

From: [Sarah McDaniel](#)
To: [Beyer, Stacie R](#)
Subject: Milton Township petition submission
Date: Monday, August 22, 2016 4:41:51 PM
Attachments: [PostHearingSubmission-McDaniel-082216.pdf](#)
[2015 Energy Plan Update Final.pdf](#)

Dear Stacie,

Please enter the attached comments into the record and provide them to the Commissioners to guide in their rulemaking.

Attached to this email is my testimony and the 2015 Energy Plan. I will send the other attachments by separate emails to ensure that they get through.

Regards,
Sarah



Sarah A. McDaniel

Douglas McDaniel Campo & Schools LLC, PA
90 Bridge Street, Suite 100
Westbrook ME 04092
(o) 207-591-5747, x 115
(f) 207-591-5752

smcdaniel@douglasmcdaniel.com

www.mainelandlaw.com

www.douglasmcdaniel.com

Confidentiality Notice: This communication is confidential and intended to be privileged pursuant to applicable law. This message is intended only for the use of the individual to whom it is addressed and may contain information that is privileged, confidential and exempt from disclosure under applicable law. If the reader of this message is not the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited. If you have received this message in error, please notify us immediately by telephone (207) 591-5747 and destroy any and all contents. Thank you.

IRS Notice: In accordance with I.R.S. Circular 230 we advise you that any tax advice in this email (or in any attachment) is not intended or written to be used, and cannot be used, by any recipient for

the avoidance of penalties under federal tax laws. Thank you.

**STATE OF MAINE
LAND USE PLANNING COMMISSION**

Substantive Review, Milton Township) **POST-HEARING SUBMISSION ON**
Petition to Remove Milton from the Expedited) **BEHALF OF PETITION CIRCULATOR**
Permitting Area for Wind Energy Development) **AND LOCAL RESIDENTS**

I represent Violetta Wierzbicki, landowner in Milton Township who was one of the lead circulators of the *Petition to Remove Milton Township from the Expedited Permitting Area for Wind Energy Development*. I also represent Peter Fetchko and Warren Hillquist, residents of Woodstock who both own land in Milton and Woodstock where they reside on the sides of Champlain Mountain.

The substantive review process was instigated by Mr. Wayne Buck, on behalf of himself and EverPower Wind Holdings, Inc. (“EverPower”), the entity that might someday propose a wind project on Bryant and Champlain Mountains in Milton Township. However, all of EverPower’s testimony at the public hearing was focused on hypothetical details of a potential specific wind project, without any regard for the legal standards that the Commission must apply in this rulemaking proceeding.

THE LEGAL STANDARDS FOR REMOVAL ARE SATISFIED

In 2015, the Legislature elected to return to the unorganized territories a voice in determining whether wind power development is appropriate in their communities. In doing so, it mandated that LUPC remove any township from the expedited permitting area if 10% of the voting residents from the prior gubernatorial election petitioned for removal. 35-A M.R.S. § 3453-A(1) (“shall, by rule, remove” if there is no substantive review requested). Notably, this required removal has no substantive standards to guide the

Commission's decision making if there is no objection filed. The Commission need not give consideration to accomplishment of the state's wind energy goals, or to consistency with the Comprehensive Land Use Plan ("CLUP"). In contrast, if only one resident of the township requests "substantive review" of the petition (as happened here), the Legislature requires this Commission to apply the following two legal standards before rulemaking to remove the township from the expedited permitting area:

(1) Does removal of Milton Township have an unreasonable adverse effect on the State's ability to meet its wind capacity goals?

(2) Is removal of Milton Township consistent with the principal values and goals of the Comprehensive Land Use Plan?

35-A M.R.S. § 3453-A(3). To apply these substantive standards, the Commission must first understand the legal consequences of removing Milton Township from the expedited permitting area.

WHAT DOES REMOVAL MEAN?

Removing Milton Township from the expedited permitting area *does not mean* that development of wind power is forever prohibited everywhere in the township.

Unsurprisingly, EverPower framed its testimony as if such an extreme result would be the unavoidable consequence of removal. However, the Governor's Task Force and the Legislature avoided the draconian approach of prohibiting wind development when it created the expedited permitting area. Instead of prohibiting wind development anywhere in the State, it established areas where wind power development would be encouraged by easing regulatory burdens. Consequently, all that removal does is return Milton Township

to its prior condition, with most of its land area in the General Management District (MGN). If a truly exceptional wind resource existed in Milton, any wind developer could at any time request to rezone its specific, required project area to a Development District, or request its re-addition back into the expedited permitting area.

The business decision EverPower asserts it would make ~refusing to request either a rezoning or the re-addition of a discrete portion of Milton back into the expedited permitting area~ is irrelevant to the applicable legal standards for removal. Their assertion is certainly not legally binding on them, nor does it reflect the attitude of all wind developers who may be interested in Maine. While it is true that removal of Milton will no longer encourage the development of wind power there, its removal does not legally protect Milton's unique wildlife habitat and valuable scenic resources forever.

The legal consequence of removing Milton Township from the expedited permitting area is that any potential wind developer would need to first demonstrate that *its specific project area* "is important to meeting the state goals" for wind capacity and is consistent with the CLUP. 35-A M.R.S. § 3453(2) and (3). If that specific area is important and not inconsistent with the CLUP, then the development permit application could proceed.

EverPower asserts that the standards to re-add an area into the expedited permitting area are "the same as" the standards to remove it. This is simply not true. First, the area to be re-added would be a discrete project area. In contrast, the current petition requests removal of the entire township of Milton.¹ In a re-addition proceeding, the

¹ If EverPower were to one day apply for re-addition, they would be presenting the Commission with specific information about the actual project area, and it would be an area that coincided with their proposed permit application. Here, EverPower's written testimony keeps referencing only Bryant Mountain, but the maps showing their potential project area covers almost a third of the

substantive standards will be applied to only the discrete area necessary for the project. In this removal proceeding, the standards require the Commission to look at all of the values and resources throughout the entire township.

Secondly, to re-add a specific area back into the expedited permitting area, EverPower would need to show that its specific project “is important to meeting the state goals” for wind capacity. This is a materially different question than whether removal of all of Milton will have “an unreasonable adverse effect” on the State’s ability to meet its goals.

Lastly, when the standard that this Commission has to apply is “consistency with the CLUP” it is imperative that it asks the correct question. As a planning document, the CLUP contains both economic development and environmental protection goals that must be balanced when any proposal is to be implemented on the ground. All of EverPower’s testimony on this standard (presented primarily by its Stantec consultants) thus far in this proceeding have framed the question as if they want to re-add their project area back into the expedited permitting area. They try to get the Commission to ask whether “developing wind power on Bryant Mountain is consistent with the CLUP?”, but that is the wrong question. The question that this Commission must answer is whether “removal of Milton Township from the expedited permitting area is consistent with the CLUP.”

Because removal of Milton Township is both consistent with the CLUP and will not have any unreasonably adverse effect on reaching the State’s wind capacity goals, the Commission should vote to remove Milton Township from the expedited permitting area.

township, including both Bryant and Champlain Mountains. *See* Stantec testimony of June 29, 2016, Exhibit 2.

THERE IS NO UNREASONABLE ADVERSE EFFECT ON MAINE'S ABILITY TO MEET ITS WIND CAPACITY GOALS BY REMOVAL OF MILTON TOWNSHIP

The Wind Energy Act enacted optimistic goals that were designed to encourage the development of appropriately sited wind power capacity in the State. By 2020, the State wants 3,000 MW of wind power capacity, of which at least 300 MW should be ocean-based. By 2030, the State wants 8,000 MW of wind power capacity, of which at least 5,000 MW should be ocean-based. 35-A M.R.S. § 3404 (2). Milton Township cannot contribute in any way to the ocean-based wind power goals, so it's only potential role is in meeting the 2,700 MW of land-based wind power capacity by 2020, and 3,000 MW by 2030.

EverPower implies that the loss of its one potential wind site on Bryant and Champlain Mountains would prevent these goals from being met. However, such an extreme viewpoint is not supported by the legislative history or the legal standard.

The opportunity for removal of unorganized territories was enacted in 2015, at a time when the State had already failed to achieve its 2015 wind capacity goals. (P.L. 2015, Ch. 265). If the loss of *any single potential wind site* would prevent satisfaction of the first standard, then the entire removal process would be rendered a nullity. Instead, the Legislature went to lengths to deprive the Commission of discretion, making removal of the townships mandatory. 35-A M.R.S.A. §3453-A (1) ("shall remove" townships on an unchallenged petition); §3453-A(3) ("shall remove" townships that meet the standards after substantive hearing).

More specifically, the adjective "unreasonable" inserted as it is before "adverse impact" demonstrates that the Legislature was aware that removal of townships would have some negative impact on meeting the State's goals. 35-A M.R.S. § 3453-A. It is the job

of this Commission to determine whether the removal of Milton Township will cause an adverse impact that is *unreasonable*.

Based on testimony and evidence submitted by others, there is 927.2 MW of wind power capacity currently in operation or under construction in the State. (LUPC summary of approved as of 6/10/16). With that as a starting point, EverPower's 39.6 MW hypothetical project on Bryant and Chamberlain Mountains is only 2.2% of the additional MW needed to reach the 2020 goal and only 1.9% needed to reach the 2030 goal. Even with no other wind projects 'in the pipeline', this impact on the State's ability to meet capacity goals is trivial. In light of the sensitive wildlife resources in need of protection in Milton, the impact is innately reasonable.

However, that impact is further reduced in light of other pending wind projects. In addition to the 927 MW of current capacity, there is also an additional 250 MW project currently pending DEP review which, if approved, would bring the total capacity up to 1,177 MW. (DEP prehearing comments 6/8/16). Even without that project, ISO-New England identifies 3,631 MW of wind capacity projects that are already pending interconnection requests in northern and western Maine.² (ISO prehearing comments 6/29/16).

² Mr. Fenn, EverPower's private transmission consultant, spoke at length at the hearing about transmission technology in a level of detail that is irrelevant to the decision now facing the Commission. As an initial matter, ISO-NE will not even *begin* its interconnection system impact study to determine if EverPower's hypothetical Bryant-Chamberlain wind project could be safely added to its transmission system for another 2 years, and that review will itself take 6-12 months. (Source: public hearing testimony of Jeffrey Fenn). The bottom line is that we do not truly know what might be required for the hypothetical Bryant-Chamberlain wind project to tie into the existing transmission system. With this absence of objective and verifiable information, no weight should be given to the self-serving conclusions of EverPower's own consultant.

However, ISO-NE's own pre-filed testimony in this proceeding indicated that it had real transmission capacity concerns. Unlike Mr. Fenn who works for EverPower, ISO-NE is objective as to the future of EverPower's project. Any wind energy to be produced in Milton Township will

Lastly, as EverPower itself notes, “the universe of viable sites” is expanding with improvements in turbine technology. EverPower pre-filed testimony at 5 (“Wind turbine technology is improving, getting taller, using longer blades, getting quieter. These are important developments that expand the universe of viable sites.”) As of 2015, the Governor’s Energy Office concluded that the industry trend towards higher-capacity turbines and larger projects makes the 2020 goal feasible despite the failure to have achieved the 2015 goal. (Maine Comprehensive Energy Plan Update, 2015 at page 56).

With all of this potential wind capacity in the pipeline, the removal of Milton Township from the expedited permitting area cannot be said to have an *unreasonable* adverse impact on the land-based wind energy capacity goals.

enter the grid as part of the Rumford Subarea and add flow into the Surowiec South interface. As ISO-NE notes: “export constraints will continue to be restrictive at the Surowiec South ... subareas, especially under maintenance or line-outage conditions. Affected subareas include the Rumford Area...” (ISO-NE pre-hearing testimony at page 3; also see ISO-NE Report submitted by Mr. Fenn at page 11 depicting Rumford Export Area as including Milton Township which is north of Woodstock.). The ISO-NE Report that Mr. Fenn cited was designed to determine when an investment in increasing the capacity of the major interfaces would be economically favorable for the New England states. In his oral testimony, Mr. Fenn tried to suggest that only the Orrington South interface was problematic. But the actual report shows that the 1% of the year that Orrington South is currently anticipated to be congested (pre-upgrade) is the same amount of congestion that Surowiec South will bear with pending wind project approvals in a pre-upgrade condition. (See page 15 of ISO-NE Report and compare Scenario 1 for Orrington with Scenario 3 for Surowiec.) ISO-NE already predicts that the Surowiec South interface will have bottled-in wind energy in 2021 in a pre-upgrade condition (see page 18 of ISO-NE Report, Scenario 1). Because the 1% annual congestion at Orrington is problematic, the full utilization of wind power in Milton Township will rely on significant upgrades being made to increase the capacity of the Surowiec interface. But in its report, ISO-NE did not even determine what manner of transmission capacity increases might actually be made, so the realization of any improvements on the ground is both many years distant and still hypothetical in nature. In any event, nothing in the ISO-NE Report suggests that Milton Township is critical to meeting the state’s wind capacity goals.

REMOVAL OF MILTON TOWNSHIP IS CONSISTENT WITH THE PRINCIPAL VALUES AND GOALS OF THE CLUP.

As discussed above (see at page 4), the question is NOT whether *wind development on Bryant Mountain* is consistent with the CLUP. The question is ***whether removal of all of Milton Township from the expedited permitting area is consistent with the CLUP.***

Because Milton Township contains wildlife habitat of statewide and national significance, as well as scenic resources that have regional significance to a major recreational area, the removal of Milton Township from the expedited permitting area is fully consistent with the principal values and goals of the CLUP.

Section 1.1 of the CLUP outlines its four principal values:

- Economic value of the jurisdiction is derived from working forest and farmlands.
- Diverse and abundant recreation opportunities.
- Diverse, abundant and unique high-value natural resources and features including water resources, wildlife resources and scenic resources.
- Natural character, including remoteness and the relative absence of development.

The CLUP notes that these four values are oftentimes interconnected, but also are not represented equally across the jurisdiction. For Milton Township, although it is located at the periphery of the jurisdiction (and so does not contribute to the “remote” character found in the middle of the jurisdiction), it has a relative absence of development and is home to a wildlife habitat resource of national and state significance. Its relative absence of development as compared to the municipalities that surround it increases its contribution to a diversity of recreation opportunities in the region.

Section 1.2 of the CLUP outlines three broad goals:

- Support management of all resources to enhance the living and working conditions of property owners and residents, to separate incompatible uses, and ensure continued availability of wildlife and other natural resource values.
- Conserve natural resources primarily for fiber and food production, outdoor recreation and wildlife habitat.
- Maintain the natural character of certain areas having significant natural values and primitive recreation opportunities.

The CLUP goes on to identify several more specific goals, and notes that the “Commission recognizes that goals or policies may at times conflict with one another, and will, in such cases, balance the various policies so as to best achieve its vision for the jurisdiction.”

CLUP at page 5. It is because of this need for balancing that it is key to this rulemaking for the Commission to keep the correct question in mind when assessing consistency with the CLUP’s principal values and goals.

There are two overriding characteristics of Milton Township that require the conclusion that removing Milton from the expedited permitting area is consistent with the CLUP’s principal values and goals. First, and most distinctively, is the extraordinary wildlife habitat resource located in Milton and the direct threat that wind development poses to the threatened and endangered bat species. By itself, that is sufficient justification to remove Milton Township from the expedited permitting area. Additionally, however, the undeveloped scenic beauty of Bryant and Chamberlain Mountains visible from multiple recreational sites adds depth and diversity to the region’s recreational resources and favors of removing Milton to discourage wind development in this gateway region.

THE IMPORTANCE OF THE HIBERNACULUM CANNOT BE OVERSTATED

The CLUP's principal values and goals include protection of significant wildlife habitat. The hibernaculum in Milton Township is a significant habitat for federally threatened, state endangered, and state threatened bat species. As one of only three cave hibernacula in the state, it is unquestionably of statewide importance. Failing to protect this unique wildlife resource would be directly contrary to the CLUP's values and goals, as well as to the analysis behind the establishment of the expedited permitting area.³

The northern long-eared bat (*Myotis septentrionalis*) was designated by the United States Fish and Wildlife Service ("USFWS") in 2015 as a federally threatened species under the Endangered Species Act, as well as a state endangered species by the Maine Department of Inland Fish & Wildlife ("MDIFW"). One other bat species is listed as endangered in Maine, one is listed as threatened in Maine, and the other five bat species found in Maine are all identified as species of special concern.⁴ Maine's Wildlife Action Plan 2015 (attached).

The following information is taken from the critical habitat determination action by USFWS for the northern long-eared bat recently posted in 24707 Federal Register, Vol. 81, No. 81 (April 27, 2016), a copy of which is attached. Suitable winter habitat for this

³ The Report of the Governor's Task Force on Wind Power Development, finalized in 2008, expressly envisioned that the expedited permitting area would *exclude* areas of particular ecological significance. Final Report at FN2, page 18.

⁴ The other state-listed endangered bat species is Little Brown Bat (*Myotis lucifugus*) and the state-listed threatened bat species is Eastern Small-footed Myotis (*Myotis leibii*). The five species of special concern are Big Brown Bat (*Eptesicus fuscus*), Silver-haired Bat (*Lasionycteris noctivagans*), Eastern Red Bat (*Lasiurus borealis*), Hoary Bat (*Lasiurus cinereus*), and Tri-colored Bat (*Perimyotis subflavus*). Species reports on all 8 bat species that are hyperlinked within the 2015 Maine's Wildlife Action Plan have been attached.

federally-threatened species is described as “caves and cave-like structures (*e.g.*, abandoned or active mines, railroad tunnels).” The USFWS notes that “Although similar bat species ... have been found using non-cave or non-mine hibernacula, ... northern long-eared bats have only been observed overwintering in suitable caves, mines, or habitat with the same types of conditions found in suitable caves or mines.” The bat hibernacula in Milton Township is located in an abandoned mine, one of only three such hibernacula in the entire State, and EverPower’s own wildlife witness noted that a northern long-eared bat was overwintering in the Milton hibernaculum in 2016 (public hearing testimony of Steve Pelletier).

After much consideration, the USFWS determined that it was not prudent to formally designate critical habitat for this species because, although hibernacula are critical to its survival, these sites would come under increased threat of vandalism and disturbance following a formal designation. Notably, Maine is one of 14 states that, as of April 2016, had assessed the possibility of human disturbance at hibernacula and found potential for disturbance at over 50% of the state’s hibernacula. 24710 Federal Register, Vol. 81, No. 81 (April 27, 2016). The lack of federal critical habitat designation does not imply that hibernacula are not critical habitat for threatened bats; to the contrary, the USFWS’s justification for declining to designate critical habitat explains how critical the winter hibernacula truly are to the conservation of the species. MDIFW staff testified that “Given the presence of a hibernaculum in Milton Township and the increased associated risks described, MDIFW has concerns with additional wind development in the area as it could result in significant adverse impacts to populations of cave hibernating bats that are

already catastrophically decimated.” (Pre-filed testimony of John Perry, MDIFW, June 29, 2016).

While the summer range of northern long-eared bats may extend 40-50 miles, the USFWS also notes that these bats may also summer near or in their winter hibernacula. Additionally, the 2015 Maine Wildlife Action Plan identifies the northern long-eared bat as a Priority 1 Species of Greatest Conservation Need and identifies mortality from wind turbines as an IUCN Level 2 threat. All other bat species are identified as threatened, endangered, or species of special concern in Maine and are at mortality risk from wind turbines. There are already 10 wind turbines located on Spruce Mountain within a five-mile radius of the hibernaculum, and preliminary reports have identified bat mortality from these turbines (public hearing testimony of Violetta Wierzbicki and Steve Pelletier). Although EverPower suggests that recently developed curtailment technology (shutting turbines off all night from April to October) is sufficient mitigation, the incidental take of federally threatened bat species near their critical winter habitat is best avoided by removal of Milton Township from the expedited permitting area.

In 2010, national nonprofit conservation group The Nature Conservancy gave a conservation easement to the Mahoosuc Valley Land Trust on multiple hundreds of acres in Milton, Woodstock and Rumford (including large tracts on Champlain Mountain in Milton) (attached). The protection of the hibernaculum was recited as one of its principal purposes, and this easement preserves the ability of future private landowners to conduct sustainable forestry while prohibiting structures such as wind turbines. Notwithstanding the great expanse of these conservation lands in Milton (see yellow speckled areas on the map prepared by LUPC staff), there are many peaks and ridgelines still susceptible to wind

development including Mount Zircon, Little Mount Zircon, Bean Mountain, Bryant Mountain, and Chamberlain Mountain. **Discouraging development known to have fatal consequences for bats near the hibernaculum by removing the entire Milton Township from the expedited permitting area is entirely consistent with several of the principal values and goals of the jurisdiction.**

MILTON TOWNSHIP'S RIDGELINES ARE PART OF THE SCENIC GATEWAY AND BACKDROP TO THE REGION'S KEY RECREATIONAL RESOURCES

The CLUP's principal values and goals include conservation of diverse recreation opportunities (not only remote recreation), preservation of regionally important scenic and recreational resources, and the separation of incompatible uses.

The views of Milton's scenic mountain ridges are a notable part of the scenery along the highways leading into Bethel, Newry, and Rumford for all visitors entering the area from the south and the east, as well as to paddlers on the Androscoggin River. With its relative absence of development, Milton Township forms the gateway to the greater Bethel recreation area and its tourist economy. Adding wind turbines to these ridgelines will degrade the undeveloped quality of the scenic resources.

The greater Bethel area has a significant concentration of recreational values. At the hearing, Mr. Rosenberg presented a slide show depicting many of these regionally important views:

- Trails on Mount Zircon, Bald Mountain, Speckled Mountain, Rumford Whitecap Mountain, Black & White Trail, Mount Will;
- Commercial ski area on Mount Abrams;
- Little Concord Pond State Park, Woodstock;

- North Pond, South Pond & Round Pond, in Woodstock & Greenwood;
- University of Maine’s 4-H Camp and Learning Center on Bryant Pond;
- Androscoggin River Trail; and
- Pleasure driving for scenic views along state routes Route 26, Route 2, Route 232 and along Milton Road.

Development of wind turbines in areas of Milton within the viewshed of these regionally important resources is incompatible with the continued growth of the recreational tourist economy in this region. Removing Milton Township from the expedited permitting area will help to separate those incompatible uses.

REMOVAL OF MILTON IS CONSISTENT WITH THE CLUP’S ENERGY GOALS

It is worth noting that the CLUP does contain a specific goal regarding the jurisdiction’s energy resources: “Provide for the environmentally sound and socially beneficial utilization of indigenous energy resources where there are not overriding public values that require protection.” Energy Resources (Goal II.E.), CLUP at 13. The existence of this one goal does not act as an overriding imperative that wind development be allowed everywhere within the jurisdiction, nor does it serve as a veto of the Legislature’s express authorization for removal of townships from the expedited permitting area. None of the policies enumerated under this goal expressly call for facilitation of wind power in particular (only one policy mentioned wind by name, in the context of ensuring that a decommissioning plan be provided), and certainly not at the expense of unique public resources.

Removal of Milton from the expedited permitting area is fully consistent with this specific energy goal because development of wind in Milton Township would not be environmentally sound in light of Milton's unique wildlife resources. The hibernaculum is a public value that is in significant need of protection, and the bat species which reside there are under direct threat from wind development.

THE REGION'S RESIDENTS OVERWHELMINGLY FAVOR REMOVAL AND ARE RELYING ON THE COMMISSION TO ACT AS THEIR VOICE BY REMOVING MILTON TOWNSHIP.

The Wind Energy Act determined that wind development should be treated as a permissible use in all areas of the State except for a small area whose particularly sensitive ecological and scenic features were undoubtedly deserving of protection. Under the original act, incorporated municipalities could protect their valuable local resources but the unorganized townships whose zoning is overseen by the Commission were not offered that opportunity. The 2015 amendments that restored the opportunity for residents of the unorganized townships to have a voice limited the Commission's discretion.

The public hearing held on August 10 was the opportunity for the residents of Milton Township and nearby areas who will be directly impacted by wind development to voice their opinions. Most of the public speakers at the hearing favored removal of Milton Township from the expedited permitting area. Those few public speakers who opposed removal nearly all admitted that they stood to gain financially from EverPower's potential proposed project. Unlike in incorporated towns, there is no vote to enact zoning regulations, so the residents are relying on the Commissioners to apply the standards fairly.

CONCLUSION

Removing Milton Township from the expedited permitting area will not have an unreasonable adverse effect on the ability of the State of Maine to meet its land-based wind capacity goals of 2,700 MW by 2020 and 3,000 MW by 2030. The small adverse effect is completely reasonable in light of the significant wildlife resource that is directly threatened by wind turbines and the regional recreational resources.

Removing Milton Township from the expedited permitting area will discourage wind development on its many ridges and, in so doing, reduce the mortality risk faced by the federally threatened and state endangered bat species who rely on the hibernaculum, and protect natural character of the many nearby recreational resources. This is consistent with the principal values and goals of the CLUP.

For all of the above reasons, I respectfully request that the Commission find that removal of Milton Township from the expedited permitting area for wind development satisfies the Legislative standards and enact a rule removing Milton Township.

Dated: August 22, 2016



Sarah A. McDaniel, Maine Bar No. 9506
*Attorney for Petitioner Violetta Wierzbicki and
Peter Fetchko and Warren Hillquist*

DOUGLAS MCDANIEL CAMPO & SCHOOLS, LLC, PA
90 Bridge Street, Suite 100
Westbrook ME 04092
(207) 591-5747
smcdaniel@douglasmcdaniel.com

ATTACHMENTS

Maine Energy Plan Update 2015, Governor's Energy Office

Maine's Wildlife Action Plan 2015, with 8 species reports on all Maine bat species

Federal Register, April 27, 2016

Deed of Conservation Easement, 2010



2015

Maine Comprehensive Energy Plan Update



**Governor's Energy Office
State of Maine
February 2015**

Table of Contents

EXECUTIVE SUMMARY	3
RESIDENTIAL THERMAL SECTOR	8
COMMERCIAL AND INDUSTRIAL SECTOR	16
Appendix – Efficiency Maine Large Customer Program	23
ELECTRICITY SECTOR.....	30
RENEWABLE ENERGY	38
GREENHOUSE GAS EMISSIONS	47
WIND ENERGY DEVELOPMENT	51
Appendices – Wind Energy	61
TRANSPORTATION SECTOR.....	72
STATE GOVERNMENT.....	76
PUBLIC COMMENT.....	81

February 5, 2015

The Honorable David Woodsome
The Honorable Mark Dion
Members of the Energy, Utilities and Technology Committee
Cross Building Room 211,
100 State House Station Augusta, ME 04333

Dear Chair Woodsome, Chair Dion, and Members of the Committee,

It is my pleasure to present to you the executive summary of Maine's energy plan.

I would like to thank Lisa Smith, Senior Planner in the Governor's Energy Office, Chris Shorey who was instrumental in the development of the energy profile, the Public Utilities Commission, the Office of the Public Advocate, Efficiency Maine, the Department of Environmental Protection, the Department of Transportation, and the stakeholders who provided comments to the Governor's Energy Office to improve this plan.

This is a time of significant volatility in energy markets that has had significant consequences on the Maine people and the Maine economy. From large employers shutting down because of the cost of natural gas and electricity, to an historic reduction in oil prices that has given some relief to Maine customers, there have been rapidly changing dynamics in energy commodity markets that humbles any effort to predict long-term energy price forecasting.

An energy plan must recognize the unpredictability of the market and position the state to adapt to these changing markets, remain competitive, and also continue to make progress in reducing air pollution. There are many assets that the State of Maine has to address our energy challenges, from our renewable hydropower in our state to regional resources, including hydropower to our north and natural gas in Pennsylvania.

To establish a plan there must be an objective. While the Legislature has established a myriad of goals and policies, there is not an overarching policy objective for the State of Maine. The Governor's Energy Office proposes that Maine's overall energy policy should be to lower costs for our businesses and residential customers and reduce pollution.

Some of our programs are achieving these goals, but are not integrated into one holistic policy and many could be more cost-effective. Simplifying our programs and subsidies to achieve clear objectives would provide better oversight and provide a mechanism for the Governor and Legislature to assess the returns of finite state resources, ultimately lower costs for our residents and businesses, and improve our environment.

The Governor's Energy Office has established eight sectors within the energy plan, and each has its own policy recommendations. These include residential thermal, commercial and industrial, renewables, electricity, transportation, wind, greenhouse gases, and state government.

1) Thermal

Profile. Maine has made significant progress in reducing the consumption of home heating oil, including a 26 percent reduction from 2007 to 2010. The State continues to have a building stock with inefficient building envelopes and inefficient heating systems. In addition, over the last three years new technologies, including heat pumps, have provided a cost-effective option to lower costs and reduce pollution. The Home Energy Savings Program at Efficiency Maine has been a catalyst for accelerating Mainers towards more affordable heat in the winter, with over 13,000 households participating in the programs over the last two years.

Policy Recommendations.

- Devote additional resources to accelerate progress in lowering heating costs and reducing pollution from this sector. Establish a goal of \$10 million annually for these programs in FY16, FY17, and FY18, with the intention of improving the heating systems and building envelopes in 10,000 homes per year.
- Our low-income programs have not been successful in reaching this population. The state needs to develop a targeted program to assist low-income households to participate in programs that lower their heating costs.
- We need a better understanding of our progress towards weatherizing Maine's homes. Efficiency Maine should adopt interim goals and report on the progress with every triennial plan.

2) Renewables

Profile. Maine continues to be one of the leaders in the country with renewable energy production. In 2012, Maine generated 54 percent of its electricity from renewable resources and has had strong growth in the use of wood energy for thermal applications. Much of the recent growth in the electrical sector has been driven from New England's renewable portfolio standard, the federal production tax credit, and Maine's wind energy resource. Maine's renewable energy credit prices have fallen significantly, and, without policy changes, renewable energy credits will unlikely be a primary reason for pursuing renewable investment in Maine.

Policy Recommendations.

- The state should consolidate our state renewable energy policies to improve cost-effectiveness, and develop a long-term distributed generation program that reflects the value of these assets to ratepayers and the environment.
- The region should adopt consistent renewable energy definitions to bring business certainty.
- The region should explore opportunities for supporting innovative technologies throughout the region.

- The state should continue additional thermal renewable energy programs to reduce greenhouse gas emissions and lower the cost of heat.

3) Commercial/Industrial

Profile. Maine's commercial and industrial electricity and natural gas prices are not nationally competitive. While there has been expansion of the natural gas distribution service in Maine to provide a more diverse fuel mix, New England experiences volatility and sharp increases in electrical pricing.

Policy Recommendations.

- The State should continue to pursue a regional solution to natural gas capacity constraints. Based upon the Maine Public Utilities Commission's report, the New England States Committee on Electricity (NESCOE)'s work, the Massachusetts' report regarding gas demand in their state, and Connecticut's Integrated Resource Plan, there is consensus that significant capacity constraints exist. Upwards of 1 billion cubic feet per day additional capacity would likely be cost-effective for ratepayers.

4) Transportation

Profile. Maine is a rural state and as a result of our population distribution, Mainers travel more miles than the national average. This is a major expense for households and contributes to Maine's greenhouse gas emissions. Although Maine has developed train service from Boston to Freeport, and feasibility studies are underway for additional service, it is unlikely that passenger rail will significantly reduce energy consumption in Maine's transportation sector.

Policy Recommendations.

- The State should follow the Department of Transportation's plan to make targeted rail investments to increase access for shipping freight by rail, and to improve the Downeaster passenger rail service.
- The state should consider public-private partnerships to increase inter-city bus service, and intermodal transportation in targeted locations that would shift commuters into public transportation. Although alternative vehicles remain a relatively small percentage of Maine's vehicle fleet, the state should consider partnerships with large fleet owners to transition to alternative vehicles including natural gas, propane, and electricity.
- Finally, the state should consider moving the state's ferry system from diesel to alternative fuels, including LNG.

5) Wind Power.

Profile. Maine has had significant growth in wind installations in the state with 443.5 MW installed and significant additional projects proposed. The vast majority of the projects installed in Maine have contracted with utilities in Massachusetts and Connecticut. Although Maine construction companies have developed an expertise in the

installation of these projects, the state has not successfully developed a wind related manufacturing base in the state.

Policy Recommendations.

- The policy recommendations issued in the Wind Energy Development Assessment (Governor's Energy Office, March 2012) remain valid. These include modifying the wind energy goals, improving the wind siting policy for the unorganized territories, clarifying long-term contracting authority, and ensuring that these projects benefit the residents of Maine in addressing their energy challenges.

6) State Government.

Profile. State Government is a significant consumer of energy, and there exist significant opportunities to reduce costs to the taxpayer. Fuel expenditures from the State of Maine are approximately \$500 million annually. The oversight of Maine's building energy management is within the Bureau of General Services.

Policy Recommendations.

- The state needs a comprehensive plan to pursue cost-effective energy efficiency, heating system, and HVAC system improvements. One challenge has been the upfront cost for the state and the budgetary cycle for long-term planning.
- The Governor's Energy Office, the Bureau of General Services, the Legislature, and Efficiency Maine should pursue a financing program that allows long-term planning for energy improvements to lower the cost of energy expenditures for taxpayers.

7) Greenhouse Gas Emissions.

Profile. Maine has a unique profile with respect to our greenhouse gas emissions. While our electric emissions are one of the lowest in the country, our transportation and thermal energy emissions are higher per capita than the national average. The State continues to pursue policies primarily in the electric sector to lower emissions by its participation in the Regional Greenhouse Gas Initiative, and state electric renewable energy programs.

Policy Recommendations.

- The state should focus efforts in the thermal and transportation sectors to lower greenhouse gas emissions. In addition, the state should consider adopting long-term goals for emissions targets based on economic growth and pursue regional efforts to comply with the Environmental Protection Agency's Clean Power Plan.

8) Electricity/Efficiency.

Profile. Maine, like the rest of New England, has experienced sharp increases in wholesale electrical prices over the last three years. While the state has significant renewable energy resources, the state remains susceptible to wholesale market pricing that is correlated to natural gas prices. Maine has a significantly higher percentage of its electrical load dedicated to industrial users than the rest of New England, and is therefore

highly susceptible to price volatility. Efficiency Maine is the manager of state's efficiency programs, and has allocated \$21 million for electric efficiency programs in FY14. The Maine Legislature also devoted 55 percent of funds from the Maine Yankee Settlement to invest in energy efficiency programs.

Competitive Electricity Suppliers have grown in the state, increasing competition, but also raising issues regarding transparency in pricing. The Legislature has also required the state to consider non-transmission alternatives as a substitute for transmission projects.

Policy Recommendations.

- Pursue long-term contracts that provide ratepayer benefits, including lowering price volatility.
- The State should closely follow efforts in other states to modernize utility infrastructure to utilize all technologies available to ensure the reliable delivery of electricity.
- The state should position itself for transmission investments that improve diversity of resources and provide ratepayer benefits.
- Finally, the state should develop a program targeting low-income households for electric efficiency upgrades.

This energy plan is outlined by section, and includes a detailed assessment of Maine's hydropower potential that was conducted by Kleinschmidt Associates. We look forward to working the specific policy proposals in the months and years to come.

Sincerely,

Patrick Woodcock
Director
Governor's Energy Office

Residential Thermal (Heating) Sector

Key Conclusions from 2009 Plan

- 1) Oil, the primary heating fuel used by Maine households, had increased dramatically in price, and was also subject to significant price volatility due to changing world market and political conditions (price per gallon in 2008 fluctuated from \$2.26 to \$4.74 per gallon);
- 2) Imported oil was a drain to the Maine economy, as 85% of the money spent on oil left the state; and
- 3) Continuing to rely primarily on oil for home heating, with its high costs and price volatility, was not sustainable for most Maine citizens.

Primary Residential Sector Objectives of 2009 Plan

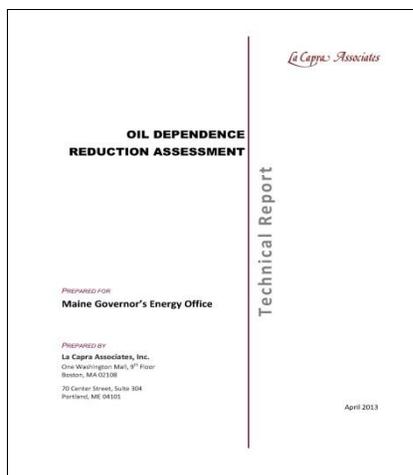
- Establish a goal for weatherizing 100 percent of residential homes by 2030;
- Aggressively provide opportunities for residents to invest in energy efficiency, including audits and financing mechanisms;
- Increase utilization of existing residential energy efficiency loan programs;
- Increase the number and availability of energy efficient heating systems and appliances in the state;
- Develop residential auditing workforce;
- Promote natural gas as a transitional fuel.

Maine Action Since Release of the 2009 Energy Plan

- ***Expand energy efficiency programs.*** Efficiency Maine Trust was reorganized as an independent, quasi-state agency; funding level increased significantly in the [2013 Omnibus Energy bill, LD 1559](#) (Sponsor- Reps. Hobbins & Fredette, Sen. Cleveland); new efficiency programs developed; and existing efforts retooled and reworked to better serve Maine residents.



- **Assess the state’s oil consumption, and develop plan to reduce oil use statewide.** In 2011, the Maine Legislature enacted LD 553 (Sponsor - Rep. Fitts), “[An Act to Improve Maine’s Energy Security” \(PL 400\)](#), which established oil consumption reduction goals, and required the Energy Office to develop a plan to meet these goals. The assessment and plan, completed in 2013, revealed that Maine residents had decreased their oil consumption by 26% from 2007 to 2010, and, overall, the state would achieve the 30% oil reduction goal under current policies and market conditions.



- **Explore new efficient heating technologies.** In 2012, the Legislature also passed LD 1864 (Sponsor – Senator Thibodeau) “[An Act to Improve Efficiency Maine Trust Programs to Reduce Heating Costs and Provide Energy Efficient Heating Options for Maine’s Consumers” \(PL 637\)](#). In this bill, the state’s investor owned electric utilities (CMP, Bangor Hydro, and Maine Public Service) were authorized to conduct pilot programs for adoption of efficient electric heating technologies. This program, first proposed by Governor LePage, resulted in the installation of 1,000 energy efficient heat pumps by Bangor Hydro and Maine Public Service customers. [A description of the program, including heating savings, is available here.](#)
- **Direct resources specifically to reduce residential heating costs.** The 2013 *Omnibus Energy* bill LD 1559 (Sponsors – Reps. Hobbins & Fredette, Sen. Cleveland) for the first time allocated a portion of Regional Greenhouse Gas Initiative (RGGI) revenues to reduce home heating demand and costs. RGGI funds, combined with other eligible Efficiency Maine funds, brought the total reallocated to reduce residential heating demand to \$10.25 million in FY14, and \$10.29 million in FY15. This program, called the Home Energy Savings Program (HESP), assisted 6,440 Maine households in FY 14 (see chart below), and incentives leveraged an additional \$21.3 million of energy efficiency and heating upgrades.

Home Energy Savings/Loan Program (MMBtu) Results, FY14 and FY 15*

Total Participants	Total Installations	Annual MMBtu Savings	Lifetime MMBtu Savings	Efficiency Maine Costs	Participant Costs	Lifetime Energy Benefit	Benefit to Cost Ratio
FY14 6,440	6,440	61,698	1,298,009	\$5,183,417	\$21,363,650	\$47,445,694	1.79
FY15 6,834	6,834	57,000	1,280,000	\$4,483,000	\$27,921,000	\$46,787,000	1.96

*FY 15 through Dec. 15 (preliminary data)

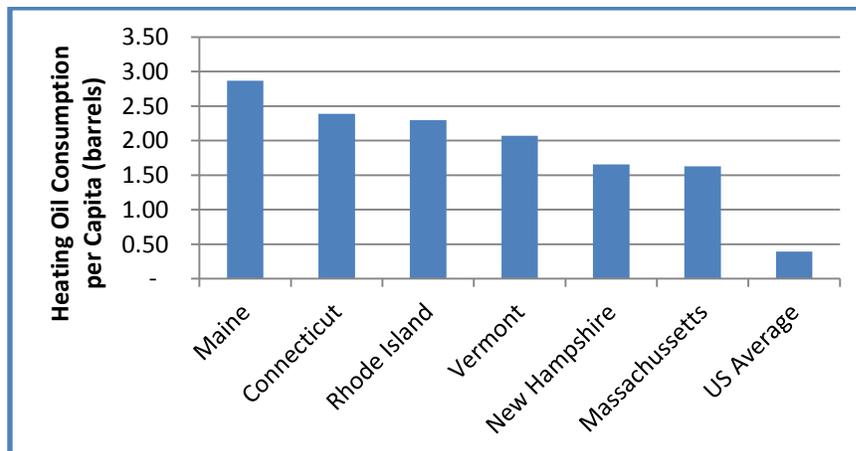
- Expand availability of natural gas to residential sector.*** Summit Utilities, certified as a Maine natural gas company in 2012, has invested approximately \$300 million in a natural gas distribution system in the Kennebec Valley and in residential areas north of Portland. The Maine PUC approved a rate structure whereby Summit was permitted to offer rebates for conversion costs (\$1,500 per household; \$4,000 for LIHEAP eligible homeowners, in addition to several hundred dollars for air sealing services). In 2013 and 2014, an estimated 8,000 residential homes have converted to natural gas by the four natural gas local distribution companies, Bangor Natural Gas; Maine Natural Gas; Summit Natural Gas; and Unitil.

