	24,217

[1] Non-resident Transients are residents of the State of Maine who harvest a deer from a WMD in which they do not reside.

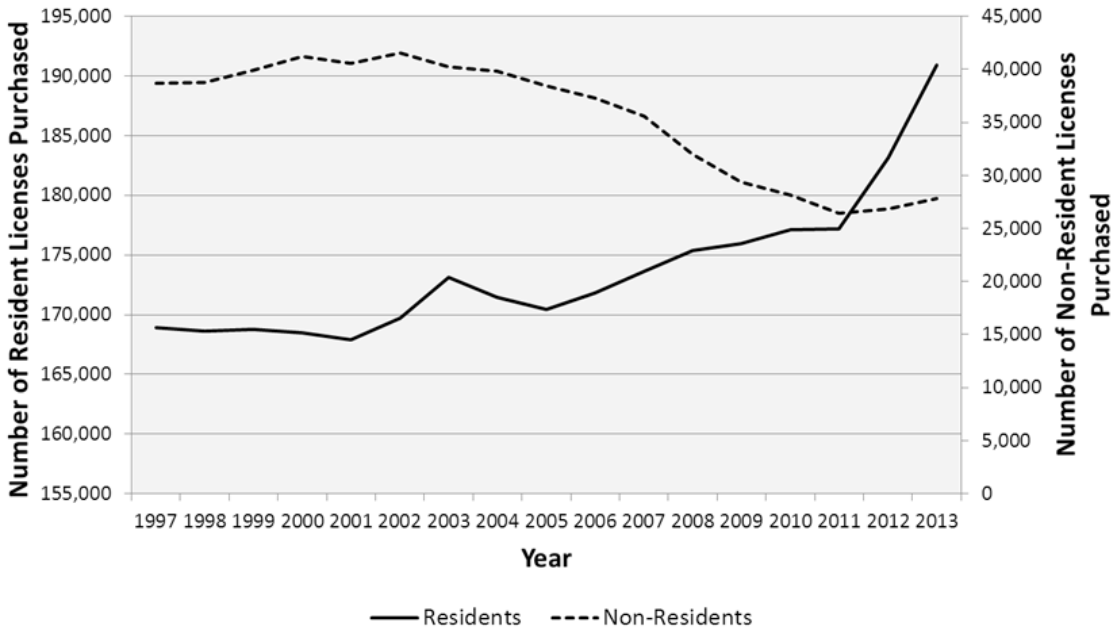


Figure 4. Until recently, Maine's sale of hunting licenses has been declining which may be attributable to the decline in the number of non-resident hunters, beginning around 2001. However, resident license sales have continued to increase during recent times, perhaps indicating a renewed interest in the sport. Note that the values for non-resident sales are expressed on the secondary axis shown on the right of the graph.

Hunter Participation and Success Rate

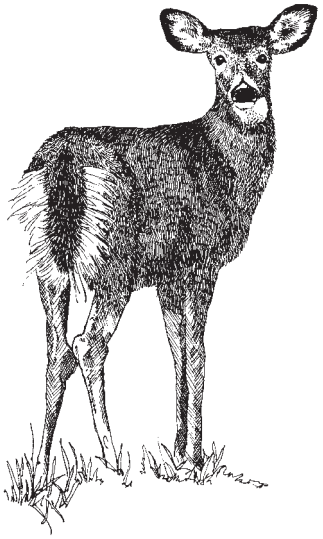
In 2013, 214,628 licenses that permit deer hunting were sold in Maine. Of these, approximately 13% were bought by non-residents, representing an increase in sales to non-residents (Figure 4). Statewide hunter participation is estimated at approximately 175,000 hunters, which translates to a hunter density of approximately six hunters per square mile, on average. The Department estimates hunters expended an estimated 1.37 million hunter-days of effort pursuing deer, representing an increase in overall effort of approximately 4% over the 2012 hunting season.

Compared to the regular firearms season, which on average attracts an estimated 150,000 or more participants (estimated by license sales and the Department's Hunter Effort Survey), the expanded archery and special muzzleloader seasons attract far fewer hunters. In its 16th year, the expanded archery season once again attracted nearly 10,000 participants (over 90% residents). Although it experienced a slight decrease (~4%), participation in the special muzzleloader season continues to be strong with the sale of 14,911 permits.

The success rate for the respondents to the 2013 deer hunter effort survey was 33%. 55% of respondents who drew an Any-deer permit successfully harvested a deer. Hunters who hold an Any-deer permit generally experience an increased chance of successfully harvesting a deer, in Maine.

Prospects for the 2014 Deer Season

In 2014, the Department will again offer 5 separate deer hunting seasons in Maine. The expanded archery season will open September 6th and run through December 13th. This season is limited to WMDs 24 and 29, as well as 10 other locations, primarily in residential-suburban areas with firearms discharge ordinances. Hunters with a valid archery license may purchase multiple antlerless permits for $12.00 each and one buck permit for $32.00. The purpose of the expanded archery season is to increase the harvest of does and fawns in and around urban areas. These areas are usually difficult to access during the October archery and regular firearms hunting seasons. In the expanded archery zone, deer populations can only be reduced if archers can gain access to huntable land. Land postings (no hunting or trespass) reduce the number of deer that can be harvested and limit the effectiveness of the expanded archery season as a tool for reducing local deer populations.



White-tailed Deer

The regular (statewide) archery season will run from October 2rd - October 31st (25 days). Youth day will be Saturday, October 25th, and is reserved for hunters between 10 and 15 years old, who are accompanied by a licensed adult. The Department asks you to please remember that youth hunters are limited to bucks only in WMDs that have not been allotted a doe quota. The 25-day regular firearms season opens for Maine residents on Saturday, November 1st, and for nonresidents the following Monday. This season ends Saturday, November 29th. Finally, the muzzleloader season will begin in all WMDs on December 1st, but will end on December 6th (6 days) in WMDs 1 – 11, 14, 19, 27 and 28. Elsewhere, the muzzleloader season will remain open from December 8th-13th. ***Crossbow archery season will coincide with modern firearms and during the archery season for special situations. Please review your Maine State Hunting Regulations or contact your local game warden for questions about use of crossbows.***

Availability of Any-deer Permits among our 29 WMDs is directly related to our deer management objectives. We are continuing with a "no doe harvest" policy in most eastern and northern WMDs where we are trying to increase deer densities. In contrast, does must be more heavily harvested in WMDs where current objectives are to stabilize deer abundance to the 15 or 20 deer / mi^2. Maine's deer density goals are publicly derived goals providing a compromise between the interests of hunting and viewing opportunities, while minimizing potential negative impacts to the public caused by whitetails (e.g., ornamental plant and crop damage).

To accomplish deer management objectives in 2014, we have set doe harvest quotas ranging from 0 to 950 animals among our 29 WMDs. Totaling 4,348 does statewide, the 2014 doe quota is 18% below the doe harvest we achieved in 2013. A total of 37,185 Any-deer Permits will be issued statewide ranging from 150 permits in WMD 26 to 8,550 in WMD 21. No permits will be allocated in WMDs 1-11, 13, 14, 18, 19, and 27-29.

The allocation of 37,185 Any-deer Permits, along with the archery and youth seasons, should result in the statewide harvest of roughly 4,348 does and an additional 2,217 fawns in 2014. Antlered buck harvests should approximate 15,010, which is about a 10% decrease from the 2013 buck kill of 16,765 animals. If normal hunting conditions and hunter effort take place, the statewide deer harvest in Maine should fall in the range of 19,000 to 24,000 deer.

Disease Monitoring in Maine's Deer and Moose

Chronic Wasting Disease

Disease Overview:

- CWD is a fatal brain disease of white-tailed deer, mule deer, caribou, moose, and elk. It is similar to mad cow disease which occurs in cattle.
- CWD occurs in wild deer populations in 2 provinces in Canada and 18 states in the U.S., states as close as Pennsylvania and New York.
- CWD has not yet been recorded as being transmissible to people. However, a human variant of the disease does exist.
- CWD can persist in the environment outside of a host for many years.
- CWD has a 100% mortality rate in deer.

CWD Monitoring and Prevention in Maine:

- Maine has actively monitored for CWD each year since 1999, and since that time screened approximately 9,000 wild deer. Thus far Maine proudly remains CWD free.
- MDIF&W prohibits the transportation of unprocessed deer carcasses, and/or parts, into Maine from states that are not directly adjacent to our state.
- MDIF&W will not transplant deer from other states into Maine.

MDIF&W Recommends that Individuals:

- Contact their regional wildlife biologist or warden if an animal shows clinical signs of illness, such as loss of fear of humans, drooling, and excessive weight loss.
- Take precautionary steps, such as using latex gloves while processing the animal, and sterilizing equipment following processing. These steps will help to reduce potential transmission of the disease to humans. Again, thus far CWD has not been identified in a person.
- Avoid consumption of the brain and spinal tissues.
- Refrain from feeding deer during the winter months, as high densities of deer within a small area can increase disease transmission.
- Do not use urine based lures, as CWD has been shown to be spread via bodily fluids. To the best of our knowledge, commercial lures are not currently monitored for CWD.

This work is supported by volunteer assistance, the federal Pittman-Robertson Funds program, and revenue from the sales of hunting licenses.

--Kyle Ravana

Moose

2013 Moose Harvest

Season Dates and Structure

Maine Moose hunters could hunt moose for 6 days by permit within the structure of a split season framework (September/ October/November) during 2013. The September season ran from September 23rd to September 28th, while the October season ran from the 14th through the 19th. For the 4th year, a 3rd week of hunting was offered in the North Country (Wildlife Management Districts [WMDs] 1-5, 7, 8, and 19) from November 4th through November 9th. In 2011, WMDs 22 and 25 were added to the southern Maine moose hunt which includes WMDs 15, 16, 23 and 26. The southern Maine moose hunt runs concurrently with the November deer season from November 4th to November 30th and opened for Maine residents on November 2nd.

Moose Permits and Applicants

The annual allocation of moose permits is a function of WMD-specific management goals. Moose management goals are categorized as either recreational, compromise, or road safety. Permit levels changed in 18 management districts between 2012 and 2013 providing an overall increase of 385 permits. This included increased antlerless permits in WMDs 1, 2, 4, and 19, as well as decreases in antlerless permits in WMDs 6, 10, 11 17, and 18. The number of moose permits allocated in 2013 was 4,110. Excess permits may be issued in a given year when permits are deferred one year due to permittee illness, armed service status, or similar situation.

During 2013, Antlerless-only Permits (AOPs) ranged from zero in 9 WMDs (districts 6, 9-11, 14, 17, 18, 27, and 28) to 400 in WMD 2. Among the 10 WMDs in which a cow harvest (and AOPs) was desired, the permit allocation totaled 1,570. The number of AOPs allocated in a given district is a reflection of a harvest level that will either grow, decline, or stabilize the district's population. Consequently, WMDs that can sustain only limited cow mortality are allocated relatively few antlerless permits. In contrast, WMDs that can support higher cow mortality, and still meet management objectives due to population size and structure, are allocated more permits. The southern Maine WMD moose hunt is a slight variation on this. Because of the low moose densities in southern Maine only Any-moose permits were allocated and the season

was extended to the length of the November deer season to increase the chances of a hunter harvesting a moose. The November time frame was chosen to honor recommendations by landowners who wanted the southern Maine moose season to open concurrently with the November firearms season for deer.

Permits were allocated to qualified applicants in a random computerized lottery. Overall, 53,604 people applied for a moose permit during 2013. This included 38,564 residents and 14,040 non-residents. Out of those applicant pools 9.6% of the residents and 2.8% of the non-residents were selected for permits.

Statewide Statistics for 2013

Overall, 2,978 moose were registered during 2013 (Table 10) which is a record harvest since the re-opening of the moose season in 1980. Since the re-institution of moose hunting in 1980, moose season timing (split seasons started in 2002) and areas open to hunting have changed several times.

Table 10. Moose harvest by season, permit type (BOP: Bull only, AOP: Antlerless only, and AMP: Any moose) and success rate in 2013 statewide, Maine.

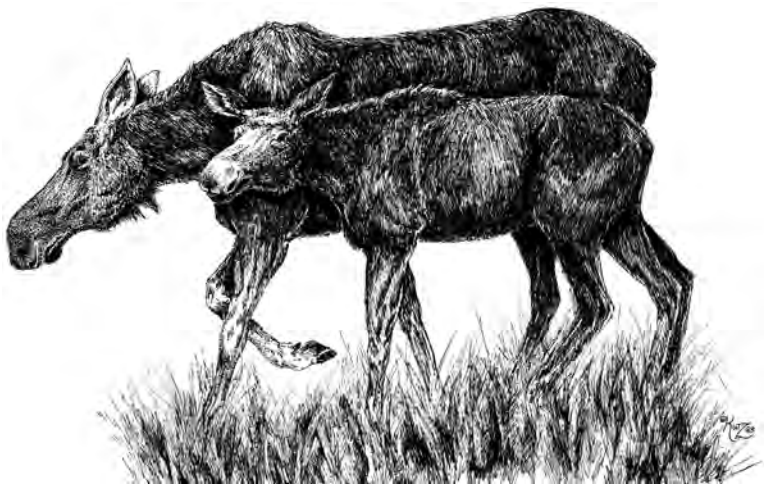
WMD	Season	Permit Type	Number of Permits	2013 Registrations	
				Kill	Success Rates
1	Sept.	BOP	150	138	92%
	Oct.	BOP	150	114	76%
	Oct.	AOP	100	72	72%
	Nov.	AOP	200	165	83%
	WMD Subtotals		**600**	**489**	**82%**
2	Sept.	BOP	225	194	86%
	Oct.	BOP	225	176	78%
	Oct.	AOP	100	84	84%
	Nov.	AOP	250	176	70%
	WMD Subtotals		**800**	**630**	**79%**
3	Sept.	BOP	100	95	95%
	Oct.	BOP	100	85	85%
	Oct.	AOP	100	67	67%
	Nov.	AOP	200	141	71%
	WMD Subtotals		**500**	**388**	**78%**
4	Sept.	BOP	200	180	90%
	Oct.	BOP	200	120	60%
	Oct.	AOP	100	73	73%
	Nov.	AOP	300	203	68%
	WMD Subtotals		**800**	**576**	**72%**
5	Sept.	BOP	100	94	94%
	Oct.	BOP	25	22	88%
	Nov.	AOP	50	32	64%
	WMD Subtotals		**175**	**148**	**85%**
6	Sept.	BOP	100	84	84%
	Oct.	BOP	50	39	78%
	WMD Subtotals		**150**	**123**	**82%**
7	Oct.	BOP	125	91	73%
	Nov.	AOP	15	10	67%
	WMD Subtotals		**140**	**101**	**72%**
8	Oct.	BOP	175	124	71%
	Nov.	AOP	75	61	81%
	WMD Subtotals		**250**	**185**	**74%**
9	Oct.	BOP	75	59	79%
	WMD Subtotals		**75**	**59**	**79%**
10	Oct.	BOP	60	24	40%
	WMD Subtotals		**60**	**24**	**40%**
11	Sept.	BOP	25	19	76%
	Oct.	BOP	25	17	68%
	WMD Subtotals		**50**	**36**	**72%**
12	Oct.	BOP	35	23	66%
	Oct.	AOP	20	9	45%
	WMD Subtotals		**55**	**32**	**58%**
13	Oct.	BOP	35	19	54%
	Oct.	AOP	10	3	30%
	WMD Subtotals		**45**	**22**	**49%**
14	Oct.	BOP	35	22	63%
	WMD Subtotals		**35**	**22**	**63%**
15	Nov.	AMP-B		1	
		AMP-C		5	
	WMD Subtotals		**25**	**6**	**24%**
16	Nov.	AMP-B		2	
		AMP-C		2	
	WMD Subtotals		**20**	**4**	**20%**
17	Oct.	BOP	20	11	55%
	WMD Subtotals		**20**	**11**	**55%**
18	Oct.	BOP	40	13	33%
	WMD Subtotals		**40**	**13**	**33%**
19	Sept.	BOP	50	29	58%
	Oct.	BOP	50	26	52%
	Nov.	AOP	50	22	44%
	WMD Subtotals		**150**	**77**	**51%**
22	Nov.	AMP-B		0	
		AMP-C		0	
	WMD Subtotals		**10**	**0**	**0%**
23	Nov.	AMP-B		0	
		AMP-C		4	
	WMD Subtotals		**25**	**4**	**16%**
25	Nov.	AMP-B		5	
		AMP-C		1	
	WMD Subtotals		**25**	**6**	**24%**
26	Nov.	AMP-B		1	
		AMP-C		0	
	WMD Subtotals		**25**	**1**	**4%**
27	Oct.	BOP	15	5	33%
	WMD Subtotals		**15**	**5**	**33%**
28	Oct.	BOP	20	16	80%
	WMD Subtotals		**20**	**16**	**80%**
OVERALL WMD TOTALS			**4,110**	**2,978**	**72%**

BOP = Bull Only Permit – The holder may kill one male moose of any age.
AOP = Antlerless Only Permit – The holder may kill a cow, a calf, or a bull w/antlers shorter than its ears.
AMP = Any Moose Permit - The holder may kill any moose.
*Does not include additions to total permit allocation through deferment, hunt of a lifetime, and auction.

Bull Harvest
The statewide harvest of antlered bulls during the Sept/Oct/Nov season (1,848) in 2013 marked a 2% increase from the previous year (1,818). Among the antlered bulls taken in 2013 (and aged by cementum annuli 1,564), 179 (9%) were 1½ years old (yearlings) sporting their first set of antlers, while 338 were 2½ years old, which made up 22% of the bull harvest. Mature bulls (4½ to 14½ years old) comprised 69% of bulls older than 2½ years.

On average, breeding bulls lose approximately 15% of their body mass during the rut. Because of this and the timing of the fall harvest, bull weights reflect a decrease in body mass from September to October. Average bull weights (yearling and older) in the 2013 harvest for September were 747 pounds versus 683 pounds (i.e., dressed weights) in the October harvest (an 8.5% decline). The heaviest bull weighed in at 1,106 dressed (no digestive tract, heart, lungs, or liver) and was killed in WMD 1 during the September season (8.5 years old). The largest antler spread was 69 inches on a 4.5 year old bull with 12 legal points. Among antlered bulls examined in the harvest, 20% of the bulls sported cervicorn antlers (antlers without a defined palm) and ~36% of these animals were yearlings; 13% were mature bulls (>4 years old) including the oldest at 15.5 years-old!

Antlerless Harvest
The statewide harvest of adult (yearling and older) cows during 2013 increased by 4% over the 2012 harvest (1,013 vs. 975, respectively); during 2012, antlerless-only permittees tagged 117 calves; 71 males and 46 females). Overall 1,130 antlerless moose were registered by hunters during the 2013 season. This increase included the antlerless moose taken as part of the 105 Any-moose permits issued within the southern zones. The antlerless moose harvest in the southern zones was comprised of 9 Bulls, 8 adult cows and 4 calves.


Moose

Moose Reproductive Data
Antlerless permits during the November season in WMDs 1-5, 7 and 8 allowed us to collect reproductive data that are critical to assessing and monitoring population health and growth. In 2013, hunters removed and brought in 255 sets of moose ovaries for examination by biological staff. A cow's body weight and condition have a bearing on her potential to become pregnant and on the number of offspring she will produce. Pregnancy rates of cow moose with age and weight data was normal at 80%. Typically, moose do not become pregnant until 2.5 years old. Of the cow moose examined this year, 13% of yearlings and 85% of the mature cows (2.5+ years) were pregnant.

Corpora lutea are identifiable structures within the ovaries that provide an indication of ovulation and potential pregnancy rates. Overall, there were 1.07 corpora lutea / cow for cows older than 3.5 years. This may be an indication that moose in the northern portion of the state are near ecological carrying capacity, since the amount of available forage (food) is what allows cows to attain the body weight necessary for reproductive success. We anticipate that additional sampling of female moose will provide a clearer picture of this relationship across northern Maine as well as regionally.

Hunter Participation, Residency and Success Rate
In 2013, 3,708 residents and 402 non-residents won permits to hunt moose. A total of 389 non-residents were successful in their hunt providing a 97% success rate. Out-of-state hunters came from 37 states (as far away as California) and 2 provinces (Nova Scotia and Ontario). The majority (18.5%) of out-of-state hunters came up from Pennsylvania. Resident success rates were 70% and when combined with the outstanding success by out-of-staters, the total success rate was 72% statewide. Success rates over the last 10 years have been around 80%. Conditions for September and November were seasonable; however, October was, yet again, unseasonably warm.

Changes for the 2014 Moose Season
In 2014, there will be 4 separate moose hunting periods in Maine. The September season will run from September 22rd to September 27th in WMDs 1-6, 11, and 19; the October season will run from October 13th through the 18th and include WMDs 1-14, 17-19, 27, and 28. In WMDs 15, 16, 22, 23, 25, and 26, the season will coincide with November's deer season running from November 3rd through November 29th. Opening day for Mainers will be on Saturday, November 1st. Also for 2014, WMDs 1-4 and 19 will have an additional moose hunt in November from the 3rd through the 8th. In total, Maine's moose hunt will offer 3,095 permits for 2014.

A New Era of Information on Moose in Maine
Beginning in the winter of 2010-11, IFW has conducted aerial surveys to estimate moose abundance and composition (bull, cow and calf) across the core range of moose in Maine (roughly a line from Grafton Notch to Calais). These data along with reproductive data from female moose (ovaries) and information on bull and cow age structure from moose teeth, has provided biologists with a more complete picture of Maine's moose population (i.e., size and composition) than ever before. In turn, this information is used by biologists and regulators (e.g., Commissioner Advisory Council) in setting moose permit levels to ensure that the public's management goals are being met.

The size of Maine's moose population is not static and will change annually in response to factors affecting the birth rates of calves (e.g., food availability) and the survival of adults and calves (e.g., disease, hunter harvest rates and predation). For example, Maine's approximately 60,000 moose have declined in the last two years, partially by design, to bring a few northern districts into management objectives, but also due to slow population growth across the state and low to moderate calf survival.

This past winter the department initiated an adult female and calf survival study to monitor survival rates over the next few years and more closely examine sources of mortality. In January and February, 30 adult females (yearling and older) and 30 calves were fitted with GPS collars. Unfortunately, this winter Maine moose experienced an apparent winter tick epizootic resulting in the loss of 32 of the collared moose (22 calves and 10 adults). Winter tick infestations can severely debilitate moose through blood loss during adult tick feeding and lead to cases of acute anemia. Calves, in part due to having no fat reserves and being of small size compared to adults, are particularly susceptible to the these effects. This fall and winter additional calf moose will be fitted with GPS collars and alongside the 28 adults will be continuously monitored over the course of the next 5 years to closely examine these important elements of the moose population.

This work is supported by volunteer assistance, the federal Pittman-Robertson Funds program, revenue from sales of hunting licenses, and a grant from the Outdoor Heritage Fund.

--Lee Kantar

Black Bear

Maine's black bear, an iconic symbol of Maine's forests, is one of Maine's wildlife success stories. Once relegated to no more than a nuisance, the black bear has risen in stature to one of Maine's prized animals. Today, the expansive forest of northern, eastern, and western Maine supports one of the largest black bear populations in the United States (Figure 5).

Maine's bear population is valued not only by hunters, but others who enjoy watching wildlife and enjoy Maine's wildlife diversity. On the other hand, conflicts with people and bears do occur and if bears become too abundant that is not good for people or the bears. IFW strives to balance these needs and makes management decisions based upon science gathered from monitoring Maine's bear population, bear harvest, and conflicts. Maine's black bear population is closely monitored by Department biologists through one of the most extensive, longest running biological studies in the U.S that began in 1975, and continues today. Over the last 39 years, Department biologists have captured and tracked over 3,000 bears to determine the health and condition of Maine's bears and estimate how many cubs are born each year.

Since 2004, Maine's bear population has been increasing and is estimated at over 30,000 animals. Hunting is the Department's primary tool for managing this thriving bear population. To meet population objectives, a variety of traditional hunting methods are offered to hunters in Maine including trapping and hunting bears with hounds and bait and still-hunting/

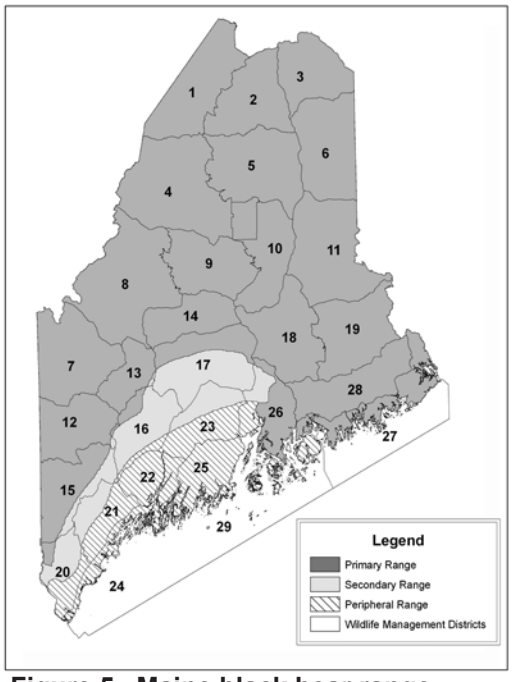


Figure 5. Maine black bear range.

stalking. Over 90% of the bear killed each year is with the use of bait, hounds or trapping; still-hunting/stalking accounts for less than 10% of the harvest. However, even with ample opportunity, success rates remain in favor of the bear, where on average 26% of hunters using bait and hounds and 20% using traps actually harvest a black bear. Hunters that use still hunting or stalking techniques to harvest black bears have the lowest success rates (<3%), due in a large part to Maine's dense forests.

Since 2005, the number of bears harvested each year has been below objectives, leading to an increase in the bear population. Maine's bear population has grown from about 23,000 black bears in 2004 to over 30,000 black bears in 2010. Since bears are more common where human densities are lowest, the number of conflicts between humans and black bears in Maine is lower than other northeastern states and averages just under 500 complaints each year. However, if Maine's bear population continues to grow, conflicts will rise as bears move into areas with higher human densities.

Maine's black bears are highly valued by outdoor enthusiasts and the general public. The Department of Inland Fisheries and Wildlife understands that a healthy, well managed bear population provides opportunities for everyone to enjoy. IFW biologists set management goals with public input through the Department's strategic planning process. Hunters in Maine are provided a variety of traditional hunting methods to meet these goals and ensure Maine's bear population continues to thrive without increasing conflicts in backyards and neighborhoods.

Black Bear

<u>Living with Black Bears</u>

The abundance of natural resources, including wildlife, is what makes life in Maine special and enjoyable. In fact, more than 90% of Maine is forested, which has allowed Maine's bear population to thrive. Despite a large population of bears, conflicts between people and bears are relatively few. However, if you live in a community that is experiencing problems with bears, this may not seem to be the case. Every spring, bears emerge from their winter dens and begin searching for food. Some bears encounter food odors that attract them to people's homes and backyards. Often, when berries begin to ripen in late summer, bears return to wooded areas to forage, which reduces conflicts with people. When natural foods are not abundant, bears are more likely to continue to search for food provided by people in backyards. The most common complaints we receive each spring involve bears feeding at bird feeders and on garbage. Although it may seem simple to move or destroy the offending bear, if you don't eliminate food odors, more bears will continue to visit your backyard.

- All of us can take a few simple steps each spring to reduce encounters with black bears in our backyards.
- Bring your bird feeders in by April 1 and do not resume feeding birds until November.
- Store bird seed in secure location, and rake and remove waste seed from the ground.
- Keep your garbage secure in a building.
- Do not bring trash to the curb until the morning of pick-up.
- Keep dumpster lids closed and locked, and if a dumpster is overflowing with garbage, call the disposal company and have the waste removed.
- Keep pet and livestock feed in a building or other secure enclosure.
- Clean or burn off outdoor grills to reduce food odors; if possible, store the grill in a building when not in use.
- Use electric fence around bee hives, and avoid setting hives close to forested edges.
- When possible, keep livestock and poultry indoors at night.

Remember, if your neighbors are not taking these steps as well, then bears may continue to frequent the area.

Many people expect the Department to move bears that are frequenting backyards, communities, agriculture crops, and livestock because trapping and moving bears provides a quick fix to a problem and is perceived as a humane response. However, trapping and moving a bear is not always appropriate or effective. Bears that are trapped and transferred to a new area do not stay where they are released. Often these bears return to the area or create problems in other areas. Relocated bears are at greater risk of mortality as they encounter more roads, other bears, and people. However, it may be appropriate to move a bear, in some situations, to provide a temporary solution. But after the bear is moved, attractants must be removed or secured to prevent future problems. To avoid enticing bears to your backyard or field, the best solution is to remove/secure common bear attractants every spring before you experience problems. To learn more about what you can do to minimize conflicts with bears, visit http://www.maine.gov/ifw/wildlife/human/lww_information/bears.html.

The 2013 Black Bear Hunting and Trapping Season

The Department's management of Maine's black bears includes regulating the harvest by setting the season length, bag limit, and legal methods of hunting. We require that hunters report their harvest so we can monitor harvest levels. The Department can make adjustments to these regulations as needed to meet Maine's bear harvest objectives.

Currently, hunters are allowed to harvest bears during the fall using a variety of methods. The general hunting season for black bears opens the last Monday in August and closes the last Saturday in November. Hunters are allowed to hunt bears near natural food sources or by still-hunting throughout this 3-month period. Hunting bears over bait is permitted for the first 4 weeks and with the use of hounds for a 6-week period that overlaps the last 2 weeks of the bait season.

Trappers can harvest a bear in September or October. Trappers must use a cable foot snare or cage style trap and, since 2008, are required to purchase a separate permit to trap a bear. Trapping continues to be on the rise, with the number of trappers purchasing a permit to trap bears reaching a new high in 2013; 486 residents and 45 non-residents bought trapping permits and harvested 92 and 14 bears, respectively. A new law that took effect in late September of 2011 allows two bears to be harvested if one is taken by trapping. Fourteen bears were trapped in 2012 by hunters who harvested another bear by other methods.