Continuing Challenges

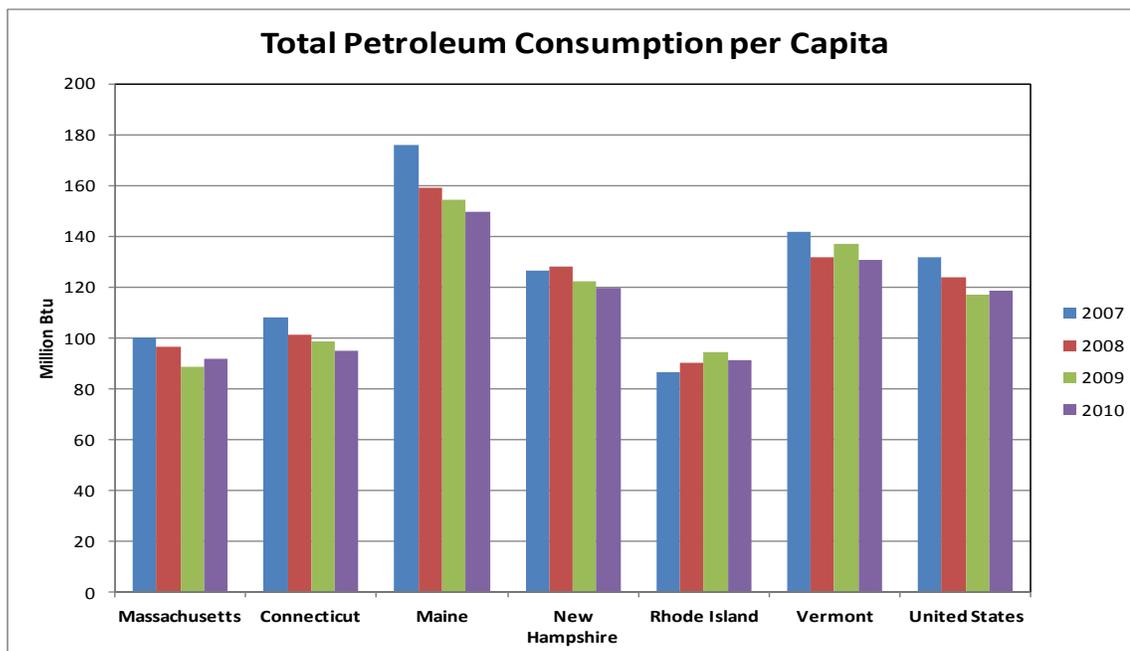
Residential Heating Costs remain unaffordable and there continue to be significant emissions from this sector. Heating costs and our reliance on inefficient petroleum heating systems continue to be one of the state’s most significant energy challenges.

Petroleum usage by residents. Although heating oil use has declined since the 2009 energy plan (75% of Maine households in 2008 to an estimated 64.2% in 2013), Maine remains the most petroleum dependent state for home heating.

2012 Heating Oil Consumption, New England and US Average



Total Petroleum Consumption per Capita, New England States, 2007-2010*



*Data from EIA State Energy Data System (SEDS) <http://www.eia.gov/beta/state/seds/>

Maine households have been given a short term reprieve from escalating heating costs, due to the significant decline in oil prices over the last several months. Reduced global demand and increased U.S. oil production are behind the price declines, and these circumstances could change quite rapidly (see EIA short term energy outlook, below).

EIA Short Term Energy Outlook – January 13, 2015

	2013	2014	2015 (projected)	2016 (projected)
WTI crude oil, \$ per barrel*	\$97.91	\$93.26	\$54.58	\$71.00
Brent crude oil, \$ per barrel	\$108.64	\$99.02	\$57.58	\$75.00
Gasoline, \$ per gallon**	\$3.51	\$3.36	\$2.33	\$2.72
Diesel, \$ per gallon***	\$3.92	\$3.83	\$2.85	\$3.25
Heating Oil, \$ per gallon	\$3.78	\$3.71	\$2.71	\$3.03
Natural Gas, \$ per thousand cubic feet	\$10.30	\$11.00	\$10.63	\$11.00
Electricity, cents per kwh****	\$12.12	\$12.50	\$12.63	\$12.86

*West Texas Intermediate.

**Average regular pump price.

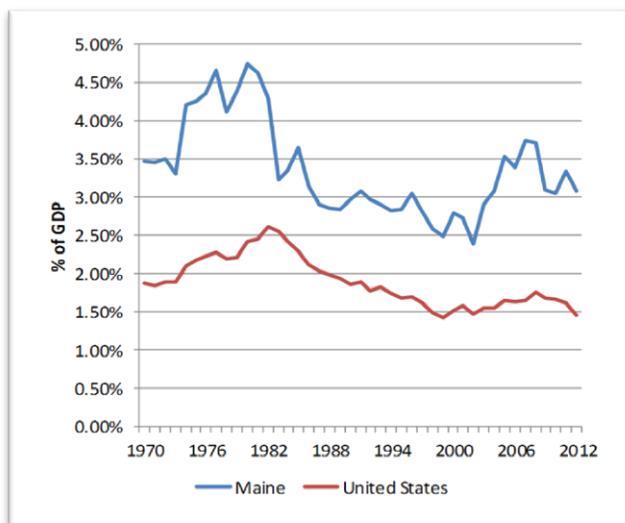
***On-highway retail.

****U.S. residential average.

What is certain is that petroleum prices remain volatile, and there is a significant range in long-term oil forecasts.

Unsustainability of current heating costs. Most Maine homeowners pay more for heating oil than any other energy expense (from \$2,460 annually in 2009 to almost \$3,400 in 2012). Maine pays a higher percentage of its GDP on residential energy than any other state in the country, largely due to high heating costs.

**Maine vs. United States Residential Energy Expenditures
As a Percent of Gross Domestic Product, 1970-2012**



State	Residential Energy Expenditures/ GDP (%)	National Rank
CA	0.90%	1
US Avg.	1.54%	-
NE Avg.	2.37%	-
ME	3.09%	50

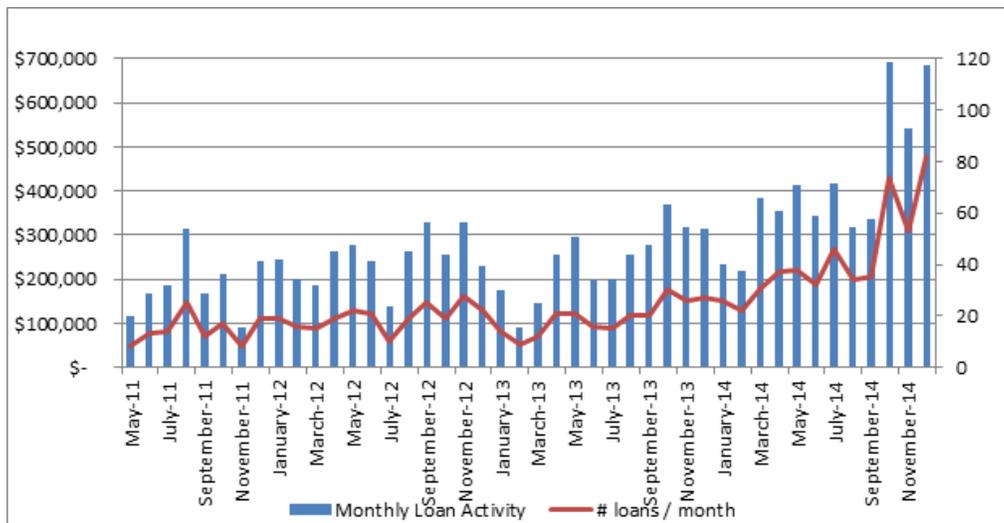
Most Maine residents reside in areas too rural to access lower priced natural gas. Most of the state’s residents will never see pipeline gas, as it is not cost effective to build natural gas distribution systems in highly rural areas, where most Mainers live ([Maine Energy Profile](#)). Therefore, most will continue to rely on a combination of delivered fuels (heating oil, kerosene, and propane), wood, and electricity to stay warm.

Energy efficiency programs have been disproportionately focused on electricity use, not heating costs. Historically, most energy efficiency programs have been supported through a fee on electric bills, so their focus has been exclusively on electric efficiency. While increasing efficiency of residential electricity use is a laudable goal, heating costs remain the most significant household energy expense. In 2012, the average Maine household spent \$900 on electricity, and \$3,400 on heating oil. Funding for residential energy efficiency is not aligned with the most significant household energy expenditure, heating costs.

State resources devoted to heating costs. The state has made significant progress toward addressing this enormous challenge; however, current programs are capturing a

fraction of the opportunity. According to the U.S. Census, in 2013 there were approximately 547,686 occupied residential dwellings in the state, and of those, almost half were built before 1970. The current home energy savings program (HESP) at Efficiency Maine served 6,400 households in FY 2014, slightly more than half the goal set out in the 2009 plan. In addition to issuing rebates, EMT also received 1,452 applications¹ for energy loans, and successfully closed on 317 of those loans, totaling \$3.6 million in residential energy upgrades. For the first 6 months of FY 2015, Efficiency Maine has received 1,017 loan applications², and successfully closed 282 loans totaling \$2.6 million, with an average project cost of \$9,400. Factors contributing to the increased uptake in loan activity include an improved economy, increased marketing of HESP rebate program, and the availability of additional loan products. Below is a chart illustrating how the rebate program has catalyzed activity in the home energy loan program.

Efficiency Maine Loan Program Monthly Closing Activity



Low-income households. Current programs are not reaching those disproportionately affected by increased heating costs, i.e., the low and very low-income households. The state administers a federally funded fuel assistance program, the Low Income Home Energy Assistance Program, which will deliver approximately \$37.7 million in heating assistance for roughly 50,000 households this year. Most, if not all of these households do not have the upfront capital to invest in energy efficiency measures or more affordable heating systems, despite the availability of rebates and low interest loans. Efficiency Maine has a small program for low income households. For the past few years, Efficiency Maine has used these funds to install cold climate heat pumps in

¹ Loan application decline rate of 38% in FY 14

² Loan application decline rate of 24% in first 6 months of FY 15

multi-family units. In FY 2014, the program served 123 households; in FY 2015 (to date), the same program has helped 139 low income families, with more installations expected by year's end. As the chart at the end of this section indicates, there are significant opportunities for lower income households to save on their energy costs with the use of a heat pump. This year, only \$1 of every \$35 spent in the federal LIHEAP program is allocated toward weatherization measures. Maine State Housing administers the Weatherization (WAP) and Central Heating Improvement Programs (CHIP); Efficiency Maine provides some additional resources to this program to permit the installation of more efficient heating equipment, or an air source heat pump. However, funding is quite limited; this past heating season (2013-14), Efficiency Maine's resources enabled only 51 LIHEAP eligible households to receive efficient heating system upgrades, and there are lengthy wait lists for eligible households to receive federal weatherization grants. However, as the chart at the end of this section indicates, there are opportunities for low income households to reduce their costs.

2015 Maine Energy Goal for Residential Heating

Continue the progress the state has made toward reducing heating costs for Maine families, by significantly increasing opportunities for residents to install energy efficiency improvements and more affordable heating systems.

Policy Recommendations

- ❖ **Target resources to lower heating costs.** In just three short years, over 10,000 cold climate heat pumps have been installed in Maine homes through the Home Energy Savings Program. However, these households represent a fraction of the opportunity available to increase thermal efficiencies and reduce home heating costs. Additional resources should be allocated to the residential program, so that 10,000 households per year can participate, the goal stated in the 2009 energy plan. Possible funding options could include the following: continued use of Forward Capacity Market (FCM) funds; expanded use of Regional Greenhouse Gas Initiative (RGGI) revenues; revenue from increasing harvesting on state lands; and using potential lease payments from use of the interstate highway corridor for energy infrastructure. **The state should prioritize this energy challenge and work to provide \$10 million annually (roughly \$1,000 for 10,000 households) to accelerate the transition to cleaner and more affordable heat.**
- ❖ **Expand financing methods.** The state should work with utilities to develop on-bill financing programs or loan programs in order to allow Mainers to install energy efficiency measures and more efficient heating systems in their homes. On-bill financing would eliminate the major obstacle to energy savings that many Mainers face, which is the upfront capital cost of the improvements.

- ❖ ***Assist low income population with targeted program.*** Create a specific low-income heating program in collaboration with Maine Community Action Program, Efficiency Maine Trust, and Maine State Housing Authority. The program could include financing options for upgrades in heating systems and efficiency improvements, at level that would be accessible for our lowest income households. Summit Natural Gas has a low income program available now, where most of the cost of a new natural gas system would be paid for, with a combination of funding from Summit and Efficiency Maine. However, the relatively small contribution needed from the low-income applicant remains an obstacle. Efficiency Maine (or EMT and the state) should work with the state’s philanthropic organizations to redirect heating assistance resources to better address old and inefficient heating systems for low income households.
- ❖ ***Define weatherization and determine progress.*** While the State continues to invest in weatherization with both federal and state resources, we do not have metrics established to determine the standard of efficiency that we are attempting to achieve, or the number of homes that have been “weatherized.” Clearly define energy efficiency, so progress toward weatherizing homes and businesses can be measured, thereby improving accountability regarding the use of state resources. Goals should be based on measurable metrics.
- ❖ ***Target natural gas expansion.*** Work with the municipalities of Ellsworth, Belfast, Rockland, Farmington, and Presque Isle, to expand natural gas infrastructure that could ultimately serve residential customers.

Commercial and Industrial Sector

Key Conclusions from 2009 Plan

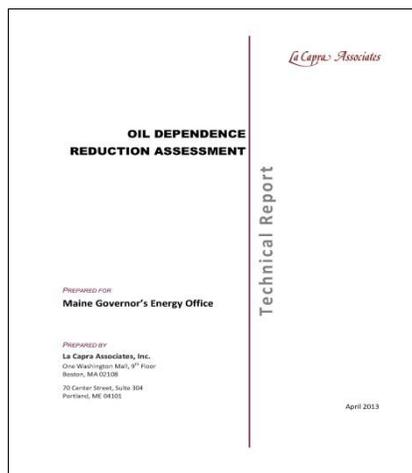
- 1) In 2007, 80% of Maine businesses (and residents) were dependent on petroleum products for heating and transportation;
- 2) Unprecedented increases in the price of heating oil, gasoline, and diesel fuel in 2008 were adversely affecting the viability of Maine business and industry;
- 3) Billions of dollars were exported out of the state to pay for foreign oil; this reduced the availability of capital for these businesses to improve and expand, as well as their ability to compete with businesses in areas not as dependent on oil.

Primary Commercial and Industrial Sector Objectives of 2009 Plan

- Expand use of natural gas as a transitional fuel;
- Reduce peak load energy consumption;
- Aggressively provide opportunities for business and industry to invest in energy efficiency, including energy audits and financing mechanisms, including grants, loans, and private funding;
- Develop an interdisciplinary energy SWAT team to assist large industries and manufacturers in addressing their energy needs (more cost effectively);
- Establish a goal of weatherizing 50% of Maine businesses by 2030;
- Increase the development and use of cogeneration and tri-generation in the state; encourage the strategic location of district heating clusters;
- Encourage Maine's businesses to invest in distributed renewable energy.

Maine Action Since Release of the 2009 Energy Plan

- ***Expand availability of natural gas to large industrial users.*** Sappi Fine Paper's Somerset Mill in Skowhegan, Huhtamaki Packaging in Waterville, Lincoln Pulp and Paper, and UPM in Madison now all have access to lower cost natural gas to run their operations, thus making them more competitive in a global marketplace.
- ***Assess state's oil consumption, and develop plan to reduce oil use.*** In 2011, the Maine Legislature enacted LD 553 (Sponsor - Rep. Fitts), "[An Act to Improve Maine's Energy Security](#)" (PL 400), which established oil consumption reduction goals, and required the Energy Office to develop a plan to meet these goals. The assessment revealed Maine's commercial sector decreased oil consumption 20%, and the industrial sector by a significant 40% from 2007 to 2012. These reductions in oil consumption were largely all market driven, and were not the result of significant government intervention. Under current technologies, programs, and market conditions, the state will attain the 30% oil reduction goal by 2030.



- Develop and implement program to assist large industrial users to increase electric efficiency.** Two of the 2009 plan’s recommendations – develop a SWAT team to assist large industrial operations, and provide opportunities for these large energy users to become more energy efficient – have been embodied in Efficiency Maine’s large customer program. Efficiency Maine reaches out to these large energy users (e.g., manufacturers, hospitals, food processors, office complexes), and assists them to develop an energy reduction plan. The companies then apply to a 50-50 cost share program for the upgrades. For example, Jasper Wyman and Sons, a large blueberry processor, worked with Efficiency Maine to upgrade their refrigeration and automate electric controls, so the company could save \$90,000 per year in electricity costs. Cuddledown, a manufacturer of high-end bedding, partnered with Efficiency Maine to update the lighting in their warehouse. By changing out older fluorescent tubes to LED lamps with motion sensors, the company will save approximately \$70,000 in annual electricity costs. Efficiency Maine’s Large Customer Program participants from 2010 to 2013 are listed at the end of this section.
- Additional funding source developed to assist large, energy intensive industrial users install energy efficiency improvements and invest in distributed renewable energy.** LD 1647 (Sponsor – Rep. Berry), [“An Act to Enhance Maine’s Clean Energy Opportunities”](#) (PL 518), directed the Public Utilities



Commission to authorize a long term contract between Maine’s t&d utilities and Efficiency Maine (title 35-A M.R.S.A. § 3210-C(2) for energy efficiency capacity resources and related energy, or EECRs. Through a competitive bid process, Efficiency Maine is to ‘procure’ energy capacity through energy efficiency and distributed generation at large,

energy intensive facilities. Efficiency Maine provides the upfront capital, and is then reimbursed for the savings by t&d utilities. For FY 2015, Efficiency Maine is authorized by the Maine PUC to procure \$7 million in energy efficiency/distributed generation. The costs of these efficiency efforts are ultimately borne by electric ratepayers.

- ***The Governor and state officials have pursued economic development opportunities with Canadian provinces.*** New England has worked with Quebec and the other provinces to improve the potential of acquiring low and no-carbon, renewable energy (electricity) from Canada.

Continuing Challenges

Massive natural gas infrastructure constraints have resulted in skyrocketing electricity costs, particularly during the winter months, for many commercial and industrial users in the state that are subject to wholesale electric and natural gas prices.

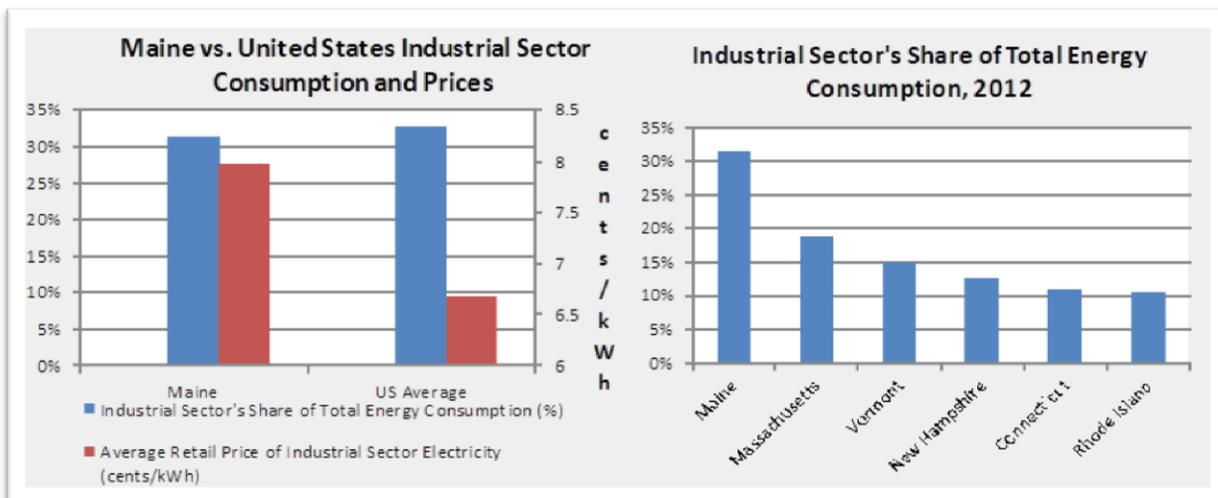
These constraints have led ISO-New England to develop winter reliability programs to ensure reliability of the electric grid. While the oil and world LNG price reductions over the last six months have significantly relieved the wholesale market, Maine continues to be severely susceptible to New England gas pipeline capacity constraints.

Last winter, constraints on existing natural gas pipelines caused the wholesale price of electricity to skyrocket, forcing some Maine manufacturers and other energy intensive businesses to cease operations and idle workers. These curtailments are occurring this winter as well, and will continue until additional pipeline capacity is constructed into the region. One recent example is Madison Paper, which has shuttered operations for several weeks due to high energy costs

<http://www.pressherald.com/2015/01/13/madison-paper-industries-to-shutter-for-weeks-lay-off-some-employees/>. This situation is anticipated to be exacerbated after 2017 as more of New England converts to natural gas for heating, and the region becomes even more dependent on natural gas for the generation of electricity. Even if additional pipeline capacity was approved today, it wouldn't be constructed and become available for Maine businesses for another three years.

Energy is so expensive in Maine that it curtails new business investment, and is one of the primary reasons energy intensive businesses close or relocate. According to the Energy Information Administration, Maine is one of only three states where the industrial sector consumes more than 30% of the state's electricity – yet our electric rates are significantly above the U.S. average. Our energy intensive businesses do not compete with others in New England; they instead compete with operations in other countries, and in lower priced areas in this country, namely the

South and Midwest. Below are some graphs that illustrate how Maine differs from the rest of New England, and the U.S. average.



For example, just this past year, three paper operations – Verso in Bucksport; Old Town Fuel and Fiber; and Great Northern in E. Millinocket closed their doors, and left approximately 1,000 Mainers out of work (Maine Fuel and Fibre has since reopened under new ownership). High energy costs were cited as one of the primary reasons for the closures; these facilities simply could not compete with operations in other states and other countries. The Governor has had personal calls with major manufacturers that are interested in Maine’s geographic location, but the energy prices are not competitive.

The [Bangor Daily News recently conducted a statewide poll](#) on the 10 most pressing issues critical to growing the state’s economy, and the results of the poll indicate the cost of energy was the #1 challenge facing the state.

Even successful manufacturing operations cannot operate during times of peak demand for their product, because the cost of electricity exceeds the value of the end product. For example, Maine Woods Pellet Company in Athens spent 63% more on electricity for the first ten months of 2014, than they spent in all of 2011. Due to prolonged colder temperatures in New England last winter, there was a shortage of wood pellets. But instead of making more pellets, the company had to shut down on occasion due to electricity costs that peaked at 80 cents/kwh. At that price, the electricity costs exceeded the value of the pellets. According to the company, if the company had shut during all the periods when it was uneconomic to operate because of electricity prices, many households in New England would have been without heat (pellets).

Maine’s many small businesses, already burdened by high energy costs, do not possess the financial resources to absorb the dramatic price increases

experienced last winter, and continuing this winter. Johnson Outdoors, manufacturer of canoes and kayaks in Old Town, consolidated its Washington state operations in Maine because of low natural gas prices. Over the last couple of years, they began experiencing price increases for both electricity and natural gas. From 2014 to 2015, their electricity will increase 39%, and natural gas 21%. They face competition from companies not burdened with these costs, and struggle with pricing themselves out of the market. Another example is Integrity Composites, a manufacturer of composite decking in southern Maine employing 18 people. Despite only operating their machinery three days a week, their electricity bill is \$180,000 per year, their largest variable operating expense. Continued price spikes will affect their ability to maintain employment and expand their business. And Jeff Ingalls, who operates a convenience store in Bangor employing 8 people, has seen the electric bill for his store double from October 2014 (\$2,300) to January 2015 (\$4,100). Mr. Ingalls does not have the ability to absorb these increases, and because of the price hikes, he does not have the capital to invest in efficiency to help lower his bills. This scenario is occurring across the state.

“The fact is, we have very competitively priced electricity and natural gas for nine months out of the year, but as every business knows, you can’t shut down for three months,” said Patrick Woodcock, Maine Energy Office Director. “We are very close to having the world’s very best natural gas reserves. Unfortunately, the region [New England] has not followed Maine’s leadership in building a natural gas infrastructure to supply our businesses and employers.”
BDN 10/7/14

“These natural gas price spikes are like signal flares, warning us that there could be an economic disaster ahead for New England consumers and businesses. We need to bolster our capacity to bring domestic natural gas into New England.” Senator Edward Markey, D-Massachusetts, to Boston Globe 1/10/14

2015 Maine Energy Goal for Commercial and Industrial Sector

Continue to work regionally, and as an individual state, to successfully expand natural gas transportation infrastructure into New England and into Maine, to restore reliability to the regional grid, and with the longer term goal of reducing the state’s electricity costs to the national average. Regional reports to NESCOE, the State of Massachusetts, and Maine Public Utilities Commission have all suggested that an additional billion cubic feet per day could be significantly cost-effective for regional ratepayers.

Policy Recommendations

- ❖ ***Continue the regional process (NESCOE) to achieve a unified regional agreement to expand natural gas pipeline capacity into the region.*** In 2014, The New England States Committee on Electricity (NESCOE) made significant progress toward reaching an agreement to bring additional natural gas pipeline capacity, as well as additional electric transmission from Canada and northern Maine, into the region. The six state coalition's work was suspended in late summer, when Massachusetts withdrew from the process. Newly elected state leaders bring an opportunity to restart this process, and Maine should take a leadership role toward finalizing an agreement for additional infrastructure.
- ❖ ***Continue evaluating cost-effective options for expanding the state's natural gas transportation infrastructure through the Maine PUC process (docket # 2014-00071).*** In 2013, LD 1559, also called the [Omnibus Energy bill](#) (PL 369; sponsors - Reps. Hobbins & Fredette, Sen. Cleveland), included a provision for addressing the natural gas capacity shortage into the region. The legislation authorized the Maine PUC to evaluate cost effective options for the state to increase natural gas infrastructure (independent of a regional solution), and to contract with pipeline companies for capacity that benefits Mainers. Phase I of the process has concluded, and Phase II, where pipeline companies submit their proposals for evaluation, is underway.
- ❖ ***Explore options for improving the credit-worthiness of key employers to reduce their energy costs.*** In Maine's de-regulated electricity market, large electricity users negotiate their own electricity supply from a competitive electricity supplier (CEP). These CEPs base their rates partly on the credit rating of the company for which they are providing electricity, i.e., companies with the best credit rating would receive a lower rate. The state could establish a mechanism to bolster the credit rating of selected energy intensive companies over the life of the electricity contract, e.g., letter of credit or a contract guarantee, so they might negotiate a lower rate with suppliers, or pursue authority for manufacturers to obtain credit enhancements for firm natural gas capacity.
- ❖ ***Provide more assistance to small businesses to reduce their energy costs.*** Small and medium sized businesses often lack knowledge, time and resources to address energy costs on their own. Efficiency Maine (EMT) has a business incentive program, but many small businesses do not have the up-front capital, staff resources, or technical knowledge necessary to participate in the EMT program; many are not even aware of the Efficiency Maine's technical assistance or financial incentive programs. Dedicated technical assistance services for small businesses may remove an initial obstacle to participation.
- ❖ ***Focus renewable energy subsidies on the most cost effective options.*** Energy costs are one of the most significant costs for commercial and industrial users, so above

market costs for renewable energy can impact commercial and industrial electric bills, and reduce their ability to compete with companies in other locations. Renewable energy policy, to the degree that it relies on ratepayer subsidies, should focus on the most cost efficient options (see renewable energy sector for more detail).

- ❖ ***Explore options to increase co-generation and district heating clusters for businesses.*** Increasing the development and use of cogeneration (combined heat and power, or CHP) as well as the strategic siting of district heating clusters, was recommended in the 2009 plan, but no significant progress has been made in this area. Aggregation of consumers is not occurring under current market conditions. The state should explore ways to promote and encourage development of CHP and district heating clusters.

**Commercial and Industrial Sector Appendix
Efficiency Maine Trust's Large Customer Program Projects
2010-2013**



Business	Town	Incentive	Private Match	Contractor/ Vendor	Lifetime Energy Savings kWh	Project Description
Bowdoin	Brunswick	\$400,000	\$3,400,000	Sullivan and Merritt Constructors, Scarborough, ME Paul Mercer, Penobscot ME Richard Renner Architects, Portland, ME Shelley Engineering, Westbrook, ME Verrill Dana LLP, Portland, ME HP Cummings, Winthrop, ME The Babcock and Wilcox Company, Yarmouth, ME Turbosteam, LLC, Turners Falls, MA Webb Pump, Cranston, RI RMF Engineering, Baltimore MD	16,341,000 kWh	Bowdoin College replaced a 46-year-old oil-fired steam boiler at the central utility plant with a new combined heat and power system. The plant provides heat to 75% of the campus and 400kW of electric power. The CHP project reduced campus energy consumption by 9% and the college's greenhouse gas emissions by 18%.
Cumberland County Jail	Portland	\$165,000	\$197,157	American DG, Waltham, MA	14,292,810 kWh	American DG Energy installed and operates two natural gas-fueled generators at the Cumberland County Jail that provide electricity, domestic hot water and space heat used on site. The company sells the energy produced from the units to the Cumberland County Jail at a discounted rate. These distributed generation units produce an average of 79,404 kWh a month. Over the life of the project, the Cumberland County Jail will save over \$100,000.
Huhtamaki	Fairfield	\$400,000	\$850,000	Trask-Decrow Machinery, Portland, ME Horizon Solutions, Portland, ME	29,715,000 kWh	Huhtamaki installed variable speed drives and higher-efficiency vacuum pumps to target energy savings in two areas of the plant. Vacuum is required for smooth molding machines to manufacture paper products. Huhtamaki installed new vacuum pumps with variable frequency drives that control the vacuum level on each individual machine. The previous system supplied a constant vacuum level for a number of machines, regardless of the volume of operation. The upgrade has significantly reduced the energy intensity of the vacuum process as

Business	Town	Incentive	Private Match	Contractor/ Vendor	Lifetime Energy Savings kWh	Project Description
						well as guaranteeing more consistent production.
Huhtamaki	Fairfield	\$155,000	\$155,000	Trask-Decrow Machinery, Portland, ME Horizon Solutions, Portland, ME	12,228,765 kWh	Huhtamaki bundled three different kinds of energy saving measures for this project. Inefficient compressors in the plant's high pressure and instrument air systems were replaced with high-performance models. Huhtamaki also replaced a number of inefficient lighting fixtures and installed variable frequency drives on two river water pumps that feed process water to the plant.
Irving Forest Products	Dixfield	\$706,543	\$706,542	Thermal Systems, Inc., Scarborough, ME	84,466,100 kWh	Irving added a steam turbine and generator to an existing biomass boiler to simultaneously generate steam and electricity. While the boiler can maintain its primary function of heating the facility and drying wood, the turbine now generates enough electricity to displace 4.2 million kilowatt hours or 23% of what the plant purchased from the grid. The upgrade significantly reduced energy expenses for the facility as well as demand on the grid.
Irving Forest Products Inc	Dixfield	\$471,000	\$471,000	The Fitch Company, Mexico, ME Ryan Mechanical Services, Rumford, ME SCS Forest Products, Sheridan, CO	23,331,860 kWh	Irving Forest Products was using a static time-based drying schedule that did not account for variability in wood stock. The company was able to improve the wood product drying process, improve customer satisfaction, and significantly reduce energy costs with the installation of a kiln that will monitor the wood moisture content as it dries. The change reduced energy consumption by allowing the company's kilns, fans, and boilers to operate more efficiently saving nearly 13% of the mill's annual energy expense or 2.3 million kilowatt hours a year.
Jackson Lab	Bar Harbor	\$369,011	\$369,011	Kinney Electric Co., Brewer, ME ABM Mechanical, Inc., Bangor, ME Turbosteam, LLC, Turners Falls, MA	38,306,300 kWh	Jackson Lab installed a back pressure steam turbine to convert its wood pellet-fired boiler into a combined heat and power plant. Housed in a new 4,000-square-foot energy center, the steam turbine reduces demand to the grid by 574 kW a year and is projected to save the laboratory an estimated \$2 million annually. Jackson Lab's switch to combined heat and power fueled by wood pellets is part of the organization's commitment to improve the local environment and stimulate the local economy.

Business	Town	Incentive	Private Match	Contractor/ Vendor	Lifetime Energy Savings kWh	Project Description
Lewiston - Auburn Water Pollution Control Authority	Auburn	\$330,000	\$487,000	TBD	28,925,180 kWh	The L-A Water Pollution Control Authority recently switched from composting and disposing of biosolids to an anaerobic digestion method. Methane produced from the digester will be directed to a cogeneration system to create electricity and heat for use at the facility. The system will reduce LAWPCA's need to purchase power by approximately 66%; LAWPCA will be able to generate the electricity needed to meet the demands of the digestion process as well as other treatment plant equipment.
Madison Paper Industries	Madison	\$725,000	\$725,743	Metso Paper USA, Inc., Norcross, GA	92,734,660 kWh	Wood grinding to create pulp is one of the most energy intensive aspects of the paper-making process. Utilizing new pressurized stone grinder technology, Madison Paper has reduced the energy intensity of the wood grinding process by 20%. These new grinders are smoother and more even than conventional grinders, allowing more pulp to be ground with less energy.
Madison Paper Industries	Madison	\$481,400	\$481,587	Metso Paper USA, Inc., Norcross, GA	60,494,670 kWh	The productivity increase resulting from the switch from conventional to pressurized stone grinders was so dramatic that Madison replaced two additional stone grinders at their facility. The upgrade resulted in a 20% reduction in energy use and a 21% increase in production. This increase in productivity has allowed Madison to grind the same amount of pulp with fewer stones.
Mid Coast Hospital	Brunswick	\$109,026	\$262,417	Energy Management Consultants, Inc., South Portland, ME	6,695,780 kWh	Mid Coast Hospital partnered with Energy Management Consultants, Inc. to replace approximately 2,900 lighting fixtures. The new lamps, including T8 lamps with low power electronic ballasts and LEDs, are estimated to reduce the hospital's energy consumption by 515,060 kWh annually. These electric savings are estimated to reduce operating costs by \$57,171 a year at current electric rates.

Business	Town	Incentive	Private Match	Contractor/ Vendor	Lifetime Energy Savings kWh	Project Description
Mid State Machine	Winslow	\$146,757	\$156,876	Energy Management Consultants, Inc., South Portland, ME	11,430,952 kWh	Mid State Machine undertook a large-scale lighting upgrade to reduce electric consumption in two buildings at its Winslow facility. The upgrade included switching from T12 to T8 lamps with low-power electronic ballasts, and replacing metal halide fixtures with high intensity fluorescent fixtures. LEDs were also installed in exit lights. The retrofit reduced the facility's energy consumption by 879,304kWh a year and is estimated to save Mid State Machine \$80,016 a year in operating costs.
Moose River Lumber	Jackman	\$450,000	\$850,000	Thermal Systems, Inc., Scarborough, ME	56,334,500 kWh	A steam turbine and generator were added to Moose River Lumber's existing biomass boiler to simultaneously generate steam and electricity. The turbine now generates about 2.8 million kilowatt hours a year or 40% of the facility's electric load on site. The resulting reduction in Moose River's electric costs allowed the facility to add three jobs while retaining the 66 full-time and 5 part-time workers currently employed at the plant.
Portland Water District	Portland	\$300,000	\$1,607,670	CDM Smith, Cambridge, MA D & C Construction, Co., Rockland, MA	35,464,230 kWh	The Portland Water District broke ground this year on an energy-efficient UV water treatment plant. The UV system will provide new purifying capabilities while reducing overall energy costs. The two-treatment units will feature 84 UV lamps that will treat water molecules as they pass through pipes, up to 52 million gallons of water a day. The project will significantly reduce energy costs for PWD rate payers; the water treatment facility will use 2,364,282 fewer kWh, and save approximately \$192,710 annually.

Business	Town	Incentive	Private Match	Contractor/ Vendor	Lifetime Energy Savings kWh	Project Description
Rumford Paper Company (New Page Corp.)	Rumford	\$340,000	\$458,165	AMEC, Portland, ME The Fitch Company, Bangor, ME Waugh's Mountain View Electric, Rumford, ME James O. Carter Company, Standish, ME Cianbro, Pittsfield, ME Kenway Corporation, Augusta, ME Sullivan and Merritt Constructors, Scarborough, ME Hahnel Bros. Co., Lewiston, ME Alfa Laval, Inc., Richmond, VA	29,486,796 kWh	This mill-wide lighting retrofit replaced 1,271 existing low-efficiency fixtures with high efficiency fixtures reduced Rumford Mill's electric consumption by 2,457,233 kWh a year. The project reduced demand on the grid and allowed Rumford Mill to enhance the economic viability of the Rumford facility.
SAPPI	Skowhegan	\$300,888	\$300,112	Horizon Solutions, Portland, ME Maine Industrial Repair Services, Inc., Augusta, ME Cianbro, Pittsfield, ME Gilman Electrical Supply, Newport, ME New England Controls, Inc., Bangor, ME URS Energy and Construction, Birmingham, AL	32,793,330 kWh	Sappi Fine Paper retrofitted its Skowhegan facility with variable-frequency drives on ten major process equipment systems. In the past, flow was controlled by valves paired with single-speed motors sized for full flow. This energy intensive method has been upgraded to a system that controls flow with variable pump speed. The pumps are able to read production needs and ramp up or ramp down to match demand. The upgrade reduced Sappi's electric consumption by 4,099,167 kWh a year, which is roughly equivalent to the annual energy consumed by 500 homes annually.
State of Maine	Augusta	\$750,000	\$3,345,000	PC Construction Company, Portland, ME Turbosteam LLC, Turners Falls, MA	18,620,000 kWh	The Bureau of General Services paired its new wood fired biomass boiler system with a cogeneration turbine serving the East Campus state office facility. This campus houses 16 different state departments and agencies. The biomass central plant provides steam heat to the campus's buildings and the turbine offsets the annual purchase of approximately 931,000 kWh.
Sugarloaf	Carrabassett Valley	\$301,149	\$702,681	Jordan Lumber, Kingsfield, ME Snow Economics, Natick, MA Crestwood Tubulars, St. Louis, MO	24,639,520 kWh	Snow making ensures consistent snow cover at Sugarloaf, but it's an energy- and cost-intensive process. The ski resort has replaced 300 of its snow guns with high-efficiency HKD Impulse snowmaking units. The new units produce more snow per hour of operation, while consuming significantly less compressed air. The upgrade to high- efficiency snow making will reduce electric energy consumption by 1,231,976 kWh per year or 4.09

Business	Town	Incentive	Private Match	Contractor/ Vendor	Lifetime Energy Savings kWh	Project Description
						kWh per grant dollar requested.
Sunday River	Newry	\$312,900	\$730,100	Snow Economics, Natick, MA Atlas Copco Constructions Mining Technique USA LLC, Philadelphia, PA Crestwood Tubulars, St. Louis, MO	21,919,000 kWh	Last year Sunday River Ski Resort made a \$1 million investment to make snow- making more efficient, allowing the resort to make more snow on more trails using less energy. The HKD Impulse snow guns are the most energy-efficient on the market and use up to 90% less compressed air than conventional snow guns. The projected annual energy savings from the project is 1,095,950 kWh per year and 21,919,000 kWh over the life of the project.
Twin Rivers Paper Company	Madawaska	\$198,240	\$102,124	Horizon Solutions, Portland, ME	29,750,400 kWh	Twin Rivers Paper Company identified a number of electrical energy-consuming applications for efficiency improvements that were submitted in two rounds of funding. These projects included a number of pumps that could be converted from constant speed to variable speed to better track production levels. These pumps move materials and pulp between different internal process stations, as well as river water into the facility.
Twin Rivers Paper Company	Madawaska	\$301,960	\$301,960	Horizon Solutions, Portland, ME	30,651,260 kWh	In addition to retrofitting constant speed pumps to variable speed applications, Twin Rivers also modified a number of existing drives for greater efficiency. Combined, these projects have reduced the facility's annual electrical consumption by 3,065,126 kWh and demand on the grid.