Most bears in Maine are harvested by hunting over bait. In 2013, 72% were taken over bait, 17% with hounds, 4% by deer hunters, 3% by still-hunting or stalking prior to deer season, and 2% in traps. Few bears were harvested in central and coastal Maine (i.e., Knox, Lincoln, Waldo, Androscoggin, Cumberland, Sagadahoc, Kennebec, and York counties) where bear populations are low and hunting opportunity is limited. Since 2005, the bear harvest has averaged 2,900 each year (ranging from a low of 2,400 bears in 2011 and high of 3,486 bears in 2009). Again this year, the 2013 harvest was below 3,000 bears with 2,845 bears harvested. Many factors influence the harvest of black bears in Maine with the abundance of natural foods during the baiting season being first and foremost. The weather during the 4 week season, especially during the first 2 weeks, also impacts the final tally. More abundant natural foods in the late summer and early fall decrease bait interest and bear activity around bait sites, as a result, it was more difficult to harvest a bear over bait during the 2013 season. Hunters and guides in 2013 reported fewer bears visiting bait sites than in 2012, when natural foods were less abundant. Because the bait harvest comprises the greatest portion of the overall harvest, it has the greatest effect on the final harvest figures.

The low number of early-season bear hunters (prior to deer season) in 2011 appears to be an anomaly, with permit sales returning to previous levels. Although non-resident permit holders account for just over half of Maine's bear hunters, they continue to harvest close to 2/3 of the bears taken. While most non-resident hunters hire a guide, fewer resident bear hunters hire guides, which may account for the higher success rate of non-resident hunters (in 2013 resident success rate = 18% and non-resident success rate = 35% during the early season). In 2013, non-resident hunters harvested the majority of bears during the bait (69%) and hound seasons (62%). Hunting over bait is also the most popular method for resident bear hunters and accounted for 59% of the bears harvested by Maine residents. Although few bears are taken during the firearms season for deer or in traps, Maine residents harvested the majority of bears taken by these methods (89% and 87% respectively in 2013, Table 11).

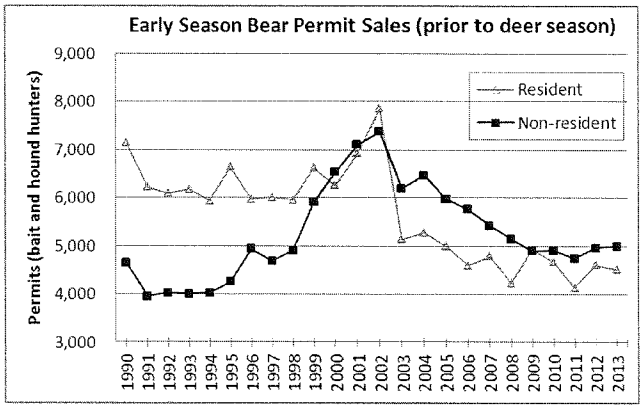


Table 11. Number of bears harvested in Maine in 2013 by Wildlife Management District (WMD).

WMD	Method of Take					Total Harvest	Assisted by Guide	Resident	Non-resident
	Hunting with Bait	Hunting with Dogs	While Deer Hunting	Trapping	Unknown				
1	125	16	0	2	7	**150**	131	19	131
2	68	25	3	3	1	**100**	81	20	80
3	144	7	10	5	11	**177**	123	64	113
4	179	3	1	1	4	**188**	143	39	149
5	138	35	0	0	5	**178**	160	18	160
6	137	13	5	7	12	**174**	96	54	120
7	77	22	3	7	2	**111**	83	31	80
8	153	73	4	9	6	**245**	142	118	127
9	88	6	2	3	2	**101**	67	30	71
10	66	8	0	2	3	**79**	58	23	56
11	201	49	4	6	7	**267**	194	77	190
12	67	39	7	10	7	**130**	54	76	54
13	18	18	8	3	3	**50**	20	28	22
14	43	21	3	5	5	**77**	46	32	45
15	12	12	3	3	5	**35**	5	27	8
16	3	2	2	0	1	**8**	2	6	2
17	45	9	10	3	4	**71**	17	57	14
18	143	21	2	15	9	**190**	102	93	97
19	97	45	0	3	7	**152**	123	33	119
20	4	1	2	0	2	**9**	1	9	0
21	4	0	0	0	0	**4**	1	4	0
22	0	0	2	0	0	**2**	0	2	0
23	1	0	1	0	0	**2**	0	2	0
24	0	0	0	0	1	**1**	0	1	0
25	1	0	1	0	2	**4**	0	4	0
26	59	3	2	5	6	**75**	3	64	11
27	37	6	1	6	5	**55**	17	38	17
28	137	45	5	8	13	**208**	116	88	120
29	1	0	0	0	1	**2**	0	2	0
Totals	**2,048**	**479**	**81**	**106**	**131**	**2,845**	**1,785**	**1,059**	**1,786**

[1] Unknown Method = Hunter registered the bear as not harvested with bait, hounds, or traps.

Non-resident hunters became more interested in hunting black bears in Maine following the closure of the spring bear hunt in Ontario in 1999. Their interest remained high until 2003, when a rise in permit fees lowered participation by both non-resident and resident hunters (resident price increased from $5.00 to $25.00 and non-residents from $15.00 to $65.00). After this sharp decline in bear hunters in 2003, and a slight bump in bear hunting participation during the bear hunting referendum year (2004), bear hunter numbers have declined steadily. This downward trend in participation rates is especially significant for non-resident hunters. The downturn in the U.S. economy has likely contributed to recent lower bear hunter participation, especially among non-residents. Since non-resident hunters enjoy a higher success rate than residents, loss of these hunters has a greater effect on the final harvest and bear population, than a similar loss of resident hunters. If hunter participation does not increase, we may need to increase hunting opportunities to meet bear management goals.

Starting in 2008, trappers and non-resident deer hunters are required to purchase a bear permit to harvest a bear by trap or during deer season. Funds from these permit sales are dedicated to bear research and management. Currently, we are using these funds to age teeth from harvested black bears, which will allow us to monitor the age structure of Maine's bear population and trends in bear numbers. In 2013, near record high (849) non-resident bear permits for deer season and record high (531) trapping permits were sold.

This work is supported by volunteer assistance, the federal Pittman-Robertson Funds program, and revenue from the sales of hunting and trapping licenses.

--Jennifer Vashon and Randy Cross

Canada Lynx

The lynx is a medium-sized cat and can be distinguished from a bobcat by its completely black-tipped tail, longer ear tufts, and larger paws. Lynx populations are influenced by the numbers and distribution of snowshoe hare -- their primary prey. Maine is at the southern extent of the lynx range where forests transition from spruce-fir to hardwood and where winter snow depths lessen. When compared to historic records, snow track surveys initiated in 2003 indicate that lynx distribution has not changed substantially over the last 100 years. Lynx remain common north of Moosehead Lake and west of Route 11. In recent years, lynx have become more common in eastern Maine. Canada lynx are federally-listed as a threatened species, and Maine is home to the largest breeding population of Canada lynx in the eastern United States.

A History of Lynx in Maine

Historically, it appears that lynx have persisted in low numbers with brief periods of abundance. Lynx numbers are tied to the abundance of snowshoe hare, which are most numerous in young stands of spruce and fir forests or in older spruce and fir forests with a dense understory of young trees. Lynx were relatively common in the mid-1800s following a major spruce budworm outbreak and subsequent harvest of spruce and fir that created ideal habitat for their prey. As the forest matured, lynx became less common. By the late 1970s, the amount of mature spruce and fir forest reached record high levels, which helped trigger another major budworm outbreak. The extensive clearcutting that followed created record levels of lynx habitat by the late 1990s and remains today. As a result, Maine's lynx population is likely at an historic high, conservatively estimated at between 750 and 1,000 adult lynx in the core range in 2006. Sightings of lynx in recent years, suggest that lynx numbers are likely continuing to increase, with lynx remaining in the core range and beginning to occupy more southern areas (Figure 6).

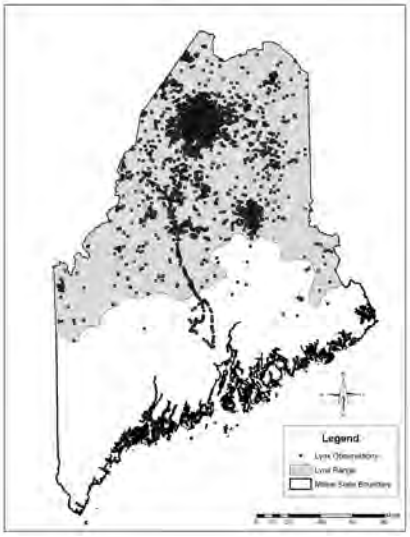


Figure 6. Lynx observations and geographic range in Maine.

State and Federal Protection

In 1967, a statewide bounty on all wildcats, including lynx, was repealed and hunting and trapping seasons for lynx were closed. Thirty years later, IFW designated lynx as a species of special concern in Maine. The special concern designation is given to species when there is some management concern and more information is needed to determine whether additional protection is warranted. In 2000, the US Fish and Wildlife Service (USFWS) listed lynx as a threatened species in 14 states, including Maine. Information gathered from snowtrack surveys and telemetry studies in northern Maine after lynx were federally-listed, indicate that lynx do not meet the state's threatened or endangered listing requirements. Although the USFWS has drafted a recovery outline for lynx that serves as an interim guide for recovery, a species status and need for continued protection under the U.S. Endangered Species Act cannot be evaluated without a recovery plan.

As a federally-listed species, lynx are protected from intentional and accidental take that may or may not result in the direct death of a lynx. The Department and the USFWS have been working on methods to minimize potential incidental trapping of lynx in Maine. Last year, the Department submitted a revised incidental take plan that would allow a low level of incidental take of lynx by fur trappers. This plan provides measures to minimize the accidental catch of lynx in traps. The USFWS is currently reviewing this plan. Since altering upland trapping regulations in 2008 specifically to protect lynx, no lynx have be killed in traps legally set in Maine. Each year, a few lynx are captured in foothold traps, and IFW biologists examine as many of these animals as possible prior to release. Most lynx caught have no, or minor, injuries and are released at the trap site.

From Research to Management

Biologists at IFW have been in the process of building a lynx management system that involves collecting field data, analyzing what it means, getting input from the public on management goals, and developing a monitoring plan. The process started in the winter of 1999 with the first radiotelemetry study on Canada lynx in Maine. In 2011, Department biologists shifted their focus from acquiring field data to applying information from this long-term study to management and conservation strategies for lynx in northern Maine. In 2012, we prepared an assessment of lynx habitat and population levels in Maine to guide future management decisions. This document is available on the Department's website and describes what is known about Canada lynx in the northeastern U.S.

The Lynx Assessment relied heavily on our 12-year study of lynx in northern Maine. From 1999-2011, Department wildlife biologists captured and radiocollared 85 lynx and documented the production of 42 litters of kittens on a study area in northern Maine. By studying lynx for 12 years, we were able to determine what habitats lynx prefer, how much area a lynx uses, and the quality of these areas based on the ability of lynx to survive and reproduce. Data from this study have shown that lynx and snowshoe hares thrive in the regenerating thickets of spruce and fir following logging, and lynx can exist at high densities in northern Maine when this ideal habitat is common. The reproduction and survival data demonstrated that the studied population of lynx in northern Maine was producing an excess number of animals, allowing lynx numbers to increase and colonize new areas.

To learn more about lynx in Maine, visit: http://www.maine.gov/ifw/wildlife/species/mammals/canada_lynx.html.

This work is supported by the federal Pittman-Robertson funds and state revenues from the sales of hunting and trapping licenses.

--Jennifer Vashon

Furbearers and Small Game Mammals

Furbearers include all mammals harvested primarily for their pelts. In Maine, these include coyote, red and gray fox, bobcat, fisher, marten, raccoon, skunk, short- and long-tailed weasels, mink, otter, beaver, muskrat, and opossum. The pelts of all furbearers, except weasel, raccoon, muskrat, skunk, and opossum are tagged for tracking the furbearer harvest. Pelt tagging is one of the primary population indices used in our furbearer management systems. Furbearers are primarily trapped, but some species (i.e., fox, coyote, bobcat, raccoon, and skunk) are also hunted. Small game that can be hunted includes snowshoe hare, gray squirrel, woodchuck, porcupine, and red squirrel.

Fisher

Overview of Trapping Season

In general, for most species, the fur prices were lower than they have been in previous years and trapping conditions were difficult this season. During the fall trapping season, there was a lot of natural food resources available to furbearers and weather conditions were mild. However, the winter and spring trapping conditions were wrought with deep snow and thick ice through the end of the season. Therefore, the overall furbearer harvest was down this past season and almost all species had a lower harvest than the previous five years (Table 12). Grey foxes continue to increase their range in Maine and trappers are catching them farther north and east in Maine.

Table 12. Harvest of furbearing animals in Maine. Harvest records are from pelt-tagging records collected from the 2006-2007 to 2013-2014 trapping seasons. Pelt-tagging records may under-represent the harvest of coyote and beaver. Harvest figures followed by an h superscript were significantly (α = 0.05) higher than the mean harvest the previous 5 years for that species. Harvest figures followed by an L superscript were significantly lower than the mean harvest for that species the previous 5 years.

Species	13-14	12-13	11-12	10-11	09-10	08-09	07-08	06-07
Beaver	7,841	9,063	15,769	6,976	10,765	9,119	6,357	12,635
Bobcat	124^{L}	205	239	305	281	407	410	344
Coyote	1,237^{L}	1,670	2,037	1,623	1,743	1,901	1,819	1,521
Fisher	617^{L}	1,242	925	1,207	1,078	1,456	993	1,968
Red fox	642^{L}	991	989	922	932	893	1,030	1,245
Grey fox	279	426	308	332	250	163	161	107
Marten	996^{L}	3,805	1,317	3,559	2,613	2,291	2,401	2,350
Mink	1,398^{L}	2,184	2,339	1,926	1,465	1,297	1,888	2,280
Otter	464^{L}	646	1,234	754	696	528	493	968

This work is supported by the federal Pittman-Robertson funds, state revenues from the sales of hunting and trapping licenses, and in-service match from conservation and science partners at the University of Maine.

--John DePue

Bats and White-nose Syndrome

White-nose syndrome (WNS) is a disease that affects winter hibernating bats and is associated with a newly discovered fungus, *Geomyces destructans*. The disease was named white-nose syndrome because when first discovered, infected bats had white fungus on their muzzles. WNS was first documented in New York in 2006 and has since spread throughout the Northeast and Canada, including Maine. WNS causes hibernating bats to awaken more often during hibernation and prematurely use up fat reserves needed to survive the winter. The USFWS estimated that WNS has already killed more than 6 million bats.

To date, there have been no known illnesses to humans attributed to WNS. Scientists are still learning about WNS, but the fungus lives in cold damp environments and we know of no risk to humans from contact with infected bats.

In March 2014, IFW biologists conducted bat surveys at hibernacula in Maine. Unfortunately, all the sites that were initially infected with WNS have had dramatic declines of hibernating bats up to 100% from pre-WNS surveys. For the

fourth year, MDIFW, with partners from federal agencies, NGO's, and volunteers, has conducted surveys to determine bat population trends in Maine. Bat population data was collected by conducting acoustic surveys that record the call sequences of bats.

Also in 2013 and 2014, MDIFW opened bat informational displays at the Maine Wildlife Park in Gray and the Maine Discovery Museum in Bangor, providing information on the bat species in Maine, threats to populations, and how the public can help.

For information on what to do if you encounter a bat in your home, see http://www.vtfishandwildlife.com/wildlife_bats.cfm.

This work is supported by volunteer assistance, State Wildlife Grants and Pittman-Robertson funds (federal programs), Outdoor Heritage Fund awards, and a White-nose Syndrome Grant from the USFWS.