Business	Town	Incentive	Private Match	Contractor/ Vendor	Lifetime Energy Savings kWh	Project Description
University of Maine	Orono	\$300,000	\$1,113,085	Wright Ryan Construction, Inc., Portland, ME Emerald Environmental Technologies, Wentworth, NH	14,793,980 kWh	UMaine Orono's Alford Arena underwent significant renovations to reduce the facility's energy consumption including the ice rink refrigeration system and the heating, ventilation, and air conditioning (HVAC) system. The new high-efficiency ice rink refrigeration system includes variable frequency drive pumps to modulate flow, reducing power consumption during lighter occupancy and lower refrigeration loads. The existing HVAC system was replaced with a new dehumidification HVAC system which provides critical dehumidification and climate control to the facility. The new systems result in higher quality ice and greater comfort for fans.
University of Southern Maine	Portland	\$135,000	\$200,000	Leading Edge Design Group, Enfield, NH	7,271,433 kWh	The University of Southern Maine is installing a large lighting efficiency project on its Gorham Campus, including retrofits at the Field House, the Hill Gym, and the Ice Arena. Existing metal halide fixtures were replaced with T5 and T8 fluorescent high bay fixtures with individual wireless controls. The campus also replaced metal halide and high pressure sodium exterior site lighting with high-efficiency LED lamps. These lighting upgrades are projected to save the campus approximately \$61,527 a year.
Verso Paper-Jay	Jay	\$460,000	\$460,000	GL&V USA Inc., Nashua, NH Advanced Fiber Technologies, Sherbrooke, Canada	62,556,860 kWh	Verso Paper undertook a number of energy efficiency upgrades to its pulping air doctoring and screening systems, as well as improved the operating efficiency of its hydroelectric generation. Verso replaced compressed air being used in the pulping process with high-pressure blowers. Older, energy intensive screens were also replaced with energy-efficient screens. In addition, the facility rebuilt its flashboard system to increase the operating efficiency of its hydroelectric dam. The projects reduced the amount of electricity Verso needs to purchase from the grid, as well as increased electricity generation on site.

Electricity Sector

Wholesale Power, Transmission, and Distribution

Key Conclusions from 2009 Plan

- 1) Maine's electric transmission infrastructure is aging, and in need of major upgrades and expansion, for reliability purposes, to incorporate new wind development and other renewable energy projects, and to incorporate low carbon emission electricity (hydropower) from Canada;
- 2) Use of natural gas for residences, business, and electrical generation continues to grow, which will place increased pressure to upgrade/expand the Maritimes Northeast Pipeline serving Maine;
- 3) Major policy and regulatory differences exist between Maine and the regional grid operator, ISO-NE; these unresolved differences may impact the state's continued participation in the regional grid.

Primary Electric Sector Objectives of 2009 Plan

- Evaluate Maine's continued participation in the regional electric grid administrator, ISO-NE;
- Support development of electrical transmission projects in Maine for increased economic security, system reliability, lower electricity costs, and to accommodate economically and environmentally sustainable renewable energy from Northern Maine and Canada, including offshore wind;
- Support expansion of natural gas infrastructure to serve all sectors in Maine, including the state's natural gas generators;
- Reduce peak load in all sectors.

Maine Action Since Release of the 2009 Energy Plan

- ***The Maine Public Utilities Commission (MPUC) evaluated Maine's continued participation in ISO-NE.*** At the time of the 2009 Energy Plan, there was dissatisfaction with Maine's financial obligations to continue participating in the regional grid (ISO-NE is the New England grid administrator and planning agency), and a concern that the current structure was inhibiting renewable power development. The Maine PUC was charged with evaluating the state's options regarding continued participation in ISO-NE ([123rd Maine Legislature, Resolve, Chapter 193](#)), and performed an analysis in 2008 (*PUC docket #2008-156*). In 2009, the PUC recommended that Maine's transmission and distribution utilities remain in ISO-NE for another two years, while they renegotiated the terms of Maine's financial support. The Commission stated that leaving ISO-NE at that time would: 1) not provide tangible economic benefits to ratepayers; 2) it would represent a step backward in the development of energy markets;

and 3) it would introduce significant transactional risks to implement. Leaving ISO-NE to become part of the Maine Independent System Administrator (MISA), would leave the state without access to the significant technical resources at ISO-NE, and would result in a significant loss of control over energy issues to New Brunswick, Canada.

- **Upgrades in the state’s bulk power transmission system (CMP service area) are underway; the Maine Power Reliability Project (MPRP) is almost complete.** In 2010, Central Maine Power initiated a \$1.4 billion upgrade to the utility’s bulk transmission system, called the Maine Power Reliability Project (MPRP). The project is an update of the utility’s 40 year old transmission system, in order to maintain grid reliability and accommodate increases in load anticipated before the 2008-09 recession. Upgrades will be completed in 2015.
- **Interagency Review Panel (IRP) established to evaluate proposed transmission or pipelines in interstate highway corridors.** In 2010, LD 1786 “[An Act Regarding Energy Infrastructure Development](#)” (PL 655; sponsor Rep. Hinck), established a process by which companies/developers can apply to the state to build pipelines, transmission lines or other energy infrastructure along Interstate 95 corridor, as well as two other transportation corridors owned by the state. In return, the State would receive payment(s) for reinvestment in energy efficiency and renewable energy in the transportation sector. Any benefit the state would receive would be to increase Maine’s development, supply and transport of reliable, clean and secure energy; create new economic development opportunities; and attract investment. As of December 2014, the IRP has: 1) developed rules and procedures by which the Panel would evaluate energy infrastructure proposals; 2) approved a letter of intent (LOI) for a developer interested in using the corridor; and 3) hired a consultant to develop an estimated range of values for use of the corridor for energy infrastructure. The applicant is Emera Maine/National Grid; the project is the [Northeast Energy Link](#), an underground DC transmission line from Canada to Massachusetts; and the proposed route utilizes the I-95/Turnpike/I-295 transportation corridor.
- **Energy efficiency programs have reduced the state’s peak electric load.** Through FY 2014, Efficiency Maine (EMT) delivered 171 MW of peak demand savings to ISO-NE’s forward capacity market (FCM). The forward capacity market is a process by which the regional grid operator, ISO-NE, assures that there is sufficient generating capacity available from year to year. Efficiency programs can receive payments for documented energy savings that reduce demand. EMT was able to decrease 171 MW of peak (summer) demand through their efficiency programs.

Continuing Challenges

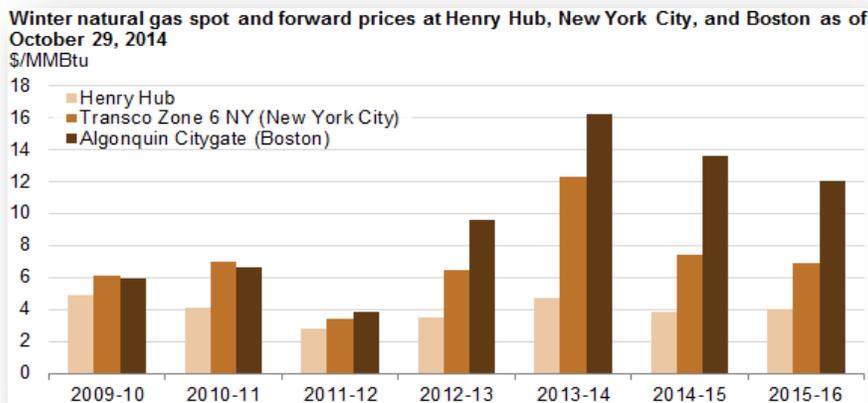
Massive natural gas infrastructure constraints are causing unprecedented increases in electric rates for both businesses and residents. Left unaddressed, these costs are, at a minimum, a significant drain to Maine’s economy and place the state’s businesses and industry at a significant

competitive disadvantage. The current constraints are so severe that the long term viability of the entire state’s economy is threatened.

Transformation of natural gas markets across the country, with the exception of New England. In the few years since release of the 2009 plan, the markets for natural gas, oil, and other fossil fuels in the U.S. have been transformed. Adoption of new horizontal drilling techniques has resulted in domestic production of natural gas, oil, and other distillates at levels not seen in over three decades. As a result, most of the U.S. has experienced the lowest natural gas prices in years. New England has been an exception. The region’s electricity market has been in a state of rapid transformation as well; in 2000, 15% of the region’s electricity was produced using natural gas; by 2013, it had climbed to 46%. In addition, proposals for new generation are also primarily natural gas-fired plants. However, pipeline capacity to transport more gas to New England has not kept pace. As a result, existing pipelines are severely constrained (especially in cold weather, when heating demand is its highest), and fuel prices spike. Extremely high natural gas prices means that gas-fired electric generators do not operate, and, to maintain grid reliability, the region has relied on old and inefficient coal and oil plants to make up this deficiency.

“The strategy was expensive and dirty, but it was probably the only reason New England avoided rolling blackouts this winter.” – Forbes on ISO-NE’s 2013/2014 Winter Program

The graph below illustrates these steep natural gas costs. The ‘Henry Hub’ price is the benchmark price for natural gas before it is transported through constrained pipelines to New England; the ‘Algonquin Citygate’ price shows how much prices increase when there isn’t adequate infrastructure to transport the fuel to our region. Without additional pipeline capacity, natural gas generators will face spot fuel prices three to four times higher than generators in other parts of the country.



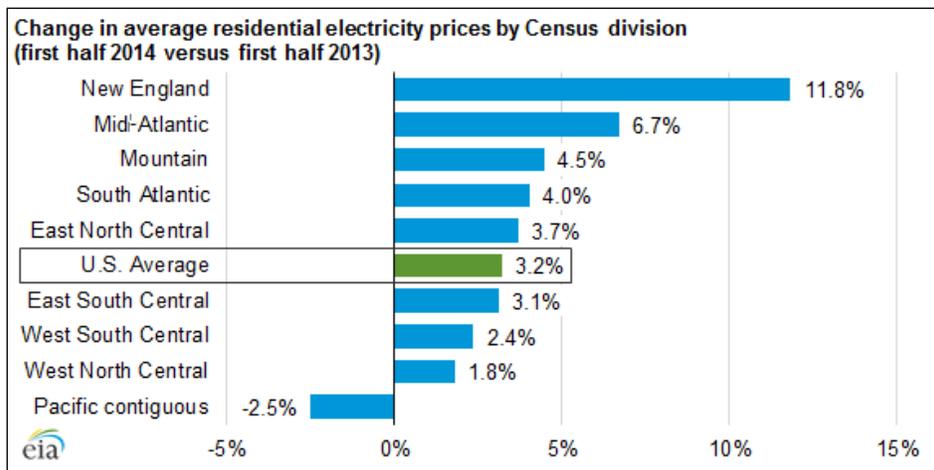
Source: U.S. Energy Information Administration, based on Bloomberg

Note: November through March are considered winter months. Forward prices for 2014-15 and 2015-16 are as of 10/29/2014.

And, although Maine has significant generation from renewable resources, the state (and region) remains susceptible to wholesale electric market pricing that is correlated to natural gas prices. For the three month period December 2013-February 2014, the wholesale cost of power for New England was \$5 billion, due to high natural gas costs. Compare that to previous years; during the same time period in 2012-2013, the wholesale cost of power was \$2.9 billion, and in 2011-2012, it was \$1.2 billion ([ISO-NE newswire, Nov. 2014](#)).



Step wholesale market price increases have been and will be reflected in retail rates that consumers and businesses pay. The graph below illustrates how much more retail electricity rates have increased in New England than other regions of the country.



Source: U.S. EIA, August 2014 Electric Power Monthly.

Note: Average U.S. retail electricity price for first half of 2014 was 12.3 cents/kwh (preliminary data)

The increases illustrated above also do not include the additional price increases the region began experiencing this fall. Below is a table of recent rate increases (for energy portion of bills only) for three New England states, as well as Maine’s very recent standard offer rate.

2014-15 Retail Rate Increases, Energy Only*

Residential Rates	Energy Rate (c/kWh)		% Change	Upcoming Period
	Current Rate	Upcoming Rate		
Connecticut				
CL&P	10.0	12.5	25%	Jan '15 - Jun '15
United Illuminating	8.7	13.3	53%	Jan '15 - Jun '15
Massachusetts				
NSTAR	9.4	15.0	60%	Jan '15 - Jun '15
WMECO	8.8	14.0	58%	Jan '15 - Jun '15
National Grid	8.3	16.2	96%	Nov '14 - Apr '15
Fitchburg	8.5	14.1	66%	Dec '15 - May '15
New Hampshire				
PSNH	9.9	9.6*	(3%)	Jan '15 - Dec '15
Unitil	8.4	15.5	85%	Dec '14 - May '15
Liberty	7.7	15.5	100%	Nov '14 - Apr '15
NH Elec Coop	9.0	11.6	29%	Oct '14 - Apr '15
Maine				
standard offer	7.6	6.5	(14%)	Mar '15 - Dec '15

*Per Northeast Utilities November 21, 2014 presentation, Restructuring Roundtable, updated with Maine standard offer

Just recently, Maine ratepayers were the recipients of ‘fortuitous circumstances’, due to the timing of the MPUC’s solicitation of standard offer proposals. The very recent steep declines in oil prices, combined with closer-to-average winter temperatures, have resulted in Maine obtaining a much *lower* supply cost than our neighboring states. However, lower oil prices are masking the seriousness of natural gas pipeline constraints, so this decline is not expected to be sustained. Until new capacity is constructed, this situation will worsen in the next several years, as a substantial amount of the region’s non-natural gas fired generation is taken out of service. In 2014 alone, almost 1,850MW of [non-gas fired] generation was retired ([ISO-NE E2Tech conference, March 2014](#)).

At Risk Generator Retirements Have Begun

Major Retirements 2014	
Salem Harbor	749 MW (coal & oil)
Norwalk Harbor	342 MW (oil)
Mount Tom	146 MW (coal)
Vermont Yankee	604 MW (nuclear)

Total MW Retiring in New England (through 2018)	
Connecticut	528 MW
Maine	159 MW
Massachusetts	2,682 MW
New Hampshire	56 MW
Rhode Island	64 MW
Vermont	666 MW

“The challenges to grid reliability are not a question of if they will arise, but when - and when is now.”
Gordon van Welie, CEO, ISO-NE, 2014 Regional Electricity Outlook

Northern Maine (Aroostook and Washington counties) suffers from a lack of diversity in power generation sources, and an inability of renewable resource generators to deliver power to load areas in southern New England. This adversely affects reliability of the northern Maine grid, and requires an increasing reliance on Canadian generated power sources. Wind power development in these counties could also be curtailed due to an inability to transmit power to load centers south of Maine.

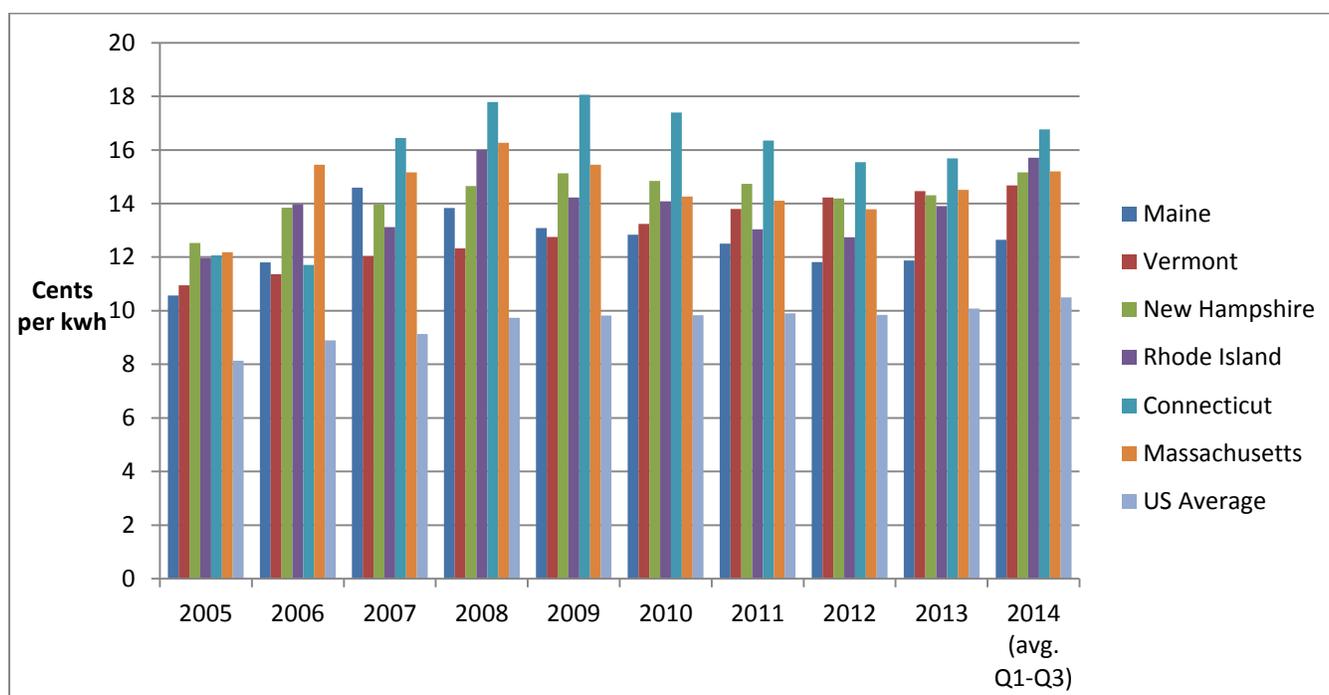
Northern Maine is connected to Canada, not New England. The northern part of Maine is unlike any other area in the lower 48 states, in that their electric grid is not directly connected to one of the three major power grids in the U.S. Instead, northern Maine is linked to New England indirectly through connections with New Brunswick, Canada, and is served by the Northern Maine Independent System Administrator (NMISA). Historically, northern Maine had sufficient local generation to serve its small population. In recent years, lower regional natural gas prices have forced the closure of some local, higher priced generation. The Maine PUC is presently evaluating generation and transmission options for this area, including providing northern Maine with a direct link to the rest of New England, and its electricity markets <http://www.eia.gov/todayinenergy/detail.cfm?id=19671>; (PUC docket #2014-00048).

2015 Maine Energy Goal for Electricity Sector

Continue to work regionally, and as an individual state, to successfully expand natural gas infrastructure into New England, to restore reliability to the regional grid, and with the longer term goal of reducing the state's electricity costs to the national average.

As the graph below illustrates, electricity in all of New England costs significantly more than the national average. Maine's rates, while lower than the other New England states, are still much more expensive than most states in the U.S.

New England and U.S. Average Electricity Prices, 2005-2014*



*Energy Information Administration

Policy Recommendations

- ❖ **Continue the regional process (NESCOE) to achieve a unified regional agreement to expand natural gas pipeline capacity into the region.** In 2014, The New England States Committee on Electricity (NESCOE) made significant progress toward reaching an agreement to bring additional natural gas pipeline capacity, as well as additional electric transmission from Canada and northern Maine, into the region. The six state coalition's work was suspended in late summer, when Massachusetts withdrew from the process. Newly elected state leaders bring an opportunity to restart

this process, and Maine should take a leadership role toward finalizing an agreement for additional infrastructure.

“The lack of pipeline infrastructure has raised fuel adequacy for natural gas generators to the top of the list of pressing concerns for New England’s power system. ISO New England has made changes to the wholesale power markets and to operating procedures to help address this concern, but to keep the region’s power grid reliable and flexible, a commitment to investing in fuel adequacy is needed from all New England stakeholders.” Gordon van Welie, ISO New England president and CEO, press release 11/6/2014.

- ❖ ***Improve transparency for consumers and business seeking to contract with competitive electricity providers (CEPs).*** Maine’s deregulated electricity market has brought increased competition in the energy supply arena. Both residential and small business customers now have more companies from which they can choose to purchase their electricity (delivery of that electricity supply is still regulated by the Maine PUC). A wider array of choices, however, brings with it some problems. Because CEPs for households and small businesses are an emerging market, some business practices of these CEPs have resulted in adverse consequences to consumers. These consequences primarily stem from a lack of disclosure and/or transparency regarding the details of these retail contracts. The Office of the Public Advocate has made attempts to inform consumers, but electricity supply and delivery is a complicated topic for most consumers. Increasing disclosure requirements for CEPs would improve information dissemination to consumers on this complicated issue.
- ❖ ***Develop process by which non-transmission alternatives can be evaluated and developed.*** The 2013 Energy Omnibus bill included a provision requiring the evaluation of non-transmission alternatives (NTAs) for all proposed new transmission lines less than 69 kilovolts, and with costs over \$20 million; these alternatives can include energy efficiency, load management, demand response and/or distributed generation. The statute provides criteria by which the Maine PUC must evaluate alternatives to new transmission, but does not include a clear process for the advancement of these measures. For example, what role can t&d utilities play in this process? Will they be permitted to participate in the management (smart grid coordinator) and/or deployment (provider) of approved NTAs? The Maine PUC has an inquiry open regarding this issue (docket # [2013-00519](#)). This investigation may result in a transparent and competitive process by which transmission alternatives can be deployed.

Renewable Energy Sector

Key Conclusions from 2009 Plan

- 1) Maine is highly dependent on expensive and unreliable foreign fossil fuels for heating our homes, powering our businesses, and fueling our vehicles, trains, and boats, which makes our citizens more and more vulnerable to rapid price escalations, fuel curtailments, and infrastructure disruptions;
- 2) Maine has taken a leadership role in the development of innovative energy programs and policies, including the first energy efficiency program and the first state to pass legislation addressing global warming.
- 3) The state should support the development of indigenous, renewable energy sources, to reduce our dependence on foreign petroleum;
- 4) The state needs to transition from a fossil fuel culture to a clean renewable, sustainable energy culture.

Primary Renewable Energy Objectives of 2009 Plan

- Support development of electrical transmission projects in Maine for increased reliability, and to accommodate economically and environmentally sustainable renewable energy from Northern Maine and Canada;
- Increase the generation of renewable power into the State of Maine's electricity portfolio;
- Seek to develop on-site renewable energy projects at state facilities;
- Work with public and private schools to facilitate alternative energy demonstration projects;
- Encourage Maine's businesses and residents to invest in distributed renewable energy;
- Support research at UMaine to create cellulosic ethanol, and increase the use of bio-fuels in state buildings and schools;
- Foster renewable energy (biomass, biofuels, wind, solar, tidal, geothermal, co-generation);
- Identify, assess, and remove technical, regulatory, and economic barriers to the use of co-generation.

Maine Action Since Release of the 2009 Energy Plan

- **Maine has continued to increase electricity generation from renewable sources through compliance with the region's renewable portfolio standard.** In 2012, Maine generated 54% of its electricity from renewable sources, already far surpassing the 30% existing plus the 10% new renewable statutory requirement. The Renewable Portfolio Standard (RPS) is a ratepayer-funded incentive

mechanism to encourage the development of legislatively designated types of electric generation; in Maine, this includes generators of less than 100MW that use fuel cells, tidal, solar, geothermal, hydroelectric, and biomass, including landfill gas; in addition, wind generators of all sizes are eligible. The vast majority of facilities satisfying the RPS in Maine are biomass projects. Projects that are able to qualify as Class I in another New England state often do so, as the REC value is higher in other states. According to the most recent (2012) [Maine Public Utilities Commission report on the RPS](#), there is more than sufficient planned renewable generation in the ISO-NE interconnection queue to satisfy the state's RPS through 2017, when total "new" renewable generation required will reach 10%.

- ***The state legislature passed the Ocean Energy Act to encourage development of offshore wind and tidal energy; above market contracts authorized for electricity generated from tidal energy and offshore wind.*** During its 2010 session, the Maine Legislature enacted '[An Act to Implement the Recommendations of the Governor's Ocean Energy Task Force](#)' (PL 615, Sponsor – Sen. Hobbins). Section A-6 directed the Maine Public Utilities Commission (MPUC), to conduct a competitive solicitation for proposals for long-term contracts to supply installed capacity, associated renewable energy and renewable energy credits (RECs) from one or more deep-water offshore wind energy pilot projects or tidal energy demonstration projects. Of the 30MW total authorized in the Act, 5MW was authorized for tidal energy demonstration projects, and the remaining 25MW was authorized for offshore wind energy. In 2012, the MPUC authorized a contract for tidal energy to the Ocean Renewable Power Company (ORPC); in 2013 & 2014, the Commission approved long term contracts for offshore wind projects proposed by the Norwegian energy company Statoil, and for the Maine Aqua Ventus project proposed by a University of Maine consortium. The tidal project has intermittently produced power, but is currently not in production. In October 2013 Statoil removed their proposal from consideration from the PUC. At this time, the University of Maine continues to have a term sheet in place and is positioning them for further consideration of federal funding to make the project financially viable.
- ***Residential solar and wind rebate pilot program was established using federal ARRA funds.*** For several years, the state administered a rebate program for residential and small commercial solar and wind installations. From 2010 through 2013, Efficiency Maine used a combination of funds (federal recovery act; renewable resource, and residual solar/wind rebate program SBC revenues) to continue a rebate program beyond the statutorily authorized time frame. Efficiency Maine provided 1,150 alternative energy rebates (primarily solar installations). In FY14, the final months of the program, Efficiency Maine issued rebates for 178 renewable energy systems (see table below). As you can see from the results, using a total resource cost test, the benefit-to-cost ratio was 0.57, below the minimum 1:1 ratio. This means that the total costs of the rebate program significantly exceeded the lifetime benefits.

Solar/Wind Rebate Program, FY 2014 (MMBtu Results)

Total Participants	Total Rebates	Annual MMBtu Savings	Lifetime MMBtu Savings	Efficiency Maine Costs	Participant Costs	Lifetime Energy Benefit	Benefit to Cost Ratio
178	178	4,356	87,113	\$428,947	\$3,024,981	\$1,985,355	0.57

- Authorization of pilot program for community based renewable energy.***
 The Community Renewable Energy Pilot program was established in 2009 (PL 329, 35-A MRSA c. 36) to provide ratepayer funded incentives, for up to 50 MW of small, community-based, renewable electricity generators. The incentive could be a long term contract (20 years) for above market rates, or a renewable energy credit (REC) multiplier. At present, this program is fully subscribed. Projects certified by the MPUC are listed below.

Community-Based Renewable Energy Pilot Program

Project	Type	Size	Price
Exeter Agri-Energy (Exeter)	anaerobic digestion	3MW	\$.09/kwh
Clinton Agri-Energy (Clinton)	anaerobic digestion	5.86MW	\$0.10/kwh
Jonesport Wind (Jonesport)	wind	9.6MW	\$.085/kwh
Pisgah Mtn. (Clifton)	wind	9MW	\$0.93/kwh
Shamrock Wind (Fort Fairfield)	wind	10MW (4MW under contract)	\$0.099/kwh
Goose River Hydro (Belfast)	hydropower	0.375MW	\$0.10/kwh
Maine Wood Pellets (Athens)	biomass	7.1MW	\$0.099/kwh
Fox Islands Wind (Vinalhaven)	wind	4.5MW	REC multiplier
Good Will Hinckley School (Hinckley)	solar	0.026MW	REC multiplier
Revision Energy (Unity College)	solar	0.037MW	REC multiplier
Revision Energy-Riding to the Top	solar	0.034MW	REC multiplier
Lewiston-Auburn Water Authority	anaerobic digestion	0.460MW	REC multiplier

- Net energy billing program for distributed generation.*** The Maine Public Utilities Commission has permitted some form of net energy billing (NEB) since the 1980s. In 2011, the Legislature passed “[An Act to Expand Net Energy Billing](#)” (PL 262; sponsor Sen. Whittemore), requiring specific parameters for this program. It requires transmission and distribution utilities (t&ds) to credit small, grid-connected distributed generation (DG) installations for electricity they generate, so they only pay for electricity over what is generated by the installation (over the course of a year). Net energy billing customers are credited for the full retail cost of the electricity (energy, transmission & distribution, and stranded costs). This means that NEB customers do not pay for access to the grid; these costs are instead borne by the general body of ratepayers. Most NEB customers in Maine are small solar and wind installations (statutory limit is 660kw, and there is a cap on the number of NEB customers in a utility service territory). As the table below illustrates, the number of NEB customers has increased significantly in a short time period.

NEB customers	2012	2013
Central Maine Power	1007	1302
Emera – BHE	196	274
Emera – MPS	67	72

- The state has updated its inventory of existing and potential hydropower resources, statewide.*** The last assessment of the state’s hydropower resources was conducted in in the early 1990s, and was based on the traditional hydropower model of constructing large, new dams. The regulatory environment has evolved, and new technologies have emerged since 1990. The new inventory is based on the current regulatory environment, and assesses development potential using newer technologies at both existing and currently undeveloped sites. The report and its recommendations can be accessed [here](#).
- Value of solar study being conducted by the Public Utilities Commission.*** The Legislature passed legislation requiring the PUC to conduct an analysis of the “value of solar.” The associated Docket No., [2014-00171](#), may provide context for public policy surrounding distributed generation and solar. The report is due to the Legislature in early 2015.

Continuing Challenges

Maine does not have an integrated, inclusive, renewable energy policy.

Myriad of renewable subsidy programs. Maine has the following renewable energy programs: long term contracting; ocean energy, including offshore wind & tidal (purchased power agreements, or PPAs); community renewable energy program (feed-in

tariff); net energy billing; renewable portfolio standard Class I and II; and, the Regional Greenhouse Gas Initiative. The cumulative impact of these programs is that Maine ratepayers are paying millions annually in above market costs, and these costs increase each time a new program is adopted or expanded. Below is a table that illustrates the costs (to the state’s ratepayers) of these renewable energy subsidies.

State Subsidy Program for Renewable Energy	Total Annual Cost to Ratepayers*
Renewable Portfolio Standard (RPS) Class I	(2012 data) \$18,431,375
Renewable Portfolio Standard (RPS) Class II	(2012 data) \$533,247
Long Term Contracts - tidal	\$1.875 million (for 20 years); \$93,750 annual avg.
Long Term Contracts – offshore wind**	\$9.9 million (for 20 years); \$495,000 annual avg.
Community Renewable Energy Pilot Program	\$4.2 million (for 20 years); \$210,000 annual avg.
Net Energy Billing	(2012 data) \$960,600 in lost revenue
Regional Greenhouse Gas Initiative (RGGI)	(2013 data) \$14.1 million
Total (nominal annual costs)	\$34.8 million (\$34.3 net of offshore wind subsidy)

*source: MPUC

**offshore wind subsidy delayed as project did not receive federal support for construction

Costs are easily identified, but are benefits are often subjective. Maine generates more electricity than it uses, and over half of this electricity comes from renewable sources (the U.S. average was 12 percent). Maine produces more electricity from hydropower than any state east of the Mississippi, and we have the highest biomass fueled generation in the country. In addition, Maine’s greenhouse gas emissions are the 44th lowest in the country ([Maine energy profile](#)).

Financial incentives for renewable generation can be regressive.

Costs for these programs have been allocated on a per kwh basis. This is a surcharge on a basic life necessity; the increased cost does not correlate to income; and ratepayers have limited ability to reduce their usage. And, although any one renewable program raises the average electric bill by less than \$1.00, cumulatively, these add-on fees, when coupled with other assessments (such as Efficiency Maine Trust, low income, MPUC & OPA assessments, stranded cost charges, low income programs), means that in 2013, the average Emera-MPS customer of 550 kwh per month, was paying \$8.58 in fees on a monthly bill of \$75.68, or 11.3% (Emera-BHE paid \$10.23 on a \$81.95 bill, 12.5%); CMP paid \$4.23 on a 65.56 bill, 6.45%).

<http://www.maine.gov/mpuc/electricity/CMPElectricityRateTransparencyTable.htm>

<http://www.maine.gov/mpuc/electricity/BHEElectricityRatesandAssessments.htm>

<http://www.maine.gov/mpuc/electricity/MPSElectricityRatesandAssessments.htm>

In 2013, Maine’s residential electric rates were the 12th highest in the country; as of October, [Maine’s 2014 residential rates were the 11th highest \(EIA\)](#). Each new or expanded renewable energy program results in incremental cost increases.

Maine’s net energy billing program subsidizes renewable generation at the full retail cost of the power (including transmission and delivery), rather than the wholesale cost of the energy. Is this the appropriate level of subsidy? Under Maine’s net energy billing program, utilities are required to credit a distributed generation (DG) customer’s excess power at full retail price which includes transmission, distribution, and the supply costs of electricity. This policy is not unique to Maine. Throughout the country there are fundamental questions regarding equity between demographic groups as well as whether the compensation for solar generation is appropriate. The state must continue to assess whether this is the appropriate DG policy and work to ensure that low-income populations as well as all ratepayers are benefiting from these policies.

New England’s Definition of Renewable Energy is inconsistent from state to state.

Six New England states, more than six different renewable portfolio standards. Presently, of the six New England states, there are five different sets of renewable portfolio standards, and one set of renewable energy goals (Vermont). Below is a table that summarizes the many differences between standards.

New England Renewable Portfolio Standard Requirements 2015

RPS Attributes	CT	ME	MA	NH	RI	VT
Number of Classes	Class I and II	Class I and II	Class I, II, and APS	Class I, II, III, and IV	Class I	No distinct classes; voluntary
Class I eligible date	7/1/2003	9/1/2005	1/1/1998	1/1/2006	1/1/1998	1/1/2005 (for 20% new)
2015 RPS and total RPS requirements	2015 – 19.5%, of which 3% is Class II & 4% Class III 2020 – 27%, increases to Class I only	2015 – 38%, 8% of which is Class I 2017 – 40%; Class I increases to 10%	2015 – 20.85%; 10% Class I, 7.1% a combo of Class I, II resources, and 3.75% APS Future years – Class I to increase 1%, and APS by 0.25% annually; no cap	2015 – 15.8%, mostly Class I and III 2025 – 24.8%; increases Class I only	2015 – 8.5%, most from new sources 2019 – 16%, all but 2% from new sources	2017 – 20% of sales; if not met, utilities would have to meet RPS 2032 – 75% of sales to be met with renewables
Biomass included in Class I	limited	yes	Eligible only under very complex conditions; reporting requirements make	yes	yes	n/a

<p>Types of Resources in Class I</p>	<p>Fuel cells; tidal, wave & ocean thermal; solar; wind; geothermal; landfill methane; biogas; thermal from Class I; 'low emission advanced renewable energy conversion; run-of-river hydro <30MW w/addtl fish passage requirements; some biomass (low NOx and sustainable fuel or <500kw); no double counting (generation cannot be claimed in another state's RPS)</p>	<p>Fuel cells; tidal; solar; wind; geothermal; new hydro with fish passage; biomass; landfill gas – all <100MW, except wind</p>	<p>qualification impractical Fuel cells; tidal, wave, current & ocean thermal; other HK; solar; wind; geothermal; hydro <30MW, no pumped storage, meeting environ. criteria; landfill methane (under certain conditions); anaerobic digestion; biomass only under very narrow conditions</p>	<p>Tidal, wave & current; ocean thermal; wind; geothermal; biomass; hydrogen from biomass or methane; landfill gas; methane gas; refurbished hydro and biomass; new production by III and IV resources; elect. displacement by solar hw</p>	<p>Fuel cells; tidal, wave, current, and ocean thermal; solar; wind; geothermal; landfill gas; anaerobic digestion; biomass, hydro <30MW+</p>	<p>Fuel cells; solar; wind; geothermal; landfill gas; anaerobic digestion; biomass; hydro; CHP (65% efficient)</p>
<p>Other Classes besides I</p>	<p>Class II – existing trash-to-energy with NOx cap; existing run-of-river hydro < 5MW Class III – CHP>50% efficient after 1-1-2006; DSM</p>	<p>Class II – existing renewable or 'efficient' (CHP)</p>	<p>Class II – operating before 1-1-98; waste-to-energy APS – CHP, flywheel storage; coal gasification; efficient steam if reduces fossil fuel use</p>	<p>Class II – new solar Class III – existing biomass & methane gas <25MW Class IV - <5MW hydro with fish passage</p>		<p>n/a</p>
<p>Solar or thermal carve out/separate class</p>	<p>No – solar & thermal part of Class I</p>	<p>No – solar part of Class I</p>	<p>Yes – Class I carve out</p>	<p>Yes – solar separate classII (0.3%) Thermal – class I carve out (2% of 15% total in 2025)</p>		<p>n/a</p>
<p>Notes</p>			<p>Class I generation not required to be grid connected</p>			

Because both Massachusetts and Connecticut essentially prohibit biomass generators from qualifying for the RPS in those states, most biomass generators seek qualification in Maine, which drives down the price of Renewable Energy Credits³ (RECs). If standards

³ A REC (pronounced: rĕk) represents the property rights to the environmental, social, and other nonpower qualities of renewable electricity generation. A REC, and its associated attributes and benefits, can be sold separately from the underlying physical electricity associated with a renewable-based generation source. In those states with a RPS system, renewable energy has two components for sale – the physical energy, and the REC (environmental attributes - one REC is earned for every 1000 kilowatt-hours (or 1 megawatt-hour) of electricity placed on the grid). For more on RECs, please see: EPA <http://www.epa.gov/greenpower/gpmarket/rec.htm>

were more aligned regionally, the REC prices would be more consistent from state to state, which would benefit all renewable generators seeking RPS qualification in the state.

2015 Maine Energy Goal for Renewable Energy

Re-evaluate all Maine's renewable energy programs, and develop a simplified, integrated, inclusive, renewable energy policy which is aligned toward the state's greatest challenges – reducing electricity costs for Maine businesses, and lowering total energy costs for Maine households.

Policy Recommendations

- ❖ **Establish clear goals and simplify the policies.** Maine's renewable energy programs have been based on a particular technology or energy source, rather than an overall policy or objective. Maine supports renewable energy in our policies, programs, and goals. Rather than establishing specific technology goals there should be a uniform mission. Policies should be flexible to incorporate changing technology and be reviewed on a consistent basis.
- ❖ **Align Maine's renewable energy policies toward the state's challenges.** The state faces two major energy challenges: 1) The Price of Electricity to Attract Business Investment; 2) Inefficient and Expensive Thermal Energy. The state generates much more electricity than it uses, and over half of this already comes from renewable sources. At the same time, Maine businesses pay the 8th highest electricity costs in the country, and Maine residents pay the 11th highest. Policies should be designed to use Maine's renewable energy resource to address our challenges.
- ❖ **Work with all New England states to align the various renewable portfolio standards/renewable energy credit (REC) markets where possible.** As outlined above, presently there are six different renewable portfolio standards in the six New England states. This creates inequitable REC markets, and can reduce their effectiveness. For example, some states do not recognize biomass in their RPS, so biomass producers are forced to sell their RECs in the limited Maine market, and this drives down the Maine REC price. If the region's RPS policies were aligned, there would be a uniform, regional REC price, and all renewable generators would operate on a 'level playing field'.
- ❖ **Focus renewable energy development on all cost-effective renewable resources.** In the 1980s decisions were made to approve long term, above market contracts for renewable generation, as energy prices were forecasted to increase. Energy prices instead declined, and Maine ratepayers were burdened with unnecessarily high electricity prices for years as a result. Oil prices shot up to historic highs in 2007-2008, so any other energy source (e.g., offshore wind) seemed a more viable long-term solution than oil. Since the release of the 2009 energy plan, new extraction technologies have resulted in

abundant and inexpensive domestic natural gas, oil, and distillates such as propane – unconceivable just six years ago. This increase in domestic energy production has turned global oil markets upside-down in just the last six months. In 2012, regional electricity prices were at their lowest price in a decade, yet changing electricity markets and lack of infrastructure improvements caused last winter’s prices to spike to unprecedented levels. The history of energy markets clearly indicates that choosing one energy source over another is a risky, and often costly, decision. The State should recognize that the competition for electrical generation has increased and the cost-competitive level for resources is challenging.

- ❖ ***Provide price stability for distributed generation.*** Under current market and regulatory conditions, it is challenging for distributed generation to access renewable energy markets. Price stability (that reflects the value of DG) for these clean energy resources should be established. Maine should work to develop a long-term policy to provide price certainty for distributed generation resources.
- ❖ ***Encourage hydropower.*** Maine’s hydropower provides clean, baseload generation. The state should pursue policies to prioritize redevelopment and investment in existing hydro dams. Currently, Maine’s greenhouse gas emissions from the electrical sector are one of the lowest in the country, but if the state were to lose these generators, they would likely be replaced by additional natural gas, oil, or other resources from outside the state.

Greenhouse Gas Emissions

The 2009 Comprehensive Energy Plan discussed greenhouse gas (GHG) emissions primarily in a broad (global) context. Few conclusions were reached about GHG emissions in Maine, and recommendations for action were limited to promoting combined heat and power (CHP) installations and promoting ‘smart’ development, a significant challenge in such a rural state.

In 2013, the Legislature enacted LD 927, [“An Act to Further Energy Independence for the State”](#) (PL 415 – sponsor Rep. McGowan), which requires that, beginning in 2015, the biennial updates to the comprehensive state energy plan must address the association between energy planning and meeting the greenhouse gas (GHG) reduction goals in the state climate action plan pursuant to Title 38, section 577. According to the Department of Environmental Protection’s [5th Biennial Report on Progress Toward GHG Reduction Goals](#), 86% of GHG emissions in Maine are the result of energy consumption, largely produced by combustion of petroleum products. The significant relationship between energy use and GHG emissions makes a discussion of GHG reduction efforts an appropriate inclusion in the Comprehensive Energy Plan update.