--John DePue

New England Cottontail

About the Rabbit

The New England cottontail (NEC; *Sylvilagus transitionalis*), or cooney, was once a common rabbit in Maine and ranged from Belfast to Kittery. However, as the old fields from abandoned farms reverted into mature forests, and brushy habitat was developed into residential areas, NEC populations declined markedly. Our Department closed the hunting season on NEC in 2004 and listed the species as endangered in 2006. As of the winter of 2012-2013, there were no known populations of NEC north of Portland, and less than 200 rabbits left in the state. New England cottontail now exist in three populations in Maine: 1) Cape Elizabeth / Scarborough, 2) Wells, and 3) Kittery/York/Elliot (Figure 7). In addition to being a state endangered species in Maine, the NEC is also a candidate for listing under the federal Endangered Species Act. The US Fish and Wildlife Service (USFWS) must make a final determination on the federal listing status of NEC by 2015. This summer and fall, the USFWS will be hosting meetings to develop a listing recommendation with representatives from all the states in New England that still have NEC. There has been a considerable effort to restore NEC habitat at the regional level. Biologists from the Northeast will review the restoration efforts that have been accomplished to date, and future restoration plans, to determine whether sufficient assurances can be given to preclude NEC being listed as a federal threatened or endangered species.

The fact that a species, with a high reproductive rate like the NEC's, is endangered raises serious questions about the status of other species that use brushy / old field habitats. There are at least 42 Species of Greatest Conservation Need that use habitats similar to what NECs require in Maine. These include species such as the Eastern Towhee, Woodcock, and box turtles. Dense shrubby habitat is rare in southern Maine and makes up less than 3% of the land base. Therefore, much of IFW's efforts, and that of its partners in NEC restoration, is targeted at creating or maintaining dense shrublands.

The three biggest challenges to NEC recovery in Maine are 1) the low percentage of the land base that is composed of shrublands. Complicating this matter further, the remaining patches of shrubland are isolated from each other by roads and unsuitable habitat for NEC. 2) NEC numbers are very low in the state. NEC are found in isolated populations (Figure 7), which are vulnerable to factors that may cause local extirpations; and 3) public perception and local regulations that limit the ability to manage land in a manner beneficial for NEC.

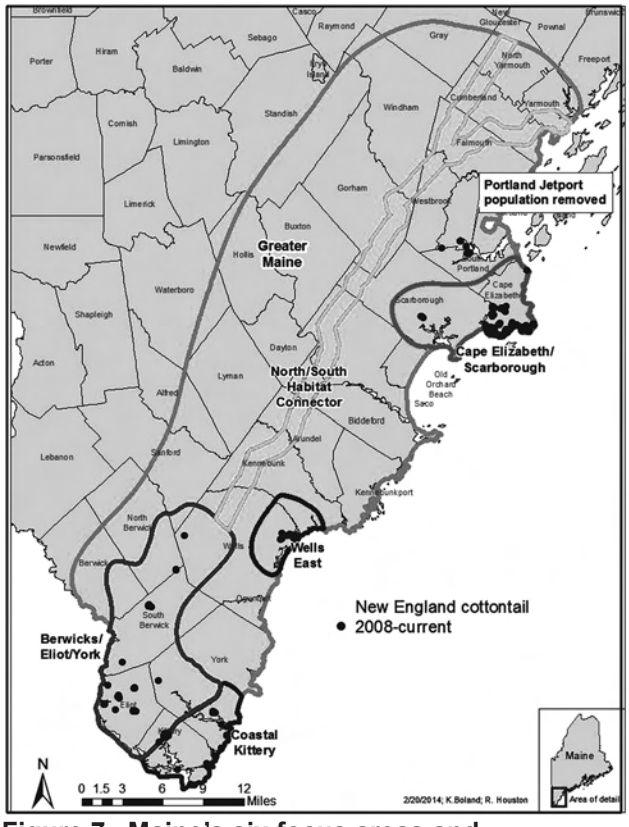


Figure 7. Maine's six focus areas and approximate location of remaining New England Cottontail (NEC) populations.

Management Strategies

Maine's management strategy for NEC is based on the regional Conservation Strategy for New England Cottontail (http://newenglandcottontail.org/). IFW is a member of the Regional Initiative, whose members include five state wildlife agencies in the Northeast, two federal agencies, and one non-governmental partner. Each state was asked to select focus areas in which to concentrate their restoration efforts for NEC. Maine selected six focus areas and developed management goals for each

that need to be completed by 2030 (Figure 7, Table 13). As you can see from Table 13, Maine has made good progress in meeting its habitat restoration goals. IFW needs to tip its hat to its partners in the USFWS and Natural Resources Conservation Service (NRCS), **and the many willing landowners** who made this possible. Without the hard work of people like Kelly Boland, Kate O'Brien, Bob Houston (USFWS); Andrew Johnson, Jeff Norment (NRCS); and many others, we would have made far less progress in restoring habitat for this species.

Table 13. Habitat restoration goals and progress by focus area in Maine. All units are in acres and represent protected lands (i.e., private lands under management agreement, state & federal lands, or non-governmental conservation lands). Habitat patches smaller than 5 acres in the natural habitat were not included because they are unlikely to sustain rabbits. By 2014, we had achieved 20% of our 2030 habitat goals for protected lands.

Focus Area	Habitat Goal	Self-sustaining Habitat	Management Implemented	Management Planned	Totals
Berwicks, Eliot & York	**1,800**	189	40	28	257
Cape Elizabeth & Scarborough	**1,000**	78	131	79	288
Coastal Kittery	**350**	45	35	0	80
Wells East	**350**	117	80	25	222
North-South Connector*	**1,015**	Unk	20	52	72
Greater Maine	**625**	Unk	80	25	105
Total Acres	**5,140**	429	387	209	1,024

A key element to Maine's plan is the Central Maine Power (CMP) utility corridor (Figure 7; i.e., North/South Habitat Connector). Our desire is to work with CMP to maintain shrubby habitat up and down the corridor that NEC can use as a travel corridor to move between habitat patches. We would like to restore habitats and NEC populations along the CMP utility corridor, which should make it easy for NEC to disperse to other favorable habitat as it becomes available throughout much of their former range. CMP is already cooperating with IFW and its conservation partners on a research project to enhance habitat in the corridor for NEC. Enhancement of the CMP utility corridor can be a win-win for all partners. CMP will still be able to manage the utility corridor in a way that meets their needs for low maintenance vegetation under their powerlines, NEC will benefit from continuous shrubby habitat, and in return for managing habitat for NEC, the state and USFWS may be able to offer legal assurances to CMP regarding the unintentional harm or harassment of a state endangered or federal candidate species.

A big step towards this cooperation may come by this fall. IFW and its partners have worked for a number of years with the USFWS on a CCAA (Candidate Conservation Agreement with Assurances). This agreement will protect landowners wishing to manage habitat on their lands for NEC from legal action that could be taken against them for unintentionally harming or harassing a federally endangered or threatened species, should NEC become federally listed. Currently, the USFWS is planning on publishing the CCAA this summer in the Federal Register for public comment. We hope to have the agreement finalized soon after the public comment period. We expect other large and small landowners to be interested in this agreement. Hopefully, many more acres of habitat will be created for NEC, and other early successional species, by this time next year with this agreement in place. If the USFWS determines that NEC do not warrant federal listing, CCAA will still be a valid agreement and may be useful in addressing issues related to the unintentional harming or harassing of a state endangered species.

This work is supported by the State Wildlife Grants and Pittman-Robertson funds (federal programs), state revenues from the sales of hunting and trapping licenses, and other support from the National Fish and Wildlife Foundation, the Wildlife Management Institute, USFWS' Partners Program, Rachel Carson National Wildlife Refuge, NRCS, and many private landowners.

--Wally Jakubas

New England Cottontail

Reptile, Amphibian, and Invertebrate Group

Maine is home to 18 species of frogs and salamanders (amphibians), 16 species of turtles and snakes (reptiles), and over 16,000 species of terrestrial and freshwater invertebrates, from beetles and butterflies to mayflies and mussels, to name just a few. Coordinating research and conservation priorities for such a diverse suite of organisms is challenging! One of the Group's highest priorities is to address the recovery needs of the large number of reptiles and invertebrates currently on the state's list of Endangered and Threatened species (21 of 46 species). Some rare invertebrates, such as the Katahdin Arctic Butterfly and Roaring Brook Mayfly, are state or regional endemics – found nowhere else in the world but in Maine or a small area of the Northeast. The Reptile, Amphibian, and Invertebrate (RAI) Group works to ensure that these and many other less familiar, but ecologically important, species remain a part of Maine's rich natural heritage.

The Reptile, Amphibian, and Invertebrate Group is one of the Department's few units devoted entirely to nongame and endangered species services and is, therefore, largely dependent on dedicated, non-general fund sources of revenue -- mainly the Loon License Plate, and Chickadee Check-off. Unfortunately, both of these funding sources are in decline, and a more dependable revenue stream is critical if the Department is to meet its legislative mandate *"to conserve, by according such protection as is necessary…, all species of fish or wildlife found in the State, as well as the ecosystems upon which they depend"*.

Phillip deMaynadier, Ph.D., Wildlife Biologist and Group Leader – Phillip supervises Group activities and serves as the Department's lead biologist on issues related to amphibians, vernal pools, butterflies, dragonflies, and general policy issues related to reptile-amphibian-invertebrate conservation. He is also a Graduate Faculty member at the University of Maine's Department of Wildlife Ecology.

Beth Swartz, Wildlife Biologist – Beth serves as the Department's lead biologist on several invertebrate taxa, with recent efforts devoted to conservation of Clayton's Copper butterfly, freshwater mussels, rare mayflies, and bumble bees. Beth also helps coordinate the Department's vernal pool data review responsibilities.

Derek Yorks, Wildlife Biologist – Derek serves as the Department's lead biologist on reptile issues where he coordinates research and conservation efforts on several rare turtle and snake species. Derek is currently focused on assessing the distribution and status of Blanding's, spotted, and wood turtles in Maine and is also studying the impacts of roadways on Maine's rare turtle species.

Seasonal Staff/Cooperators – The RAI Group could not address such a diverse suite of taxa without the expert assistance provided by the following professionals (in 2013-2014): Paul M. Brunelle, Dr. Ron Butler, Ken Hotopp, Dr. Cynthia Loftin, Jonathan Mays, Dr. Allison Moody, Derek Moore, Ethan Nedeau, Trevor Persons, Jen Raber, Justin Schweitzer, Marcia Siebenmann, Dr. Reggie Webster, and Dr. Herb Wilson.

Reptile, Amphibian, and Invertebrate Conservation and Management

Amphibians and Reptiles

Partners in Amphibian and Reptile Conservation (PARC)

MDIFW continues to cooperate with an initiative entitled Partners in Amphibian and Reptile Conservation (PARC). Modeled partly after the successful Partners in Flight (PIF) bird conservation program, PARC's mission is to forge partnerships among diverse public and private organizations in an effort to stem recent declines of amphibian and reptile (herpetofauna) populations worldwide. MDIFW regularly participates in northeastern chapter PARC meetings, including the most recent 2014 annual meeting in Salamanca, New York.

To date, PARC-Northeast has made progress on a) drafting model state herpetofauna regulations, b) compiling a list of regional species of conservation concern, c) publishing management recommendations for important habitats, and d) designing guidelines for identifying high value areas entitled Priority Amphibian and Reptile Conservation Areas (PARCAs).

Recognizing that habitat loss and fragmentation is the greatest threat to reptiles and amphibians worldwide, the PARCA project is an initiative to develop a network of focus areas in the U.S., designed specifically for the unique conservation needs of reptiles and amphibians. Areas are nominated using scientific criteria and expert review, drawing on the concepts of species rarity, richness, regional responsibility, and landscape integrity. PARCAs are a nonregulatory

designation whose purpose is to raise public awareness and spark voluntary habitat protection by landowners and conservation partners. PARCAs are not designed to compete with existing landscape biodiversity initiatives, but to complement them – providing an additional spatially explicit layer for conservation consideration. With significant support from the U.S. Fish and Wildlife Service, MDIFW is working closely with researchers at the University of Maine (Cyndy Loftin and Allison Moody) and Clemson University (Kyle Barrett and Bill Sutton) to develop a framework for identifying PARCAs throughout the Northeast.

For more information on this or other national PARC conservation efforts, visit the PARC website at www.parcplace.org.

This work is supported by the USFWS Landscape Conservation Cooperative program, the federal State Wildlife Grants program, and state revenues from the Loon License Plate and Chickadee Check-off fund.

--Phillip deMaynadier and Derek Yorks

Maine Amphibian and Reptile Atlas Project (MARAP)

From 1986–1990, MDIFW, in cooperation with Maine Audubon and the University of Maine, conducted the Maine Amphibian and Reptile Atlasing Project (MARAP). During a four-year period, over 250 volunteers from around the state contributed approximately 1,200 records of observations of amphibians and reptiles. This initiative culminated in the 1992 publication of the book *The Amphibians and Reptiles of Maine*. The first edition sold out within two years of publication.

By 1998, considerable new data had been compiled, and there was increasing demand for updated information on the state's amphibians and reptiles. Editors Malcolm Hunter, Jr., Aram Calhoun, and Mark McCollough revised a second edition, incorporating information from 1,300 new records into updated range maps and species narratives, and added color photographs and a CD of the calls of the frogs and toads of Maine. Copies of the updated 1999 edition of *Maine Amphibians and Reptiles* can be ordered for $19.95 from MDIFW's Information Center (207-287-8000) or from the online store found on the Department's website: http://www.maine.gov/ifw.

MDIFW continues this atlasing work and maintains a comprehensive database on the distribution of Maine's 35 amphibian and reptile species (33 native and 2 exotic). Though most of this work is opportunistic, as of summer 2014 nearly 10,000 entries from more than 760 volunteers have been logged. There is much still to learn regarding the distribution and ecology of Maine's herpetofauna, and we encourage members of the public to share their photo-documented observations by submitting a MARAP reporting form, available on MDIFW's website in the Species Information section. **Please submit observations of any of the four state-listed reptiles -- Eastern Box Turtle (Endangered), Blanding's Turtle (Endangered), Spotted Turtle (Threatened), and Black Racer (Endangered) – as soon as possible to MDIFW (derek.yorks@maine.gov or call 207-941-4475).**

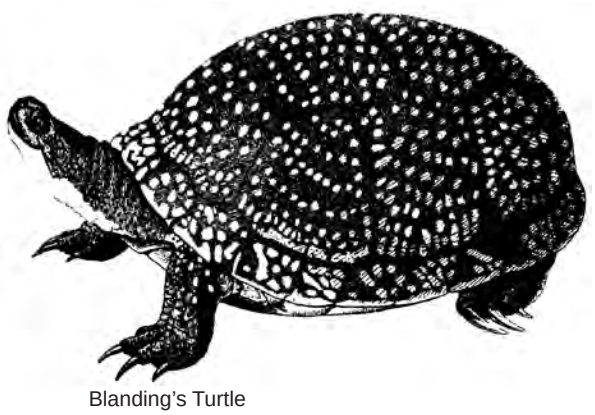
For more information on research, assessment, and conservation efforts for Maine's amphibians and reptiles, visit the RAI Group's webpage here: http://www.maine.gov/ifw/wildlife/species/reptiles/index.html.