Key Conclusions from 2009 Plan

- 1) Maine has already made progress in reducing its greenhouse gas emissions;
- 2) Maine’s transportation sector is responsible for more than one-third of the state’s greenhouse gas emissions;
- 3) The residential sector, while not a major source of greenhouse gas emissions, still relies heavily on petroleum based fuels, and most of the state’s residents do not have access to lower carbon emitting fuel sources (e.g., natural gas).

Primary Greenhouse Gas Objectives of 2009 Plan

- Encourage ‘smart growth’ as a way to reduce vehicle miles traveled in the transportation sector, thereby reducing GHG emissions;
- Encourage adoption of co-generation and district heating clusters as a way to reduce emissions (more efficient use of power generation);
- Pursue a low carbon fuel standard on a regional basis to further reduce GHG emissions, and lower the carbon intensity of the transportation sector.

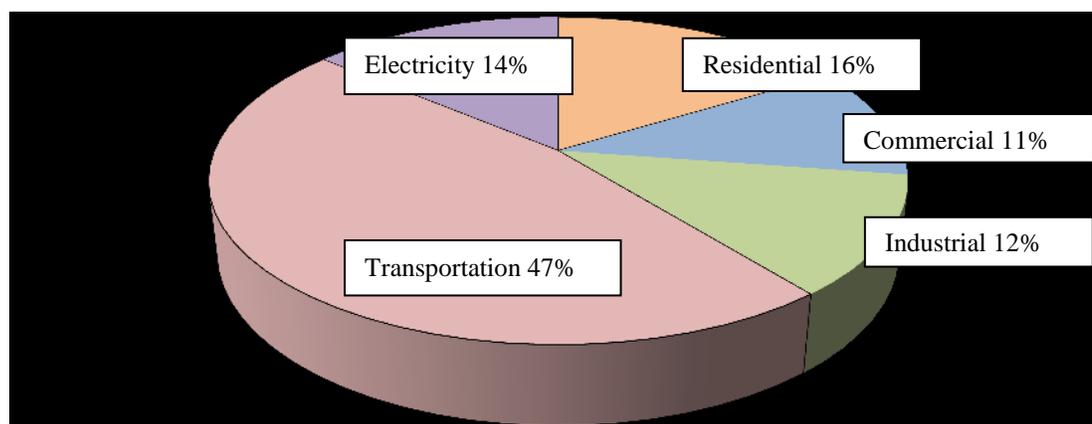
Maine/Regional/Federal Action Since Release of the 2009 Energy Plan

- **Maine joined the Regional Greenhouse Gas Initiative, the first regional carbon dioxide cap-and-trade program in the United States.** Maine, in

conjunction with other New England and some mid-Atlantic states, formed the [Regional Greenhouse Gas Initiative \(RGGI\)](#), a market based regulatory program that places a cap on carbon dioxide (CO₂) emissions from the power sector. The cap is [reduced over time](#), encouraging participating states to generate more of their electricity using low-or zero-carbon sources. Participation in this program has resulted in significant reductions of GHG from the power sector, and has provided funding for residential and industrial energy efficiency programs. These efficiency programs have since yielded even further GHG emission reductions.

- ***Maine’s GHG emissions have decreased steadily since 2003.*** In 2012, the Department of Environmental Protection (DEP) confirmed the state met the first goal outlined in the State Climate Action Plan, i.e., reducing GHG emissions to 1990 levels. The DEP’s analysis of energy consumption, industrial processes, agriculture, and waste management for calendar years 2010 and 2011 ([5th Biennial Report on Progress Toward GHG Reduction Goals](#)) found that Maine is continuing to trend downward in GHG emissions. This downward trajectory aligns with meeting the medium-term goal outlined in the 2003 legislation [“Maine’s Act to Provide Leadership in Addressing the Threat of Climate Change”](#) (PL 237; sponsor Rep. Koffman), i.e., reducing GHG emissions to 10% less than 1990 levels by 2020. Gross statewide GHG emissions increased from 1990 to a peak in 2003, and have since steadily declined. This decrease is especially notable considering that, a 900 megawatt nuclear powered electrical generation station ceased operations in 1996. GHG emissions in the state have declined 6% just since 2010.
- ***By 2011, carbon dioxide (CO₂) emissions from petroleum combustion had dropped significantly below 1990 levels.*** Emissions from the industrial sector declined 61%, and emissions from the power sector declined by 93%. Due to high oil prices, many industrial operations switched to less expensive energy sources, such as natural gas and biomass, which has reduced emissions. Oil, coal, and nuclear generation have primarily been replaced by natural gas, biomass, and waste sources. As a result, per capita emissions in 2011 were similar to levels measured in 1980.

2011 Maine CO₂ Emissions from Combustion Sources, by Sector



Source: Maine DEP 5th Report on Progress Toward GHG Reduction Goals, January 2014

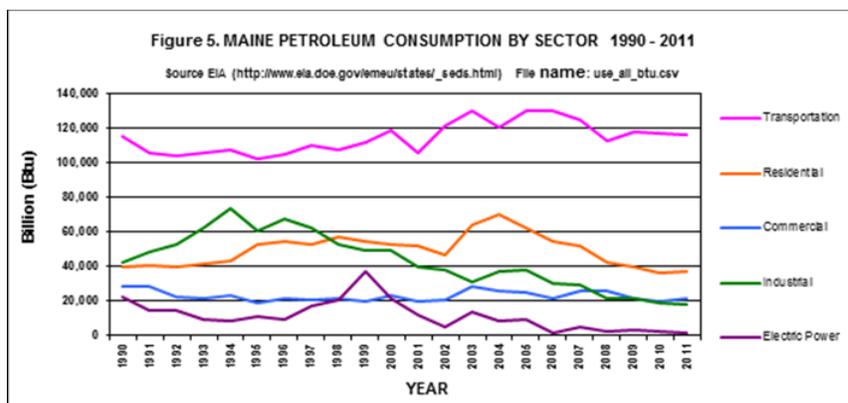
- ***U.S. EPA releases the Clean Power Plan.*** In June of 2014, the federal Environmental Protection Agency published its draft ‘Clean Power Plan’, a 130-page proposed rule for reducing CO₂ emissions nationwide, by setting emission limits on fossil fueled-fired electric generators, and by encouraging further development of low- and no-carbon generation. The rule is expected to be finalized this year, and will likely require further emission reductions from the power sector.
- ***The state continues to work to increase the availability of natural gas for residential, business, and electricity sectors.*** The Governor, the Energy Office, and the Maine Public Utilities Commission continue regional efforts to increase natural gas transmission capacity, and to access lower carbon-emitting energy sources from Northern Maine and Canada (*see electricity sector*). Maine relies on several Natural Gas Combined Cycle (NGCC) generation facilities for a significant portion of the state’s electric supply. NGCC facilities are among the cleanest fossil fuel-fired electricity generating units available, and these plants are a critical part of Maine’s efforts to maintain a diversified network of power sources for the state’s electricity needs. Increasing natural gas capacity, and enhanced transmission capacity for low-or no-carbon energy sources, will assist the state to continue reducing its GHG emissions.

Continuing Challenges

Achieving significant additional reductions in GHG emissions will be challenging in Maine.

Maine’s ongoing successful efforts in GHG reductions. The state has already made significant progress in GHG emission reductions; our CO₂ emissions are the 44th lowest of the 50 states ([Maine Energy Profile](#)). Maine has demonstrated leadership on this issue by its participation in the [Regional Greenhouse Gas Initiative](#); by increasing access to natural gas; and by the state’s energy efficiency efforts. We have, essentially, already harvested the ‘low hanging fruit’.

Maine’s rural population makes significant GHG emission reductions in the transportation sector challenging. In 2011, the DEP estimated that over 45% of remaining GHG emissions in Maine originated from the transportation sector.



Due to more stringent federal fuel efficiency standards, emissions from transportation sources have declined in recent years. However, over half of Maine's population resides in rural areas, the greatest proportion of any state in the country ([Maine Energy Profile](#)). This presents challenges for reducing vehicle miles traveled, as public transportation investments are significant relative to the benefits accrued.

2015 Maine Energy Goal for Greenhouse Gas Emissions

Continue the progress the state has made in reducing GHG emissions in the state.

Policy Recommendations

- Continue the state's current efforts to increase energy efficiency, and replace higher emitting energy sources with renewable energy sources and low carbon emitting natural gas.*** The state has recently devoted resources to accelerate progress towards low-carbon heating sources. In addition, additional funding has been made available for energy efficiency programs. Assisting Mainers to reduce their energy costs will also have the environmental benefit of reduced greenhouse gas emissions. In addition, the federal government has made fuel efficiency standards more stringent; has required the use of ethanol blended gasoline to reduce emissions; and has developed a plan for further reductions in GHG emissions from the state's power sector. Given time, all the efforts and initiatives already in place will result in additional reductions in GHG emissions.

Renewable Energy, Continued **Wind Energy Development**

The 2009 Comprehensive State Energy Plan did not discuss wind energy in isolation from other renewable energy sources. Substantive legislation on wind energy, including the expedited permitting process, and development of the state's wind energy goals (Title 35-A, §3404 (2)), occurred in 2008 and 2010 - [‘An Act to Implement Recommendations of the Governor’s Task Force on Wind Power Development’](#) (PL 661, 123rd Maine Legislature; sponsor Sen. Bartlett), and [‘An Act to Implement the Recommendations of the Governor’s Ocean Energy Task Force’](#) (PL 615, 124th Maine Legislature; sponsor Sen. Hobbins). In 2013, the 126th Legislature passed [‘An Act to Further Energy Independence for the State’](#) (PL 415; sponsor Rep. McGowan), which required the state's comprehensive energy plan to include a separate section on wind energy development (2 M.R.S.A §9(3)(C)(1)(c)). This section of the plan is to include the following:

- 1) The State's progress toward meeting the wind energy development goals established in Title 35-A, §3404 (2), including an assessment of the likelihood of achieving the goals and any recommended changes to the goals;
- 2) Examination of the permitting process and any recommended changes to the permitting process;
- 3) Identified successes in implementing the recommendations contained in the February 2008 final report of the Governor's Task Force on Wind Power Development created by executive order issued May 8, 2007;
- 4) A summary of tangible benefits provided by expedited wind energy developments, including, but not limited to, documentation of community benefits packages and community benefit agreement payments provided;
- 5) A review of the community benefits package requirement under Title 35-A, section 3454, subsection 2, the actual amount of negotiated community benefits packages relative to the statutorily required minimum amount and any recommended changes to community benefits package policies;
- 6) Projections of wind energy developers' plans, as well as technology trends and their state policy implications; and
- 7) Recommendations, including, but not limited to, identification of places within the State's unorganized and de-organized areas for inclusion in the expedited permitting area established pursuant to Title 35-A, chapter 34-A and the creation of an independent siting authority to consider wind energy development applications.

These specific requirements are incorporated in the ‘Maine Action Since the 2009 Plan’; ‘Continuing Challenges’, and ‘Policy Recommendations’ sections below.

Key Conclusions from 2009 Plan (*specific to wind energy*)

The plan concluded that:

- 1) Maine was poised to develop 2,000MW of land-based wind by 2015, and nearly 3,000MW of offshore and land-based wind by 2020;
- 2) Maine has significant offshore wind energy potential that could be developed over the next several decades. Since the state's capacity needs are only 2,000 to 3,000MW, offshore wind-generated electricity could become one of Maine's most economically productive exports to other states and regions;
- 3) The Governor's Wind Energy Task Force and Ocean Energy Task Force have resulted in a more streamlined wind power application process; increased interdepartmental communication and collaboration on wind farm applications; and increased efforts to balance environmental considerations with economic development.



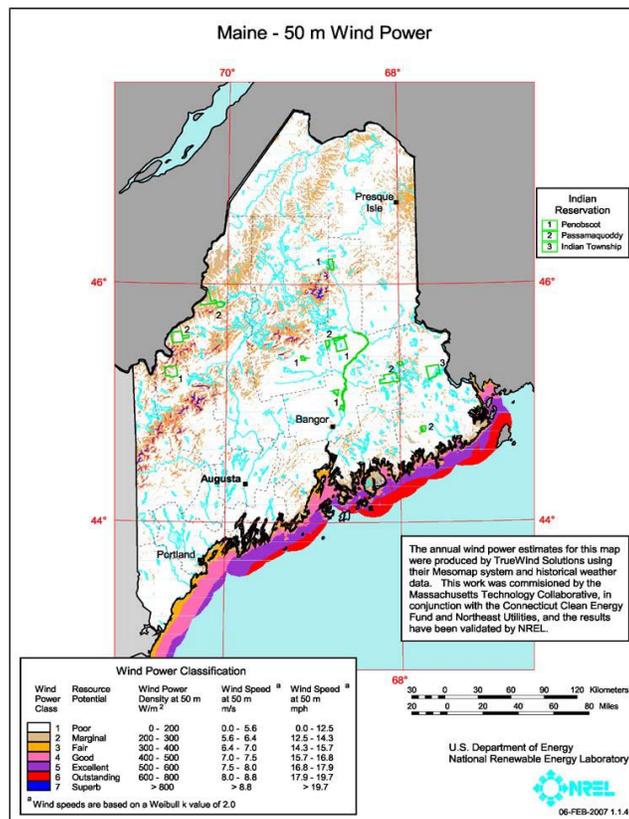
Primary Wind Energy Development Objectives of 2009 Plan

- Continue to advance Maine's position as a leader in responsible wind power development and maximize the tangible benefits that Maine people receive;
- Although not specifically part of the 2009 plan, the Legislature's passage of the [Wind Energy Act](#) (PL 661, 123rd Maine Legislature) established several wind energy goals for the state, including: 2,000MW installed capacity by 2015; 3,000MW installed capacity by 2020, including 300MW from offshore wind; and 8,000MW of installed capacity by 2030, of which 5,000MW is from offshore wind;
- Work with state agencies, the Governor's Ocean Energy Task Force, Maine Maritime Academy, and private developers to promote tidal power in Maine.

Maine Action Since Release of the 2009 Energy Plan (*specific to wind energy*)

- ***The state has implemented the recommendations of the 2008 Governor's Task Force on Wind Energy Development.*** The Task Force, in its [final report](#), made 38 recommendations which, if implemented, would encourage investment in wind energy development in Maine. The Task Force believed these actions would not create an unreasonable regulatory burden; would enable the state to become a leader in wind power development; and would protect Maine's 'quality of place' and natural resources.

Maine Wind Resource Map (from the Governor’s Task Force Report)



Source: U.S. Department of Energy, National Renewable Energy Laboratory (2007)

All 38 recommendations have been achieved through legislation, rulemaking, or other actions by state, federal or private organizations (See Wind Energy Appendix 1, located at the end of this section). Goals for and benefits of wind energy development have been formally established; permitting for wind energy projects has been streamlined, consolidated and standardized; efforts have been initiated to enhance the ability of Maine-based industry to participate in the wind power sector both through manufacturing of components and through servicing of equipment; benefits have been assured to host communities and to residents of the state; and efforts to encourage the development of Maine’s offshore wind energy potential are ongoing. Over the past few years, implementation of these recommendations has helped Maine become the leader in installed wind energy generation capacity per capita in the Northeast. Some of the specific actions taken are described in the bulleted list below.

- ***The Maine Legislature enacted legislation to encourage development of both land-based and offshore wind.*** In 2008 and 2010, the Legislature passed two major initiatives to encourage both on and offshore wind development - [‘An Act to Implement Recommendations of the Governor’s Task Force on Wind Power](#)

[Development](#)' (PL 661, 123rd Maine Legislature; sponsor Sen. Bartlett), and ['An Act to Implement the Recommendations of the Governor's Ocean Energy Task Force'](#) (PL 615, 124th Maine Legislature; sponsor Sen. Hobbins). These two bills established state goals for both land-based and offshore wind energy; established an expedited permitting process for land-based, grid-scale wind development; and, authorized the use of long term contracting by the Maine PUC to subsidize offshore wind energy and tidal energy pilot projects.

- **Maine has significantly increased the number of operating wind energy developments in the state.** As of December 2014, Maine has eleven land-based projects in operation, with a total (nameplate) generating capacity of 443.5 MW (See Wind Energy Appendix 2, located at the end of this section).
- **Additional grid-scale wind energy projects are under construction, permitted, under review, or proposed to the Department.** Three additional projects are under construction (217.65MW); five projects have been approved, but are either under appeal or subject to appeal (140MW); one project is under review (54MW) and pre-application meetings have been held for four other projects (approximately 550 MW). See Wind Energy Appendix 2.
- **Maine successfully approved installation of the first grid-connected tidal energy project in the country.** This project, developed by the [Ocean Renewable Power Company](#), deployed the first successful grid connected tidal power project in Coobscook Bay in 2012. The project was made possible in part by a long term, above market contract approved by the Public Utilities Commission pursuant to PL 615, 124th Maine Legislature, passed in 2010.
- **Small community scale wind projects have been proposed, and accepted into the Community Renewable Energy Pilot Program** (PL 329, 124th Legislature; sponsor Rep. W. MacDonald). The Maine Public Utilities Commission (MPUC) has certified Jonesport Wind (9.6MW); Fox Island Wind on Vinalhaven Island (4.5MW); Shamrock Wind in Fort Fairfield (10MW, 4 approved for the program); and Pigsah Wind in Clifton (9MW). To date, Fox Island Wind is the only project operating.
- **Wind developers are now required to compensate host and/or affected communities to grid scale projects by providing a community benefits package.** In 2010, the Legislature modified the [Wind Energy Act](#) (WEA) to require developers to include a Community Benefits Package (CBP), which would provide tangible benefits to host communities and affected neighboring communities (['An Act to Provide Predictable Benefits to Maine Communities that Host Wind Energy Developments'](#)), (PL 642, 124th Legislature; sponsor Sen. Mills). The CBP must have a total value of at least \$4,000 per turbine per year, averaged over 20 years. The CBP requirement is a permit condition for five projects which are either in construction or under appeal. No operational projects have, thus far, been required to meet this standard. A benefit package may include different categories of tangible benefits, such

as direct monetary payments to municipalities under Community Benefit Agreements; direct monetary payments to utility customers to reduce energy costs; and donations for land or natural resource conservation. A CBP may not include property tax payments. Current statute allows a developer some flexibility in designing a CBP. The minimum total value of the CBP is established by statute, but there is no language specifying how benefits are to be distributed. In addition, the total value may legally be reduced in certain circumstances. Non-profit developments and projects smaller than 20MW are exempt from the CBP requirement (35-A M.R.S.A. §3454(3)).

- **Data on tangible benefits to host communities, and affected neighboring communities, is now being collected by the Department of Environmental Protection.** Wind energy developers are required to provide tangible benefits to the host community or communities, and affected neighboring communities; however, reporting these benefit packages has not been a requirement of the permitting process until recently. Prior to the new licensing requirement, the DEP had some success in assimilating the value of tangible benefits from existing projects, but the data collected cannot be considered complete. Despite this limitation, the DEP can provide these minimum benefit figures:
 - *\$539 million of in-state construction expenditures for projects developed by First Wind;*
 - *Over \$19 million paid to municipalities and counties in the form of real estate property taxes;*
 - *Approximately \$1,138,000 per year in payments to host communities and affected neighboring communities under Community Benefit Agreements;*
 - *\$36,500 per year in college scholarships for students from host communities;*
 - *Projects approved but not yet constructed have the potential to add over \$2M per year in tangible benefits, not including direct tangible benefits in the form of construction jobs and in-state construction spending.*

The DEP will continue to pursue additional data for future reports from these first permitted projects through a voluntary annual reporting mechanism.

- **Projections of wind energy developers' plans and technology trends appear significant in terms of future wind energy development.** Based on information from various sources, ranging from pre-application meetings to news reports, there are between four and nine grid-scale wind energy developments in Maine which have not yet been formally proposed. These projects potentially represent over 1000 MW of new generating capacity. There are also between three and seven small-scale wind energy developments that have not been formally proposed, potentially representing as much as 90 MW of additional new generation capacity. It is expected that the rate at which new developments are proposed will ultimately depend on the federal government's action regarding the federal Production Tax Credit, which provides a generous financial incentive to developers of wind energy projects.

Industry and other factors that may influence the rate of development and that may require regulatory changes as they are proposed to be included in future projects include:

- *Taller towers*
- *On-site fabrication of some tower components*
- *More powerful turbines, with longer blades*
- *Longer expected lifespan for turbines*
- *Radar activated lighting*
- *Offshore turbines*
- *Greater emphasis on development of renewable energy due to federal regulatory changes*
- *Climate-related changes in species migration patterns and abundance*

These factors are discussed in detail in Wind Energy Appendix 3, located at the end of this section.

Continuing Challenges

Given where the state is in terms of operating, permitted, and proposed wind projects, it is highly unlikely that the state will meet the statutory goal of 2,000 MW of installed capacity by 2015.

Status of current wind development projects. The total generating capacity for all existing, permitted, proposed, and pending projects is 1403.8 megawatts. In light of this fact, it is unrealistic to expect that the 2015 goal of at least 2,000 megawatts of installed wind energy capacity will be met. Nevertheless, given the industry trend towards higher capacity turbines and larger projects, and given the rapid advances in offshore wind technology, the 2020 goal of 3,000 megawatts with 300 megawatts of offshore capacity, and the 2030 goal of 8,000 megawatts with 5,000 megawatts of offshore capacity, remain technologically feasible. Development standards and application submission requirements for offshore wind energy projects are less stringent than for land-based developments, so it is possible that, if offshore projects are proposed, they would progress more quickly from planning through review and construction than comparable land-based development.

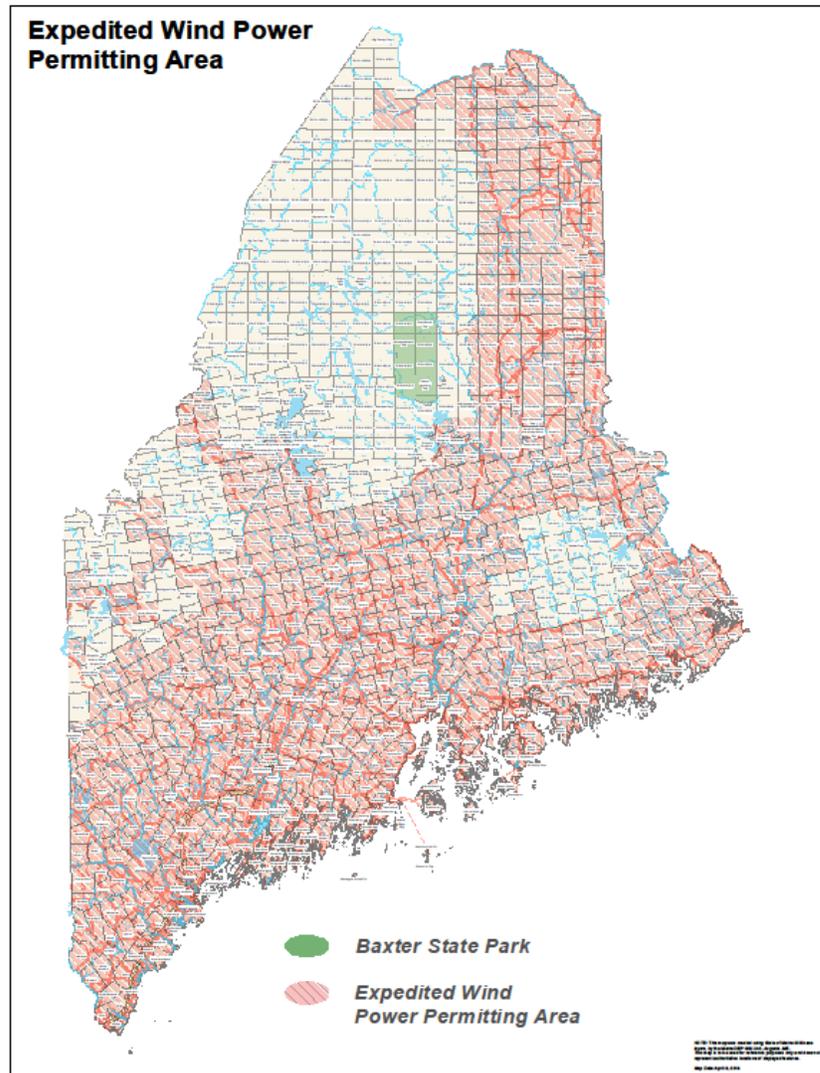
Every operating and permitted grid scale wind project has been the subject of appeals and/or lawsuits. Clarification of statutory language in the original wind energy act would benefit developers and regulators alike, and may reduce time and resources spent on appeals and other legal challenges.

Department of Environmental Protection review of the current permitting process. The DEP has reviewed the permitting process for expedited wind energy

developments, and has several recommendations to make the permitting process more consistent and less burdensome, both for applicants and for the Department. The Department’s recommendations for these areas of consideration are listed in the policy recommendations section, and are discussed in more detail in Wind Energy Appendix 2.

The possibility of future expansion of the state’s designated expedited permitting areas. Below is an illustration showing the expedited permitting areas of the state.

Map of Expedited Permitting Areas for Wind Energy Development



The portion of the expedited permitting area located in the unorganized and de-organized parts of the state (the UT) includes “[p]ortions of the unorganized territories that are generally on the fringe of the [LUPC] jurisdiction where unorganized townships are intermingled with plantations and organized towns, but excluding 1) broad areas that encompass concentrations of ecological, recreational and/or scenic values that are

among the most significant in the jurisdiction; and 2) smaller areas (primarily, but not necessarily limited to, P-MA zones) that possess ecological, recreational and scenic values of particular significance” ([Report of the Governor’s Task Force on Wind Power Development](#), Feb. 2008, page 18, footnote 2). Despite these constraints, which would seem to limit the expedited area in the UT to the least sensitive portions thereof, and despite the further constraints imposed by the results of scenic impact analyses and other resource impact analyses during the site investigation and application review processes, every permit approval of a wind energy development has been appealed by individuals who feel that even in these areas of less significant resource value, the impact of a wind energy development is unduly adverse. Therefore, the Department believes any attempt to expand the expedited permitting area would be met with very strong resistance at the local level, and possibly at the state Legislature. Given the current level of development, it seems that there is ample opportunity for new development in the existing expedited area sufficient to reach the 2020 and 2030 statutory goals for wind energy development, especially considering the greater generating capacity of modern turbines.

Consideration of an independent siting authority to review wind energy development applications. The DEP has considered the advisability and desirability of an independent siting authority to consider wind energy development applications. While such an authority would provide welcome relief for staff currently involved in the review of proposed wind energy developments, there is insufficient development pressure to justify the increase in resources (i.e., staffing) that would be required for such a new organization. With uncertainty surrounding the future of the Production Tax Credit (PTC), and given the dependence of many wind energy developers on PTC-induced reductions in operating costs as a financial incentive to pursue a project, there is no way to predict the workload relating to these permits going forward. Finally, establishing a new organization to review permits would in no way assure that the number of legal challenges would diminish.

Wind energy should be part of an overall mix of cost effective renewable energy generation, rather than the prioritized source of renewable energy for the state.

Holistic Renewables Policy. With the passage of the [Wind Energy Act](#) in 2008 (PL 661, 123rd Maine Legislature; sponsor Sen. Bartlett), the Maine Legislature made a decision to prioritize development of wind energy. Energy market developments since release of the 2009 Energy Plan (i.e., the shale oil and gas revolution in the U.S., which has made low cost natural gas available, and contributed to the recent decline in global oil prices) have demonstrated that prioritizing any one energy source creates cost exposure. A more inclusive, integrated renewable energy policy that encourages the most cost-effective options would diversify the state’s energy base, encourage renewable energy development, and accomplish this at a lower cost to all Maine ratepayers.

2015 Maine Goal for Wind Energy Development

Clarify the statutory language regarding expedited permitting to assist both applicants and state regulators, and to minimize the number of projects that undergo appeals and other legal challenges; revisit state's wind energy development goals with the goal of developing a more inclusive and integrated renewable energy policy.

Policy Recommendations

- ❖ ***Explore and/or adopt changes to the permitting requirements for both grid-scale and smaller wind power development projects.*** The recommendations listed below would provide more certainty to both applicants and regulators (the DEP), and would perhaps reduce the number of appeals and lawsuits associated with wind energy developments. Further discussion of these recommendations can be found in Wind Energy Appendix 4, located at the end of this section.
 - *More time is needed for the Department to adequately and thoroughly review applications for wind energy developments.*
 - *Current law does not provide for adequate review of small scale wind energy developments. (less than 3 acres).*
 - *The studies on which the Department relies to identify the significance of Great Ponds as scenic resources for project impact review are outdated.*
 - *The Department should consider adding standards for scenic impacts to locally significant scenic resources.*
 - *The Department should consider adding standards for evaluation of potential impacts to culturally significant sites and activities.*
 - *The Department should formalize standards for shadow flicker impacts.*
 - *The Department should investigate the appropriateness of developing standards for impacts from low frequency sound generated by wind energy developments.*
 - *The Department should develop a list of pre-qualified contractors that have expertise in financial documentation to provide analysis of financial capacity demonstrations and financial guarantees relating to decommissioning costs.*
 - *The Department should require applicants to consider the potential effects of climate change on a project over its designed operational lifetime.*

- *The Department should conduct rulemaking to formalize the requirements regarding a decommissioning plan for a proposed wind energy development.*
- ❖ ***The process by which Maine host communities and affected neighboring communities receive the required community benefit packages could be improved to maximize allocation of benefits to those most affected.*** As stated above, current statute requires developers to provide a minimum package, but the benefits are: 1) not for the length of the project, and 2) benefits don't always accrue to all affected communities. The DEP has identified several opportunities to improve these benefits packages and their distribution:
 - *The minimum per-turbine value of a CBP is fixed in statute. This value should be allowed to grow over the life of a project, either with inflation or in some way tied to the value or physical size or generation capacity of the turbines proposed for a project.*
 - *Payments to host communities and affected neighboring communities under a CBP should endure for the life of the project, instead of sunseting after 20 years. The annual payments should be required to at least meet the statutory minimum value, rather than allowing averaging over some longer period.*
 - *There should be a requirement that some minimum portion of a CBP be actually distributed to or invested in each individual host community and affected neighboring communities for a project, rather than allowing the developer to potentially choose to ignore one or more host communities for a project in favor of others.*
 - *There is no definition for an affected neighboring community in statute or rule. The Department should establish a definition to eliminate confusion during project design and review.*
- ❖ ***Revisit wind goals with the intent of establishing an inclusive, integrated renewable energy policy in the state.*** The concept of a comprehensive, integrated renewable energy policy for Maine, which is aligned toward the state's greatest challenges – reducing electricity costs for Maine businesses and households - has been discussed in the renewable energy section. The statutory goals for wind energy should be modified to align with such an inclusive, integrated policy.

Wind Energy Appendix 1 - Implemented Recommendations of the Task Force on Wind Power Development

Below are the 38 specific recommendations listed in the Report of the Governor's Task Force on Wind Power Development, issued in February 2008.

- ✓ Track progress toward achievement of state wind energy goals (state energy plan update)
- ✓ Clarify the benefits of wind power projects (Wind Energy Act)
- ✓ Identify areas where permitting for wind power development will be streamlined (expedited area - Wind Energy Act)
- ✓ Streamline permitting (Wind Energy Act)
- ✓ Within the area where permitting will be expedited in the unorganized territories, eliminate LURC's rezoning process with respect to grid-scale wind power project applications (expedited area-Wind Energy Act)
- ✓ Expedite permit processing at DEP (Wind Energy Act)
- ✓ Add energy expertise to DEP and LURC by adding the chair of the PUC or his or her designee as a non-voting member of BEP and LURC (Wind Energy Act)
- ✓ Supplement staff resources and expertise available for permit processing (consultants)
- ✓ Adopt and adhere to timelines for permit review in LURC territory (DEP now reviews all applications)
- ✓ Harmonize the regulatory processes used by DEP and LURC (DEP now reviews all applications)
- ✓ Refine LURC's approach and standards for the review of certain issues (authority transferred to DEP)
- ✓ Clarify state approach to noise and shadow flicker issues (administrative rules, Ch. 375(10)(noise); shadow flicker in permit submission requirements but further clarification recommended)
- ✓ Refine LURC's Comprehensive Land Use Plan (DEP now reviews all applications)
- ✓ Ensure tangible benefits for Maine people (statute for expedited)
- ✓ Ensure that all commercial wind power projects meet state rules regarding noise and setback (statute)
- ✓ Develop a model municipal wind power ordinance (available at DEP web page)
- ✓ Remove obstacles at the pre-construction stage (PUC administrative rules Ch. 313 and 324)
- ✓ Provide a data clearinghouse (in process at regional level – ([Northeast Wind Resource Center](#)))
- ✓ Provide financial incentives/economic assistance (Federal Production Tax Credit [PTC]; tax increment financing [TIF])

- ✓ Designate a facilitator within DOE/PUC to engage Maine schools in the Wind for Schools Program (GEO sponsored [energy education program](#))
- ✓ Enhance the involvement of Maine's education system ([UMaine Renewable Energy minors, wind turbine blade testing facility](#) at UMaine)
- ✓ Continue current state energy policy-related efforts to ensure that diversification of the state's energy mix and development of transmission infrastructure benefit Maine (GEO, ongoing)
- ✓ Encourage developers' efforts to provide direct economic benefits to communities that host grid-scale wind power projects through preferential access to or favorable rates for power generated by the project (Spruce Mountain Wind)
- ✓ Actively explore opportunities to site and support the growth of wind energy-related businesses in Maine ([Maine Ocean & Wind Industry Initiative](#))
- ✓ Encourage public-private partnerships to develop workforce capacity in Maine to support the wind energy industry (Maine Ocean & Wind Industry Initiative)
- ✓ Explore provision of incentives to communities that host grid-scale wind power projects through PUC's Efficiency Maine Program and the Carbon Savings Trust Fund (fund replaced with [RGGI trust fund](#))
- ✓ To the extent Maine tribes wish to do so, explore potential state roles, if any, in addressing financing-related barriers unique to Maine tribes interested in development of commercial wind power facilities (DECD)
- ✓ Retain current state tax incentives for wind energy development (35-A MRSA §10112 REPEALED)
- ✓ Work with Maine's Congressional delegation to secure extension of the federal Production Tax Credit (PTC extended thru 2014)
- ✓ Aggressively pursue development of Maine's offshore wind potential (minimal restrictions on development)
- ✓ Streamline Maine's environmental laws as applied to offshore wind energy projects (statute provides for minimal reviews)
- ✓ Complete development of rules regarding leasing for large-scale projects and evaluate the potential for other wind power-related improvements to the state's submerged lands leasing program (12 MRSA §1862(13)(B)(6))
- ✓ Promote dialogue with coastal stakeholders about near shore and offshore wind power siting (Wind Energy Conference 2011)
- ✓ Develop guidance regarding siting of wind power development on state-owned submerged lands (NRPA)
- ✓ Monitor and continue involvement in federal regulatory program development regarding offshore wind energy development (finalized 2009, 2011, 2013)
- ✓ Help position Maine's universities and colleges, and private engineering and construction firms to become leaders in offshore wind power ([DeepCWind Consortium](#))

- ✓ Increase understanding of Maine's coastal wind resource (DMR, MGS ongoing)
- ✓ Track technical advances in the wind energy industry with an eye toward potential regulatory and/or policy implications (GEO, ongoing)

Wind Energy Appendix 2 - Progress toward Meeting Wind Energy Development Goals

Operating Wind Energy Developments as of December, 2014

Project Name	Developer	Town	Towers	Capacity	Start Date
Mars Hill Wind	First Wind	Mars Hill	28	42MW	Mar 2007
Beaver Ridge Wind	Patriot Renewables	Freedom	3	4.5MW	Nov 2008
Stetson Wind I	First Wind	T8R3 NBPP	38	57MW	Jan 2009
Fox Islands Wind	Fox Islands Wind LLC	Vinalhaven	3	4.5MW	Dec 2009
Stetson Wind II	First Wind	T8R4 NBPP	17	25.5MW	Mar 2010
Kibby Mountain Wind	TransCanada Maine LLC	Kibby and Skinner Twps.	44	132MW	Nov 2010
Rollins Mountain Wind	First Wind	Lincoln	40	60MW	July 2011
Record Hill Wind	Independence Wind	Roxbury	22	55MW	Dec 2011
Spruce Mountain Wind	Patriot Renewables	Woodstock	10	20MW	Dec 2011
Bull Hill Wind	First Wind	T16 MD BPP	19	34.2MW	Oct 2012
Saddleback Ridge Wind*	Patriot Renewables	Carthage	3	8.55MW	Dec 2014

*Saddleback Ridge Wind partially completed, with 3 of 12 proposed turbines operating.

Wind Energy Developments Under Construction as of December 2014

Project Name	Developer	Town	Towers	Capacity	Start Date
Oakfield Wind	First Wind	Oakfield	50	150MW	2015
Passadumkeag Wind	Quantum Utility Generation	Carthage	14	42MW	2016
Saddleback Ridge Wind*	Patriot Renewables	Carthage	9	25.65MW	2015

*Saddleback Ridge Wind partially completed, with 3 of 12 proposed turbines operating.

Wind Energy Developments Under Appeal or Open to Appeal as of December 2014

Project Name	Developer	Town	Towers	Capacity	Start Date
Bingham Wind*	First Wind	Bingham	28	42MW	2016
Canton Mountain Wind*	Patriot Renewables	Canton	3	4.5MW	2016
Bowers Mountain Wind	First Wind	Carroll Plt., Kossuth Twp.	16	48MW	2016
Pisgah Mountain Wind	Pisgah Mountain LLC	Clifton	5	12.5MW	2016
Kibby Mountain Wind II	TransCanada Maine LLC	Kibby and Skinner Twps.	11	33MW	2016

*Bingham Wind and Canton Mountain Wind are awaiting expiration of the appeal window.

Wind Energy Developments Under Department Review

Project Name	Developer	Town	Towers	Capacity	Start Date
Hancock Wind	First Wind	Aurora	18	54MW	2017

Wind Energy Developments Not Yet Submitted for Review

Project Name	Developer	Town	Towers	Capacity	Start Date
Weaver Wind	First Wind	Eastbrook	33	99MW	2018
Fletcher Mountain Wind	Iberdrola Renewables	Concord Twp.	30	99.9MW	2018
Moscow Wind	Patriot Renewables	Moscow	25	75MW	2018
Number Nine Wind	Iberdrola Renewables	T3 R8	100	275MW	2018

Wind Energy Appendix 3 - Projections of Wind Energy Developers' Plans; Technology Trends, and Their State Policy Implications

- **Taller towers**

Advances in materials, engineering and technology will allow project designers to achieve greater overall performance and higher capacity factors at wind power projects by allowing access to more reliable and stronger winds available at greater distances from the ground surface. Higher towers may be visible at greater distances, and may warrant changes to some criteria for impacts to scenic resources. Higher towers may also result in greater intrusion of rotors into travel corridors for migrating birds and bats, and may therefore present a greater risk to wildlife.

- **On-site fabrication of some tower components**

Tower height is limited by the strength of the tower sections. Taller towers are heavier, and the lower sections must be strong enough to support the upper sections and the nacelle, while enduring lateral stresses from the wind at the project site. The strength of the sections is related to their diameter, and the maximum size available has been limited to the maximum size that can be transported on trucks from the manufacturer to the project site. New technology enables tower sections to be fabricated on site from sheet stock, in a temporary manufacturing facility. It is possible that such temporary facilities will have impacts not foreseen for traditional wind energy developments. Rulemaking or legislative action may be warranted to ensure that no undue impacts result from a project that utilizes this technology.

- **More powerful turbines, with longer blades**

Existing wind power facilities in Maine utilize turbines rated typically from 1.5 to 2.85 megawatts. Projects currently approved but not yet constructed will utilize turbines rated at 3.0 to 3.3 megawatts. Manufacturers are delivering turbines rated at 6.0 megawatts for offshore installations, and there is no reason to presume that the trend towards larger and more powerful equipment will not continue. More powerful turbines require longer blades for operation, but they spin at slower speeds. This may reduce a project's potential impacts on birds and bats, and may increase project visibility from scenic resources, even if there is not a corresponding increase in tower height. This potential for increased scenic impact should be addressed by rule.

- **Longer expected lifespan for turbines**

Improvements in turbine component design and materials are increasing manufacturers' estimates of the lifespan of units in the field. Some older projects with older technology have experienced decays in power output that have affected the economic viability of the projects, shortening their operating lifespan. Typically projects have been projected to operate for at least 20 years, but in some instances power production decreased sufficiently by year 15 to render the project unprofitable. Recent research in the United Kingdom indicates that the turbines

that comprise their current fleet of wind generators are expected to last 25 years or more, while maintaining a high power output. There is no reason not to expect that further advances will continue to extend the lifespan of new generations of turbines beyond that of the currently available models. The Community Benefit requirements for wind energy projects should be amended to reflect this potential for project lifespans greater than the 20 years currently mandated in statute.

- **Radar activated lighting**

The Federal Aviation Administration (FAA) requires avoidance lighting for all tower structures above a certain height. Lights must flash at prescribed intervals to assure structure visibility to approaching aircraft. The FAA has been working on standards for radar-activated lighting, which would sense the presence of aircraft in the vicinity of a project, and activate the lights only for the period that the aircraft was within a certain distance of the project, thus reducing project visibility and scenic impact at night. Applicants for new grid-scale wind energy projects are required to employ the “best practical mitigation” to all project impacts, and this would likely include radar-activated lighting for these newer projects. It may be appropriate to retroactively require existing projects to upgrade their FAA-required avoidance lighting to a radar-activated system to mitigate existing nighttime visual impacts.

- **Offshore turbines**

Offshore wind energy projects are being developed in great number around the world, and there is increasing pressure for expanded development of this resource. Maine’s wind energy goals include development of at least 300 megawatts of offshore generation capacity by 2020, and at least 5,000 megawatts of offshore generation capacity by 2030. If development of offshore wind energy projects proceeds at a pace sufficient to meet the state goals, there will be a corresponding need to develop sufficient transmission infrastructure to accept and integrate the new power into the regional electricity distribution grid.

- **Greater emphasis on development of renewable energy due to federal regulatory changes**

Federal policy on greenhouse gas emissions and climate change, and related rulemaking by the Environmental Protection Agency and other federal regulatory agencies, is leading the energy production sector away from its traditional reliance on fossil fuels for generation, and making renewable energy, such as wind power, more attractive. If this trend continues there will be increasing pressure on Maine to continue to expand the amount of wind energy production in the state, along with the associated infrastructure necessary to bring the electricity generated to market. If demand for new development becomes strong enough, it may be necessary to augment Department staff to accommodate the increased workload.

- **Climate-related changes in species migration patterns and abundance**

It is not possible to predict with any certainty the specific effects that a changing climate may have on the local environment around a wind power project, or whether any such effects may significantly influence or be influenced by the construction and operation of the project. It is appropriate therefore, for project design to take into account the possible effects of a changing climate, including any potential changes in local species abundance and habits, as well as the possibility that new species may migrate to the area in response to pressures elsewhere. In some instances, a protected species not documented during environmental analyses conducted in the pre-development site evaluation phases of a project might colonize or otherwise utilize the project area after licensing. It is appropriate that in such an instance the Department should have a mechanism available to adequately address any potential adverse impacts to the species in question.

Wind Energy Appendix 4 – Recommended Changes to the Permitting Process for Wind Energy Developments

- ***More time is needed for the Department to adequately and thoroughly review applications for wind energy developments.*** The statutory time limit for processing an application for a Grid-Scale Wind Energy Development is 180 days, with an option to extend that period by placing a project “on hold”, upon mutual agreement of the applicant and the DEP. The average time the needed to process these applications is 314 days, with some projects taking much longer. Extending the statutory deadline would give developers more realistic expectations when submitting applications, and allow regulators the necessary time to conduct public hearings and properly evaluate review comments and other information collected during the review process. It would also provide greater opportunity for public comment and participation during the review process. The DEP recommends the deadline be extended from 185 days to 365 days.
- ***Current law does not provide for adequate review of small scale wind energy developments.*** A small-scale wind energy development is only small in the sense that it does not alter enough land area to qualify as a grid-scale wind energy development. The towers, turbines and transmission lines used are generally the same size as grid-scale developments, but fewer in number. Nevertheless, the level of review is significantly reduced for small-scale projects, and statutory requirements regarding project operation are considerably less stringent. Small scale wind projects are not required to have a decommissioning plan in place, nor are they required to provide financial assurance for decommissioning. There is no review of the site’s geology; no requirement for a Spill Prevention, Containment and Countermeasure plan; and no requirement for a fire protection plan. Scenic impacts from small scale wind energy developments are not subject to review. Because a small-scale project is not reviewed under Site Law, it is not required to meet the No Adverse Effects rule (CMR 06-096 Chapter 375), which would require review of potential impacts to birds and bats and other wildlife. There is also no requirement for a Community Benefits Package to provide tangible benefits to host communities and affected neighboring communities. The Wind Energy Act should be amended to require more stringent standards for small-scale wind energy developments.
- ***The studies on which the state relies to identify the significance of Great Ponds as scenic resources for project impact review are outdated.*** The Wind Energy Act identifies a great pond as a scenic resource of state or national significance based on its rating on one of two studies: Maine’s Finest Lakes, published in October of 1989; and the Maine Wildlands Lakes Assessment, published in June of 1987. Neither of these studies was exhaustive, and in the more than 25 years since they were published, considerable development has taken place on some of the lakes in the studies. It is not unreasonable to expect that a lake that was remote and undeveloped in 1987 may in the interim have been developed with one or more lakeside subdivisions, and that this change may affect its status as a scenic resource under the criteria used in

the original study. The Wind Energy Act should be amended to require an applicant for a wind energy development to fund scenic resource evaluation studies of all great ponds within an 8 mile radius of the proposed development, using the same standards that were used in the original 1987 and 1989 studies. The studies should be carried out by independent evaluators under contract to the state, who can demonstrate that they have no conflict of interest with the developer.

- ***The state should consider adding standards for scenic impacts to locally significant scenic resources.*** Some communities have designated local scenic resources, which may be significant to the local economy or which may be historically significant or otherwise significant at the local level. This type of resource is not protected under the Wind Energy Act, and is therefore not addressed by DEP's review of potential scenic impacts from a proposed wind energy project. The state should consider whether it is appropriate to protect such scenic resources from unduly adverse scenic impacts.
- ***The state should consider adding standards for evaluation of a project's potential impacts to culturally significant sites and activities.*** The DEP has received comments from citizens concerned about the potential for development and operation of a wind energy project to interfere with traditional Native American religious ceremonies, or culturally significant sites with historical significance potentially dating back thousands of years. The Wind Energy Act does not provide for consideration of potential impacts to such cultural resources during the application review process. The state should consider the appropriateness of regulating project impacts to culturally significant sites and activities, and if appropriate, propose legislation or rulemaking to address the issue.
- ***The DEP should formalize standards for shadow flicker impacts.*** There is no quantifiable statutory or regulatory standard for impacts from shadow flicker. Department policy has been to use the industry standard of no more than 30 hours per year of shadow flicker at an affected protected location as a limit. DEP policy has also been to allow developers to use easements to demonstrate that a project has been designed and sited to avoid undue adverse shadow flicker effects as required by the Wind Energy Act. However, while Chapter 375 does provide for the use of easements in demonstrating compliance with sound limits, there is no provision for the use of easements in avoiding and minimizing shadow flicker impacts. The DEP should formalize the annual limit for shadow flicker impacts in rule, and should conduct rulemaking to either specifically allow or specifically disallow the use of easements to address shadow flicker impacts.
- ***The DEP should investigate the appropriateness of developing standards for impacts from low frequency sound generated by wind energy developments.*** Currently, DEP's authority to regulate noise from a project extends only to audible sounds generated by the project in question. During the application review period, citizens have raised concerns regarding impacts on human health from sonic vibrations at lower frequencies than the human ear can discern (infrasound),

which may be generated by wind energy developments. Published studies regarding the effects of infrasound from wind energy projects have found contradictory results, and the subject is very controversial in public discussions about wind energy. The DEP should review the published literature and independently determine the appropriateness of establishing a standard for allowable impacts from infrasound or other low-frequency sonic vibrations.

- ***The state should develop a list of pre-qualified contractors that have expertise in financial documentation to provide analysis of financial capacity demonstrations and financial guarantees relating to decommissioning costs.*** An applicant for a permit for a grid-scale energy development is required to show assurance that it has sufficient funds to develop the project as proposed, and to provide financial assurance for decommissioning costs (regardless of the point in time when decommissioning takes place). In order to ensure the accuracy and sufficiency of these assurances, the DEP should establish a list of pre-qualified contractors with expertise in the area of financial records and financial assurance. During project review, a pre-qualified independent contractor with no conflict of interest should review the financial submissions to determine their accuracy and sufficiency, in order to protect the interests of the state over the lifetime of these projects. The cost of the review should be borne by the developer.
- ***The state should require applicants to consider the potential effects of climate change on a project over its designed operational lifetime.*** To maintain consistency with ongoing statewide efforts to mitigate and adapt to the effects of a changing climate, developers of wind energy projects should be required to consider the potential effects of climate change on their proposed project design. The potential for such effects as increased frequency and intensity of storm events and consequent changes to runoff volumes; changes to migration habits for affected species of birds, bats and other wildlife; and changes in the wind resource itself should all be considered as reasonable possibilities during project design and review. This change should be accomplished through a modification of the application submission requirements.
- ***The DEP should conduct rulemaking to formalize decommissioning plan requirements for a proposed wind energy development.*** To allay public fears of “rusting hulks” on Maine’s mountaintops, to protect project sites and their vicinity from degradation due to leakage of lubricants, hydraulic fluids and other hazardous materials that might be present, and to protect the state against any potential financial liability with respect to an abandoned project, it is essential that a proposal for a wind energy development should include provisions for eventual decommissioning of the project and restoration of the site. Currently, an applicant for a grid scale wind energy development permit is required to submit a decommissioning plan as part of the application package, but there are no standards defining what constitutes an appropriate and sufficient plan. The DEP should conduct rulemaking to create formal standards for decommissioning plans for wind energy developments.

Transportation Sector

Key Conclusions from 2009 Plan

- 1) In 2007, Maine was effectively 100% dependent on petroleum to fuel rail, truck, bus, marine, and automobile transportation fleets;
- 2) Unprecedented increases in the price of gasoline and diesel fuel in 2008 were taxing the budgets of Maine residents, and adversely affecting the viability of Maine businesses and industry;
- 3) Maine's economy had quickly become vulnerable to volatile energy costs over which the state had no control, resulting in the export of billions of dollars from the state just to pay for foreign oil.

Primary Transportation Sector Objectives of 2009 Plan

- Support and enhance state and private sector efforts for education and awareness of alternative transportation options and promotion of a low carbon fuel standard and fuel efficient vehicles;
- Support state transportation investments and encourage private investment for enhanced passenger and freight transportation;
- Encourage greater coordination of land use and transportation policy to reduce vehicle miles traveled and decrease greenhouse gas emissions;
- Encourage the development of ethanol-blend fueling stations.

Maine Action Since Release of the 2009 Energy Plan

- ***The use of ethanol has increased in Maine's transportation sector.*** Since the 2009 Energy Plan, the U.S. government has maintained requirements for the renewable fuel standard. This blending, coupled with increased fuel efficiency standards, has resulted in decreased transportation-related GHG emissions.
- ***Maine has reintroduced interstate passenger rail service, by establishing the Downeaster service from Portland to Boston.*** The rail service has recently been expanded, and now travels to Freeport and Brunswick as well as Portland.
- ***The state has assessed petroleum use in the transportation sector, including the greenhouse gas emissions produced.*** According to the Maine DEP, greenhouse gas emissions have declined well below 1990 levels. However, of the emissions remaining, the DEP estimates that over 45% originate from the transportation sector.

- ***The state has operated alternatively fueled transportation pilot projects in several locations around the state.*** The state has operated a successful propane-fueled transit fleet (the Island Explorer) in the Bar Harbor/Acadia area since 1998. In 2006, the Portland METRO added compressed natural gas (CNG) busses, as well as a CNG fueling station; in 2011, the METRO added several clean diesel busses using Recovery Act and MDOT funds. In 2014, the Casco Bay Ferry Line began using a 20% biodiesel blend (from vegetable oil), which has fewer emissions, is slightly less expensive than regular diesel, and enhances engine performance & extends engine life.
- ***The state is expanding bus service to the Lewiston/Auburn area.*** In 2015, MaineDOT will construct the Downtown Auburn Transportation Center that will serve the Lewiston-Auburn fixed route bus service, Citylink. The bus station will also provide a connection for passenger transfers to intercity transit. The station will be 1500 square feet with room for a warm seating area, two public restrooms and a break area for drivers. In 2016, MaineDOT also will construct an intercity bus terminal at Exit 75 in Auburn. The station will be serviced by Concord Coach Lines and offer on-site parking and bus connections to Portland/Boston.

Continuing Challenges

While the transportation sector comprises a significant portion of the state's petroleum consumption, most transportation infrastructure investments, from increasing public transportation, to greater use of electric vehicles, have significant capital and operating costs, and Maine does not currently have the population density to support many of these investments.

Maine's highly rural population. Maine has the distinction of having the greatest proportion of its residents residing in rural areas of *any state* in the country ([Maine Energy Profile](#)). Other states may have very large rural spaces, but most of the population does not reside in these areas. Approximately 800,000 of Maine's 1.3 million residents live outside the more densely populated areas. This creates significant challenges regarding capital investment decisions for public transit or for alternative vehicle infrastructure.

In addition to a highly rural population, Maine also has the oldest population, and it is aging faster than any other state. By 2030, it is expected that one out of every four Mainers will be over 65. In 2010, 28% of the state's over-65 population resided in a community served by fixed route public transportation, or a larger flex-route transit system. That means that almost three quarters of the state's seniors live in communities not served by public transit ([Maine Statewide Strategic Transit Plan 2025](#)). A passenger survey conducted for the transit plan revealed that seniors would use public transit, if it were available to them.

Technology for alternatively fueled vehicles has not progressed sufficiently for widespread adoption in the state. Electric vehicle technology has not developed enough to be practical for most Mainers. Battery life in colder climates, limited travel range on a single charge, and higher up-front costs currently make this transportation choice not a viable option for many Maine households. Likewise, the additional upfront costs of alternatively fueled vehicles for commercial fleets and long haul trucking, along with a lack of refueling infrastructure, have prevented more widespread adoption of alternatives to diesel.

In an effort to pilot new technology, MaineDOT purchased six hybrid gas/electric vehicles in 2010 for public transit agencies in the mid-coast and southern Maine region. The price of each vehicle was more than \$50,000 over the price of a conventionally fueled 16 passenger bus. The hybrid/electric technology has also proven to be very problematic. Hybrid vehicle repairs are costly and require transit providers to travel to another state for repairs. Until hybrid technology for buses improves, MaineDOT does not anticipate purchasing additional vehicles.

Rail upgrades and new investments for both freight and passengers are costly, but have potential for growth in targeted areas. MaineDOT, in conjunction with the Northern New England Passenger Rail Authority, is currently proposing additional upgrades to the existing rail system to improve service, including the Brunswick layover facility, a siding at Royal Jct., construction of a wye track in Portland, and connections to the Thompson's Point Development Project. Due to the complexity in establishing new passenger rail service in Maine, MaineDOT convened a Passenger Rail Advisory Council in 2014. The Council's charter is to advise the State; develop criteria for evaluating rail projects; and, to prioritize current and future investments in passenger rail service as appropriate between the major economic and population centers of this State.

2015 Maine Energy Goal for the Transportation Sector

Make strategic investments in transportation infrastructure that the state's population density and economy will support. Cost-effective investments can reduce the sector's energy use, and provide alternatives to petroleum for targeted applications.

Policy Recommendations

- ❖ **Follow the Department of Transportation's plan to make targeted rail investments to increase access for shipping freight by rail, and to augment the Downeaster passenger rail service.** MaineDOT's [three year work plan](#) has numerous investments in rail service planned for both freight and passengers. Freight rail investments are ranked by economic and efficiency criteria, with input from local stakeholders, railroad operators and the public. Passenger rail investments are prioritized by MaineDOT and the Northern New England Passenger Rail Authority (NNEPRA). The DOT is also developing a long term [state rail plan](#) to determine what

investments are most promising from cost, safety, reliability, ridership, and economic development perspectives.

- ❖ ***Pursue public-private partnerships to increase inter-city bus service, and intermodal transportation in targeted locations and expand alternative transportation.*** MaineDOT has conducted a [feasibility study](#) to evaluate the options for expanding bus and rail service in selected locations, such as Lewiston to Portland and beyond. While most of these options have significant capital and operating costs, there may be opportunities to explore public-private partnerships for establishing a commuter or feeder service in selected locations. This infrastructure can be targeted to improve access to pedestrian, bike, and alternative transportation networks.
- ❖ ***Explore opportunities for public-private partnerships with large fleet owners to transition to alternative fuels, including natural gas, propane, and electricity.*** Fleet vehicles provide the state's best opportunity for adoption of alternatively fueled vehicles, as the cost of centrally located refueling infrastructure is lower. However, the cost of converting or purchasing these more expensive vehicles poses the greatest challenge to increased use. Public-private partnerships should be explored to increase visibility of these alternatives.
- ❖ ***Explore the opportunities to convert the state's ferry system to alternative fuels, including LNG.*** This option has been explored by the state of [Washington](#), including a [feasibility analysis](#). Assessments of risk and safety have also been performed, and presently the state of Washington is seeking approval from the U.S. Coast Guard to convert their ferry system to LNG. Conversion from diesel could provide [cost savings as well as environmental benefits](#). Maine should explore this option for the state's ferry system.

State Government (*Lead by Example*) Sector

Key Conclusions from 2009 Plan

- 1) The rapid increase in heating oil, gasoline and diesel prices, and their deleterious effects on the state's economy, underscored the need to plan for energy emergencies – whether the emergency was from a weather event or volatile energy market conditions;
- 2) The state's dependence on oil, and its vulnerability to wildly fluctuating prices determined by a global market, illustrated the need for the state to become more energy independent, and to diversify its energy base;
- 3) Active interagency coordination on state, regional, and federal energy policies offers many opportunities to make more economically efficient, environmentally responsible and energy secure decisions regarding the use of state energy resources.

Primary State Government Sector Objectives of 2009 Plan

- Promote increased efficiency standards for all new construction;
- Support and implement energy audits for state facilities, and adopt energy reduction goals at these facilities;
- Adopt a goal for renewable power generation at State;
- Continue to promote and enhance training opportunities for energy auditors and weatherization technicians;
- Assist UMaine and other colleges with the use of biomass and biofuel cogeneration systems;
- Implement progressive energy policies applicable to state and local government;
- Continue to plan for Maine's energy independence;
- Continue to plan for an energy emergency.

Maine/Market Action Since Release of the 2009 Energy Plan

- ***Lower heating expenditures in state buildings.*** The state successfully completed a conversion of the Cross Office Building Complex and is on track to convert nearly 30 buildings in the region to natural gas.
- ***Install energy efficiency measures and heating system upgrades in many state buildings.*** In the last several years, the Bureau of General Services (BGS) has performed many upgrades in state buildings for which they are responsible. Below is a table listing the energy projects that BGS has completed over the last several years.

Building/Location	Efficiency Measure	Heating/Cooling System
<i>East Campus All Capitol area buildings</i>		<i>Dual-fuel biomass boiler Dual-fuel conversion (natural gas and oil) boilers, including replacement of inefficient boilers</i>
<i>Bureau of Motor Vehicles</i>	<i>Demand control ventilation Efficient lighting/motion control sensors (several areas & exterior)</i>	
<i>Dept. of Transportation 221 State Street (DHHS)</i>	<i>Demand control ventilation Demand control ventilation</i>	<i>Efficient boiler installation Heat pump installations</i>
<i>Blaine House; staff house; parking garage Criminal Justice Academy</i>	<i>Efficient lighting/motion control sensors (several areas)</i>	
<i>Cross Building</i>	<i>Efficient lighting/motion control sensors</i>	<i>Installation of a free cooling system</i>
<i>Cultural Building</i>	<i>Efficient lighting/motion control sensors</i>	
<i>Daschlager</i>	<i>Efficient lighting/motion control sensors</i>	
<i>Mechanical Building</i>	<i>Efficient lighting/motion control sensors</i>	
<i>Maine Lottery</i>	<i>Efficient lighting/motion control sensors</i>	
<i>McLean Building</i>	<i>Efficient lighting/motion control sensors</i>	
<i>State Crime Lab</i>	<i>Efficient lighting/motion control sensors</i>	
<i>Medical Examiners</i>	<i>Efficient lighting/motion control sensors</i>	
<i>Various garages – capitol complex; pre-release; CF; state police</i>	<i>Efficient lighting/motion control sensors</i>	
<i>Tyson Building</i>	<i>Efficient lighting/motion control sensors</i>	
<i>Wellness Center</i>	<i>Efficient lighting/motion control sensors</i>	
<i>Sewall Street</i>	<i>Efficient lighting (post lights)</i>	

- Adopt energy related state building code standards.*** In 2008, the legislature enacted LD 2257, [“An Act to Establish a Uniform Building and Energy Code”](#) (PL 699), which established a statewide building standards, including minimum energy efficiency standards (called the Maine Uniform Building and Energy Code, or MUBEC). Current statute requires the state to make periodic energy related updates to these standards <http://www.maine.gov/dps/bbcs/>. The code applies to all municipalities with populations of 4,000 or more, which covers approximately 65% of the state’s population. The code does not apply to municipalities with populations under 4,000.
- Develop a list of energy priorities in state buildings.*** The State Bureau of General Services (BGS) has developed and updated a list of energy priorities in some state buildings. BGS has contracted with Honeywell to compile an updated energy cost report of Augusta area state buildings. This analysis provides a baseline of the energy costs in each building, from which an efficiency upgrade priority list can be compiled.

- ***Develop state energy assurance and emergency plan.*** The state developed its first energy assurance plan in 2011, using federal recovery act funding [http://maine.gov/energy/pdf/Maine Energy Assurance Plan 6 1 11\[1\].pdf](http://maine.gov/energy/pdf/Maine_Energy_Assurance_Plan_6_1_11[1].pdf).
- ***Anticipated technological advancements and markets for cellulosic ethanol and other biofuels have not materialized.*** The U.S. shale drilling boom has resulted in abundant volumes of oil and natural gas, in fact, the most domestic production in three decades. This has driven down the price of oil and natural gas to very low levels; the country's natural gas have increased substantially, and global oil prices are down over 50% over the last six months. More stringent motor vehicle fuel efficiency standards have decreased fuel demand, and markets are saturated with ethanol produced from corn. In addition, technologies to produce ethanol from paper making and agricultural wastes on a commercial scale have not advanced as anticipated. Finally, there is considerable political debate over the costs and consequences of an E-85 ethanol-gasoline blend, and the actual climate impact of ethanol produced from residues. All these factors have limited progress on the expanded use of biofuels.

Continuing Challenges

There are significant opportunities to increase the efficiency and decrease energy expenditures in state buildings, but the state lacks the up-front capital to address these deficiencies timely and most cost-effectively.

Fuel costs for state buildings highlight opportunities exist for efficiency.

Fuel expenditures alone for the 78 buildings for which the Bureau of General Services is responsible (includes the university and the prisons) is approximately \$500 million per year. With expenditures of this magnitude compared to the square footage, significant opportunities exist to increase efficiencies in electrical and thermal loads. However, BGS has historically made upgrades in only a few buildings a year, as the Bureau has been limited to appropriations for these purposes in the two-year budget cycle. A comprehensive assessment of efficiency opportunities has not been performed in all buildings, and funding sufficient to aggregate projects has not been available.

The state still needs to improve energy emergency planning.

Recent energy emergencies. Just in the last year, the state experienced a region-wide short term propane supply shortage exacerbated by recent, rapid market changes, which significantly altered the means by which liquid fuels are transported into Maine; and, all of New England continues to grapple with natural gas infrastructure constraints more severe than experts predicted. More focus is needed on planning for such contingencies.

Formalizing interagency participation and cooperation across all energy programs, policies and initiatives would improve the use of existing resources toward meeting the state's most pressing energy challenges.

Lead by Example by maximizing information dissemination throughout state government. The state has taken some efforts to increase information dissemination and increase interagency cooperation on energy challenges. The GEO has established excellent working relationships with Efficiency Maine Trust, the Public Utilities Commission, the Maine State Housing Authority, and the Department of Environmental Protection. Efficiency Maine Trust has worked with the Maine State Housing Authority to reduce program overlap and identify synergistic opportunities in use of energy resources. However, in our development of this plan update, the GEO observed areas where more formalized interaction could be of benefit in deploying limited state resources in the most efficient manner.

2015 Maine Energy Goal for State Government

Develop and implement a plan for installing widespread energy efficiency upgrades in state and local government buildings, and improve the planning process for energy emergencies.

Policy Recommendations

- ❖ **Develop comprehensive assessment of potential energy improvements in all state buildings, and develop a list of energy priorities.** The Bureau of General Services has assessed the energy use in state buildings in the Augusta area, but has not had an opportunity to assess the universe of cost-effective efficiency opportunities in each building. This assessment would allow the state to competitively bid aggregated projects to accomplish upgrades in the most cost efficient manner as possible. A similar process should be followed for state buildings outside of the Capitol area.
- ❖ **Develop and implement financing method to fund aggregated energy efficiency projects in all state buildings.** The current two year budgeting process is not aligned with a more efficient and timely method of installing energy efficiency upgrades in state buildings. The state should explore options for leveraging a state appropriation to access greater amounts of capital, so that larger and/or aggregated projects can be financed and installed more timely. The program would be developed so that energy savings would pay for the improvements over time. Once a financing model is established, the model could be duplicated for local government building improvements.
- ❖ **Provide the state the ability to collect information about all winter fuel deliveries into the state, in order to anticipate and prevent supply disruptions.** The state currently has limited ability to track fuel deliveries into the

state, particularly by rail. This makes it challenging for the state to act proactively when deliveries are delayed or when supplies are tight. Routine data collection on fuel deliveries would enhance the state's ability to address infrastructure and delivery problems before it becomes an emergency situation.

- ❖ ***Formalize working relationships between state agencies on energy challenges.*** Interagency coordination and information dissemination could be enhanced in several areas. Participation by the Public Utilities Commission on the Efficiency Maine Board of Directors could provide an additional perspective on energy challenges; formalizing interaction between all agencies involved in the deployment of Regional Greenhouse Gas Initiative (RGGI) funds may result in more transparency in the use of these funds; establishing periodic review and discussion of energy programs by multiple state government agencies may result in more opportunities for synergy among programs, use of funds, and agency objectives.

Public Comment

The Governor's Energy Office solicited comments from the public during the development of this update. Below are the comments the Office received. Some have been edited for spelling and grammar.

- **Antonio Blasi** - Bring as much hydro power (on and off shore) into the mix as practical. Invest in state-of-the art fish ladders to accommodate the existing industry. Invest in solar and more hydro. Repeal the Expedited Wind Energy Act. Give county commissioners veto power over new methods of site location of development permits.
- **Ken Porter, Bowdoinham** - Please consider a natural gas expansion plan, where the consumers pay toward the running of the gas lines. I live about three miles from the lines. I am not rich. But I would have no objections to paying \$10, 000 toward getting the lines extended to my house. I have neighbors that I am sure would sign onto a plan where consumers pay extra to have the natural gas run to their homes. Years ago, CMP had a plan where new customers requiring new poles down the public road, paid extra each month till the poles were paid for!
- **Gina Hamilton, New Maine Times, Bath** - There is one issue I'd like to see addressed. Maine is a state of mostly independent homeowners who need little more than a little financial assistance to do what needs to be done and a little bit of information. In part to stimulate the building trades industry, there was an effort back in 2008 to get everyone "audited". Energy audits are useful things, and may be a good starting place for people who have no idea how their house really works. But most homes don't need an audit; they simply need to have a few low-hanging fruit issues addressed. In short, the goal to winterization or weatherization is to plug up gaps that open the home to the elements, and most of us have more gaps than we'd care to think about. Anywhere that opens to the outdoors is a gap, so making sure there are no gaps around windows and doors, no leaks around unused chimneys, putting in gaskets around switch plates and outlets, sealing up places where pipes go through walls, making dead air space between thin windows and your rooms by covering windows with plastic or reusable indoor or outdoor storm windows is the first step for anyone, energy audit or not. The next step is to determine the amount of insulation in roofs, basements, and walls that are necessary to keep the home comfortable. Insulating a cold basement's ceiling — the floor of the living space — by a plastic vapor barrier on the warm side and rolled fiberglass insulation on the cold side or rigid foam insulation on the cold side is a relatively cheap fix. Blown-in cellulose insulation into walls and roofs can increase the R-value — the amount of thermal resistance the home has. An R-value of 1 means there is very little resistance to heat flow. In Maine, roofs should have an R-value of 49 or more. Fortunately, this is neither difficult nor expensive to achieve with blown-in cellulose insulation, but if the household is paying a professional to tell them that instead of paying to get it done, the energy audit is little more than a curiosity. While audits are still an important part of a large-scale renovation project, for basic weatherization projects, they're mostly unnecessary, as people are learning more about the way energy flows through their homes. A short 20 minute talk online, or a free pamphlet could address the issues for most do-it-yourselfers. Requiring a professional for most of the work simply causes a larger expenditure than is necessary. Putting together a program for people who are adept at doing this basic work — either a system where people can pick up materials to do the work and borrow equipment to do it, or a system that pays for purchases to do the work, would be very cost effective, encourage neighbors to work together to fix their issues, and solve most of the basic weatherization issues

that Maine homes face. What we'd like to see is a separate program for people who can solve most of their own energy issues, independent of professionals, to keep costs as low as possible. Perhaps an auditor can come and meet with the household, hear their plan, approve the expenditure, and return in several months' time to be sure that the work had been completed. Save the full audit for when a house is being built or being fully renovated.

- **Karla Hunter, Bucksport** - When we first moved to Maine, our home consumed 5 tanks of oil per year, 3 of those during the months of November through February. We filled in all the gaps that we could find with expanding foam. We sealed cracks and crevices with caulking. We reduced the use of fuel oil down to 3 tanks of oil (at 275 gallons per tank). We replaced an inefficient basement window and continued to seal what leaks we could find. We managed, on our third year here, to reduce our oil consumption to 2.5 tanks per year. Then we added a wood pellet stove a few years ago. During last year's extremely long and cold winter, we used just one tank of oil. We spent \$1000 on oil and \$1250 on wood pellets. This means we have saved \$0.00 over the years, and in fact are spending more on heating costs than ever because of price increases over that time. We are just barely able to afford this so we are quite concerned that alternatives should be found. Our home should be weatherized, but the cost is prohibitive. We believe that the focus of decreased use of foreign oil should not be on finding alternative fuels alone, but on being more efficient in the fuel usage, whatever its source. To that end we support weatherization efforts for existing buildings and incentives to greater efficiency in any new structures. We do see the need for alternative fuels as fossil fuels are by their nature, finite (including natural gas, propane, and coal--whose extraction methods are less than ideal). We would like to see more focus on solar and wind power generation.

After reading the extensive report on energy use and reduction plans we are aware that the major contributor to oil consumption is transportation. Though we are unaware of the infrastructure that currently exists and what would be needed to bring it into usable condition, the rails would seem to be a more efficient (?cost effective) method of moving freight throughout the state than trucks, although trucks that were more efficient in themselves would go a long way to helping. From observations I see lots of trucks that still sit idling during their down time, a great waste of fuel. Also the railroad engines that sit down at the paper plant run idle all day and night. Surely there must be a better use of fuel. There must be a way to restart these engines if they were to shut down during their wait for cargo. The pollution emitting from these idling engines is not good either.

There were a couple comments throughout the report of adding a surcharge to oil to pay for weatherization efforts. This is taxing the people who are already hard hit to pay for the oil they currently use and may result in someone going without heat or choosing paying their oil bill to stay warm over such other necessities as food or medicine (as we have had to do more than once). This would be unbearable.

- **Don Tibbetts, Norway** - I believe Maine should be looking at its rivers to maximize electricity from those sources, developing a natural gas delivery system that can, over time, be expanded to serve most, if not all, citizens of our state and be looking at development possibilities to utilize ocean currents, such as the bay of Fundy or the gulf stream. I also believe the law should be changed requiring a high percentage of our power be produced by renewable sources such as wind and solar, which are clearly not developed to the necessary efficiency capabilities to be cost effective. Hydropower technology already exists, as does natural gas delivery technology and the cost would be borne by private industry, not the taxpayers of Maine. Not requiring a high percentage of renewable energy would also allow us to obtain the cheapest power rather than

the most expensive. I also believe Maine should investigate the feasibility of oil delivery pipelines. If properly done, they would be non-invasive and environmentally safe. Anyone who thinks it is safer to ship crude petroleum by rail or truck need only look at Lac Megantic and the numerous truck accident spills that occur. I would contend that pipelines are a better, safer choice than shipping by ocean carrier, as there have been serious repercussions there as well. We need to use a common-sense approach to energy rather than a "what makes you feel good" approach.

- **Karen Brown Mohr, Portland** - I have been following your press: Energy Office Seeks Proposals to Assess Maine's Unrealized Hydropower Potential with New Technology. I have attached something that was in the Post that may be of interest to you. Dave Emery, David Clough, Floyd Rutherford and I did an inventory of all rivers in the US a few years ago. Our research showed tremendous opportunity to generate additional power in Maine. I am pleased that the state is looking at this important issue. This data is just the first step to develop a strategy that is needed in the US. At some point I hope to be in the state and perhaps I could discuss this study with your office. <http://www.washingtonpost.com/blogs/capital-weather-gang/wp/2014/07/23/how-a-solar-storm-nearly-destroyed-life-as-we-know-it-two-years-ago/>
- **Paul Sheridan, Northport** - I understand that the Governor's Energy Office is updating Maine's Comprehensive Energy Plan and is seeking comments from the public on how the state should plan for the next decade. I further read that the office is still undecided about whether to hold a public hearing. I am writing to suggest to the GEO that there are many things to be learned from many of Maine's citizens: its carpenters, designer, contractors, architects, and engineers. In reviewing the 2008 Comprehensive Energy Plan as well as the 2013 oil reduction assessment report, I see very little emphasis put upon the two largest (and quickest payback) methodologies for a sensible, sustainable energy plan: increasing conservation and maximization of insulation. With all due respect, members of your office needs to get out of the State House's stuffiness, and into the fresh air of town halls. You need to schedule a series of public hearings, in all regions of the state to make the best use of the collective knowledge of Mainers.
- **Brad Sherwood, Professional Home Projects, Maine Employee Ownership Network** - I recommend having public hearings on a revised energy plan for the principles of transparency and government representing the wishes of the people, to which it belongs. Here are three comments I have concerning Maine energy policy. 1. Maine should protect itself from the potential long term shutdown caused by a major solar flare. We are fortunate to have been missed by solar flares for the past 120 years but cannot rely upon the hope it will never happen again. If we install surge protectors at our major substations we can avoid this. One of our legislators has researched this thoroughly already. I don't remember her name. 2. Energy efficiency. This has been very helpful to our energy security and needs continued emphasis. Japan has a law that requires every device using electricity to be more efficient than previous models. 3. Subsidies should be considered as a public investment and lessons can be learned from the subsidies that were invested into the oil industry in the early 1900's. First, they helped the industry to achieve the critical mass to become self-sustaining and improve the technology. The same dynamic is being repeated by the renewable industry. Second, that 100 years later the oil industry bullies Congress into continuing them. We should end the subsidies for the oil industry and establish a 20 year plan for ending renewable subsidies by stages.

- **Richard Paradis, Farmingdale** - Minimize solar and wind energy except for very limited research. Maximize nuclear and natural gas. Move from an utopian world to reality for economic expansion to provide jobs for the young folks we spend so much to educate. To spend yourself broke to achieve a unrealistic energy free future is plain stupid. And, thank God Governor LePage ran for Governor and was elected. I hope he is reelected by an even greater margin this time. He has my vote.
- **Janet Williams, Searsport** – When considering an updated energy plan, I urge you to push for increased support for renewable energy sources – solar, wind, and waves. There is so much potential to produce cheaper electricity and boost the Maine economy by selling electricity to other states. The oil industry has received subsidies for years, and continues to receive subsidies even though it is swimming in profits. Renewable energy deserves the same help. Also, please support all efforts to winterize and make energy efficient the thousands of old homes in Maine, which saves money and cuts down on energy use. Fossil fuels must be phased out and all subsidies to those industries must be stopped. It is vital that Maine refuses to cooperate with Stephen Harper’s government in its efforts to export Canadian tar sands oil. For the sake of the environment and climate change, that oil must stay in the ground.
- **Sandi Hennequin, [New England Power Generators Association, Boston](#)** – comments available via hyperlink
- **Steve Leahy, [Northeast Gas Association, Needham MA](#)** – comments available via hyperlink
- **Andrea Chartier, Belfast** - I understand the Governor's Energy Office (GEO) is updating Maine's Comprehensive Energy Plan and is seeking comments from the public. Here are my comments. I would like to see incorporated into the new plan the following 4 items: 1) The greatly reduced use of fossil fuels for energy and heating and the greatly increased use of renewable energy such as solar, wind, and geothermal; 2) A great increase in research for better energy storage (to compensate for times when solar and wind energy are not immediately able to meet energy needs); 3) A great increase in research for a better windmill (one that doesn't kill birds, isn't noisy, and can make use of very low wind speeds as well as withstand higher wind speeds, such as the cylinder-style windmill); 4) A great increase in the use of direct solar heating of homes, businesses, and water used for washing or heating (as opposed to the less efficient use of electricity converted from solar or wind power to heat buildings and water).
- **Carrie Annand, [Biomass Power Association, Portland](#)** – comments available via hyperlink
- **Jeff Marks, E2Tech, Portland** - On behalf of the Environmental and Energy Technology Council of Maine (E2Tech), thank you for the opportunity to provide public comments regarding updates to the Maine Comprehensive Energy Plan. E2Tech and its partners have performed extensive analyses on the environmental, energy and clean technology sectors in Maine. We evaluated the sectors’ economic impact, discussed the trajectory of the cleantech sector, and developed a strategic plan for E2Tech to improve and tailor its activities to serve its members, provide value, and help expand the clean technology sector in Maine. We believe these materials will be useful to you as you revise the 2008 Energy Plan and prepare recommendations to reduce energy costs, expand cost-effective and clean energy to power and heat our homes and businesses, and invest in companies that will promote economic

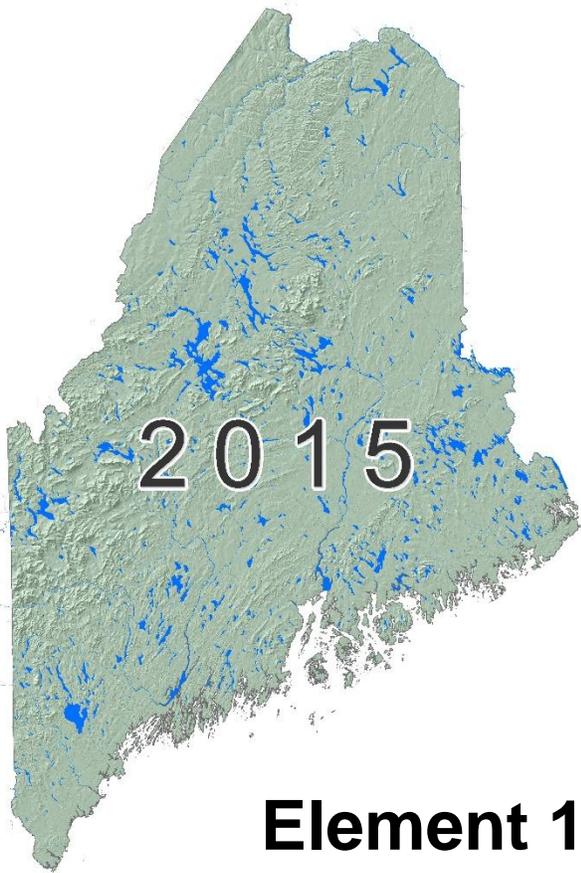
development and jobs in the State. Our comments and materials are focused almost exclusively on economic and business development scenarios, issues and outlook.

Attached to these comments are the following documents for your review:

- [Cover Letter with comments and references to supporting materials](#)
- [Business Climate for Maine's Clean Technology Sector 2013](#)
- [The Clean Technology Sector in Maine 2013](#)
- [The Trajectory of Clean Technology in Maine and Beyond](#)
- [Maine Clean Technology Business & Economic Development: Strategic Plan 2014](#)

The above documents are accessible via hyperlink.