This work is supported by volunteer assistance, the federal State Wildlife Grants program, and state revenues from the Loon License Plate and Chickadee Check-off fund.

--Derek Yorks and Phillip deMaynadier

Rare Turtles

For nearly 20 years, MDIFW has actively researched the distribution and status of Blanding's and Spotted Turtles in Maine. Blanding's Turtles (Endangered) are 7 to 10 inches long with a yellow throat and light colored flecking on a helmet-shaped shell. Spotted Turtles (Threatened) are 5 to 6 inches in length, have yellow spots on the head, tail, and legs and a somewhat flat, yellow-spotted shell. Both species are semi-aquatic preferring small, shallow wetlands in southern Maine, including pocket swamps and vernal pools. Undeveloped fields and upland forests surrounding these wetlands provide habitat for nesting, aestivating (a period of summer inactivity), and movements between wetlands.



Blanding's Turtle

Despite the attention these turtles have received, habitat loss and fragmentation continue to threaten both species' persistence in Maine. As the human population expands, road mortality becomes an ever increasing threat. The turtle's shell has provided sufficient protection from predators for millions of years, but unfortunately is no match for a car tire. Both Blanding's and Spotted Turtles are long-lived animals that take a minimum of seven (Spotted) to 14

(Blanding's) years to reach reproductive age. This, coupled with low hatching success, places increased importance on adult survivorship. Recent population analyses of several freshwater turtle species indicate that as little as 2 - 3% additive annual mortality of adults is unsustainable, leading ultimately to local population extinction. In other words, losing just a few breeding adult turtles each year to road-kill may be the greatest factor threatening the persistence of Blanding's and Spotted Turtles in Maine.

MDIFW is currently involved in three active conservation projects benefitting Blanding's and Spotted Turtles in Maine:

- *Cautionary Road Signage Project (Turtle X-ing):* A cooperative study by the University of Maine and MDIFW identified high-density rare turtle areas with road-crossing hotspots. With the assistance of the Maine DOT, The Nature Conservancy, and local towns, temporary yellow warning signs are installed in strategic locations to alert motorists to the possible presence of turtles on the roadway. The signs are deployed seasonally, coinciding with the period when overland turtle movements are greatest, thus helping to maximize the signs impact by reducing "sign fatigue" by local commuters. This project is now in its 9th year.
- *Conservation of Blanding's Turtle in the Northeast:* MDIFW, along with four other northeastern states, was awarded a USFWS Competitive State Wildlife Grant to develop a regional model and plan for Blanding's Turtles. Field work on this project began spring 2012 and was completed in 2013. Site specific conservation and management plans were developed for three of Maine's most promising Blanding's turtle sites that span the following five townships: Sanford, Lyman, South Berwick, Berwick, and York.
- *Wildlife Road Watch:* Partnering with Maine Audubon and Maine DOT, Wildlife Road Watch, a volunteer initiative to report wildlife-road interactions (both alive and dead) was launched in 2010. Additionally, in 2014 MDIFW began monitoring for road mortality at previously documented Blanding's and Spotted Turtle crossing and road kill sites and potentially important road-crossing sites identified in a predictive GIS model. Data generated from these efforts will help in planning future wildlife road mitigation efforts (e.g., additional signage areas, critter crossings, exclusionary fencing). In addition to incidental sightings, participants may also choose to adopt a road segment for repeated monitoring. For more information on the Wildlife Road Watch, please visit: http://www.wildlifecrossing.net/maine.

This work is supported by volunteer assistance, The Nature Conservancy, the federal State Wildlife Grants program, and state revenues from the Loon License Plate, Chickadee Check-off, the Maine Outdoor Heritage Fund, and the Maine Department of Transportation.

--Derek Yorks

Invertebrates

Bumble Bees: Native Pollinators in Trouble

Bumble bees are one of our most valuable pollinators of both wild plants and commercial crops. Their early spring emergence and "buzz pollination" method are especially effective for important Maine crops like apples, blueberries, cranberries and tomatoes. Unfortunately, over the past 10-15 years, some species of native bumble bees have drastically declined throughout their ranges and several have all but disappeared. Habitat loss, diseases and parasites, pesticides, and agricultural management practices may all play a role in bumble bee declines worldwide.

Table 14. Bumble bees of Maine.

Rusty-patched Bumble Bee	*Bombus affinis*
Yellowbanded Bumble Bee	*Bombus terricola*
Brown-belted Bumble Bee	*Bombus griseocollis*
Red-belted Bumble Bee	*Bombus rufocinctus*
Ashton's Cuckoo Bumble Bee	*Bombus ashtoni*
Lemon Cuckoo Bumble Bee	*Bombus citrinus*
Fernald's Cuckoo Bumble Bee	*Bombus fernaldae*
Indiscriminate Cuckoo Bumble Bee	*Bombus insularis*
Two-spotted Bumble Bee	*Bombus bimaculatus*
Common Eastern (Impatient) Bumble Bee	*Bombus impatiens*
Confusing Bumble Bee	*Bombus perplexus*
Sanderson's Bumble Bee	*Bombus sandersoni*
Tri-colored Bumble Bee	*Bombus ternarius*
Half-black Bumble Bee	*Bombus vagans*
Northern Amber Bumble Bee	*Bombus borealis*
Yellow Bumble Bee	*Bombus fervidus*
American Bumble Bee	*Bombus pensylvanicus*

Because of the high level of concern for this group of important insects, MDIFW was recently contracted by NatureServe (http://www.natureserve.org/) to develop a list of bumble bee species (*Bombus* spp.) native to Maine and rank their current conservation status in the state. Since there is not a lot of collection data for Maine, especially from recent years, this was not an easy task! However, thanks to the efforts of a small number of past and present avid collectors, we were able to determine that 17 of the 47 species of bumble bees native to the United States have been documented to occur in Maine (Table 14). Of those 17 species, three – the Rusty-patched Bumble Bee, Ashton's


Bumble Bee (Photo by Sharon Fiedler)

Cuckoo Bumble Bee, and American Bumble Bee – have not been collected in 15-20 years and may be extirpated. Many species have so little collection data that it was impossible to determine their current status in Maine and only 6-8 species appear to have stable populations for the present time.

In order to get a better understanding of the diversity, distribution, and conservation status of Maine's native bumble bee species, MDIFW is applying for grants to fund a statewide atlasing project. Similar to the Maine Butterfly and Maine Damselfly and Dragonfly surveys, this project will enlist the aid of citizen volunteers from all over the state to help the Department collect valuable data on what species are present, where they occur, what habitats they are using, and possibly their relative abundance. This 5-year project is tentatively scheduled to begin in 2015.

Funding for this work comes from NatureServe, the federal State Wildlife Grants program, and state revenues from the Loon License Plate and Chickadee Check-off fund.

--Beth Swartz

Stalking Rare Damsels and Dragons: The Maine Damselfly and Dragonfly Survey

Insects in the Order Odonata, damselflies and dragonflies, are a conspicuous component of Maine's wildlife diversity. Presently, 158 species have been documented in the state, comprising nearly 36% of the total North American fauna. Several of Maine's odonate species are of national and global conservation concern. Maine currently lists three species as Endangered or Threatened and 25 species as Special Concern. While several odonates are highly sensitive to freshwater habitat degradation, baseline information for the group had been lacking in Maine, until recently.

In 1998, MDIFW initiated the Maine Damselfly and Dragonfly Survey (MDDS), a multi-year, citizen-science atlasing initiative designed to improve our knowledge of the distribution, status, and habitat relationships of damselflies and dragonflies statewide. In addition to accumulating a tremendous amount of scientific data, the MDDS engaged over 200 of Maine's non-game enthusiasts and raised public awareness of invertebrate conservation generally. Some of the more significant contributions by the survey, from among the 17,000 new records submitted, included 10 new state species records and two new US national records (the Quebec Emerald and Canada Whiteface dragonflies).


Dragonfly

With the volunteer atlasing component of the MDDS project completed, MDIFW is now actively working with Paul M. Brunelle, an odonate expert and graphic design artist from Nova Scotia, to assist with authoring and designing the project's capstone product: *An Atlas and Conservation Assessment of Acadia's Damselfly and Dragonfly Fauna*. Populated largely with data contributed by MDDS volunteers, this atlas will serve as the first authoritative publication on the distribution and natural history of odonates from Maine and the Canadian Maritime Provinces. The Atlas is scheduled for completion in 2016.

Funding for this work comes from volunteer assistance, the federal State Wildlife Grants program, state revenues from the Loon License Plate, Chickadee Check-off fund, Maine Outdoor Heritage Fund, and contributions by the New Brunswick Museum of Canada.

--Phillip deMaynadier

Arrowhead Spiketail Dragonfly

The Arrowhead Spiketail (*Cordulegaster obliqua*) is a large dragonfly with a distinctive yellow "arrowhead" abdominal pattern. The species is most often found patrolling small, first-order forested streams. These streams are the reproductive habitat where the females deposit eggs into the substrate and developing larvae spend several years feeding and growing before emerging as adults. While the species is found across much of the eastern U.S., it is uncommon throughout its range and, until recently, known from only nine sites in Maine where it is listed as a species of Special Concern.

A collaborative research project between University of Maine and MDIFW was undertaken in 2013 to better understand the distribution and habitat needs of this rare dragonfly. Surveys were conducted at approximately 12 waterways in York County that were believed to be suitable habitat, resulting in four new Spiketail occurrences. These surveys also identified other headwater stream dragonflies that co-occur with the Arrowhead Spiketail. An array of habitat data documenting stream characteristics and plant communities along with remote GIS mapping data are being used to

better characterize reproductive habitat, which is poorly defined at present. Increasing our biological knowledge of the Arrowhead Spiketail will help inform future listing status and potential conservation needs for the species. A final report from the project is scheduled for 2014.

Funding for this work comes from the University of Maine, the federal State Wildlife Grants program, and state revenues from the Loon Conservation Plate and Chickadee Check-off funds.

--Jen Raber and Phillip deMaynadier

The Maine Butterfly Survey: Keeping Track of Scaled Jewels

Juniper Hairstreak, Clayton's Copper, and Spicebush Swallowtail are just some of the state's rarest butterflies that are both colorful in name and on the wing. In an effort to improve our knowledge of these and other priority butterflies, MDIFW is actively studying the group during statewide regional surveys. Attractive and ecologically important, butterflies have garnered increasing attention from scientists and the general public as sentinels of habitat change. By documenting the distribution and status of the state's butterfly fauna, MDIFW hopes to improve its understanding of the group and prioritize conservation efforts towards those species most vulnerable to decline and potential state extinction.

In support of this goal, MDIFW received a grant from the Outdoor Heritage Fund in 2002 to contract a professional lepidopterist, Dr. Reginald Webster from New Brunswick, to help assemble a comprehensive assessment of the state's butterfly fauna. Drawing from published literature and specimen records located in museums and amateur collections throughout the Northeast, Reggie helped MDIFW develop the first baseline atlas and database of Maine's butterfly fauna. The baseline atlas project compiled nearly 9,000 records and added 11 previously undocumented butterflies to the state list, which now stands at 123 species. Of special note, is the relatively high proportion (~20%) of Maine butterflies and skippers that are extirpated (5 species) or state-listed as Endangered, Threatened, or Special Concern (19 species) -- a pattern consistent with global trends elsewhere for the group. Contact MDIFW to receive an updated checklist of the butterflies of Maine (phillip.demaynadier@maine.gov) or visit http://mbs.umf.maine.edu/Publications.htm to download a pdf copy of Maine's first baseline butterfly atlas.

Finally, we are excited to announce that a statewide volunteer butterfly atlas that took flight in 2007 has been extended through 2015. Sponsored by MDIFW, in partnership with the University of Maine at Farmington (Dr. Ron Butler), Colby College (Dr. Herb Wilson), and Dr. Reginald Webster of New Brunswick, the Maine Butterfly Survey (MBS) is a multi-year, statewide, volunteer survey effort. Following in the tradition of previously successful state-sponsored wildlife atlasing projects, including the Maine Damselfly and Dragonfly Survey, data generated from the MBS comes primarily from trained citizen scientists. The survey will help fill information gaps identified during the baseline assessment on butterfly distribution, flight seasons, and habitat relationships for one of the state's most popular insect groups. To become involved in this project or to learn more about Maine's butterflies, contact the volunteer coordinator, Dr. Herb Wilson, at whwilson@colby.edu, or check the MBS website at: http://mbs.umf.maine.edu.

Funding for this work comes from volunteer assistance, The Nature Conservancy, the federal State Wildlife Grants program, state revenues from the Loon Conservation Plate, Chickadee Check-off funds, and the Maine Outdoor Heritage Fund.

--Phillip deMaynadier

Rare Mayflies

Mayflies, or "shadflies" as they are often called, are a diverse group of insects with over 160 species found in Maine. Some species inhabit lakes and ponds, but most live in the flowing waters of our many streams and rivers. Belonging to the Order "Ephemeroptera" – named for the short lifespan of the winged adults – mayflies spend nearly their entire lives underwater, where they play a significant role in the food webs of aquatic ecosystems. Often abundant, the nymphs are a major consumer of algae and decomposer of plant material, and in turn provide a high quality food source for many more visible stream predators. Anglers have long recognized that a good mayfly stream is likely a good trout and salmon stream as well. The most popular "flies" tied by fly-fishers to mimic their quarry's natural prey are modeled after the different life stages of the mayfly.

While most of Maine's mayfly species are widely distributed and relatively common, some are much rarer. Maine currently lists one species of mayfly as Endangered, one as Threatened, and 13 as Special Concern. The Roaring Brook Mayfly

(Endangered) holds the distinction of being among the rarest in the world. For many years it was only known from a single adult specimen collected on Mt. Katahdin in 1939, until surveys conducted by MDIFW in 2003 confirmed the species was still present on the mountain. Since then, MDIFW has surveyed approximately 160 streams and documented a total of 14 where the mayfly occurs. All of these sites are clustered in the mountains of central and western Maine (Figure 8). Other researchers have also collected a specimen in the Green Mountains of Vermont and another in the White Mountains of New Hampshire. While we now know the Roaring Brook Mayfly is not confined just to Mt. Katahdin, it does appear to be New England's only endemic mayfly - restricted to cold, undisturbed, high-elevation streams of the northern Appalachian Mountain Range.

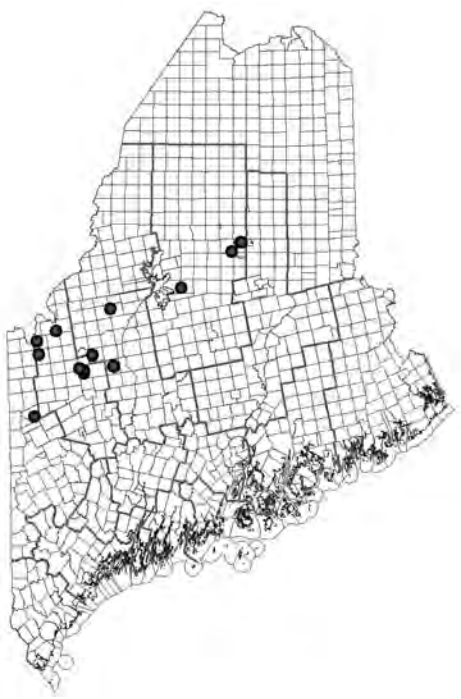


Figure 8. Distribution of Roaring Brook Mayfly in Maine.