- **Glen Marquis, [Ocean Renewable Power Company, Portland](#)** – comments available via hyperlink
- **Jeremy Payne, [Maine Renewable Energy Association, Augusta](#)** – comments available via hyperlink



MAINE'S WILDLIFE ACTION PLAN

Element 1: Species of Greatest Conservation Need

Prepared by

**Maine Department of Inland
Fisheries and Wildlife**

In collaboration with

Maine's Conservation Partners

September 2015

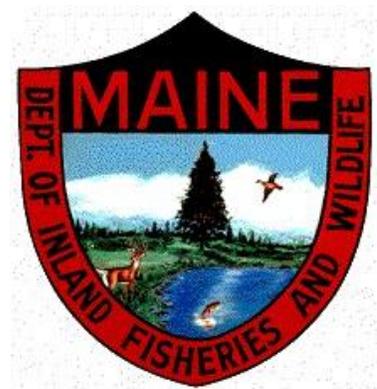


TABLE OF CONTENTS

Element 1: Species of Greatest Conservation Need

1.0 Abstract..... 1

1.1 Introduction 2

1.2 Significant Changes from Maine’s 2005 Plan 3

1.3 An Overview of Maine’s Fauna and SGCN..... 4

1.3.1 Mammals (Non-Marine)..... 5

1.3.2 Birds..... 7

1.3.3 Reptiles and Amphibians 10

1.3.4 Freshwater (Non-Diadromous) Fish..... 11

1.3.5 Inland and Freshwater Invertebrates 12

1.3.6 Marine Fauna (Except Birds)..... 16

1.4 Distribution of Maine’s SGCN and Associated Habitats..... 19

1.4.1 Methodology for Mapping Element 1 – SGCN Distributions..... 20

1.4.2 Methodology for Mapping Element 2 – Habitats 20

1.4.3 Species Conservation Range Maps..... 21

1.4.4 SGCN Distribution Synthesis..... 22

1.5 Designation Criteria for Maine’s SGCN - 2015 26

1.5.1 Priority 1 (Highest Priority) SGCN..... 26

1.5.2 Priority 2 (High Priority) SGCN 27

1.5.3 Priority 3 (Moderate Priority) SGCN..... 28

1.6 Maine’s 2015 SGCN 31

1.7 Literature Cited and References..... 60

1.8 Appendices 64

LIST OF TABLES

Table 1-1. Diversity of fauna, E/T listings, and SGCN in Maine by major taxa groups.....5

Table 1-2. Vulnerability concepts and criteria for designating Maine’s SGCN.30

Table 1-3. Maine’s 2015 SGCN and scale of conservation concerns33

LIST OF FIGURES

Figure 1-1. Examples of conservation range maps by USGS sub-watersheds for aquatic SGCNs and by Maine townships for terrestrial SGCNs. Red/yellow shaded areas indicate an SGCN’s presence based on observation data; green/blue indicates presence of potential habitats associated with the SGCN.....23

Figure 1-2. Examples of SGCN summaries by taxa class and habitat associations for USGS sub-watersheds and Maine townships.25

LIST OF APPENDICES

Appendix 1-1. Maine’s list of state-designated Endangered / Threatened plants administered by Natural Areas Program - Maine Department of Agriculture, Conservation and Forestry.64

Appendix 1-2. Maine’s list of state-designated Endangered and Threatened inland fish and wildlife administered by the Maine Department of Inland Fisheries and Wildlife (in statute; see 12 MRSA, §12803).69

Appendix 1-3. Maine’s list of state-designated Endangered and Threatened marine fish and wildlife administered by the Maine Department of Marine Resources (in statute; see 12 MRSA §6975).....71

Appendix 1-4. Maine’s list of federally-designated Endangered and Threatened species administered by the U.S. Fish and Wildlife Service and National Marine Fisheries Service; see <http://ecos.fws.gov/ecp/>.72

Appendix 1-5. Maine’s 2005 SGCN that are removed from the 2015 Wildlife Action Plan.73

KEY TO ACRONYMS

ASMFC	Atlantic States Marine Fisheries Commission
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
EBTJV	Eastern Brook Trout Joint Venture
ECOS	Environmental Conservation Online System
ESA	U.S. Endangered Species Act
E/T	Endangered and/or Threatened
ETSC	Endangered, Threatened, and Special Concern
GIS	Geographic Information System
IUCN	International Union for the Conservation of Nature
MDACF	Maine Department of Agriculture, Conservation and Forestry
MDIFW	Maine Department of Inland Fisheries and Wildlife
MDMR	Maine Department of Marine Resources
MESA	Maine Endangered Species Act
MRSA	Maine Revised Statutes Annotated
NARSP	North Atlantic Regional Shorebird Plan
NAWCP	North American Waterbird Conservation Plan
NEFWDTC	Northeast Fish and Wildlife Diversity Technical Committee
NEPARC	Northeast Partners in Amphibian and Reptile Conservation
NMFS	National Marine Fisheries Service
RSGCN	Regional Species of Greatest Conservation Need
SC	Special Concern
SGCN	Species of Greatest Conservation Need
SoC	Species of Concern
SWAP	State Wildlife Action Plan
SWG	State Wildlife Grants
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USSCP	U.S. Shorebird Conservation Plan
WNS	White-nose syndrome

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

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

1.0 ABSTRACT

A critical dilemma facing conservation biologists and managers worldwide is the need to allocate limited dollars, staff, and programmatic resources toward a growing list of conservation challenges. Foundational to this prioritization process in Maine's State Wildlife Action Plan is the development of a list of Species of Greatest Conservation Need (SGCN). Biologists from Maine Department of Inland Fisheries and Wildlife (MDIFW) and other state agencies, with cooperation from conservation partners and species experts, developed a suite of objective criteria for designating SGCN that is intended to be transparent and science-based, and recognizes that species conservation concerns can be identified at global, regional, and local scales. The primary themes for SGCN prioritization include risk of extirpation, population trend, endemism, and regional conservation concerns. Secondary themes for SGCN prioritization include climate change vulnerability, survey knowledge, and indigenous cultural significance.

Maine's 2005 list of SGCN totaled 213 species grouped into two priority levels. To help further advance the challenge of species prioritization, Maine's 2015 list of 378 SGCN are assigned to three species priority levels: Priority 1 (Highest; 58 SGCN), Priority 2 (High; 131 SGCN), and Priority 3 (Moderate; 189 SGCN), all of which are eligible for State Wildlife Grant (SWG) assistance from the U.S. Fish and Wildlife Service. The 2015 process for reviewing and identifying Maine SGCN included both species deletions (33) and additions (198) to the 2005 list. The net increase in SGCN is driven primarily from a) additional conservation science designation criteria, b) scrutiny of more invertebrate taxa, c) significantly greater attention to marine fauna in the Gulf of Maine, and d) more explicit recognition of climate change vulnerability. It is our hope that identifying a relatively comprehensive, prioritized suite of SGCN will help MDIFW and conservation partners implement meaningful conservation actions for some of Maine's most vulnerable and valued wildlife resources over the coming decade.

"A critical dilemma facing conservation biologists and managers worldwide is the need to allocate limited dollars, staff, and programmatic resources toward a growing list of conservation challenges. Foundational to this prioritization process in Maine's State Wildlife Action Plan is the development of a list of SGCN."

1.1 INTRODUCTION

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

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

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

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

1.2 SIGNIFICANT CHANGES FROM MAINE'S 2005 PLAN

Maine and other states drafted their initial plans as a “Comprehensive Wildlife Conservation Strategy” (CWCS) for submission in 2005. The CWCS documents of that era were retitled (but not reformatted) as State Wildlife Action Plans (SWAP). Maine's 2005 CWCS still serves as a thorough, detailed account of the full scope of wildlife, habitats, threats, conservation actions, and monitoring programs in the State (<http://www.maine.gov/ifw/wildlife/reports/wap.html>). Key differences in Element 1 of the 2015 Action Plan are:

- Purpose: Maine's resource agencies and conservation partners strove to construct a document that better served as a statewide conservation plan rather than one focused on MDIFW perspectives.
- SGCN emphasis: A focus on SGCN rather than the full array of fish and wildlife resources significantly reduced the length of Element 1 and each subsequent chapter of the 2015 Action Plan.
- SWAP database: Similar to the review of habitats and stressors in subsequent parts of this Plan, Element 1 includes a tabulation of 378 SGCN (Table 1-3) that is hot-linked to database report summaries for each SGCN. This strategy streamlines the Plan itself and provides updateable information (in lieu of static tables) during its 10-year horizon.
- Expanded faunal reviews: Several taxa groups received much greater attention for SGCN eligibility in 2015: marine fauna in the Gulf of Maine and terrestrial/freshwater invertebrates. Plant conservation remains ineligible for SWG funding, but habitat-scale conservation actions from Maine's 2015 Plan will benefit vulnerable flora and important natural communities.
- Refinements to SGCN qualifying criteria: Whenever possible, we employ objective, published reviews of species vulnerability among faunal groups to identify SGCN.
- Coordinated conservation in the Northeast: The Northeastern states and partner collaborations in USFWS Region 5 have focused on the regional scale of vulnerability. The Northeast Regional Conservation Needs program (<http://rcngrants.org/>) and North Atlantic Landscape Conservation Cooperative (<http://northatlanticlcc.org/>) are premiere examples.
- Vulnerable species in Canada: This Plan now extends SGCN eligibility for Maine fauna that are listed E/T by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC; http://www.cosewic.gc.ca/eng/sct5/index_e.cfm) in the neighboring provinces of New Brunswick, Nova Scotia and Quebec.
- Global vulnerability: Maine's 2015 Plan newly recognizes fish and wildlife species occurring in Maine as SGCN if listed as “Critically Endangered” (CR), “Endangered” (EN), or “Vulnerable” (VU) on the IUCN Red List.
- Climate change vulnerability: Although many climate change projections escalate beyond the 10-year duration of the Plan, the revised SGCN list of 2015 now includes species with high vulnerability and high certainty for this stressor in Maine.

1.3 AN OVERVIEW OF MAINE'S FAUNA AND SGCN

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

“Maine’s varied landscape, rural character, and traditional resource-based economy heighten public familiarity and appreciation for fish and wildlife. Regular exposure to fauna in the every-day lives of many Maine citizens reinforces concern for the state’s natural heritage generally, and species-at-risk in particular.”

The variety of wildlife is also key to the allure. Maine is a mixing zone of northern species allied with boreal systems prevalent in neighboring Canada that yield to southern species typical of Appalachian habitats that predominate further south in New England and beyond. Examples of northern fauna include Canada Lynx (*Lynx canadensis*), Arctic Charr (*Salvelinus alpinus*), Mink Frog (*Lithobates septentrionalis*), and Atlantic Puffin (*Fratercula arctica*); all approach southernmost range limits in the state. Southern fauna that are near the northern edge of their range in Maine include New England Cottontail (*Sylvilagus transitionalis*), Roseate Tern (*Sterna dougalli*), Black Racer (*Coluber constrictor*), Loggerhead Sea Turtle (*Caretta caretta*), and Monarch Butterfly (*Danaus plexippus*).

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

Not surprisingly, our knowledge of Maine fauna has limitations. For example, many invertebrate taxa are not yet considered, let alone proportionately represented among Maine's SGCN. Nevertheless, Maine's 2015 Plan identifies 378 SGCN spanning 44 orders of vertebrates and 28 orders of invertebrates. A compilation by major taxa groups (Table 1-1) reveals both the sheer number and diversity of SGCN at present in Maine.

Sixty (16%) SGCN in Maine are state-listed E/T species (Appendices 1-2 and 1-3). Only 18 SGCN (<5%) are federally-listed as E/T (Appendix 1-4). Thus, the vast majority of Maine's SGCN, while

“...the vast majority of Maine’s SGCN, while characterized by distinct biological sensitivities, are not on the brink of extirpation or ecological crisis. This provides a strategic opportunity for MDIFW and a coalition of conservation partners to implement meaningful conservation for some of Maine’s most vulnerable and valued wildlife populations in advance of the necessity for ESA listings and regulatory implications.”

characterized by distinct biological sensitivities, are not on the brink of extirpation or ecological crisis. This provides a strategic opportunity for MDIFW and a coalition of conservation partners to implement meaningful conservation interventions for some of Maine's most vulnerable and valued wildlife populations in advance of the necessity for ESA listings and regulatory implications.

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

Taxa Groups lead state agency jurisdiction	# Species			
	Extant in Maine	Federal E/T (ESA)	State E/T (MESA)	SGCN in 2015 Plan
Invertebrates subtotal ¹	>33,000	0	20	168
freshwater / terrestrial (MDIFW)	>15,000	0	20	132
marine (MDMR)	>18,000	0	0	36
Vertebrates subtotal	840	18	40	210
Amphibians (MDIFW)	18	0	0	4
Birds (MDIFW)	423	3	20	130
Fish	291	3	3	43
freshwater (MDIFW)	39	0	2	15
marine / diadromous (MDMR)	252	3	1	28
Mammals	85	8	10	22
marine (MDMR)	24	6	5	7
terrestrial (MDIFW)	61	2	5	15
Reptiles	23	4	7	11
freshwater / terrestrial (MDIFW)	17	0	4	7
marine (MDMR)	6	4	3	4
MAINE FAUNA TOTALS	>33,840	18	60	378

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

1.3.1 MAMMALS (NON-MARINE)

General Overview

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

mammals in Maine will be affected by climate change, it will likely be the species at the edge of their range that will experience the greatest change.

Conservation Overview

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

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

Bats, as an order, perhaps face the most unified set of conservation threats. White-nose syndrome (WNS), a deadly fungal disease, has drastically reduced populations of *Myotis* spp. Because of this disease, Little Brown Bats (*Myotis lucifugus*) and Northern Long-eared Bats (*Myotis septentrionalis*) were state-listed as Endangered in 2015, and the Eastern Small-footed Bat (*Myotis leibii*) was newly state-listed as Threatened. These bat populations are not only threatened by WNS in Maine but throughout most of their U.S. range. Although WNS has primarily affected *Myotis* spp., Tri-colored Bats (*Perimyotis subflavus*) and Big Brown Bats (*Eptesicus fuscus*) are also affected. The impact of WNS on Maine's bat populations has heightened concerns over the effects of other mortality factors, such as wind turbines, and the vulnerability of maternity colonies to disturbance. Our lack of knowledge about the habits of bats in Maine also poses a significant threat to the species. It is difficult to undertake effective conservation actions if we do not understand many of the basic habits of bats. In addition to the three bat species that have recently been listed as E/T under MESA, Maine's five other species of bats are all considered species of Special Concern and/or SGCN.



Efforts underway in Maine and five other Northeast states were pivotal to a recent decision not to list the New England Cottontail (*Sylvilagus transitionalis*, SGCN Priority 1) as E/T under the federal ESA. © Tom Barnes

The availability and structure of forest seral stages in Maine is a major factor determining the abundance of Maine's mammals. In southern Maine, the loss of early successional habitat through forest maturation and development has resulted in a 75% to 80% decline of suitable habitat for New England Cottontail. In York County, only 3% of the landscape can be characterized as early successional forest habitat. The lack of shrublands and young forests in southern Maine threatens not only the New England Cottontail, but also several SGCN birds associated with scrub-shrub habitat.

Conversely, in northern Maine, less than 3% of the landscape remains as ecologically mature forest that is suitable for deer wintering areas. This not only impacts Maine's White-tailed Deer (*Odocoileus virginianus*) but other mammals (e.g., American Marten, *Martes americana*) and birds that are dependent on mature interior forests. Unlike the interior boreal forests of Canada

and Alaska, where natural wildfires play a major role in determining the pace of forest succession, commercial logging operations and market forces are major factors influencing the composition and structure of Maine's northern forests.

1.3.2 BIRDS

General Overview

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

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

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

Conservation Overview

All of Maine's bird guilds are represented on Maine's official E/T List or the List of Species of Special Concern (SC). The latter is an administrative list of species that could become E/T without attention. The challenges for future conservation and stewardship are many. At least five bird species are documented as extinct or extirpated from Maine, emphasizing the importance of preventing any more erosion of the state's avian biodiversity. Among 423 birds documented in Maine, 11 are listed as state Endangered, nine are listed as state Threatened, and 130 are listed SC and/or SGCN. Thus, conservation concerns exist for ~31% of the bird species known to inhabit Maine. Most attention is devoted to birds that breed, nest and raise their young in Maine. However two waterfowl, the Barrow's Goldeneye (*Bucephala islandica*) and Harlequin Duck (*Histrionicus histrionicus*), are state-listed as Threatened because they winter in significant numbers in coastal Maine. Since a large percentage of the North Atlantic populations of these waterfowl species winter here, Maine has a high regional management responsibility for them.

Threats to bird populations are many and conservation challenges are equally diverse. Managers are tasked with protecting small numbers of ground-nesting Least Terns (*Calidris minutilla*) and Piping Plovers (*Charadrius melodus*) that struggle to co-habit southern Maine's

sand beaches with tens of thousands of recreational users. Maine forest birds and many species of wetland birds may be faring well recently, but they too are threatened by cumulative impacts of development, habitat fragmentation, intensive forest practices, invasive species and various forest pests and diseases. While these species face numerous threats, vast areas of forest in Maine remain intact, presenting opportunities for large-scale conservation.

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

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

In general, raptor populations have also fared well in Maine since the use of certain harmful pesticides was banned. Following years of intensive management to protect nests, Bald Eagles (*Haliaeetus leucocephalus*) were delisted in 2009, and populations continue to grow statewide. Changes in land use practices, population shifts, and some environmental toxins appear to be foremost influences at present. Habitat losses may result from natural (e.g., succession of grasslands to woodlands) or human impacts (including land development, fragmentation, etc.) that lead to both direct and indirect effects. Most raptor populations lack baseline indices or trend indicators. Limiting disturbance from recreation and development provides additional protection during critical nesting periods. Documenting continuing exposure of some persistent toxins such as lead, mercury, polychlorinated biphenyls, and polybrominated diphenyl ethers is a potential priority for some raptors.

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



This regional endemic, the Saltmarsh Sparrow (*Ammodramus caudactus*, SGCN Priority 1) is a “vulnerable” species on the IUCN Red List. It lives in one of the most threatened habitats in the Northeast. © Patrick Leary

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

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



Semipalmated Sandpipers (*Calidris pusilla*, SGCN Priority 2) & 13 other SGCN shorebirds stage along the Maine coast in annual, long-distance migrations from the Arctic to South America. © Lindsay Tudor

numbers of these birds concentrate in discrete areas of coastal habitat where they are highly susceptible to disturbance, habitat loss, and environmental contaminants. Conservation requires attention to these cumulative impacts.

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

1.3.3 REPTILES AND AMPHIBIANS

General Overview

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

Conservation Overview

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

Reptiles (Snakes and Turtles)

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



Northern Black Racers (*Coluber constrictor*, SGCN Priority 1), Maine's rarest snake, persist only in barren and dry woodland habitats of York County, at their northernmost range limit. © Jonathan Mays



Spring Salamanders (*Gyrinophilus porphyriticus*, SGCN Priority 2), one of Maine's rarest amphibians, are a specialist of headwater streams in central and western regions of the state. © Jonathan Mays

Amphibians (Frogs, Toads and Salamanders)

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

1.3.4 FRESHWATER (NON-DIADROMOUS) FISH

General Overview

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

Conservation Overview

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

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

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



Brook Trout (*Salvelinus fontinalis*, SGCN Priority 3), are a "Maine Heritage Fish." Although occurring statewide and in a diversity of habitats, their range is retracting due to multiple stressors including interactions with non-native species, land use conversion, fish passage constraints and climate change.
© Merry Gallagher

Rare Native Fishes (Minnows and others)

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

1.3.5 INLAND AND FRESHWATER INVERTEBRATES

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

The best-studied phyla in Maine, as in most states, are the Mollusca (e.g., snails and mussels: ~200 species) and Arthropoda (e.g., insects, crustaceans, spiders: ~7,950 species). These two groups include all of the non-marine invertebrate species considered in this Plan. Within these phyla, the state of knowledge on distribution, status, and life history is strongest for just three orders: the Unionoida (freshwater mussels), Odonata (damselflies and dragonflies), and Lepidoptera (butterflies and moths), or what some have referred to as the "charismatic microfauna." Accordingly, a large proportion (66%) of the priority invertebrate species determined to be SGCN are represented by members of these same groups (Unionoida – 6 species; Odonata – 36 species; and Lepidoptera – 47 species). Other invertebrate taxa also

considered in the SWAP because of partial, but growing, knowledge include Gastropoda (snails; 8 species), Plecoptera (stoneflies; 3 species), Trichoptera (caddisflies; 4 species), Ephemeroptera (mayflies; 15 species), Hymenoptera (bumble bees; 10 species), Coleoptera (beetles; 4 species), and Decapoda (crayfish; 1 species).

Conservation Overview

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

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

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

According to Martin (1999, 2000), there are 76 species of terrestrial snails, and 45 species of freshwater snails, reported from Maine. At least five species are introduced, and the taxonomic status of several others is questionable. While a number of individual investigations of Maine's snails exist (Gleich and Gilbert 1976, Hotopp and Smith 1994, Martin 1999, Martin 2000, systematic surveys targeting terrestrial (Nekola 2008) and aquatic (Hotopp 2012) species of potential conservation concern have only recently been initiated. Most Maine SGCN snails fall in the Stagnicola (aquatic) and Vertigo (terrestrial) genera and are thought to be limited by requirements for high water quality and/or extreme habitat specialization.

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

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

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

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

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

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

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

At least 52 families and 855 species of bees, wasps, and ants have been reported from Maine (Dearborn et al. 1983; Stubbs et al. 1995). These numbers are most certainly conservative estimates, as surveys specifically designed to assess species diversity for the Hymenoptera have never been conducted (Stubbs et al. 1995). With the help of NatureServe, MDIFW recently acquired sufficient information to begin assessing the conservation status of Maine's bumble bees (*Bombus spp*), one of the state's most valuable pollinators of wild plants and cultivated crops. Of the 17 species of bumble bees documented from Maine, 10 are considered SGCN due to the lack of modern records or range-wide declines. Habitat loss, introduced diseases and parasites, pesticides, and intensive agricultural practices are all believed to have played a role in bumble bee declines in Maine and across North America. A recently launched citizen-science atlas effort (<http://mainebumblebeeatlas.umf.maine.edu/>) is designed to increase our knowledge of bumble bee distribution and status in Maine.



Significant declines of the globally rare Rusty-patched Bumble Bee (*Bombus affinis*, SGCN Priority 1) are increasingly evident in many different pollinators. Monitoring programs are critical to better understand distribution, status and conservation strategies. © Rich Hatfield

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

There are at least 96 families and 2,871 species of beetles reported from Maine (Majka et al. 2011). Generally recognized as the largest order of insects, the Coleoptera have not been

systematically surveyed in Maine and there are likely hundreds of state species records yet to be discovered (D. Dearborn, pers. communication). The best studied group of beetles in Maine, and probably North America, is the tiger beetles (family Carabidae, subfamily Cicindelinae). Three of Maine's four SGCN beetles are Cicindelids, including a newly discovered state species record, the Cobblestone Tiger Beetle (*Cicindela marginipennis*) known from only one riverine population in the western foothills. The federally-endangered American Burying Beetle (*Nicrophorus americanus*) is known historically from southwestern and central Maine, but is now believed to be state extirpated.

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

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



Crowberry Blue (*Plebejus idas empetri*, SGCN Priority 2) is one of Maine's few regional endemics. The global range of this butterfly is restricted to a narrow band of coastal crowberry bogs in Maine and Canada's Maritime Provinces. © Bryan Pfeiffer

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

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

Like butterflies, dragonflies and damselflies are a popular and conspicuous insect group that have attracted significant attention from both scientists and the general public. Much of what is currently known about Maine's Odonates is the result of an assessment of historic records, MDIFW targeted surveys, and the recently completed Maine Dragonfly and Damselfly Survey (MDDS) (<http://mdds.umf.maine.edu/>). These efforts have led to a list of 158 species of dragonflies and damselflies known from Maine and considerable knowledge on distribution, habitat relationships, and conservation status of most species (Brunelle and deMaynadier 2005). Three of Maine's Odonata are listed as E/T and 25 species as Special Concern and/or SGCN. A recent assessment of high priority Odonata for conservation action in the Northeast identified 21 species in Maine because of high regional responsibility (narrow geographic ranges centered in the Northeast) and/or moderate to high imperilment due to habitat vulnerabilities and potential population declines (White et al. 2014). Most of Maine's most vulnerable Odonata are associated with northern peatlands, lakes, and moderate to large forested rivers.

1.3.6 MARINE FAUNA (EXCEPT BIRDS)

General Overview

There are approximately 1,800 known marine animal species in the Gulf of Maine, but it is estimated that far more are still undiscovered, especially in the invertebrate and chordate groups (Census of Marine Life 2015). Maine state waters (<3 nautical miles offshore) host a wide array of species including invertebrates, diadromous fishes, groundfish, marine mammals, sea birds, pelagic finfishes, and more. The diversity of habitat within coastal and marine waters, the geographic location between the Arctic and Temperate zones, as well as complex coastal circulation patterns all provide Maine with unique and delicately balanced species assemblages.

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

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

Conservation Overview

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

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

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

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

Marine Invertebrates

Although a large proportion of the known marine animal species in the Gulf of Maine are invertebrates (~80%), less than half of the marine SGCN are invertebrates (34 species, 48% of SGCN). This is primarily due to a lack of knowledge about the status, distribution, or abundance of these species. Marine invertebrates face many of the same research challenges



Sea Cucumbers (*Thyonidium drummondii*, SGCN Priority 2) and several other invertebrates are an important foundation of the marine ecosystem that may face additional risks from warming waters and acidification in the Gulf of Maine. © Maggie Hunter

as terrestrial and freshwater invertebrates, including their small size, and small niches/habitats.

Additionally, financial and logistical challenges specific to working in the marine environment compound these issues. Since 24% of the marine SGCN are commercially or recreationally harvested, some may have existing monitoring programs in place. However, there is a need for increased knowledge about population trends and reasons for decline for many of the invertebrate SGCN.

Marine invertebrates vary in life history and are thus subject to a variety of stresses. Most juvenile invertebrates are found in the water column as zooplankton, and some species are sessile during at least part of their life cycle. Sessile organisms can be slow to recolonize an area after an event that reduces their abundance. Many invertebrates can be sensitive to changes in water quality including non-point source pollution and thermal changes.

Calcareous invertebrates may be susceptible to changes in water pH resulting from increased dissolved carbon dioxide in the water. SGCN vulnerable to ocean acidification include Softshell Clam (*Mya arenaria*) and Gaper Clam (*Mya truncata*). With recent and sometimes rapid changes in coastal development, increases in sea surface temperature, and decreases in ocean pH, understanding if and

how these species are adapting and how their ranges and habitats are affected is imperative for developing successful conservation strategies.

Finfish: Diadromous, Groundfish, and Ocean Migratory Fish

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

Some SGCN declines may be due to environmental changes and habitat alterations: e.g., Atlantic Wolfish (*Anarhichas lupus*) and Spotted Wolffish (*Anarhichas minor*). Fish populations can be slow to rebound after marked declines, even after fishing pressure has been reduced. This may be due to populations having been reduced below a critical threshold, combined with changes in habitat including increasing water temperature, reduction of bottom structure following trawling, and changes in predator-prey abundances. Key to the conservation of these species are efforts to identify spawning locations, migration patterns, habitat use, impacts of changing water chemistry and temperature, as well as how changing species assemblages will affect predator-prey relationships.

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



Alewives (SGCN Priority 2) are among the eight diadromous fish recognized as SGCN in this Plan. Most Maine rivers once supported major spawning runs, but many runs are currently less than half of their estimated potential. © Sharon Fiedler

Whales and Sea Turtles

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

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

1.4 DISTRIBUTION OF MAINE'S SGCN AND ASSOCIATED HABITATS

Best management practices for State Wildlife Action Plan updates (AFWA 2012) recommend compiling information on the distribution of each SGCN and its associated habitats to help prioritize areas within the state for conservation actions. Range, distribution, and observations all describe geographic arrangements of elements (species and habitats) across a landscape. However, these terms have different meanings. Range is the broadest geographic extent across which an element could be found. The distribution of an element is the spatial pattern of its occurrence within its range and may be scattered, random, clustered, or regular depending on the population/community dynamics of the element and the heterogeneity of the landscape. Further, individual observations of an element may or may not be evidence of a viable or persistent population.

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

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

1.4.1 METHODOLOGY FOR MAPPING ELEMENT 1 – SGCN DISTRIBUTIONS

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

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

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

1.4.2 METHODOLOGY FOR MAPPING ELEMENT 2 – HABITATS

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

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

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

The Maine GAP Analysis project (Krohn et al. 1998) used a similar process (i.e., combining observation data with habitat maps) to estimate distributions for vertebrate species in Maine. We included the GAP data in our species conservation range maps, calling it "potential habitat." Despite having fewer observations to work with and a much simpler habitat data set, the GAP distributions are quite similar to our updated distributions for many SGCNs.

1.4.3 SPECIES CONSERVATION RANGE MAPS

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

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

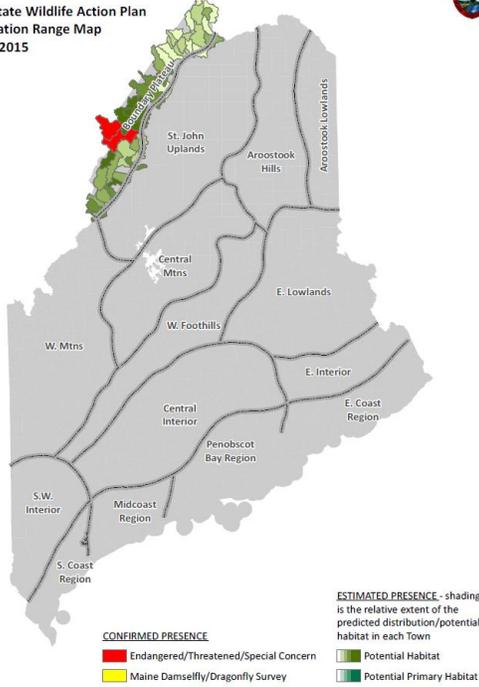
1.4.4 SGCN DISTRIBUTION SYNTHESIS

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

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

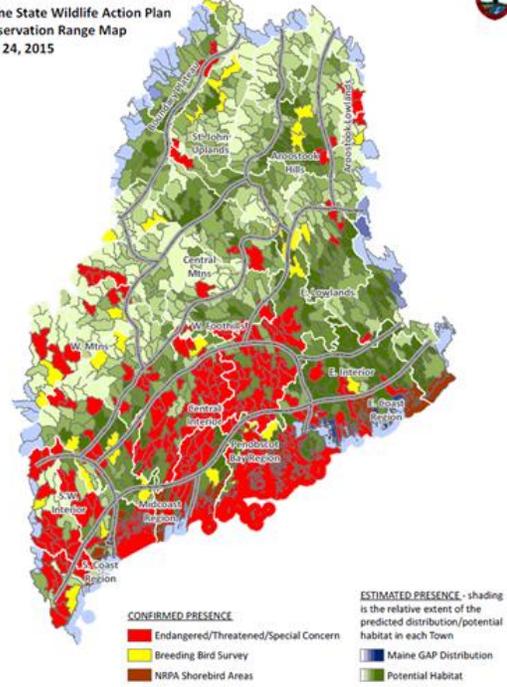
Sedge Darter (*Aeshna juncea*)

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



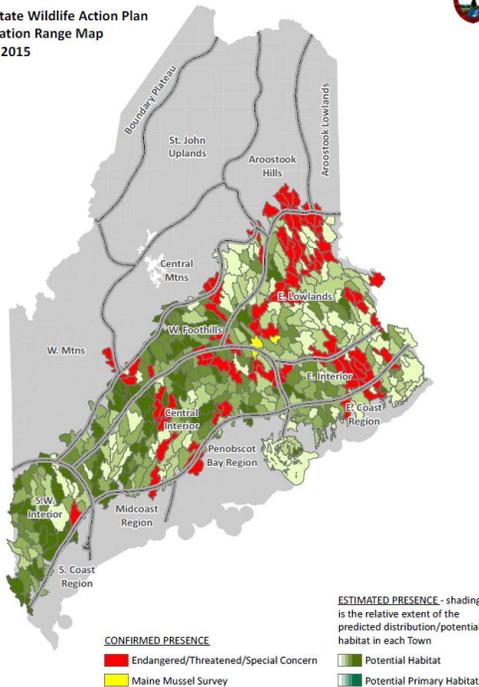
Great Blue Heron (*Ardea herodias*)

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



Brook Floater (*Alasmidonta varicosa*)

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



Canada Warbler (*Cardellina canadensis*)

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

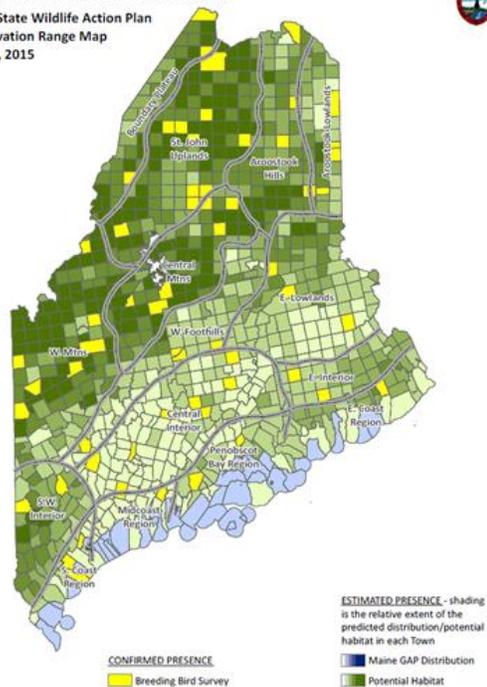
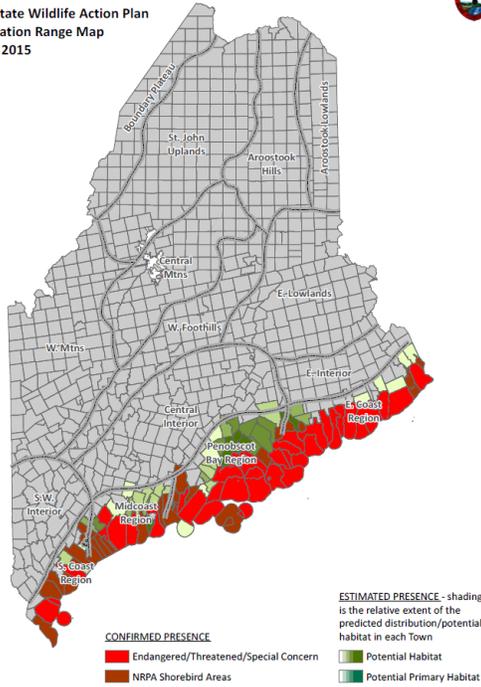


Figure 1-1. continued: page 2 of 2.

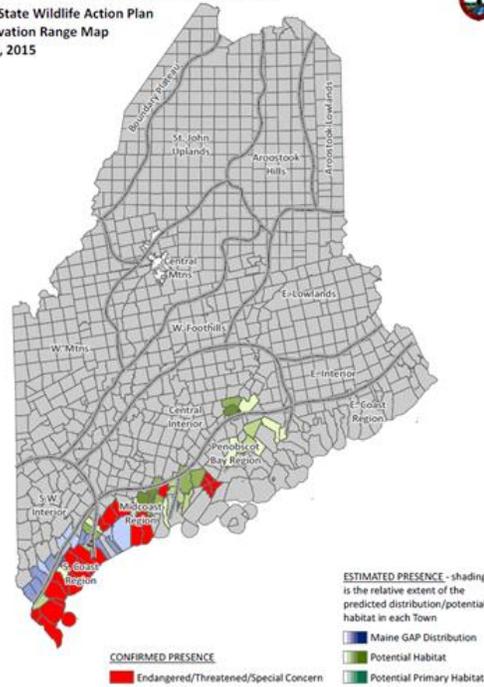
Purple Sandpiper (*Calidris maritima*)

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



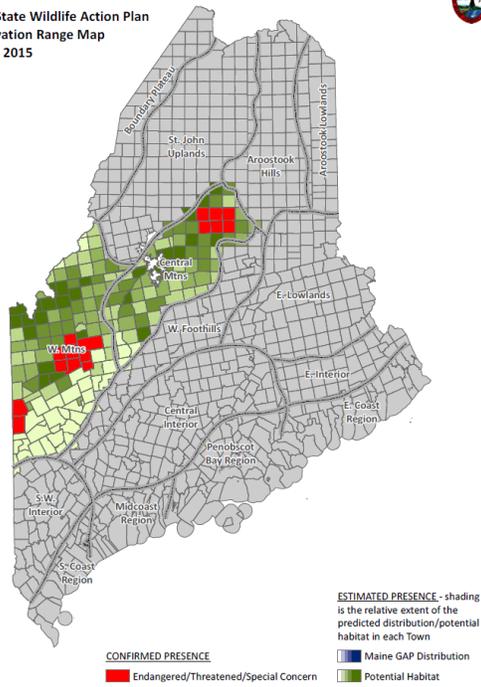
Saltmarsh Sparrow (*Ammodramus caudacutus*)

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



Bicknell's Thrush (*Catharus bicknelli*)

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



Cobblestone Tiger Beetle (*Cicindela marginipennis*)

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

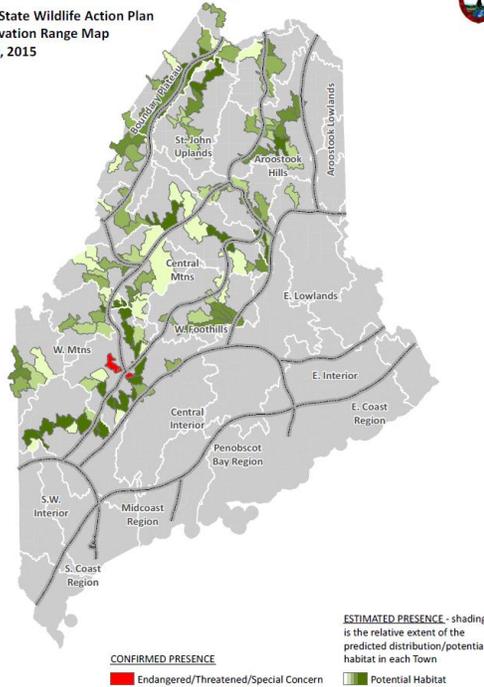
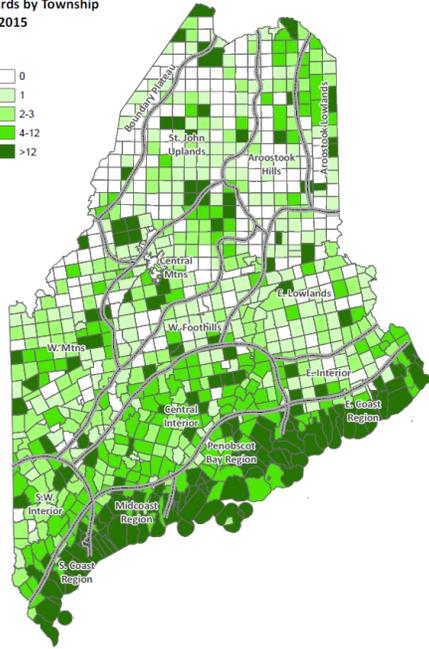
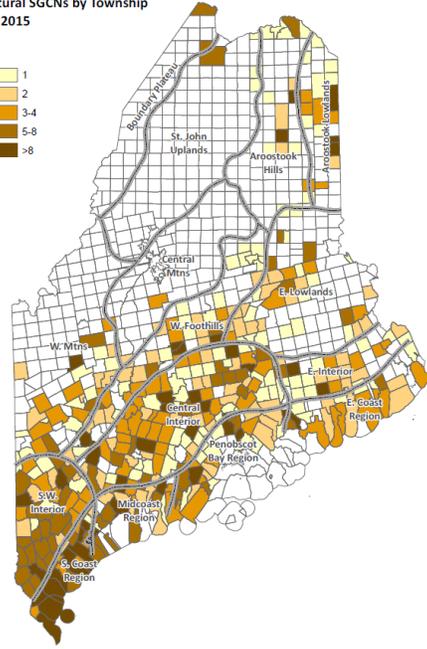


Figure 1-2. Examples of SGCN summaries by taxa class and habitat associations for USGS sub-watersheds and Maine townships.

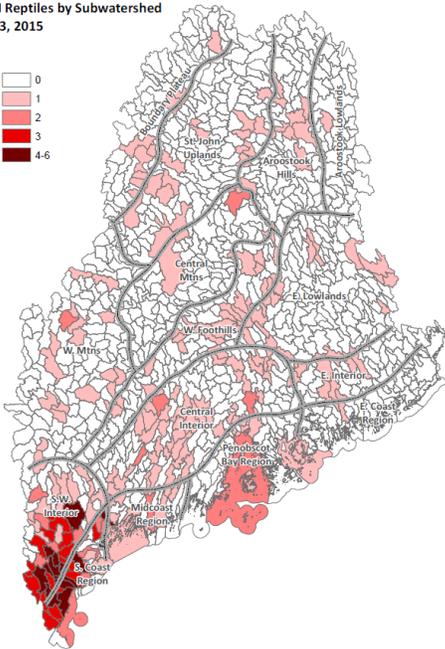
Maine State Wildlife Action Plan
SGCN Birds by Township
Jun 23, 2015



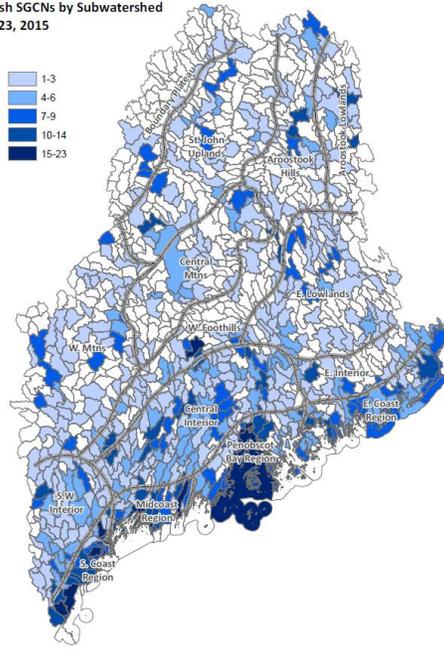
Maine State Wildlife Action Plan
Agricultural SGCNs by Township
Jun 23, 2015



Maine State Wildlife Action Plan
SGCN Reptiles by Subwatershed
Jun 23, 2015



Maine State Wildlife Action Plan
Marsh SGCNs by Subwatershed
Jun 23, 2015



1.5 DESIGNATION CRITERIA FOR MAINE'S SGCN - 2015

MDIFW biologists, with review and cooperation from conservation partners and species experts, offer the following criteria (and subcriteria) for designating Maine's eligible Species of Greatest Conservation Need (SGCN). The criteria and process for selecting SGCN are intended to be comprehensive, transparent, and based on best available science for prioritizing species of conservation concern at local, regional, and global scales. As proposed, fish and wildlife species (and subspecies) designated as priority 1 or 2 or 3 qualify as SGCN, and are thus eligible for State Wildlife Grant funding. The primary themes for SGCN prioritization include risk of extirpation, population trend, endemism, and regional conservation responsibility. Secondary themes for SGCN prioritization include climate change vulnerability, survey knowledge, and cultural significance to Maine tribes (Table 1-2). Finally, only Maine extant species were considered for designation as SGCN in 2015.