The Tomah Mayfly (Threatened) is a unique insect once thought to be extinct. It was rediscovered in Tomah Stream (Washington Co.) in 1978 and has since been documented at 18 sites distributed across northern, eastern and central Maine and at least one site in New York. The nymphal stage of the Tomah Mayfly, unlike other species of mayflies, is carnivorous - preying largely upon other mayfly nymphs. This species depends on highly productive, seasonally-flooded, sedge meadows along large streams or rivers to complete its life cycle. Although sedge meadows are not an uncommon habitat type in Maine, the Tomah Mayfly is known only from a limited number of potential sites.

In addition to these two species, 13 other mayflies are considered Special Concern in Maine. Many of them are only known from one or two sites, but comprehensive surveys have never been done. To help plan for future surveys, the Department recently contracted the expert services of Marcia Siebenmann to document all previous survey efforts for Maine's state-listed and Special Concern mayfly species. Over 35 years of data were entered into a database that will aid in tracking known occurrences and coordinating where to look for new populations of these uncommon insects in order to better understand their status and conservation needs.

Funding for this work comes from the federal State Wildlife Grants program and state revenues from the Loon Conservation Plate and Chickadee Check-off funds.

--Beth Swartz

Rare Freshwater Mussels

Maine is home to 10 species of freshwater mussels, three of which are listed as Threatened under the Maine Endangered Species Act (Table 15). The Yellow Lampmussel and Tidewater Mucket, which look similar and often occur together, are found only in the St. George, Penobscot, and lower Kennebec River watersheds. While both species can live in either flowing or still water, they seem to reach their highest numbers in ponds and lakes, including the quiet waters behind man-made dams. Unfortunately, rare mussels living in impoundments often find themselves in even more danger when dams are removed or water is drawn down for repairs. Unable to escape, thousands of stranded mussels – both common and rare – often succumb when water levels recede. During the past few years, MDIFW has worked closely with the Penobscot River Restoration Trust (http://www.penobscotriver.org/) and hydropower companies to implement recovery and relocation plans that minimize mortality of Yellow Lampmussels and Tidewater Muckets following removal of the Veazie and Great Works Dams and repairs made to another dam upriver. As a result of those cooperative efforts, significant numbers of rare mussels were moved to safety. Over the next couple years, those mussels will be monitored to see how well they survived the relocation. The Trust will also be conducting studies to investigate how mussels in the former impoundment respond to the change in their environment from an impounded to free-flowing system. These studies will help MDIFW document the effectiveness of hands-on recovery efforts and the effects of dam removal on Maine's rare freshwater mussel species.

Table 15. Freshwater Mussels of Maine.

Eastern Pearlshell (*Margaritifera margaritifera*)	
Eastern Elliptio (*Elliptio complanata*)	
Triangle Floater (*Alasmidonta undulata*)	
Brook Floater (*Alasmidonta varicosa*)	**THREATENED**
Eastern Floater (*Pyganodon cataracta*)	
Alewife Floater (*Anodonta implicata*)	
Creeper (*Strophitus undulatus*)	
Yellow Lampmussel (*Lampsilis cariosa*)	**THREATENED**
Eastern Lampmussel (*Lampsilis radiata radiata*)	
Tidewater Mucket (*Leptodea ochracea*)	**THREATENED**

Maine's third listed species is the Brook Floater. Unlike the Yellow Lampmussel and Tidewater Mucket, the Brook Floater requires flowing water and reaches its best numbers in clean, undeveloped and undammed rivers and streams. This species is more widely distributed in Maine than the other two, but is usually observed in much lower numbers. Its stronghold is in the Penobscot River watershed but it also co-occurs with the lampmussel and mucket in the St. George River and lower Kennebec River watershed, and is found in several Downeast and midcoast rivers. During the past three years, the Department has focused on intensively surveying streams and rivers where the Brook Floater has been documented in the past. Many of these sites have not been visited for 15-20 years, so very little if anything is known about the species' current status at each. MDIFW has contracted Ethan Nedeau (Biodrawversity LLC), a mussel biologist with vast experience studying Brook Floaters, to conduct the surveys. So far, Ethan has surveyed 12 rivers and found some interesting results. At Maine's only southern occurrence, the Pleasant River in Cumberland County, Ethan found that severe erosion and sedimentation likely caused by adjacent land use have nearly extirpated the species in that river. At the other end of the state, far Downeast in the Dennys River (Washington Co.), Ethan spent three days looking and only found one live animal. In the St. George River, where IFW always presumed the population was healthy based on numbers observed, Ethan found a fair number of individuals, but they were all old animals with little evidence of reproduction. Conversely, sites like Kenduskeag Stream, Marsh Stream and the Passadumkeag River appear to have relatively large, stable populations. At each site visited, Ethan is documenting the Brook Floater's population density and size, as well as microhabitat use and potential threats. In 2014, he will be surveying the Machias and East Machias River watersheds (Washington County). This information will contribute to a regional assessment of the Brook Floater's conservation status, which MDIFW is participating in with several other northeastern states.

More information on Maine's mussels can be found in *The Freshwater Mussels of Maine* (Nedeau et al. 2000), available through the Department's online store (http://www.mefishwildlife.com/) or Information Center (207-287-8000).

Funding for this work comes from volunteer assistance, the federal State Wildlife Grants program, and state revenues from the Loon Conservation Plate and Chickadee Check-off funds.

--Beth Swartz

Special Habitats for Reptiles, Amphibians, and Invertebrates

Freshwater Marshes and Shrub Swamps

Freshwater marshes and shrub swamps are open, vegetated, shallow wetlands that contain water most of the time. They vary in size and appearance, but they are all characterized as sun-soaked places with standing water and abundant vegetation with high levels of biological production. Many of Maine's amphibians, reptiles, and invertebrates depend on these wetlands for all or some of their life cycle. Frogs including: Leopard Frogs (Special Concern), Pickerel Frogs, Green Frogs, Bull Frogs, Mink Frogs, Grey Tree Frogs, Spring Peepers, breed and often live in these habitats year-round. The mixture of lush, herbaceous vegetation found above and below the water surface provides amphibians with shelter from predators, as well as food in the form of the vegetation itself or by supporting a plethora of invertebrate prey. A number of reptile species thrive in marshes and shrub swamps too. Spotted Turtles (Threatened), Blanding's Turtles (Endangered), Painted Turtles, and Snapping Turtles are found in these wetlands, as are Ribbon Snakes (Special Concern), Garter Snakes, and Northern Water Snakes. Marshes and shrub swamps are also hugely important to a number of invertebrates, perhaps most conspicuously dragonflies and damselflies. Across Maine's forest-dominated landscape, these wetlands are often focal points for wide-ranging wildlife in an area. Beyond reptiles, amphibians, and invertebrates - wading birds, waterfowl, beaver, muskrat, and even moose depend on these productive habitats.

The recent assessment and planning efforts focused on Blanding's Turtles in Maine, through the Competitive State Wildlife Grant (U.S. Fish and Wildlife Service), has been informative in highlighting the special importance of marshes and shrub swamps for this rare species. While Blanding's Turtles are known to use a number and variety of wetlands even in a single season, they are not found in just any wetland. High value marshes and shrub swamps are often at the core of their home ranges, generally serving as overwintering and late summer feeding areas. Information that has been gathered from this project will help Maine biologists to understand what specific characteristics of marshes and shrub swamps are critical for the survival of this species in the state.

Funding for MDIFW's efforts at identifying high value marshes and shrub swamps for Blanding's turtles and other herpetofauna comes from the federal State Wildlife Grants program and state revenues from the Loon License Plate and Chickadee Check-off fund.

--Derek Yorks

For more information on other important habitats for reptiles, amphibians, and invertebrates, such as Riparian Sedge Meadows, Vernal Pools, and Pitch Pine Woodlands and Barrens, see most recent annual reports here: http://www.maine.gov/ifw/wildlife/reports/research_management.html, or visit RAI Group's invertebrate webpage here: http://www.maine.gov/ifw/wildlife/species/invertebrates/index.html.

Fish Group

Maine is home to about 51 native species of freshwater and diadromous fishes and about 17 species that are considered to be non-native to the state. The issues and needs associated with such a diverse assemblage are broad, hence the Fish Group tends to focus on issues and needs complimentary to the Fisheries Division. Group members are actively involved in many aspects pertaining to native fish conservation, aquatic habitat restoration, inland commercial fisheries management, invasive fish control and remediation, and fishery resource data management, landscape analysis and mapping.

The Fish Group coordinates and actively participates in a variety of collaborator and partnership driven efforts, such as active stream and riparian habitat restoration, large-scale river connectivity projects, inventory of unsurveyed habitats, and Northeast region aquatic resource conservation efforts. The Group also collaborates and coordinates a variety of on-going research projects with academic researchers, conservation organizations, and other state and federal agencies.

Merry Gallagher, Fishery Research Biologist and Group Leader – Merry supervises Group activities and is a stream ecologist with expertise in stream survey methodology, native fish ecology, and landscape/GIS data analysis. She oversees statewide efforts to survey and assess remote ponds and coastal stream habitats, documents wild brook trout populations, and improves the general knowledge regarding the distribution of Maine's native fishes. She is also integral to managing Maine's inland commercial fisheries, including baitfish. Merry represents Maine and IFW on a variety of committees and Northeast partnership efforts, such as the Eastern Brook Trout Joint Venture, the Northeast Fish and Wildlife Diversity Technical Committee, and the Maine Stream Connectivity Work Group.

Kevin Gallant, Fishery Specialist – Kevin assists with a variety of fisheries research projects statewide and most of the Group's data collection efforts. The primary focus is on documenting wild brook trout populations in all habitat types but all freshwater fish species encountered are recorded. Kevin's primary projects this year have included the Remote Pond Survey Project and assessing coastal brook trout. Kevin is also a member of IFW's Black Bass Committee and a certified pesticide applicator and is integral to many IFW chemical reclamation projects.

Tyler Grant, Contractor – Tyler coordinates the field collections of fish species for research projects, including the Sea-run Brook Trout Project and the Remote Pond Survey Project. He assists in maintaining the stream survey, sea run brook trout, and commercial fishery databases, and helps fill data and fish collection requests that come to the Fish Group. Tyler is also involved in monitoring 'chop and drop' habitat restoration projects statewide and invasive fish species monitoring projects.

Seasonal Technicians – Brianna Pelkie and Caleb Taylor

Cooperators - The Fish Group could not accomplish all that we do without the ever present assistance from our collaborators, cooperators, and volunteers. We graciously thank the following dedicated organizations and individuals for your continued assistance: IFW Regional Fisheries staff, Sally Stockwell, Amanda Moeser, Jeff Reardon and the cadre of volunteers (Maine Remote Pond Survey Project), Michael Hopper and Geof Day (Sea Run Brook Trout Coalition), Dwayne Shaw (Downeast Salmon Federation), Dr. Michael Kinnison, Wes Wright, Dr. Joe Zydlewski and their students (UMaine), Slade Moore, Claire Enterline, Keith Kanoti, Jed Wright, Alex Abbot, Scott Craig, Josh Royte, Barbara Charry, Ben Naumann, Jeff Norment, Pat Sirois, Bruce Connery, and the many volunteers and private land owners who have worked with us over the last year.

Fish Conservation and Management

Maine Brook Trout Remote Pond Survey

Maine contains more than 6,000 lakes and ponds with over 1,000 of these waters having never been formally surveyed by Fisheries Biologists. These unsurveyed ponds tend to be small in surface area, usually less than 20 acres, remote, and are sometimes difficult for a survey crew with equipment to access. Some unsurveyed ponds may not fit the conventional description of a brook trout water, so they have not been a high priority for regional Fisheries staff to survey. Starting in 2011, the Maine Department of Inland Fisheries and Wildlife (MDIFW) teamed with Trout Unlimited (TU) and Maine Audubon (MA) to initiate a volunteer angler survey program focused on determining which unsurveyed ponds contain, or are likely to contain, wild brook trout in an attempt to provide a focus for future fisheries surveys. The two most important items provided by the volunteer anglers are: 1) whether trout or other fishes were caught during their angling survey (or in past years fishing a specific water); and 2) detailed information on how to access each water.

Over the past 3 years, volunteers have surveyed 255 ponds! 95 ponds were surveyed by volunteers in 2011, 68 in 2012 and 92 in 2013 (Figure 9). 104 of the 255 ponds have been recommended to MDIFW to have a baseline inventory survey completed. Of those ponds, 45 have been surveyed by MDIFW biologists in the past 2 seasons. Based on volunteer angler surveys from 2013, at least 33 ponds were recommended to MDIFW for baseline net surveys in 2014. These ponds have been designated in three tiers, based on presence or likelihood of brook trout. Ponds where volunteer anglers caught or observed brook trout are forwarded to MDIFW as the highest priority for baseline inventory surveys. When volunteers report that brook trout are likely to be present based on their findings, but were not caught, these ponds are considered as second level priorities for Department survey efforts. The remaining ponds are under consideration for standard fisheries baseline surveys due to brook trout presence being deemed possible, but unlikely, based on volunteer angler results.

Figure 9. Volunteer anglers prepare to survey a pond.
(Photo by Jeff Reardon, Trout Unlimited)

Table 16. Tasks and basic methods used to conduct a new pond survey using MDIW's Pond Survey Protocol.

General Task	Methods
Pond Description	Describe shoreline features Produce pond sketch Note inlets, outlets, and seeps GPS important landmarks Take representative photos
Describe Access and Angler Use	Directions to pond Notes on Access Signs of angler use
Fish Collections	Sample with multiple gears All species accurately identified Biological data
Water Quality	Produce temperature/dissolved oxygen profile Multiple parameters measured and collected
Bathymetry	Measure pond depth Denote deepest location Characterize substrate

MDIFW leads the effort of conducting standard baseline surveys of ponds where wild brook trout are likely to be found. The seasonal crew uses MDIFW's Pond Survey Protocols while performing their surveys. Table 16 outlines the activities associated with a complete pond survey (also see Figures 10-11).

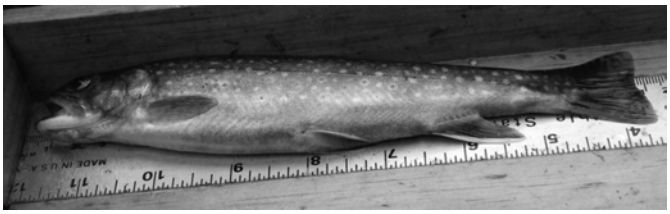


Figure 10. Typical-sized brook trout collected during the pond surveys.

While conducting pond surveys, directions provided by the volunteer anglers are used in addition to a variety of map tools and a GPS unit with Maine topographic maps. The directions provided by volunteer anglers are often invaluable in choosing the most efficient route and circumventing washed out bridges or other obstacles. The volunteer angler surveys also help to determine if canoes or boats may be available on extremely remote ponds. All of this information greatly assists MDIFW efforts to find, access, and properly inventory these remote ponds.

Volunteers are once again out in 2014, collecting data for remote ponds to be sampled by MDIFW staff in 2015. Additional information on the Volunteer Angler Survey effort can be found here: http://www.tumaine.org/brooktrout.htm. There are still 233 total ponds (including those that were attempted or not surveyed) that will carry over onto the 2014 list of survey waters for volunteer angler effort. This project would not be possible without all the volunteers' commitment of 4,090 hours over the past 3 years!! MDIFW would like to thank all associated with this project for their efforts, and we look forward to documenting many more wild brook trout in Maine's remote ponds!