"The criteria and process for selecting SGCN are intended to be comprehensive, transparent, and based on best available science for prioritizing species of conservation concern at local, regional, and global scales."

1.5.1 PRIORITY 1 (HIGHEST PRIORITY) SGCN

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

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

- g. U.S. Shorebird Conservation Plan [USSCP] (shorebirds) – U.S. Shorebird Conservation Plan 2004
- h. Birds of Conservation Concern (all birds) – USFWS 2008
- i. Northeast Partners In Amphibian and Reptile Conservation [NEPARC] (herpetofauna) – NEPARC 2010
- j. American Fisheries Society (freshwater & diadromous fish) – Jelks et al. 2008
- k. Atlantic States Marine Fisheries Commission Stock Assessments [ASMFC] - ASMFSC 2012
- l. Eastern Brook Trout Joint Venture [EBTJV] - EBTJV 2011
- m. Northeast Odonate Assessment (damselflies & dragonflies) – White et al. 2014

Note: Priority 1 designation is not intended for:

- species that have expanded their range into Maine within the past 50 years, OR
- species with only historic documentation (generally prior to mid-1970s)

1.5.2 PRIORITY 2 (HIGH PRIORITY) SGCN

Generally, Priority 2 species include:

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

- a. Northeast Endangered Species and Wildlife Diversity Technical Committee [NESWDTC] (all vertebrates and freshwater mussels) – Therres 1999
- b. Northeast Regional Synthesis [RSGCN] (all vertebrates, freshwater mussels, and tiger beetles) – Terwilliger 2013
- c. NatureServe (all taxa) – NatureServe 2014
- d. Partners in Flight (land birds). Partners In Flight Science Committee 2012 Species Assessment Database, version 2012.
- e. North American Waterbird Conservation Plan [NAWCP] (all waterbirds) – Kushlan et al. 2002 and 2006 (marsh birds)
- f. North Atlantic Regional Shorebird Plan [NARSP] (shorebirds) – Clark and Niles 2000
- g. U.S. Shorebird Conservation Plan [USSCP] (shorebirds) – U.S. Shorebird Conservation Plan 2004
- h. Birds of Conservation Concern (all birds) – USFWS 2008
- i. Northeast Partners In Amphibian and Reptile Conservation [NEPARC] (herpetofauna) – NEPARC 2010
- j. American Fisheries Society (freshwater & diadromous fish) – Jelks et al. 2008
- k. Atlantic States Marine Fisheries Commission Stock Assessments [ASMFC] - ASMFSC 2012
- l. Eastern Brook Trout Joint Venture [EBTJV] - EBTJV 2011
- m. Northeast Odonate Assessment (damselflies & dragonflies) – White et al. 2014
- n. Committee on the Status of Endangered Wildlife in Canada [COSEWIC] (all taxa) – COSEWIC 2015

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

1.5.3 PRIORITY 3 (MODERATE PRIORITY) SGCN

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

1. **Global Vulnerability** – A species designated as Vulnerable by the International Union for the Conservation of Nature (IUCN).
2. **State Special Concern** – Listed as a current or proposed species of Special Concern in Maine.
3. **Recent Significant Declines** – A species currently (within 30 years) undergoing steep population decline statewide or regionally, which has already led to, or if unchecked is likely to lead to, local extinction and/or significant range contraction.
4. **Regional Endemic** – A species whose global geographic range is at least 90% contained within the area defined by USFWS Region 5, the Canadian Maritime Provinces, and southeastern Quebec (south of the St. Lawrence River).
5. **High Climate Change Vulnerability** – A species identified as highly vulnerable by Whitman et al. 2013 or Galbraith et al. 2014 (or other published source).

6. **Understudied Rare Taxa** -- Recently documented or poorly surveyed rare species for which risk of extirpation is potentially high (e.g. few known occurrences), but insufficient data exist to conclusively assess distribution and status.
7. **Historical** -- Species currently listed as state (SH) or global (GH) Historical (by MDIFW or NatureServe) that have a reasonable probability of population rediscovery with further survey.
8. **Culturally Significant** -- Species identified as both biologically vulnerable and culturally significant by Maine's tribes.
9. **High Regional Conservation Priority** -- Identified as a high regional or global species of conservation concern by one of the following authorities (see Table 1-2 for Priority 2 subcriteria):
 - a. Northeast Endangered Species and Wildlife Diversity Technical Committee [NESWDTC] (all vertebrates and freshwater mussels) – Therres 1999
 - b. Northeast Regional Synthesis [RSGCN] (all vertebrates, freshwater mussels, and tiger beetles) – Terwilliger 2013
 - c. NatureServe (all taxa) – NatureServe 2014
 - d. Partners in Flight (land birds). Partners In Flight Science Committee 2012 Species Assessment Database, version 2012.
 - e. North American Waterbird Conservation Plan [NAWCP] (all waterbirds) – Kushlan et al. 2002 and 2006 (marsh birds)
 - f. North Atlantic Regional Shorebird Plan [NARSP] (shorebirds) – Clark and Niles 2000
 - g. U.S. Shorebird Conservation Plan [USSCP] (shorebirds) – U.S. Shorebird Conservation Plan 2004
 - h. Birds of Conservation Concern (all birds) – USFWS 2008
 - i. Northeast Partners In Amphibian and Reptile Conservation [NEPARC] (herpetofauna) – NEPARC 2010
 - j. American Fisheries Society (freshwater & diadromous fish) – Jelks et al. 2008
 - k. Atlantic States Marine Fisheries Commission Stock Assessments [ASMFC] - ASMFSC 2012
 - l. Eastern Brook Trout Joint Venture [EBTJV] - EBTJV 2011
 - m. Northeast Odonate Assessment (damselflies & dragonflies) – White et al. 2014
 - n. Committee on the Status of Endangered Wildlife in Canada [COSEWIC] (all taxa) – COSEWIC 2015

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

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

Vulnerability Factor	Authority (Source)	Metric¹	Potential Priority	Primary Taxa
Extirpation	IUCN	"CR" or "EN"	1-2	all
Extirpation	IUCN	"VU"	1-3	all
Extirpation	ESA (USFWS)	"E" or "T" or "C" or "P"	1-2	all
Extirpation	MESA (MDIFW)	"E" or "T" or "P"	1-2	all
Potential Extirpation	MDIFW	"Special Concern"	2-3	all
Potential Extirpation	NMFS	"Species of Concern"	2-3	marine
Recent Decline	MDIFW (multiple)	Steep declines < 15 yrs.	1	all
Recent Decline	MDIFW (multiple)	Steep declines < 30 yrs.	2-3	all
Regional Endemics	MDIFW (multiple)	>90% of geographic range in the Northeast	1-3	all
Specialist Group Assessment	NEFWDC (Therres 1999)	> 1: risk, data, area, spec, federal concerns	1-3	vertebrates & mussels
Specialist Group Assessment	RSGCN (Terwilliger & NEFWDC 2013)	"high responsibility" AND "very high concern"	1	vertebrates
Specialist Group Assessment	RSGCN (Terwilliger & NEFWDC 2013)	"high responsibility" AND "high concern"	2-3	vertebrates
Specialist Group Assessment	NatureServe (2014)	"G1-G2" (vertebrates) "G1" (invertebrates)	1	all
Specialist Group Assessment	NatureServe (2014)	"G3" (vertebrates) "G2" (invertebrates)	2-3	all
Specialist Group Assessment	COSEWIC (2015)	"E" or "T" in Atlantic Canada	2-3	all
Specialist Group Assessment	Partners in Flight (2012)	"concern, regional concern, or stewardship species" in US & CA	1-3	landbirds
Specialist Group Assessment	NAWCP (Kushlan et al. 2002, 2006)	"high concern"	1-3	waterbirds
Specialist Group Assessment	USSCP & NARSP (USSCP 2004; Clark & Niles 2000)	"highly imperiled" OR species of "high concern"	1-3	shorebirds
Specialist Group Assessment	Birds of Conservation Concern (USFWS 2008)	Listed in BCR 14 or 30	1-3	all birds
Specialist Group Assessment	NEPARC (2010)	"high responsibility" + "high concern" (red list)	1-3	reptiles & amphibians
Specialist Group Assessment	American Fisheries Society (Jelks et al. 2008)	Imperiled	1-3	fish

Table 1-2. *continued: page 2 of 2.*

Vulnerability Factor	Authority (Source)	Metric¹	Potential Priority	Primary Taxa
Specialist Group Assessment	ASMFC (2012)	"decreasing, unstable/decreasing, or local subpopulation"	1-3	marine fish
Specialist Group Assessment	EBTJV (2011)	"imperiled"	1-3	brook trout
Specialist Group Assessment	Northeast RCN Odonate Assessment (White et al. 2014)	"high vul" OR ["mod vul" + "primary-significant" responsibility]	1-3	damselflies & dragonflies
Climate Change	Manomet (Whitman et al. 2013)	"high vulnerability" + > "low confidence"	2-3	all
Climate Change	(Galbraith et al. 2014)	"high concern, highly imperiled, or critical"	2-3	shorebirds
Climate Change	Multiple	miscellaneous	2-3	marine
Rare & Poorly Surveyed	MDIFW	specialized habitat + <5 EOs and "G4-G5" OR < 10 EOs and "G3"	3	all
Historical	MDIFW & NatureServe (2014)	SH/GH and high rediscovery potential	2-3	all
Culturally Significant	Maine Tribes	culturally significant + biologically vulnerable	3	all

¹**Metric Notes:** CR = Critically Endangered, EN = Endangered, VU = Vulnerable, E = Endangered, T = Threatened, C = Candidate, P = Proposed, G1-G5 & GH = NatureServe Global rarity ranks (range ranks rounded as follows: G1G2=G1, G1G3=G2), SH = State Historic, BCR = Bird Conservation Region, EO = Element Occurrences

1.6 MAINE'S 2015 SGCN

Vulnerability concepts and criteria (Table 1-2) adopted in this Plan identified 378 SGCN in Maine. This number is significantly greater than the 213 SGCN recognized in the 2005 Plan, however of the 2005 total, 33 species have lost SGCN eligibility in 2015 (Appendix 1-5). The net expansion of the SGCN list between 2005 and 2015 mostly reflects updates and additions in SGCN designation criteria, recent significant declines for some species, more scrutiny of invertebrate taxa not assessed in 2005, and much greater attention to marine fauna now at risk in the Gulf of Maine.

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

The 2015 compilation of Maine's SGCN (Table 1-3) includes 378 fauna. Each cell for a species is linked to an SGCN Report that summarizes qualification criteria, habitat associations (Element 2), significant stressors to the species or its habitats (Element 3), potential conservation actions (Element 4), and conservation range maps. Click on the cell with the scientific name / common name to view reports of these details for each Maine SGCN, including data (e.g., range) that can be updated during the life of the Plan.

“The net expansion of the SGCN list between 2005 and 2015 mostly reflects changes in SGCN designation criteria, recent significant declines for some species, more scrutiny of invertebrate taxa not assessed in 2005, and much greater attention to marine fauna now at risk in the Gulf of Maine.”

Priority tiers of SGCN in this Plan ultimately are based on the degree of vulnerability for each species. Tier 1 SGCN receive utmost concern throughout the various Plan elements. However, higher SGCN priority levels do not necessarily infer they are absolute priority conservation targets. Instead, habitat-based conservation actions, or those that address a guild of several SGCN, may be more significant than a strategy that benefits a single Tier 1 SGCN. Feasibility, outcomes, and cost of conservation actions also influence Plan priorities. Among the 378 SGCN recognized in this Plan, the total number of SGCN by priority level separate as follows:

- Tier 1 (Highest Priority) – 58 SGCN
- Tier 2 (High Priority) – 131 SGCN
- Tier 3 (Moderate Priority) – 189 SGCN

Table 1-3. Maine's SGCN (by taxa class) and qualifying factors, 2015.

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

¹ Click on a species name to launch a full SGCN report summarizing associated habitats, stressors, and conservation strategies for that species.

² State & Federal ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

³ Other potential qualifying factors for 2015 SGCN designation include: climate change, recent significant decline, understudied species, regional endemism, historic taxon with rediscovery potential, and tribal cultural significance.

Table 1-3. continued: page 2 of 27

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

¹ Click on a species name to launch a full SGCN report summarizing associated habitats, stressors, and conservation strategies for that species.

² State & Federal ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

³ Other potential qualifying factors for 2015 SGCN designation include: climate change, recent significant decline, understudied species, regional endemism, historic taxon with rediscovery potential, and tribal cultural significance.

Table 1-3. continued: page 3 of 27

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

¹ Click on a species name to launch a full SGCN report summarizing associated habitats, stressors, and conservation strategies for that species.

² State & Federal ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

³ Other potential qualifying factors for 2015 SGCN designation include: climate change, recent significant decline, understudied species, regional endemism, historic taxon with rediscovery potential, and tribal cultural significance.

Table 1-3. continued: page 4 of 27

CLASS Order Scientific name ¹ Common name ¹	Maine SGCN Tier		Scale of Conservation Concern ²				Number of Other Factors ³
	2005	2015	State	Regional	National	Global	
ASTEROIDEA (sea stars; N = 5)							
Forcipulatida (sea stars; N = 3)							
Asterias forbesi Forbes's Starfish	no	2					3
Asterias rubens Common Sea Star	no	2					3
Stephanasterias albula White Sea Star	no	2					3
Valvatida (N = 2)							
Crossaster papposus Common Sun Star	no	2					3
Solaster endeca Purple Sunstar	no	2					3
AVES (birds; N = 130)							
Accipitriformes (hawks, kites, eagles, and allies; N = 3)							
Aquila chrysaetos Golden Eagle	2	2	E	yes			
Buteo platypterus Broad-winged Hawk	no	3		yes			
Circus cyaneus Northern Harrier	no	3	SC				
Anseriformes (waterfowl; N = 5)							
Aythya marila Greater Scaup	2	2	SC				1
Bucephala islandica Barrow's Goldeneye	2	1	T				1
Clangula hyemalis Long-tailed Duck	no	3				VU	
Histrionicus histrionicus Harlequin Duck	2	1	T	yes			1
Somateria mollissima Common Eider	2	3					1

¹ Click on a species name to launch a full SGCN report summarizing associated habitats, stressors, and conservation strategies for that species.

² State & Federal ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

³ Other potential qualifying factors for 2015 SGCN designation include: climate change, recent significant decline, understudied species, regional endemism, historic taxon with rediscovery potential, and tribal cultural significance.

Table 1-3. continued: page 5 of 27

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

¹ Click on a species name to launch a full SGCN report summarizing associated habitats, stressors, and conservation strategies for that species.

² State & Federal ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

³ Other potential qualifying factors for 2015 SGCN designation include: climate change, recent significant decline, understudied species, regional endemism, historic taxon with rediscovery potential, and tribal cultural significance.

Table 1-3. continued: page 6 of 27

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

¹ Click on a species name to launch a full SGCN report summarizing associated habitats, stressors, and conservation strategies for that species.

² State & Federal ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

³ Other potential qualifying factors for 2015 SGCN designation include: climate change, recent significant decline, understudied species, regional endemism, historic taxon with rediscovery potential, and tribal cultural significance.

Table 1-3. *continued: page 7 of 27*

CLASS Order <i>Scientific name</i> ¹ Common name ¹	Maine SGCN Tier		Scale of Conservation Concern ²				Number of Other Factors ³
	2005	2015	State	Regional	National	Global	
AVES (birds; continued)							
Charadriiformes (plovers, sandpipers, and allies; continued)							
Tringa solitaria Solitary Sandpiper	no	2		yes			1
Uria aalge Common Murre	2	3	SC				1
Coraciiformes (kingfishers and allies; N = 1)							
Megaceryle alcyon Belted Kingfisher	no	3		yes			
Cuculiformes (cuckoos; N = 2)							
Coccyzus americanus Yellow-billed Cuckoo	no	2	SC	yes			
Coccyzus erythrophthalmus Black-billed Cuckoo	2	3		yes			
Falconiformes (caracaras and falcons; N = 2)							
Falco peregrinus Peregrine Falcon	1	1	E	yes			
Falco sparverius American Kestrel	no	3		yes			
Galliformes (grouse, quail, and allies; N = 1)							
Falcipennis canadensis Spruce Grouse	no	3					2
Gaviiformes (loons; N = 2)							
Gavia immer Common Loon	2	3					1
Gavia stellata Red-throated Loon	no	3		yes			
Gruiiformes (cranes and rails; N = 4)							
Coturnicops noveboracensis Yellow Rail	2	2	SC	yes			1
Fulica americana American Coot	2	3	SC				
Gallinula galeata Common Gallinule	2	2	T				1

¹ Click on a species name to launch a full SGCN report summarizing associated habitats, stressors, and conservation strategies for that species.

² State & Federal ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

³ Other potential qualifying factors for 2015 SGCN designation include: climate change, recent significant decline, understudied species, regional endemism, historic taxon with rediscovery potential, and tribal cultural significance.

Table 1-3. continued: page 8 of 27

CLASS Order Scientific name ¹ Common name ¹	Maine SGCN Tier		Scale of Conservation Concern ²				Number of Other Factors ³
	2005	2015	State	Regional	National	Global	
AVES (birds; continued)							
Gruiformes (cranes and rails; continued)							
Porzana carolina Sora	no	3		yes			
Passeriformes (perching birds; N = 59)							
Ammodramus caudacutus Saltmarsh Sparrow	1	1	SC	yes		VU	1
Ammodramus nelsoni Nelson's Sparrow	2	2	SC	yes			1
Ammodramus savannarum Grasshopper Sparrow	2	1	E	yes			
Anthus rubescens American Pipit	2	2	E				1
Cardellina canadensis Canada Warbler	2	2	SC	yes			
Catharus bicknelli Bicknell's Thrush	1	1	SC	yes		VU	1
Catharus fuscescens Veery	2	2	SC	yes			
Catharus ustulatus Swainson's Thrush	no	3					1
Cistothorus platensis Sedge Wren	1	1	E	yes			
Coccothraustes vespertinus Evening Grosbeak	no	2	SC	yes			1
Contopus cooperi Olive-sided Flycatcher	2	2	SC	yes			
Contopus virens Eastern Wood-Pewee	no	2	SC	yes			
Dolichonyx oryzivorus Bobolink	2	3		yes			
Empidonax flaviventris Yellow-bellied Flycatcher	no	3					1

¹ Click on a species name to launch a full SGCN report summarizing associated habitats, stressors, and conservation strategies for that species.

² State & Federal ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

³ Other potential qualifying factors for 2015 SGCN designation include: climate change, recent significant decline, understudied species, regional endemism, historic taxon with rediscovery potential, and tribal cultural significance.

Table 1-3. continued: page 9 of 27

CLASS Order Scientific name ¹ Common name ¹	Maine SGCN Tier		Scale of Conservation Concern ²				Number of Other Factors ³
	2005	2015	State	Regional	National	Global	
AVES (birds; continued)							
Passeriformes (perching birds; continued)							
Empidonax minimus Least Flycatcher	no	3	SC				
Eremophila alpestris Horned Lark	2	3	SC				
Euphagus carolinus Rusty Blackbird	2	1	SC	yes		VU	
Geothlypis philadelphia Mourning Warbler	no	3					1
Haemorhous purpureus Purple Finch	2	3		yes			
Hirundo rustica Barn Swallow	2	2	SC	yes			1
Hylocichla mustelina Wood Thrush	2	1	SC	yes			1
Icterus galbula Baltimore Oriole	2	3		yes			
Icterus spurius Orchard Oriole	no	3	SC				
Loxia curvirostra Red Crossbill	2	3					1
Loxia leucoptera White-winged Crossbill	no	3					1
Melospiza lincolni Lincoln's Sparrow	no	3					1
Mniotilta varia Black-and-white Warbler	2	2	SC	yes			
Oreothlypis peregrina Tennessee Warbler	no	2	SC				1
Parkesia motacilla Louisiana Waterthrush	2	3		yes			
Passerella iliaca Fox Sparrow	no	3	SC				

¹ Click on a species name to launch a full SGCN report summarizing associated habitats, stressors, and conservation strategies for that species.

² State & Federal ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

³ Other potential qualifying factors for 2015 SGCN designation include: climate change, recent significant decline, understudied species, regional endemism, historic taxon with rediscovery potential, and tribal cultural significance.

Table 1-3. continued: page 10 of 27

CLASS Order Scientific name ¹ Common name ¹	Maine SGCN Tier		Scale of Conservation Concern ²				Number of Other Factors ³
	2005	2015	State	Regional	National	Global	
AVES (birds; continued)							
Passeriformes (perching birds; continued)							
Perisoreus canadensis Gray Jay	no	3					1
Petrochelidon pyrrhonota Cliff Swallow	no	3					1
Pheucticus ludovicianus Rose-breasted Grosbeak	2	3		yes			
Pinicola enucleator Pine Grosbeak	no	3					1
Pipilo erythrophthalmus Eastern Towhee	2	2	SC	yes			
Piranga olivacea Scarlet Tanager	2	3		yes			
Poecile hudsonicus Boreal Chickadee	no	2		yes			1
Progne subis Purple Martin	2	2	SC				1
Regulus calendula Ruby-crowned Kinglet	no	2					2
Riparia riparia Bank Swallow	no	1		yes			1
Setophaga americana Northern Parula	2	3					1
Setophaga caerulescens Black-throated Blue Warbler	2	3		yes			
Setophaga castanea Bay-breasted Warbler	2	3		yes			
Setophaga discolor Prairie Warbler	2	2	SC	yes			
Setophaga fusca Blackburnian Warbler	2	3		yes			
Setophaga pensylvanica Chestnut-sided Warbler	2	2	SC	yes			

¹ Click on a species name to launch a full SGCN report summarizing associated habitats, stressors, and conservation strategies for that species.

² State & Federal ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

³ Other potential qualifying factors for 2015 SGCN designation include: climate change, recent significant decline, understudied species, regional endemism, historic taxon with rediscovery potential, and tribal cultural significance.

Table 1-3. continued: page 11 of 27

CLASS Order Scientific name ¹ Common name ¹	Maine SGCN Tier		Scale of Conservation Concern ²				Number of Other Factors ³
	2005	2015	State	Regional	National	Global	
AVES (birds; continued)							
Passeriformes (perching birds; continued)							
Setophaga petechia Yellow Warbler	no	3	SC				
Setophaga ruticilla American Redstart	no	2	SC	yes			
Setophaga striata Blackpoll Warbler	no	3					1
Setophaga tigrina Cape May Warbler	2	3					1
Setophaga virens Black-throated Green Warbler	2	3		yes			
Spizella pusilla Field Sparrow	2	3		yes			
Stelgidopteryx serripennis Northern Rough-winged Swallow	no	3	SC				
Sturnella magna Eastern Meadowlark	2	2	SC	yes			
Tachycineta bicolor Tree Swallow	no	2	SC	yes			
Toxostoma rufum Brown Thrasher	2	2	SC	yes			
Tyrannus tyrannus Eastern Kingbird	2	2	SC	yes			
Vermivora cyanoptera Blue-winged Warbler	1	2	SC	yes			
Zonotrichia albicollis White-throated sparrow	no	3	SC				
Pelecaniformes (pelecans, herons, ibises, and allies; N = 6)							
Ardea herodias Great Blue Heron	2	2	SC				1
Botaurus lentiginosus American Bittern	2	3		yes			

¹ Click on a species name to launch a full SGCN report summarizing associated habitats, stressors, and conservation strategies for that species.

² State & Federal ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

³ Other potential qualifying factors for 2015 SGCN designation include: climate change, recent significant decline, understudied species, regional endemism, historic taxon with rediscovery potential, and tribal cultural significance.

Table 1-3. continued: page 12 of 27

CLASS Order Scientific name ¹ Common name ¹	Maine SGCN Tier		Scale of Conservation Concern ²				Number of Other Factors ³
	2005	2015	State	Regional	National	Global	
AVES (birds; continued)							
Pelecaniformes (pelecan, herons, ibises, and allies; continued)							
Egretta caerulea Little Blue Heron	2	3		yes			
Egretta thula Snowy Egret	2	3		yes			
Ixobrychus exilis Least Bittern	2	1	E	yes			
Nycticorax nycticorax Black-crowned Night-heron	2	2	E				
Piciformes (woodpeckers; N = 3)							
Colaptes auratus Northern Flicker	2	3		yes			
Picoides arcticus Black-backed Woodpecker	no	3					1
Picoides dorsalis American Three-toed Woodpecker	2	3					1
Podicipediformes (grebes; N = 2)							
Podiceps auritus Horned Grebe	no	3		yes			
Podilymbus podiceps Pied-billed Grebe	2	3		yes			
Procellariiformes (tubenoses; N = 2)							
Oceanodroma leucorhoa Leach's Storm-petrel	no	3	SC				
Puffinus gravis Great Shearwater	2	3		yes			
Strigiformes (owls; N = 4)							
Asio flammeus Short-eared Owl	1	2	T	yes			
Asio otus Long-eared Owl	2	3					1
Megascops asio Eastern Screech-Owl	2	3	SC				1

¹ Click on a species name to launch a full SGCN report summarizing associated habitats, stressors, and conservation strategies for that species.

² State & Federal ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

³ Other potential qualifying factors for 2015 SGCN designation include: climate change, recent significant decline, understudied species, regional endemism, historic taxon with rediscovery potential, and tribal cultural significance.

Table 1-3. *continued: page 13 of 27*

CLASS Order Scientific name ¹ Common name ¹	Maine SGCN Tier		Scale of Conservation Concern ²				Number of Other Factors ³
	2005	2015	State	Regional	National	Global	
AVES (birds; continued)							
Strigiformes (owls; continued)							
Tyto alba Barn Owl	no	3	SC				
Suliformes (frigatebirds, boobies, cormorants, darters, and allies; N = 1)							
Phalacrocorax carbo Great Cormorant	2	1	T	yes			1
BIVALVIA (marine and freshwater molluscs; N = 14)							
Myoida (saltwater clams; N = 3)							
Mya arenaria Softshell Clam	no	3					1
Mya truncata Gaper Clam	no	3					4
Zirfaea crispata Atlantic Great Piddock	no	2					3
Mytiloida (mussels; N = 1)							
Mytilus edulis Blue Mussel	no	3					1
Ostreoida (oysters, scallops, and allies; N = 1)							
Crassostrea virginica Eastern oyster	no	3					2
Pectinoida (N = 2)							
Chlamys islandica Icelandic Scallop	no	3					2
Placopecten magellanicus Atlantic Sea Scallop	no	3					1
Unionoida (freshwater mussels; N = 6)							
Alasmidonta undulata Triangle Floater	no	3		yes			
Alasmidonta varicosa Brook Floater	2	1	T	yes			
Anodonta implicata Alewife Floater	no	3		yes			

¹ Click on a species name to launch a full SGCN report summarizing associated habitats, stressors, and conservation strategies for that species.

² State & Federal ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

³ Other potential qualifying factors for 2015 SGCN designation include: climate change, recent significant decline, understudied species, regional endemism, historic taxon with rediscovery potential, and tribal cultural significance.

Table 1-3. continued: page 14 of 27

CLASS Order Scientific name ¹ Common name ¹	Maine SGCN Tier		Scale of Conservation Concern ²				Number of Other Factors ³
	2005	2015	State	Regional	National	Global	
BIVALVIA (marine and freshwater molluscs; continued)							
Unionoida (freshwater mussels; continued)							
Lampsilis cariosa Yellow Lampmussel	1	1	T	yes		EN	
Leptodea ochracea Tidewater Mucket	1	1	T	yes			
Margaritifera margaritifera Eastern Pearlshell	no	3				EN	
Veneroida (veneroids; N = 1)							
Mercenaria mercenaria Hard-shelled Clam	no	3					1
CEPHALASPIDOMORPHI (lampreys; N = 1)							
Petromyzontiformes (lampreys; N = 1)							
Lethenteron appendix American Brook Lamprey	no	3		yes			
CHONDRICHTHYES (sharks, rays, and skates; N = 9)							
Carcharhiniformes (ground sharks; N = 2)							
Prionace glauca Blue Shark	no	3					
Sphyrna zygaena Smooth Hammerhead	no	3				VU	
Lamniformes (sharks, skates, and rays ; N = 3)							
Alopias vulpinus Common Thresher Shark	no	3				VU	
Isurus oxyrinchus Shortfin Mako	no	2		yes		VU	
Lamna nasus Porbeagle	no	2		yes	SoC	VU	
Rajiformes (rays; N = 4)							
Amblyraja radiata Thorny Skate	no	2			SoC	VU	
Dipturus laevis Barndoor Skate	no	2		yes		EN	

¹ Click on a species name to launch a full SGCN report summarizing associated habitats, stressors, and conservation strategies for that species.

² State & Federal ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

³ Other potential qualifying factors for 2015 SGCN designation include: climate change, recent significant decline, understudied species, regional endemism, historic taxon with rediscovery potential, and tribal cultural significance.

Table 1-3. continued: page 15 of 27

CLASS Order Scientific name ¹ Common name ¹	Maine SGCN Tier		Scale of Conservation Concern ²				Number of Other Factors ³
	2005	2015	State	Regional	National	Global	
CHONDRICHTHYES (sharks, rays, and skates; continued)							
Rajiformes (rays; continued)							
Leucoraja ocellata Winter Skate	no	2				EN	
Malacoraja senta Smooth Skate	no	2				EN	
ECHINOIDEA (sea urchins; N = 1)							
Camarodonta (sea urchins; N = 1)							
Strongylocentrotus droebachiensis Green Sea Urchin	no	2					2
GASTROPODA (aquatic and terrestrial snails; N = 15)							
Basommatophora (air-breathing freshwater snails; N = 2)							
Stagnicola mighelsi Bigmouth Pondsnaill	2	1	SC	yes			1
Stagnicola oronoensis Obese Pondsnaill	no	3					1
Littorinimorpha (N = 2)							
Arrhoges occidentalis American Pelican Foot	no	2					3
Limneria undata Wavy Lamellaria	no	3					2
Neotaenioglossa (mostly sea snails; N = 5)							
Boreotrophon clathratus Clathrate Trophon	no	2					3
Boreotrophon truncatus Murex	no	2					3
Colus pygmaeus Colus Snail	no	2					3
Floridobia winkleyi New England Silt Snail	no	3					2
Ptychotractus ligatus Spindle Shell	no	2					3

¹ Click on a species name to launch a full SGCN report summarizing associated habitats, stressors, and conservation strategies for that species.

² State & Federal ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

³ Other potential qualifying factors for 2015 SGCN designation include: climate change, recent significant decline, understudied species, regional endemism, historic taxon with rediscovery potential, and tribal cultural significance.

Table 1-3. continued: page 16 of 27

CLASS Order Scientific name ¹ Common name ¹	Maine SGCN Tier		Scale of Conservation Concern ²				Number of Other Factors ³
	2005	2015	State	Regional	National	Global	
GASTROPODA (aquatic and terrestrial snails; continued)							
Stylommatophora (air-breathing snails land snails; N = 5)							
Appalachina sayana Spike-lip Crater	no	3					1
Neohelix dentifera Big-tooth Whitelip	no	3					1
Vertigo malleata Malleated Vertigo	no	3	SC				1
Vertigo morsei Six-whorl Vertigo	2	1	E				2
Vertigo paradoxa Mystery Vertigo	2	2	SC				
Thecosomata (sea butterflies; N = 1)							
Limacina helicina Limacina Snail	no	3					1
HOLOTHUROIDEA (sea cucumbers; N = 4)							
Dendrochirotida (sea cucumbers; N = 4)							
Cucumaria frondosa Orange-footed Sea Cucumber	no	2					2
Psolus fabricii Psolus	no	2					3
Psolus phantapus Psolus	no	2					3
Thyonidium drummondii Sea Cucumber	no	2					3
INSECTA (insects; N = 119)							
Coleoptera (beetles; N = 4)							
Cicindela ancocisconensis White Mountain Tiger Beetle	no	2	SC	yes			1
Cicindela marginata Salt Marsh Tiger Beetle	no	2	SC				1
Cicindela marginipennis Cobblestone Tiger Beetle	no	1	E	yes			1

¹ Click on a species name to launch a full SGCN report summarizing associated habitats, stressors, and conservation strategies for that species.

² State & Federal ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

³ Other potential qualifying factors for 2015 SGCN designation include: climate change, recent significant decline, understudied species, regional endemism, historic taxon with rediscovery potential, and tribal cultural significance.

Table 1-3. continued: page 17 of 27

CLASS Order Scientific name ¹ Common name ¹	Maine SGCN Tier		Scale of Conservation Concern ²				Number of Other Factors ³
	2005	2015	State	Regional	National	Global	
INSECTA (insects; N = 119)							
Coleoptera (beetles; continued)							
Nebria nivalis gaspesiana Gaspe Gazelle Beetle	no	3					1
Ephemeroptera (mayflies; N = 15)							
Ameletus browni A Mayfly	no	3	SC				1
Baetisca berneri A Mayfly	no	3	SC				1
Baetisca carolina A Mayfly	no	3	SC				1
Baetisca lacustris A Mayfly	no	3	SC				1
Baetisca rubescens A Mayfly	2	3	SC				2
Epeorus frisoni Roaring Brook Mayfly	1	1	T	yes			1
Hexagenia rigida A Mayfly	no	3	SC				1
Metretopus borealis A Mayfly	no	3	SC				1
Nixe horrida A Mayfly	2	3	SC	yes			1
Parameletus midas A Mayfly	no	3	SC				1
Rhithrogena undulata A Mayfly	no	3	SC				1
Siphonisca aerodromia Tomah Mayfly	1	1	T				1
Siphonurus barbaroides A Mayfly	no	3	SC				1
Siphonurus barbarus A Mayfly	no	2	SC	yes			1

¹ Click on a species name to launch a full SGCN report summarizing associated habitats, stressors, and conservation strategies for that species.

² State & Federal ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

³ Other potential qualifying factors for 2015 SGCN designation include: climate change, recent significant decline, understudied species, regional endemism, historic taxon with rediscovery potential, and tribal cultural significance.

Table 1-3. continued: page 18 of 27

CLASS Order Scientific name ¹ Common name ¹	Maine SGCN Tier		Scale of Conservation Concern ²				Number of Other Factors ³
	2005	2015	State	Regional	National	Global	
INSECTA (insects; continued)							
Ephemeroptera (mayflies; continued)							
Siphonurus demaryi A Mayfly	2	2	SC	yes			2
Hymenoptera (ants, bees, wasps and sawflies; N = 10)							
Bombus affinis Rusty-patched Bumble Bee	no	1	SC	yes			1
Bombus ashtoni Ashton's Cuckoo Bumble Bee	no	2	SC				2
Bombus citrinus Lemon Cuckoo Bumble Bee	no	3	SC				1
Bombus fernaldae Fernald's Cuckoo Bumble Bee	no	3	SC				1
Bombus fervidus Yellow Bumble Bee	no	3	SC				1
Bombus griseocollis Brown-belted Bumble Bee	no	3	SC				1
Bombus insularis Indiscriminate Cuckoo Bumble Bee	no	2	SC				2
Bombus pensylvanicus American Bumble Bee	no	2	SC				2
Bombus sandersoni Sanderson's Bumble Bee	no	3	SC				1
Bombus terricola Yellowbanded Bumble Bee	no	3	SC				1
Lepidoptera (butterflies, skippers, and moths; N = 47)							
Atrytonopsis hianna Dusted Skipper	no	3	SC				1
Boloria chariclea grandis Purple Lesser Fritillary	2	2	T				2
Boloria frigga saga Frigga Fritillary	2	1	E				2
Callophrys gryneus Juniper Hairstreak	2	2	E				1

¹ Click on a species name to launch a full SGCN report summarizing associated habitats, stressors, and conservation strategies for that species.

² State & Federal ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

³ Other potential qualifying factors for 2015 SGCN designation include: climate change, recent significant decline, understudied species, regional endemism, historic taxon with rediscovery potential, and tribal cultural significance.

Table 1-3. continued: page 19 of 27

CLASS Order Scientific name ¹ Common name ¹	Maine SGCN Tier		Scale of Conservation Concern ²				Number of Other Factors ³
	2005	2015	State	Regional	National	Global	
INSECTA (insects; continued)							
Lepidoptera (butterflies, skippers, and moths; continued)							
Callophrys hesseli Hessel's Hairstreak	1	1	E				1
Callophrys lanoraieensis Bog Elfin	no	3					1
Catocala similis Similar Underwing	no	3	SC				1
Chaetaglaea cerata A Noctuid Moth	2	2	SC				1
Chaetaglaea tremula Barrens Chaetaglaea	no	3	SC				1
Citheronia sepulcralis Pine Devil	2	2	SC				1
Cucullia speyeri A Moth	2	3					1
Cupido amyntula maritima Western Tailed Blue	no	3					1
Danaus plexippus Monarch	no	3					1
Erora laeta Early Hairstreak	2	2	SC				1
Erynnis brizo Sleepy Duskywing	2	2	T				
Hemaris gracilis Graceful Clearwing	2	3	SC				1
Hemileuca lucina New England Buckmoth	no	3					1
Hemileuca maia maia Eastern Buckmoth	2	2	SC				1
Hesperia leonardus Leonard's Skipper	2	3	SC				
Hesperia metea Cobweb Skipper	2	3	SC				1

¹ Click on a species name to launch a full SGCN report summarizing associated habitats, stressors, and conservation strategies for that species.

² State & Federal ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

³ Other potential qualifying factors for 2015 SGCN designation include: climate change, recent significant decline, understudied species, regional endemism, historic taxon with rediscovery potential, and tribal cultural significance.

Table 1-3. continued: page 20 of 27

CLASS Order Scientific name ¹ Common name ¹	Maine SGCN Tier		Scale of Conservation Concern ²				Number of Other Factors ³
	2005	2015	State	Regional	National	Global	
INSECTA (insects; continued)							
Lepidoptera (butterflies, skippers, and moths; continued)							
Lapara coniferarum Southern Pine Sphinx	no	3	SC				1
Lepipolys perscripta A Moth	no	3	SC				1
Lithophane lepida lepida Pine Pinion	2	2	SC	yes			2
Lycaena dorcas claytoni Clayton's Copper	1	2	T	yes			
Lycia rachelae Twilight Moth	1	2	T				1
Metarranthis apiciaria Barrens Metarranthis Moth	no	2	SC	yes			1
Nepytia pellucidaria A Moth	2	3	SC				1
Oeneis polixenes katahdin Katahdin Arctic	1	1	E	yes			1
Paonias astylus Huckleberry Sphinx	no	3	SC				1
Papilio brevicauda gaspeensis Short-tailed Swallowtail	no	3	SC				1
Papilio troilus Spicebush Swallowtail	2	3	SC				
Plebejus idas Northern Blue	no	2	SC				2
Plebejus idas empetri Crowberry Blue	2	2	SC				1
Polygonia satyrus Satyr Comma	no	3	SC				1
Psectraglaea carnosa Pink Sallow	2	2	SC				2
Satyrium edwardsii Edwards' Hairstreak	2	2	E				1

¹ Click on a species name to launch a full SGCN report summarizing associated habitats, stressors, and conservation strategies for that species.

² State & Federal ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

³ Other potential qualifying factors for 2015 SGCN designation include: climate change, recent significant decline, understudied species, regional endemism, historic taxon with rediscovery potential, and tribal cultural significance.