--Kevin Gallant

Figure 11. Biologists collecting bathymetric data on a remote pond.

Assessing Maine's Sea-Run Brook Trout

Maine is considered one of the last true strongholds of natural brook trout (*Salvelinus frontinalis*) in the United States, having numerous river, lake, and anadromous populations (Figure 12). Anadromous populations contain individuals which, for a variety of reasons, go into marine environments at some point in their lives. Population assessment of native brook trout, so far, has focused largely on inland populations, and little is known about these "salter" or sea run brook trout. Historically, these fish were well known, and we believe they may represent an excellent focal species for assessing the health and connectivity of coastal streams and estuaries.

Figure 12. A sea-run brook trout stream.
(Photo courtesy of Merrymeeting Bay Chapter of Trout Unlimited)

One of the major difficulties in managing these elusive fish populations is the difficulty in identifying them. If migratory trout are caught shortly after returning to fresh water, they are identifiable by the silvery color that they take on from being in the salt water (Figure 13). This silver color quickly fades back to their normal dark colors once in fresh water again, usually within a week or two.

Figure 13. A sea-run brook trout showing the unique silver color.
(Photo courtesy of Merrymeeting Bay Chapter of Trout Unlimited)

In 2006, a small project was initiated to use anglers who target these coastal trout populations. These anglers consented to provide their angling information to us. They record the length and species of their catch, along with descriptions of the fish, the waterbody and town, and any comments they might have. This provides invaluable information on where populations of sea run brook trout likely still exist.

Over the 9 years of the project so far, eight different anglers have returned at least one personal log book. Some anglers have returned them every year. These log books represent 400 hours spent fishing, with 275 of those hours spent targeting sea-run brook trout. This effort resulted in a total of 52 sea run trout, as determined by trout with a pronounced silvery appearance, being caught with an average length of 6.7 inches. 1,480 total brook trout were caught, with an average length of 5.7 inches (Figure 14).

The biggest limitation of this study is the difficulty in identifying truly sea run fish. The only method available to the anglers is a visual check for a silver color. While this does indicate a sea run trout, with the wide range of color variations in brook trout, it is by no means certain. In addition, it's only viable for trout which recently returned. Being able to correctly identify sea run fish, however, is not paramount to this part of the project. The volunteer anglers provide useful information to where robust coastal populations of trout are for further assessment.

Another limitation of the study is the small numbers of anglers who actively participate. Sea run trout anglers, by nature, are secretive, and many do not wish to share their information with the Department or anyone else, for that matter. To address this, starting in the summer of 2014, we have partnered with Maine Audubon and Trout Unlimited to make use of their extensive volunteer network. Their efforts have been widely successful, and now some of their volunteers will be sent to coastal areas to fish for sea run trout in areas where we are lacking current information. This is the first season for this effort, and we look forward to working with a very devoted group of volunteers.

Assessing anadromy in trout by relying on external features requires catching or handling the fish shortly after its return from marine habitats. There are other, more definitive ways to determine if an individual has spent time in salt water. Stomach content analysis may indicate marine forage, or the fish's bony tissues will acquire the unique chemical composition of certain ions present in higher concentrations in seawater.

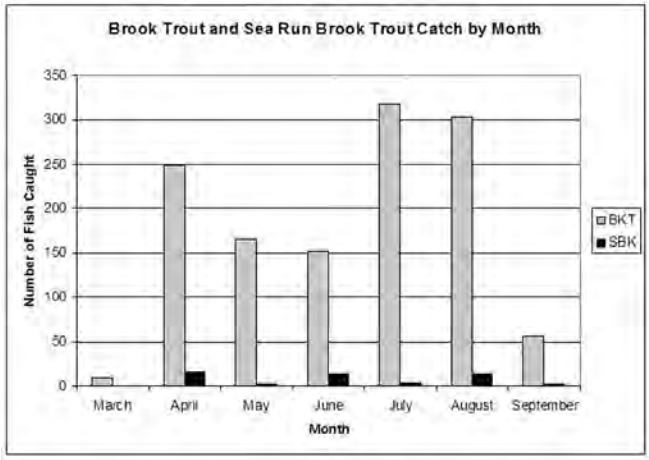


Figure 14. The total catch of brook trout and sea-run brook trout by month for the entire project.
Sea-run brook trout that can be identified visually make up a very small percentage of the fish caught by anglers.

Otoliths are small bones located directly behind the brain of bony fish, and they grow concentrically from the centroid outward, similarly to how a tree grows rings. This growth pattern can be used to estimate the age of a fish, and because the bone incorporates trace isotopes and elements indicative of the chemical composition of the water that the fish was in at the time of the bone growth, it can be used to determine the degree of anadromy as well (Figure 15).

Graph A (Figure 16) shows the Sr:Ca ratio of a fish from Lower Hunter's Brook on Mount Dessert Island showing no apparent marine migration. The Sr:Ca ratio is the same along the entire otolith. Graph B shows a rise in the ratio of a fish from Chandler River in Jonesboro showing delayed but prolonged marine migration. Graph C shows the ratios of another Chandler River brook trout showing repeated annual marine migrations.

Using chemical analysis of pertinent body tissues that reflect an individual's migratory history between fresh and salt water habitats is a promising technique for identifying and assessing anadromous coastal populations. Unfortunately, current methods for conducting tissue chemical analyses of this type rely on using bony tissues that require killing the fish. This is undesirable for a population segment that we are conserving and which provides a popular sport fishery in Maine.

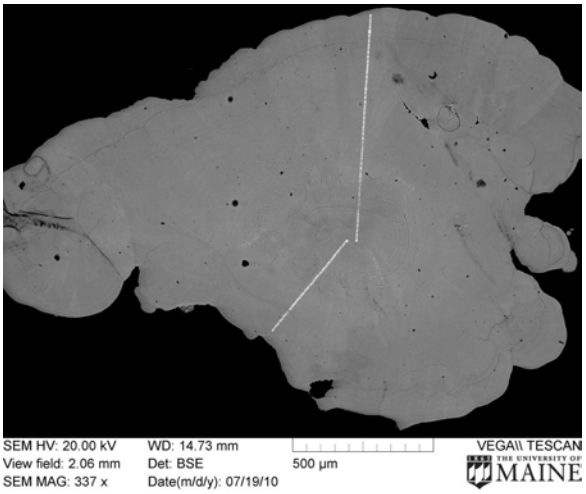


Figure 15. A photo of an otolith from a brook trout with access to marine environments. The white lines show where the Strontium/ Calcium ratio (Sr:Ca ratio) has been sampled with an electron microscope.

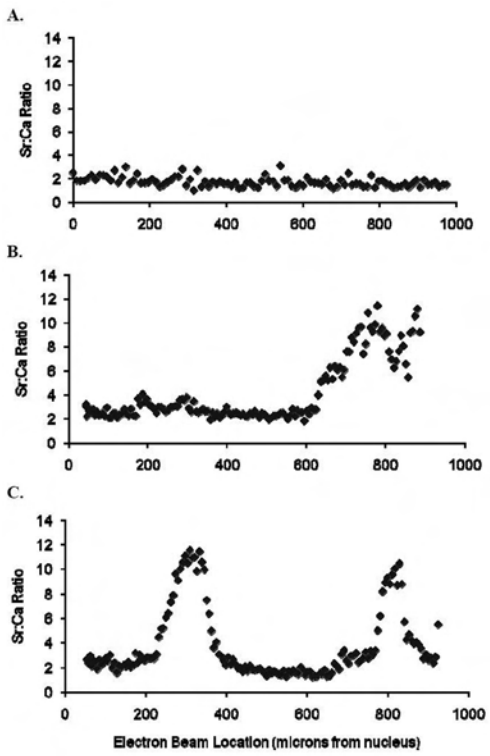


Figure 16. Three graphs showing the Sr:Cr ratios taken from the otoliths of three different brook trout.

Starting in the spring of 2014, a new phase of the project has begun. The University of Maine, School of Biology and Ecology has partnered with the Fish Group to further develop a chemical/elemental analytical technique to determine anadromy in coastal brook trout populations. This technique will further refine the chemical tests generally performed on lethally collected bony tissues, to investigate the utility of using other body tissues like muscle, scales or fin rays. Preliminary work on this method shows great promise, and refining it further requires larger sample sizes of fish collected from a broader geographic range. Individuals from six coastal streams distributed along the coast of Maine will be collected for this effort; one with a known robust population of sea run trout, one with an obstruction that prevents a coastal trout population from accessing an estuary, and four coastal streams that may contain anadromous individuals but the degree of anadromy is unknown. For each stream, an upper and lower site is identified and around 30 fish are collected from each. We limit collections to fish four inches in length or larger to assure that the individuals we sample are old enough to have made a trip to sea, if they intended. These collections will continue into 2015.

The goal of this project is to identify anadromy in coastal stream brook trout populations without the need for lethal sampling. In addition, this technique will likely extend the sampling window for coastal populations since marine chemical signatures are detectable in body tissues for a much longer time frame than what an angler can confidently determine through fish coloration. Being able to positively identify which coastal populations still retain this unique behavioral trait is a vital first step in conserving this unique resource.

--Tyler Grant

Fisheries Management Section

Maine is blessed with over 5,800 lakes and ponds one acre or more in size, totaling nearly one million acres, and about 36,000 miles of rivers and streams. In the early 1950s, the Legislature and Maine's Department of Inland Fisheries and Wildlife created the Fisheries and Hatcheries Division to manage this vast inland fishery resource, an asset that is now estimated to add over $300 million annually to the state's economy. This Division is responsible for protecting native fish species and their critical habitats, while providing a diversity of opportunities for Maine's angling community. A staff of 24 fishery biologists in the Fisheries Section works from seven Regional Headquarters, Bangor, and Augusta to achieve these objectives.

Progressive fisheries management emphasizes the protection of native, self-sustaining populations, along with carefully considered stocking programs to maximize fishing opportunities in all areas of the state. Our Fisheries Section receives national acclaim for its efforts to protect native species, while making Maine a destination for serious anglers. Below are just a few examples of the work our fisheries biologists are conducting in support of this state's incredibly rich and diverse freshwater resources.

--Dave Boucher
Fisheries Management Section Supervisor

REGIONAL FISHERIES MANAGEMENT

State Heritage Fish Waters

Maine has more than 1,000 lakes and ponds with significant brook trout populations, and we are considered a stronghold for native brook trout, with more than 97% of the remaining lake and pond populations in the US. In 2005, the Maine legislature enacted in P.L. 2005 c. 180, "An Act to Recognize and Protect the Native Eastern Brook Trout as Maine's Heritage Fish." This law named the eastern brook trout a "State Heritage Fish". Outlined in Title 12, §12461, "A List" waters are lakes and ponds that have never been stocked with brook trout according to any reliable records. Under this statute, 1) the commissioner may not stock or issue a permit to stock fish in a lake or pond listed as a State Heritage Fish water, and 2) a person may not use live fish as bait or possess live fish to be used as bait on a lake or pond listed as a State Heritage Fish water. From 2005 to 2014, 35 additional ponds were added to the original A List. In 2007, the Maine legislature enacted P.L. 2007 c. 21, "An Act to Designate the Arctic Charr as a State Heritage Fish".

Public Law c. 180 also directed the Maine Department of Inland Fisheries and Wildlife (MDIFW) to review wild (i.e. historically stocked and now self-sustaining) brook trout waters for possible inclusion on the A List. In its 2006 report to the Joint Standing Committee on Inland Fisheries and Wildlife (*Managing Maine's Wild Brook Trout Fisheries in Lakes and Ponds*), MDIFW stated that "the primary intent for managing wild brook trout in lakes and ponds shall be the protection and conservation of these self-sustaining fisheries, in so far as possible, without resorting to stocking brook trout." The MDIFW concluded that these specific wild brook trout waters had not been entirely isolated from the potential impacts of stocking, but concluded nonetheless that these populations were an important resource. These waters were organized under a "B List" and were defined as waters that:

1. Have not been directly stocked with brook trout in at least 25 years;
2. Have self-sustaining brook trout populations; and
3. Have brook trout that are sufficiently abundant to be considered a principal brook trout fishery.

These lakes and ponds may have received indirect stockings within the last 25 years.

A Brook Trout Working Group was established in 2012 and was tasked with providing the MDIFW with recommendations on conserving brook trout resources. A Baitfish Working Group was established in 2013 and was tasked with providing the MDIFW with recommendations for baitfish management, policies, and disease prevention. Since the legislature enacted P.L. 2013 c. 358 §8, which directed the MDIFW to develop a new wild brook trout management plan, both the Brook Trout and Baitfish Working groups were also asked to provide joint recommendations for inclusion in this plan. As a result of the working group's input and recommendations from MDIFW fisheries staff and administration, MDIFW submitted the "Proposed Plan for Managing State Heritage Fish Waters" during the 126th Legislative Session in February 2014. After several legislative work sessions, the Maine Legislature amended Title 12, §12461. This law merged the A and B-List waters and Arctic charr waters into a single "State Heritage Fish Waters" list.

The MDIFW proposed to merge the A and B Lists to: 1) renew focus on protecting Maine's most outstanding brook trout resources by applying A List management strategies to wild (B List) brook trout waters, and 2) recognize the significant cultural and economic value of sport fisheries for other native coldwater species. This action reaffirmed that wild brook trout populations are not threatened by current MDIFW salmonid stocking programs, that protecting wild brook trout on these waters will continue to be a high management priority, and that maintaining principal fisheries for other native coldwater game fish species remains an important function of the Fisheries Division. Therefore, certain waters were not included on the State Heritage Fish Waters list:

- Wild brook trout waters, where interspecific stocking programs for lake whitefish, landlocked salmon, togue, or where restoration programs for native species are contemplated or ongoing;
- Wild brook trout waters where use of live fish as bait is permitted.

Using these criteria, 38 waters were not included on the State Heritage Fish Waters list. These 38 waters will continue to be managed appropriately according to MDIFW's existing policies for protecting Maine's native and wild salmonids.

The new list of State Heritage Fish Waters includes waters containing brook trout and Arctic charr that have never been stocked with any species according to reliable records, or those that have not been stocked with any species for at least 25 years according to reliable records. The following restrictions for managing State Heritage Fish Waters are applied:

1. Stocking. The Commissioner may not stock or issue a permit to stock fish in a lake or pond listed as a State Heritage Fish water.
2. Restrictions. A person may not use live fish as bait or possess live fish to be used as bait on a lake or pond listed as a State Heritage Fish water. This may include an "artificial lures only" or "fly fishing only" restriction.

--Dana DeGraaf
Coldwater Fisheries Biologist

The Response of a Native Brook Trout (*Salvelinus fontinalis*) Population to the Removal of Competing Species in Little Moxie Pond, Somerset County

Little Moxie Pond has been the subject of intense research over the past 19 years. The original objective of evaluating Little Moxie Pond beginning in 1994 was to compare the performance of brook trout populations in ponds with varying regulations and access. The project was continued when early results indicated that the removal of competing species was having a positive impact on the native brook trout population and the fishery it supported. The specific objective of this modified study was to determine the short and long-term effects of white sucker removal on this native brook trout population.

Little Moxie Pond is a small (73 acres), homothermous pond located in northwestern Maine. It has a native population of brook trout. White suckers (*Catostomus commersoni*), creek chubs (*Semotilus atromaculatus*), and golden shiners (*Notemigonus crysoleucas*) are also present in varying densities. Little Moxie Pond was trapnetted annually in the fall from 1994-2001 and then again in 2006 and 2013 to determine the longevity of impacts (Figure 17). Annual population estimates were calculated for brook trout. All other species were removed from the pond. Annual pre-netting population estimates for white suckers were calculated from catch data.

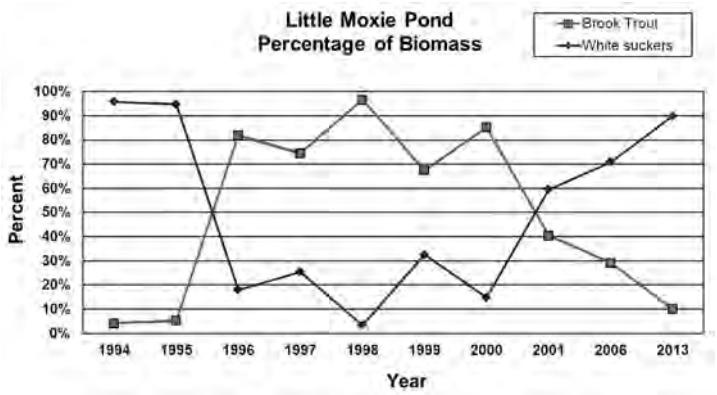


Figure 17. Percent of total biomass for white suckers and brook trout in Little Moxie Pond, 1994-2013.

Over 18,000 white suckers were removed from Little Moxie Pond in 1994 and 1995. The total biomass of non-trout species removed was 3,622 lbs or 49.6 lbs/acre for the first two years of the project. After this initial removal, the total number of white suckers removed in any single year ranged from 25 to 300 fish from 1996 to 2006.

The total number of brook trout greater than 4 inches ranged from 45 to 1,419 fish over the study period. Total biomass of brook trout increased from 1.2 lbs/acre in the first 2 years of the study to a high of 6.4 lbs/acre in the third year. The number of larger brook trout also increased in the third year of the study. All brook trout age classes showed improved growth after 2 years of competition removal.

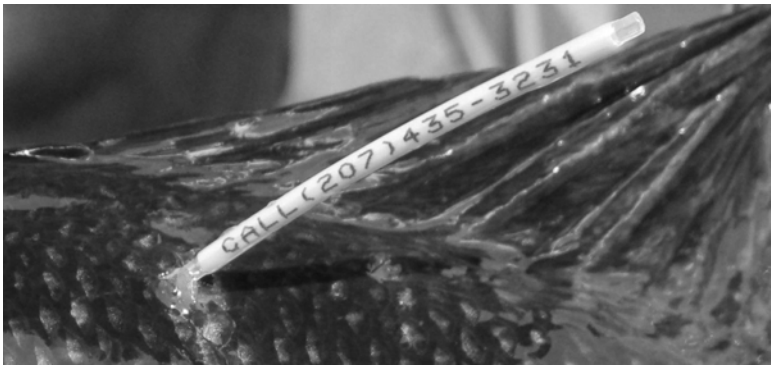
However, after seven years with no removal, the white sucker population rebounded significantly. Over 4,400 white suckers were captured and removed in the fall of 2013 and the mean length declined for age 2 and age 3 brook trout. This brook trout population responded dramatically to the removal of competing species. Brook trout density and growth rates improved after just two years of removal. The effects of the study were still apparent in 2006, despite a suspension of white sucker removal five years prior in 2001. However, with only one season of removal between 2001 and 2013, the white sucker population became re-established at a level that caused a decline in brook trout growth and abundance compared to non-drought years.

This study indicated that short-term, low effort removal of white suckers can have longer-term, but not permanent, benefits for native or wild brook trout in small homothermous headwater ponds.

--Tim Obrey
Regional Fisheries Biologist, Moosehead Lake Region

New Fish Tagging Study on the St. John River

Smallmouth bass and muskellunge have been a huge topic of conversation among anglers in the St. John River watershed since their invasion in recent decades, but as biologists we often lack the specific data needed to answer questions about these fish populations and where they are headed. With that in mind, we recently initiated a long-term tagging study of bass and muskies in the St. John River drainage. Individually numbered T-bar anchor tags have been placed in fish captured throughout the river below its confluence with the Allagash River. We hope that anglers will report tagged fish they catch and help provide the data we need to answer questions about fish movement, survival and growth.



The small, tubular plastic tags are located on the outside of the fish's body, just below the dorsal fin. Each tag has an ID number printed on one side, and the phone number to our office on the other side. When we tag a fish, we record its length, weight, age, and where it was caught. When the fish is recaptured, we can then compare that same information with data collected at the time of tagging. For instance, say we catch a 3 year old, 10 inch long bass in the river in Frenchville this summer, and three years later an angler catches that same tagged bass at the boat launch in Fort Kent and it's 15 inches long. We know that the fish survived to age 6, grew 5 inches in 3 years, and migrated upstream more than 12 miles from where it was tagged. That information is very valuable in itself, but when combined with data from hundreds of tagged fish, it can be extremely useful in guiding overall fisheries management strategies in the St. John River system in the future.

--Jeremiah Wood
Fisheries Biologist, Fish River Lakes Region

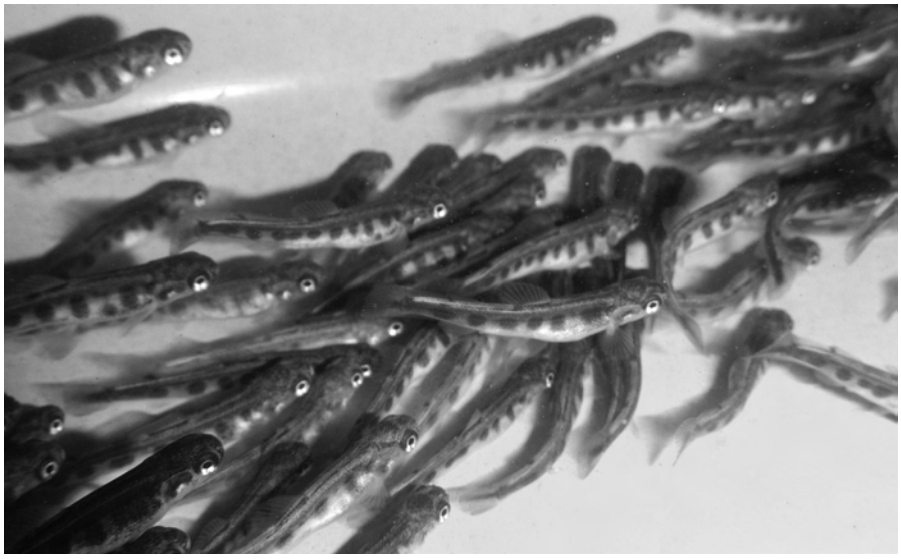
Fish Production Report, 2013

The Hatchery Section stocked 1,164,842 fish, weighing a total of 413,336 pounds during 2013 (Table 17). This represents the most pounds of fish ever produced for our statewide stocking program, and shattered the previous 2012 record of 382,778 pounds. Fish were stocked from our eight state fish hatcheries and rearing stations: Wade Hatchery in Casco, Dry Mills Hatchery in Gray, Ela Rearing Station in Embden, Cobb Hatchery in Enfield, Governor Hill Hatchery in Augusta, Grand Lake Stream Hatchery, New Gloucester Hatchery, and Palermo Rearing Station. Supplemental fish were provided from the Dead River Hatchery and Mountain Springs Trout Farm in Frenchville. Fish were transferred for further grow-out into these two latter satellite facilities for a combined return of 22,403 fish weighing 10,202 lbs.

Table 17. Stocking by Species, 2013.

Species	# of Fish	Lbs
Brook Trout	835,862	264,260
Brown Trout	147,965	89,918
Landlocked Salmon	102,975	27,989
Splake	32,060	17,286
Rainbow Trout	36,580	12,618
Lake Trout	9,400	1,265

--Todd Langevin
Superintendent of Hatcheries



Wildlife Management Section

The Wildlife Management Section is comprised of seventeen Regional Wildlife Biologists, a Wildlife Biologist liaison with the Bureau of Parks and Lands (BPL) and two staff Foresters within the Lands Management Program.

The Regional Wildlife Biologists are "generalists" whose work program requires a broad breadth of knowledge in regards to wildlife species as well as the interactions between wildlife and humans. In addition to working with the Lands Management Program on state owned Wildlife Management Areas (WMAs), these professionals provide an integral connection to the public – whether it be through a successful hunt, addressing a nuisance wildlife complaint, working on updating a species management plan or conserving nongame wildlife species under the State Wildlife Grant.

The Wildlife Biologist assigned to BPL and the Foresters within the Lands Management Program are focused on the acquisition and management of wildlife habitats. These are the folks who look to provide and promote wildlife habitats on conserved lands within the State. To do so requires not only knowledge of a species need for shelter, food, water, and space but also an understanding of the capability of an area to provide those requirements. Through application of numerous management techniques, these folks provide the best habitat possible for a wide range of wildlife.

The members of the Wildlife Management Section work to ensure the Wildlife Division's mandates are met. They are the stewards of Maine's natural and wildlife resources – ensuring that these values are here to be enjoyed by those yet to come.

After reading the WMS overview, you'll probably agree that wildlife management work covers a wide spectrum of possibilities. However, much of what we do relates to managing or conserving specific habitat types and features. Since each species of wildlife has specific habitat requirements that can differ seasonally, we must ensure the proper balance and distribution of habitat types across the landscape if we are to maintain healthy wildlife populations. The Department addresses this issue every day using a variety of tools.

--Ryan Robicheau
Wildlife Management Section Supervisor

REGIONAL WILDLIFE MANAGEMENT

The dedicated professionals who work within the Wildlife Management Section touch on all of the wildlife management programs within the Department. They collect important data on species management and provide valuable knowledge within their respective regions on the status and health of those species. Involved in the development of species management plans, which drive the planning and implementation of season lengths and bag limits, their knowledge of these species is critical to maintaining appropriate balances between the needs of wildlife and the needs of humans. They conduct this work effort for the benefit of game and non-game wildlife species – those that are regulated by hunting and trapping, but also those that are not.

The staff of the Wildlife Management Section will be involved in the Department's effort to update the State Wildlife Action Plan (SWAP). The SWAP update is mandatory for funding associated with the management of non-game wildlife species and over the next year or so, the Regional Wildlife Biologists will assist in the Wildlife Division's update of the plan by assessing Beginning with Habitat Focus Areas of Statewide Ecological Significance. The Focus Areas are landscape scale areas of statewide ecological significance containing exceptionally rich concentrations of at-risk species and habitats. These Focus Areas help guide conservation and management initiatives of the Department and the long list of its conservation partners.

The Focus Areas are non-regulatory and considered a planning tool to address the management needs and conservation of habitat – a priority list of areas that provide the most benefit when using the limited funds available to the Department. To identify what ecological hotspots might qualify for Focus Area designation, several factors are considered, including both natural community status and wildlife species that are at risk. Natural community status is important, since habitat is a driving factor in wildlife species abundance and ability to remain viable.

Focus Areas are a useful tool, in part, because they consider the assemblages of natural communities (habitat) that contain Species of Greatest Conservation Need (SGCN). Many of these SGCN species occur dispersed throughout the state, but others are confined to very specific natural communities that are in jeopardy due to disturbance, land use

changes, or other factors that contribute to decline in extent. Where these SGCN species are found, in many instances, coincide with rare, natural communities, and these areas are strongly considered as candidate Focus Areas.

The review and update of Focus Areas of Statewide Ecological Significance is one of the tasks assigned to the Wildlife Management Section staff associated with the update of the SWAP. So, what happens after these areas are reviewed and updated? The Focus Areas, SGCN and other components of the SWAP will be incorporated into the regional wildlife work program. It's important to note that the existing SWAP has been around for nearly a decade and is currently employed throughout the state for the benefit of wildlife species identified within it. The Wildlife Management Section has impacts for management of the species contained within the SWAP in several key arenas, including wildlife habitat acquisition and management, environmental review, and technical assistance and public outreach.

Wildlife Habitat Acquisition and Management

Working in conjunction with the Lands Management Program, our Regional Wildlife Biologists develop and implement wildlife management practices on state owned Wildlife Management Areas. The management plans developed for the WMAs take into account existing habitat and potential improvements for the benefits of game and non-game wildlife species. Although WMAs are disbursed throughout every county within the State, the Department's ownership is generally heavier in southern and coastal Maine. This is due to the initial acquisition strategy of the Department to own public property within a certain radius of population centers for public recreational opportunities for hunting and trapping. Coincidentally, the southern and coastal portions of Maine are hotbeds for rare, natural communities, as well as rare animal species – precisely the criteria used for the designation of Focus Areas.

It's important to note the distinction between game and non-game species, but also the similarities in management and conservation for those species. Most habitats supporting SGCN species also contain the necessary habitat characteristics required by game species such as deer, grouse, hare, and bear. As an example, the New England cottontail in extreme southern Maine is suffering from loss of early successional habitat. Due to both development and an aging forest resulting from reverted farmland, the habitat available for this species is dwindling. To combat this, the Department has worked with conservation partners on acquisition of appropriate habitat, but also managing for young forest conditions. These same young forest conditions are important for numerous other wildlife species, some of which are dependent upon them. That's just one example of how management for a non-game species would benefit numerous other species, whether game or non-game.

Technical Assistance and Public Outreach

Regional Wildlife Biologists continually provide technical assistance to private landowners, other state agencies, and private non-profit conservation partners to assist in the management and conservation of wildlife species. The Focus Areas will assist in focusing the efforts of staff to maximize benefits to wildlife.

In some instances, Focus Areas have served as an indicator to a landowner who is interested in management for wildlife that they can potentially assist in the conservation of those species by undertaking some best management practices identified by the Regional Wildlife Biologists. Examples of some of the simple management practices one can do to benefit SGCN species is delayed mowing of fields, proper maintenance of gravel roads and driveways, and conducting forest management activities consistent with the needs of the particular species.

Towns and other planning agencies can use the Focus Areas to help guide development and land use planning decisions within communities to conserve important wildlife habitat, reduce future environmental compliance costs for those creating development opportunities, and improve the quality of life of its residents through preservation of open space.

The Wildlife Management Section truly touches on all aspects of wildlife management within the State of Maine, from assisting the public with nuisance wildlife complaints to the acquisition of wildlife habitat for the preservation and management species for generations to come. To be involved with the update of the SWAP and revision of Focus Areas of Statewide Ecological Significance, the Regional Wildlife Biologist will work to ensure the species identified within the plan remain viable and persist for those same future generations.

--Ryan Robicheau

Maine Department of Inland Fisheries and Wildlife

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(Game Wardens and Biologists)

Ashland -- 435-3231
Bangor -- 941-4440
Gray -- 657-2345
Greenville -- 695-3756
Sidney -- 547-5300

Additional Regional Offices
(Biologists)

Enfield -- 732-4132
Jonesboro -- 434-5927
Strong -- 778-3324

Research and Assessment Section, Species Specialist Office

Bangor -- 941-4466

If you cannot locate a Warden at the above numbers,
contact the nearest State Police barracks:

State Police Toll-free Numbers

Augusta 1-800-452-4664 / Houlton 1-800-924-2261
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