Table 1-3. continued: page 21 of 27

CLASS Order Scientific name ¹ Common name ¹	Maine SGCN Tier		Scale of Conservation Concern ²				Number of Other Factors ³
	2005	2015	State	Regional	National	Global	
INSECTA (insects; continued)							
Lepidoptera (butterflies, skippers, and moths; continued)							
Satyrium titus Coral Hairstreak	2	3	SC				
Satyrodes appalachia Appalachian Brown	no	3	SC				
Spartiniphaga inops Spartina Borer Moth	no	3					1
Speranza exonerata Barrens Itame	2	2	SC				2
Thorybes bathyllus Southern Cloudywing	no	3	SC				1
Xylena thoracica Acadian Swordgrass Moth	no	3	SC				
Xylotype capax Broad Sallow	no	3	SC				1
Xystocheilus rufago Red-winged Sallow	no	3	SC				1
Zale lunifera Bold-based Zale Moth	2	3	SC				1
Zale obliqua Oblique Zale	no	3	SC				1
Zanclognatha martha Pine Barrens Zanclognatha	2	1	T				2
Odonata (dragonflies and damselflies; N = 36)							
Aeshna juncea Sedge Darner	2	2	SC	yes			2
Aeshna sitchensis Zigzag Darner	no	3	SC	yes			
Anax longipes Comet Darner	no	3	SC				1
Argia translata Dusky Dancer	2	3	SC				1

¹ Click on a species name to launch a full SGCN report summarizing associated habitats, stressors, and conservation strategies for that species.

² State & Federal ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

³ Other potential qualifying factors for 2015 SGCN designation include: climate change, recent significant decline, understudied species, regional endemism, historic taxon with rediscovery potential, and tribal cultural significance.

Table 1-3. continued: page 22 of 27

CLASS Order Scientific name ¹ Common name ¹	Maine SGCN Tier		Scale of Conservation Concern ²				Number of Other Factors ³
	2005	2015	State	Regional	National	Global	
INSECTA (insects; continued)							
Odonata (dragonflies and damselflies; continued)							
Arigomphus furcifer Lilypad Clubtail	no	3	SC				
Celithemis martha Martha's Pennant	no	3		yes			1
Cordulegaster obliqua Arrowhead Spiketail	2	3	SC	yes			
Enallagma carunculatum Tule Bluet	2	3	SC				1
Enallagma durum Big Bluet	2	3	SC				1
Enallagma laterale New England Bluet	no	2		yes			1
Enallagma pictum Scarlet Bluet	2	2	SC	yes			1
Epiaeschna heros Swamp Darner	2	3	SC				1
Erythrodiplax berenice Seaside Dragonlet	no	3		yes			
Gomphus quadricolor Rapids Clubtail	1	2	E				
Gomphus vastus Cobra Clubtail	2	3	SC				1
Ischnura hastata Citrine Forktail	2	3	SC				1
Ischnura ramburii Rambur's Forktail	2	3	SC				1
Lanthus vernalis Southern Pygmy Clubtail	no	2	SC				1
Leucorrhinia patricia Canada Whiteface	2	2	SC	yes			1
Libellula needhami Needhams Skimmer	no	3	SC				1

¹ Click on a species name to launch a full SGCN report summarizing associated habitats, stressors, and conservation strategies for that species.

² State & Federal ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

³ Other potential qualifying factors for 2015 SGCN designation include: climate change, recent significant decline, understudied species, regional endemism, historic taxon with rediscovery potential, and tribal cultural significance.

Table 1-3. continued: page 23 of 27

CLASS Order Scientific name ¹ Common name ¹	Maine SGCN Tier		Scale of Conservation Concern ²				Number of Other Factors ³
	2005	2015	State	Regional	National	Global	
INSECTA (insects; continued)							
Odonata (dragonflies and damselflies; continued)							
Libellula semifasciata Painted Skimmer	no	3	SC				
Nannothemis bella Elfin Skimmer	no	3		yes			
Neurocordulia michaeli Broad-tailed Shadowdragon	no	3		yes			
Ophiogomphus anomalus Extra-striped Snaketail	no	3		yes			
Ophiogomphus colubrinus Boreal Snaketail	2	1	T	yes			
Ophiogomphus howei Pygmy Snaketail	2	2	SC	yes			
Progomphus obscurus Common Sanddragon	no	3	SC				
Rhionaeschna mutata Spatterdock Darner	1	3	SC				1
Somatochlora albicincta Ringed Emerald	no	3	SC				
Somatochlora brevicincta Quebec Emerald	2	2	SC	yes			1
Somatochlora incurvata Incurvate Emerald	no	3	SC	yes			
Somatochlora minor Ocellated Emerald	no	3		yes			
Stylurus spiniceps Arrow Clubtail	2	3	SC				
Tramea carolina Carolina Saddlebags	no	3	SC				1
Tramea lacerata Black Saddlebags	no	3	SC				1
Williamsonia lintneri Ringed Boghaunter	1	1	T	yes		VU	1

¹ Click on a species name to launch a full SGCN report summarizing associated habitats, stressors, and conservation strategies for that species.

² State & Federal ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

³ Other potential qualifying factors for 2015 SGCN designation include: climate change, recent significant decline, understudied species, regional endemism, historic taxon with rediscovery potential, and tribal cultural significance.

Table 1-3. continued: page 24 of 27

CLASS Order Scientific name ¹ Common name ¹	Maine SGCN Tier		Scale of Conservation Concern ²				Number of Other Factors ³
	2005	2015	State	Regional	National	Global	
INSECTA (insects; continued)							
Plecoptera (stoneflies; N = 3)							
Alloperla voinae A Stonefly	no	3					1
Neoperla mainensis A Stonefly	2	3	SC	yes			1
Pteronarcys comstocki Spiny Salmonfly	no	3					1
Trichoptera (caddisflies; N = 4)							
Hydroptila blicklei A Caddisfly	no	3	SC	yes			2
Hydroptila parachelops A Caddisfly	no	3	SC	yes			2
Hydroptila tomah A Caddisfly	2	3	SC	yes			2
Ochrotrichia denningi A Caddisfly	no	3					2
MALACOSTRACA (crustaceans; N = 4)							
Decapoda (decapods; N = 4)							
Lebbeus groenlandicus Spiny Lebbeid Shrimp	no	2					3
Lebbeus polaris Polar Lebbeid Shrimp	no	2					3
Orconectes limosus Spinycheek Crayfish	no	3					1
Pandalus borealis Northern Shrimp	no	1		yes			2
MAMMALIA (mammals; N = 22)							
Artiodactyla (even-toed ungulates; N = 1)							
Alces alces americanus Moose	no	3					1
Carnivora (carnivores; N = 1)							
Lynx canadensis Canada Lynx	2	2	SC		T		1

¹ Click on a species name to launch a full SGCN report summarizing associated habitats, stressors, and conservation strategies for that species.

² State & Federal ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

³ Other potential qualifying factors for 2015 SGCN designation include: climate change, recent significant decline, understudied species, regional endemism, historic taxon with rediscovery potential, and tribal cultural significance.

Table 1-3. continued: page 25 of 27

CLASS Order Scientific name ¹ Common name ¹	Maine SGCN Tier		Scale of Conservation Concern ²				Number of Other Factors ³
	2005	2015	State	Regional	National	Global	
MAMMALIA (mammals; continued)							
Cetacea (whales; N = 7)							
Balaenoptera borealis Sei Whale	1	2	E	yes	E	EN	
Balaenoptera musculus Blue Whale	no	2		yes	E	EN	
Balaenoptera physalus Finback Whale	1	2	E	yes	E	EN	
Eubalaena glacialis North Atlantic Right Whale	1	1	E	yes	E	EN	
Megaptera novaeangliae Humpback Whale	1	1	E	yes	E		
Phocoena phocoena Harbor Porpoise	no	2					
Physeter macrocephalus Sperm Whale	1	2	E	yes	E	VU	
Chiroptera (bats; N = 8)							
Eptesicus fuscus Big Brown Bat	no	2	SC				1
Lasionycteris noctivagans Silver-haired Bat	no	2	SC	yes			
Lasiurus borealis Eastern Red Bat	no	3	SC				
Lasiurus cinereus Hoary Bat	no	3	SC				
Myotis leibii Eastern Small-footed Myotis	2	1	T	yes			
Myotis lucifugus Little Brown Bat	no	1	E				1
Myotis septentrionalis Northern Long-eared Myotis	no	1	E	yes	T		1
Perimyotis subflavus Tri-colored Bat	no	2	SC	yes			

¹ Click on a species name to launch a full SGCN report summarizing associated habitats, stressors, and conservation strategies for that species.

² State & Federal ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

³ Other potential qualifying factors for 2015 SGCN designation include: climate change, recent significant decline, understudied species, regional endemism, historic taxon with rediscovery potential, and tribal cultural significance.

Table 1-3. continued: page 26 of 27

CLASS Order Scientific name ¹ Common name ¹	Maine SGCN Tier		Scale of Conservation Concern ²				Number of Other Factors ³
	2005	2015	State	Regional	National	Global	
MAMMALIA (mammals; continued)							
Lagomorpha (rabbits, hares, and pikas; N = 1)							
Sylvilagus transitionalis New England Cottontail	1	1	E	yes	C	VU	2
Rodentia (rodents; N = 3)							
Microtus pennsylvanicus shattucki Penobscot Meadow Vole	1	2	SC	yes			
Ondatra zibethicus Muskrat	no	3					1
Synaptomys borealis sphagnicola Northern Bog Lemming	2	1	T	yes			
Soricomorpha (shrews and relatives; N = 1)							
Sorex dispar Long-tailed Shrew	no	3		yes			
MAXILLOPODA (crustaceans; N = 1)							
Calanoida (calanoid copepods; N = 1)							
Calanus finmarchicus A Copepod	no	3					1
MEROSTOMATA (horseshoe crabs and sea scorpions; N = 1)							
Xiphosurida (horseshoe crabs; N = 1)							
Limulus polyphemus Horseshoe Crab	no	1		yes			1
OPHIUROIDEA (brittle stars; N = 1)							
Euryalida (basket stars; N = 1)							
Gorgonocephalus arcticus Northern Basket Starfish	no	2					3
REPTILIA (reptiles; N = 11)							
Squamata (lizards and snakes; N = 3)							
Coluber constrictor constrictor Northern Black Racer	2	1	E	yes			
Storeria dekayi dekayi Northern Brownsnake	no	2	SC				1

¹ Click on a species name to launch a full SGCN report summarizing associated habitats, stressors, and conservation strategies for that species.

² State & Federal ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

³ Other potential qualifying factors for 2015 SGCN designation include: climate change, recent significant decline, understudied species, regional endemism, historic taxon with rediscovery potential, and tribal cultural significance.

Table 1-3. continued: page 27 of 27

CLASS Order Scientific name ¹ Common name ¹	Maine SGCN Tier		Scale of Conservation Concern ²				Number of Other Factors ³
	2005	2015	State	Regional	National	Global	
REPTILIA (reptiles; N = 11)							
Squamata (lizards and snakes; continued)							
Thamnophis sauritus Eastern Ribbon Snake	no	2	SC	yes			
Testudines (turtles and tortoises; N = 8)							
Caretta caretta Loggerhead Seaturtle	no	2	T	yes	T	EN	
Chelonia mydas Green Seaturtle	no	2		yes	E	EN	
Clemmys guttata Spotted Turtle	2	1	T	yes		EN	
Dermochelys coriacea Leatherback Seaturtle	no	1	E	yes	E	VU	
Emydoidea blandingii Blanding's Turtle	1	1	E	yes		EN	
Glyptemys insculpta Wood Turtle	2	1	SC	yes		EN	
Lepidochelys kempii Kemp's Ridley Seaturtle	no	2	E	yes	E	CR	
Terrapene carolina carolina Eastern Box Turtle	1	2	E	yes		VU	
RHYNCHONELLATA (brachiopods; N = 1)							
Terebratulida (articulate brachiopods; N = 1)							
Terebratulina septentrionalis Lamp Shell	no	2					3

¹ Click on a species name to launch a full SGCN report summarizing associated habitats, stressors, and conservation strategies for that species.

² State & Federal ESA Codes: Endangered Species [E]; Threatened Species [T]; Candidate Species [C]; Special Concern Species [SC]; Species of Concern [SoC]. IUCN Codes: Critically Endangered [CR]; Endangered [EN]; Vulnerable [VU].

³ Other potential qualifying factors for 2015 SGCN designation include: climate change, recent significant decline, understudied species, regional endemism, historic taxon with rediscovery potential, and tribal cultural significance.

1.7 LITERATURE CITED AND REFERENCES

- Association of Fish and Wildlife Agencies (AFWA) - Teaming With Wildlife Committee, State Wildlife Action Plan (SWAP) Best Practices Working Group. 2012. Best practices for State Wildlife Action Plans - voluntary guidance to states for revision and implementation. Association of Fish and Wildlife Agencies, Washington, DC. 80pp.
- Atlantic States Marine Fisheries Commission (ASMFC). 2012. Stock assessments. Available online at <http://www.asmfc.org/fisheries-science/stock-assessments#Documents> Last accessed: July 19, 2015.
- Blickle, R. L. and W. J. Morse. 1966. The caddisflies (Trichoptera) of Maine excepting the Family Hydroptilidae. Maine Agricultural Experiment Station Technical Bull. T-24. University of Maine, Orono. 12pp.
- Brower, A. E. 1974. A list of the Lepidoptera of Maine, Part I, The Macrolepidoptera. Maine Agricultural Experiment Station Technical Bull. 66. Univ. of Maine, Orono. 136pp.
- _____. 1983. A list of the Lepidoptera of Maine, Part 2, The Microlepidoptera, Section 1, Limacodidae through Cossidae. Maine Forest Service and Maine Agricultural Experiment Station Technical Bull. 109. University of Maine, Orono. 60pp.
- _____. 1984. A list of the Lepidoptera of Maine, Part 2, The Microlepidoptera, Section 2, Cosmopterigidae through Hepialidae. Maine Forest Service and Maine Agricultural Experiment Station Technical Bull. 114. University of Maine, Orono. 70pp.
- Brunelle, P. M., and P. G. deMaynadier. 2005. The Maine damselfly and dragonfly survey: a final report. Technical report submitted to the Maine Department of Inland Fisheries and Wildlife, Bangor.
- Burian, S. K. and K. E. Gibbs. 1991. Mayflies of Maine: an annotated faunal list. Maine Agricultural Experiment Station Technical Bull. 142, University of Maine, Orono. 109pp.
- Carlton, J.T., G. J. Vermeij, D. R. Lindberg, D. A. Carlton, and E.C. Dubley. 1991. The first historical extinction of a marine invertebrate in an ocean basin: the demise of the eelgrass limpet *Lottia alveus*. Biological Bulletin 180(1):72-80.
- Census of Marine Life. 2015. Gulf of Maine area - Register of marine species. Available at <http://www.gulfofmaine-census.org/about-the-gulf/biodiversity-of-the-gulf/lists/gulf-of-maine-register-of-marine-species/>
- Clark, K. E. and L. J. Niles. 2000. North Atlantic regional shorebird plan. Endangered and Nongame Species Program, Woodbine, NJ. 17pp. plus appendices.
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2015. Database of species assessed by COSEWIC. Last Update August 24, 2015. Available at http://www.cosewic.gc.ca/eng/sct1/searchform_e.cfm

- Dearborn, R. G., R. Bradbury, and G. Russell. 1983. The forest insect survey of Maine: Order Hymenoptera. Maine Forest Service Entomology Division Tech. Rep. 202. Maine Department of Conservation, Augusta. 101pp.
- Eastern Brook Trout Joint Venture (EBJTV). 2011. Conserving the eastern brook trout: conservation strategies. EBJTV, Sanbornton, NH. 91pp. Available at <http://easternbrooktrout.org/reports/ebtjv-conservation-strategy/view>
- Ferree, C. and M. G. Anderson. 2013. A map of terrestrial habitats of the northeastern United States: methods and approach. The Nature Conservancy, Eastern Conservation Science, Eastern Regional Office. Boston, MA. 85pp.
- Galbraith H., D.W. DesRochers, S. Brown, and J.M. Reed. 2014. Predicting Vulnerabilities of North American Shorebirds to Climate Change. PLoS ONE 9(9): e108899
- Gawler, S. C., J. J. Albright, P. D. Vickery, and F. C. Smith. 1996. Biological diversity in Maine – an assessment of status and trends in the terrestrial and freshwater landscape. Maine Natural Areas Program, Department of Conservation, Augusta, Maine. 80pp plus appendices.
- Gleich, J. G. and F. F. Gilbert. 1976. A survey of terrestrial gastropods from central Maine. Canadian Journal of Zoology 54:620-627.
- Hotopp, K. C., 2012. Freshwater snail inventory of the Fish River Lakes. Final Report submitted to Maine Outdoor Heritage Fund, Pittston, ME. 55pp.
- _____, and D. A. Smith. 1994. Notes on land snails near Big Reed Pond. Unpublished report to the Maine Chapter of The Nature Conservancy, Brunswick, Maine. 4pp.
- Huryn, A. D. and S. C. Harris. 2000. High species richness of caddisflies (Trichoptera) from a riparian wetland in Maine. Northeastern Naturalist 7:189-204.
- International Union for Conservation of Nature (IUCN). 2015. IUCN Red List [web application]. Version 2015-3. IUCN, Gland, Switzerland. Available at <http://www.iucnredlist.org/>. Last accessed: September 17, 2015.
- Jelks, H. L., S. J. Walsh, N. M. Burkhead, S. Contreras-Balderas, E. Díaz-Pardo, D. A. Hendrickson, J. Lyons, N. E. Mandrak, F. McCormick, J. S. Nelson, S. P. Platania, B. A. Porter, C. B. Renaud, J. J. Schmitter-Soto, E. B. Taylor, and M. L. Warren, Jr. 2008. Conservation status of imperiled North American freshwater and diadromous fishes. Fisheries 33:372–407.
- Krohn, W. B., R. B. Boone, S. A. Sader, J. A. Hepinstall, S. M. Schaefer, and S. L. Painton. 1998. The Maine GAP analysis project, final report. University of Maine, Orono, ME. 123pp plus appendices.
- Kushlan, J. A., M. J. Steinkamp, K. C. Parsons, J. Capp, M. Acosta Cruz, M. Coulter, I. Davidson, L. Dickson, N. Edelson, R. Elliot, R. M. Erwin, S. Hatch, S. Kress, R. Milko, S. Miller, K. Mills, R. Paul, R. Phillips, J. E. Saliva, B. Sydeman, J. Trapp, J. Wheeler, and K. Wohl. 2002. Waterbird conservation for the Americas: the North American waterbird

- conservation plan, Version 1. Waterbird conservation for the Americas, Washington, DC. 78pp. Available at <http://www.waterbirdconservation.org/pubs/complete.pdf>
- Kushlan et al. 2006. Conservation status and distribution of solitary-nesting waterbird species, Revision April 17, 2006. Waterbird Conservation for the Americas: The North American waterbird conservation plan. Washington, DC. Summary Table available at http://www.waterbirdconservation.org/pdfs/status_assessment/FinalStatusandDistributionMarshbirdsTable.pdf
- Majka, C. D., D. S. Chandler, and C. P. Donahue. 2011. Checklist of the beetles of Maine, USA. Empty Mirrors Press, Halifax, NS, Canada. 328pp.
- Martin, S. M. 1999. Freshwater snails (Mollusca: Gastropoda) of Maine. *Northeastern Naturalist* 6(1):39-88.
- _____. 2000. Terrestrial snails and slugs (Mollusca: Gastropoda) of Maine. *Northeastern Naturalist* 7(1):33-88.
- McCullough, M. A. 1997. Conservation of invertebrates in Maine and New England: perspectives and prognoses. *Northeastern Naturalist* 4(4):261-278.
- Mingo, T. M. 1983. An annotated checklist of the stoneflies (Plecoptera) of Maine. *Entomology News* 94(2):65-72.
- NatureServe. 2014. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, VA. Available at <http://www.natureserve.org/explorer> Last accessed: September 18, 2015.
- Nedeau, E. J., M. A. McCullough, and B. I. Swartz. 2000. The freshwater mussels of Maine. Maine Department of Inland Fisheries and Wildlife, State House Station #41, Augusta, ME. 118pp.
- Nekola, J. C. 2008. Land Snail Ecology and Biogeography of Eastern Maine. Report to the Maine Department of Inland Fisheries and Wildlife, Augusta, ME. 119pp.
- Northeast Partners in Amphibian and Reptile Conservation (NEPARC). 2010. Northeast amphibian and reptile species of regional responsibility and conservation concern. Northeast Partners in Amphibian and Reptile Conservation (NEPARC). Publication 2010-1. 20pp. Available at http://www.northeastparc.org/products/pdfs/NEPARC_NESpeciesofresponsibility.pdf
- Partners in Flight Science Committee 2012. Species Assessment Database, version 2012. Available at <http://rmbo.org/pifassessment>. Last accessed: September 18, 2015.
- Stein, B. A., L. S. Kutner, and J. S. Adams (Eds.). 2000. Precious heritage: the status of biodiversity in the United States. Oxford University Press, Oxford, UK. 399pp.
- Stubbs, C. S., E. A. Osgood, J. D. Dimond, and F. A. Drummond. 1995. Letter to Maine Natural Areas Program, Augusta. 6pp.

- Terwilliger Consulting, Inc. and the Northeast Fish and Wildlife Diversity Technical Committee (NEFWDTC). 2013. Taking action together: Northeast regional synthesis for state wildlife action plans. A report submitted to the Northeast Association of Fish and Wildlife Agencies. Locustville, VA. 291pp.
- Therres, G. D. 1999. Wildlife species of regional conservation concern in the northeastern United States. *Northeast Wildlife* 54:93-100.
- Thomas, J. A., M. G. Telfer, D. B. Roy, C. D. Preston, J. D. Greenwood, J. Asher, R. Fox, R. T. Clarke, and J. H. Lawton. 2004. Comparative losses of British butterflies, birds, and plants and the global extinction crisis. *Science* 303:1879-1881.
- U.S. Fish and Wildlife Service. 2008. Birds of conservation concern - 2008. U.S. Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, VA. 85pp.
- U.S. Shorebird Conservation Plan (USSCP). 2004. High priority shorebirds – 2004. Unpubl. Report, U.S. Fish and Wildlife Service, 4401 N. Fairfax Dr., MBSP 4107, Arlington, VA. 5pp.
- Webster, R.P. and P.G. deMaynadier. 2005. A baseline atlas and conservation assessment of the butterflies of Maine. A Technical Report submitted to the Maine Department of Inland Fisheries and Wildlife, Bangor.
- White, E. L., P. D. Hunt, M. D. Schlesinger, J. D. Corser, and P. G. deMaynadier. 2014. A conservation status assessment of Odonata for the northeastern United States. New York Natural Heritage Program, Albany. 50pp.
- Whitman, A., A. Cutko, P. deMaynadier, S. Walker, B. Vickery, S. Stockwell, and R. Houston. 2013. Climate change and biodiversity in Maine: vulnerability of habitats and priority species. Manomet Center for Conservation Sciences (in collaboration with Maine Beginning with Habitat Climate Change Working Group) Report NCI-2013-03. Brunswick, ME. 105pp. Available at https://www.manomet.org/sites/default/files/publications_and_tools/BwHSummary_021914.pdf

1.8 APPENDICES

Appendix 1-1. Maine's list of state-designated Endangered / Threatened plants administered by Natural Areas Program - Maine Department of Agriculture, Conservation and Forestry.

<u>Taxa group (class)</u> Scientific name	Common name	State status (updated, 2015)
Class Dicotyledoneae (Dicots)		
<i>Adlumia fungosa</i>	Allegheny Vine	Endangered
<i>Agalinis neoscotica</i>	Nova Scotia False-foxglove	Threatened
<i>Agalinis purpurea</i>	Large-purple False Foxglove	Endangered
<i>Amelanchier nantucketensis</i>	Nantucket Shadbush	Threatened
<i>Amerorchis rotundifolia</i>	Small Round-leaved Orchis	Threatened
<i>Anemone multifida</i>	Cut-leaved Anemone	Threatened
<i>Arctous alpina</i>	Alpine Bearberry	Threatened
<i>Arnica lanceolata</i>	Hairy Arnica	Threatened
<i>Asarum canadense</i>	Wild Ginger	Threatened
<i>Astragalus robbinsii</i> var. <i>minor</i>	Robbins' Milk Vetch	Endangered
<i>Bartonia paniculata</i>	Screwstem	Threatened
<i>Benthamidia florida</i>	Flowering Dogwood	Endangered
<i>Betula glandulosa</i>	Tundra Dwarf Birch	Endangered
<i>Betula minor</i>	Dwarf White Birch	Endangered
<i>Bistorta vivipara</i>	Alpine Bistort	Endangered
<i>Boechera laevigata</i>	Smooth Rockcress	Threatened
<i>Boechera missouriensis</i>	Missouri Rockcress	Threatened
<i>Calystegia spithamea</i>	Upright Bindweed	Threatened
<i>Cardamine bellidifolia</i>	Alpine Bitter-cress	Endangered
<i>Cardamine concatenata</i>	Cut-leaved Toothwort	Endangered
<i>Cardamine longii</i>	Long's Bitter-cress	Threatened
<i>Carya cordiformis</i>	Bitternut Hickory	Endangered
<i>Ceanothus americanus</i>	New Jersey Tea	Threatened
<i>Chenopodium foggii</i>	Fogg's Goosefoot	Threatened
<i>Chimaphila maculata</i>	Spotted Wintergreen	Endangered
<i>Coptidium lapponicum</i>	Lapland Buttercup	Threatened
<i>Cynoglossum virginianum</i> var. <i>boreale</i>	Northern Wild Comfrey	Endangered
<i>Dicentra canadensis</i>	Squirrel-corn	Threatened
<i>Draba arabisans</i>	Rock Whitlow-grass	Threatened
<i>Draba cana</i>	Lance-leaved Draba	Endangered
<i>Draba glabella</i>	Smooth Draba	Endangered
<i>Drosera anglica</i>	English Sundew	Endangered
<i>Drosera linearis</i>	Slender-leaved Sundew	Endangered
<i>Epilobium anagallidifolium</i>	Alpine Willow-herb	Endangered
<i>Epilobium hornemannii</i>	Hornemann's Willow-herb	Endangered
<i>Eupatorium pubescens</i>	Hairy Boneset	Endangered
<i>Eupatorium sessidifolium</i>	Upland Boneset	Endangered
<i>Euthamia caroliniana</i>	Narrow-leaved Goldenrod	Threatened
<i>Gentiana rubricaulis</i>	Red-stemmed Gentian	Threatened
<i>Gentianella amarella</i> ssp. <i>acuta</i>	Northern Gentian	Endangered

Appendix 1-1. continued: page 2 of 5.

Taxa group (class) <i>Scientific name</i>	Common name	State status (updated, 2015)
Class Dicotyledoneae (Dicots) - continued		
<i>Geum fragarioides</i>	Barren-strawberry	Endangered
<i>Hackelia deflexa</i> ssp. <i>americana</i>	Northern Stickseed	Endangered
<i>Harrimanella hypnoides</i>	Moss Bell-heather	Threatened
<i>Hieracium robinsonii</i>	Robinson's Hawkweed	Endangered
<i>Hieracium venosum</i> var. <i>nudicaule</i>	Rattlesnake Hawkweed	Endangered
<i>Hottonia inflata</i>	Featherfoil	Threatened
<i>Hypericum ascyron</i>	Great Saint John's-wort	Endangered
<i>Ilex glabra</i>	Ink-berry	Endangered
<i>Iva frutescens</i> ssp. <i>oraria</i>	Marsh-elder	Endangered
<i>Kalmia procumbens</i>	Alpine Azalea	Threatened
<i>Krigia virginica</i>	Dwarf Dandelion	Endangered
<i>Lespedeza hirta</i> <i>hirta</i>	Hairy Bush-clover	Endangered
<i>Liatris novae-angliae</i>	Northern Blazing Star	Threatened
<i>Lomatogonium rotatum</i>	Marsh Felwort	Threatened
<i>Lonicera dioica</i>	Mountain Honeysuckle	Endangered
<i>Micranthes foliolosa</i>	Star Saxifrage	Endangered
<i>Minuartia michauxii</i>	Michaud's Stitchwort	Endangered
<i>Minuartia rubella</i>	Arctic Sandwort	Endangered
<i>Nabalus boottii</i>	Boott's Rattlesnake Root	Endangered
<i>Nymphaea leibergii</i>	Pygmy Water-lily	Threatened
<i>Omalotheca supina</i>	Alpine Cudweed	Endangered
<i>Oxytropis campestris</i> var. <i>johannensis</i>	Saint John Oxytrope	Threatened
<i>Panax quinquefolius</i>	American Ginseng	Endangered
<i>Paronychia argyrocoma</i>	Silverling	Threatened
<i>Pedicularis furbishiae</i>	Furbish's Lousewort	Endangered
<i>Phyllodoce caerulea</i>	Mountain Heath	Threatened
<i>Pinguicula vulgaris</i>	Common Butterwort	Endangered
<i>Polemonium vanbruntiae</i>	Bog Jacob's-ladder	Endangered
<i>Polygala senega</i>	Seneca Snakeroot	Endangered
<i>Proserpinaca pectinata</i>	Comb-leaved Mermaid-weed	Endangered
<i>Prunus maritima</i>	Beach Plum	Endangered
<i>Quercus bicolor</i>	Swamp White Oak	Threatened
<i>Quercus coccinea</i>	Scarlet Oak	Endangered
<i>Quercus montana</i>	Chestnut Oak	Threatened
<i>Ranunculus fascicularis</i>	Early Crowfoot	Threatened
<i>Rhododendron lapponicum</i>	Lapland Rosebay	Threatened
<i>Rhododendron maximum</i>	Great Rhododendron	Threatened
<i>Rhododendron viscosum</i>	Clammy Azalea	Endangered
<i>Salix arctophila</i>	Arctic Willow	Endangered
<i>Salix candida</i>	Hoary Willow	Endangered
<i>Salix exigua</i> ssp. <i>interior</i>	Sandbar Willow	Endangered
<i>Salix herbacea</i>	Dwarf Willow	Threatened
<i>Salix myricoides</i>	Blue-leaf Willow	Threatened
<i>Salix planifolia</i>	Tea-leaved Willow	Threatened

Appendix 1-1. continued: page 3 of 5.

Taxa group (class) <i>Scientific name</i>	Common name	State status (updated, 2015)
Class Dicotyledoneae (Dicots) - continued		
<i>Salix uva-ursi</i>	Bearberry Willow	Threatened
<i>Sanguisorba canadensis</i>	Canada Burnet	Threatened
<i>Saxifraga paniculata</i> ssp. <i>neogaea</i>	Livelong Saxifrage	Endangered
<i>Sericocarpus asteroides</i>	White-topped Aster	Endangered
<i>Shepherdia canadensis</i>	Canada Buffaloberry	Endangered
<i>Solidago leiocarpa</i>	Cutler's Goldenrod	Threatened
<i>Solidago speciose</i>	Showy Goldenrod	Threatened
<i>Suaeda calceoliformis</i>	American Sea-blite	Threatened
<i>Symphyotrichum anticostense</i>	Anticosti Aster	Endangered
<i>Symphyotrichum subulatum</i>	Small Salt-marsh Aster	Threatened
<i>Thalictrum thalictroides</i>	Rue-anemone	Endangered
<i>Thalictrum venulosum</i> var. <i>confine</i>	Boundary Meadow-rue	Threatened
<i>Triosteum aurantiacum</i>	Wild Coffee	Endangered
<i>Veronica wormskjoldii</i>	Alpine Speedwell	Endangered
<i>Vitis aestivalis</i> var. <i>bicolor</i>	Summer Grape	Threatened
Class Filicopsida (Ferns)		
<i>Adiantum aleuticum</i>	Aleutian Maidenhair Fern	Endangered
<i>Asplenium viride</i>	Green Spleenwort	Endangered
<i>Cryptogramma stelleri</i>	Slender Cliffbrake	Threatened
<i>Dryopteris filix-mas</i> ssp. <i>brittonii</i>	Male Wood Fern	Endangered
<i>Woodsia alpine</i>	Northern Woodsia	Threatened
<i>Woodsia glabella</i>	Smooth Woodsia	Threatened
<i>Woodsia obtusa</i>	Blunt-lobed Woodsia	Threatened
Class Isoetopsida (Quillworts & Spike-mosses)		
<i>Isoetes prototypus</i>	Prototype Quillwort	Threatened
<i>Selaginella apoda</i>	Creeping Spike-moss	Endangered
<i>Selaginella selaginoides</i>	Low Spike-moss	Threatened
Class Lycopodiopsida (Clubmosses)		
<i>Diphasiastrum sitchense</i>	Alaskan Clubmoss	Threatened
<i>Huperzia selago</i>	Northern Firmoss	Threatened
<i>Lycopodiella alopecuroides</i>	Foxtail Bog-clubmoss	Endangered
Class Monocotyledoneae (Monocots)		
<i>Agrostis mertensii</i>	Boreal Bentgrass	Threatened
<i>Anthoxanthum monticola</i>	Alpine Sweet-grass	Threatened
<i>Bolboschoenus novae-angliae</i>	Marsh Bulrush	Endangered
<i>Bromus kalmia</i>	Wild Chess	Endangered
<i>Calamagrostis pickeringii</i>	Pickering's Reed Bent-grass	Threatened
<i>Calamagrostis stricta</i> ssp. <i>inexpansa</i>	Northern Reed Grass	Endangered
<i>Calamagrostis stricta</i> ssp. <i>stricta</i>	Neglected Reed-grass	Threatened
<i>Carex adusta</i>	Swarthy Sedge	Endangered
<i>Carex atherodes</i>	Awned Sedge	Threatened
<i>Carex bicknellii</i>	Bicknell's Sedge	Endangered

Appendix 1-1. continued: page 4 of 5.

Taxa group (class) <i>Scientific name</i>	Common name	State status (updated, 2015)
Class Monocotyledoneae (Monocots) - continued		
<i>Carex eburnea</i>	Ebony Sedge	Endangered
<i>Carex granularis</i>	Meadow Sedge	Threatened
<i>Carex laxiculmis</i>	Spreading Sedge	Endangered
<i>Carex media</i>	Intermediate Sedge	Endangered
<i>Carex muehlenbergii</i>	Muhlenberg Sedge	Endangered
<i>Carex oronensis</i>	Orono Sedge	Threatened
<i>Carex polymorpha</i>	Variable Sedge	Endangered
<i>Carex prairea</i>	Prairie Sedge	Threatened
<i>Carex saxatilis</i>	Russett Sedge	Endangered
<i>Carex sparganioides</i>	Bur-reed Sedge	Endangered
<i>Carex typhina</i>	Cattail Sedge	Endangered
<i>Carex vacillans</i>	Brackish Sedge	Endangered
<i>Carex vestita</i>	Clothed Sedge	Endangered
<i>Corallorhiza odontorhiza</i>	Autumn Coral-root	Endangered
<i>Cyperus erythrorhizos</i>	Red-root Flatsedge	Endangered
<i>Cypripedium arietinum</i>	Ram's-head Lady's-slipper	Endangered
<i>Eleocharis rostellata</i>	Beaked Spikerush	Threatened
<i>Eleocharis tuberculosa</i>	Long-tubercled Spikerush	Endangered
<i>Festuca prolifera</i>	Arctic Red Fescue	Endangered
<i>Galearis spectabilis</i>	Showy Orchis	Endangered
<i>Glyceria acutiflora</i>	Sharp-scaled Manna-grass	Endangered
<i>Goodyera oblongifolia</i>	Giant Rattlesnake-plantain	Endangered
<i>Iris prismatica</i>	Slender Blue Flag	Threatened
<i>Isotria medeoloides</i>	Small Whorled Pogonia	Endangered
<i>Juncus secundus</i>	Secund Rush	Threatened
<i>Juncus subtilis</i>	Slender Rush	Endangered
<i>Juncus vaseyi</i>	Vasey's Rush	Endangered
<i>Lipocarpa micrantha</i>	Dwarf Bulrush	Threatened
<i>Luzula confuse</i>	Northern Wood-rush	Endangered
<i>Luzula spicata</i>	Spiked Wood-rush	Threatened
<i>Malaxis monophyllos</i>	White Adder's-mouth	Endangered
<i>Muhlenbergia sobolifera</i> ssp. <i>brachypoda</i>	Cliff Muhly	Endangered
<i>Listera auriculata</i>	Auricled Twayblade	Threatened
<i>Phleum alpinum</i>	Mountain Timothy	Threatened
<i>Platanthera leucophaea</i>	Prairie White-fringed Orchid	Endangered
<i>Poa glauca</i>	White Bluegrass	Threatened
<i>Poa laxa fernaldiana</i>	Wavy Bluegrass	Endangered
<i>Potamogeton friesii</i>	Fries' Pondweed	Endangered
<i>Potamogeton pulcher</i>	Spotted Pondweed	Threatened
<i>Potamogeton strictifolius</i>	Straight-leaved Pondweed	Threatened
<i>Rhynchospora capillacea</i>	Horned Beak-rush	Threatened
<i>Rhynchospora macrostachya</i>	Tall Beak-rush	Endangered
<i>Scirpus longii</i>	Long's Bulrush	Threatened

Appendix 1-1. continued: page 5 of 5.

<u>Taxa group (class)</u> <i>Scientific name</i>	Common name	State status (updated, 2015)
<u>Class Monocotyledoneae (Monocots) - continued</u>		
<i>Sorghastrum nutans</i>	Indian Grass	Endangered
<i>Spiranthes lucida</i>	Shining Ladies'-tresses	Threatened
<i>Sporobolus compositus</i> var. <i>drummondii</i>	Longleaf Dropseed	Endangered
<i>Triphora trianthophora</i>	Nodding Pogonia	Threatened
<i>Vahlodea atropurpurea</i>	Mountain Hairgrass	Endangered
<i>Xyris smalliana</i>	Yellow-eyed Grass	Endangered
<u>Class Ophioglossopsida (Adder's-tongues and Grapeferns)</u>		
<i>Botrychium lunaria</i>	Moonwort	Endangered
<i>Botrychium oneidense</i>	Blunt-lobed Grapefern	Threatened
<i>Botrychium pallidum</i>	Pale Moonwort	Endangered

Appendix 1-2. Maine's list of state-designated Endangered and Threatened inland fish and wildlife administered by the Maine Department of Inland Fisheries and Wildlife (in statute; see Title 12 MRSA, §12803, <http://legislature.maine.gov/legis/statutes/12/title12sec12803.html>).

<u>Taxa group (class)</u>	Common name	State status (year listed)
<i>Scientific name</i>		
<u>Class Actinopterygii (Fish)</u>		
<i>Esox americanus americanus</i>	Redfin Pickerel	Endangered (2007)
<i>Etheostoma fusiforme</i>	Swamp Darter	Threatened (1997)
<u>Class Aves (Birds)</u>		
<i>Alca torda</i>	Razorbill	Threatened (1997)
<i>Ammodramus savannarum</i>	Grasshopper Sparrow	Endangered (1987)
<i>Anthus rubescens</i>	American Pipit	Endangered (1997)
<i>Aquila chrysaetos</i>	Golden Eagle	Endangered (1987)
<i>Asio flammeus</i>	Short-eared Owl	Threatened (1987)
<i>Bartramia longicauda</i>	Upland Sandpiper	Threatened (1997)
<i>Bucephala islandica</i>	Barrow's Goldeneye	Threatened (2007)
<i>Charadrius melodus</i>	Piping Plover	Endangered (1987)
<i>Chlidonias niger</i>	Black Tern	Endangered (1997)
<i>Cistothorus platensis</i>	Sedge Wren	Endangered (1987)
<i>Falco peregrinus</i>	Peregrine Falcon	Endangered (1975)
<i>Fratercula arctica</i>	Atlantic Puffin	Threatened (1997)
<i>Gallinula galeata</i>	Common Gallinule	Threatened (2007)
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Recovered (2009) / Threatened (1996) / Endangered (1978)
<i>Histrionicus histrionicus</i>	Harlequin Duck	Threatened (1997)
<i>Ixobrychus exilis</i>	Least Bittern	Endangered (2007)
<i>Nycticorax nycticorax</i>	Black-crowned Night Heron	Endangered (2015) Threatened (2007)
<i>Phalacrocorax carbo</i>	Great Cormorant	Threatened (2007)
<i>Sternula antillarum</i>	Least Tern	Endangered (1984)
<i>Sterna paradisaea</i>	Arctic Tern	Threatened (1997)
<i>Sterna dougallii</i>	Roseate Tern	Endangered (1997) / Threatened (1987)
<u>Class Bivalvia (Molluscs)</u>		
<i>Alasmidonta varicose</i>	Brook Floater	Threatened (2007)
<i>Lampsilis cariosa</i>	Yellow Lampmussel	Threatened (1997)
<i>Leptodea ochracea</i>	Tidewater Mucket	Threatened (1997)
<u>Class Gastropoda (Snails)</u>		
<i>Vertigo morseii</i>	Six-whorled Vertigo	Endangered (2015)

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

<u>Taxa group (class)</u>	Common name	State status (year listed)
<i>Scientific name</i>		
<u>Class Insecta (Insects)</u>		
<i>Boloria chariclea grandis</i>	Purple Lesser Fritillary	Threatened (2007)
<i>Boloria frigga</i>	Frigga Fritillary	Endangered (2015)
<i>Callophrys gryneus</i>	Juniper Hairstreak	Endangered (2007)
<i>Callophrys hesseli</i>	Hessel's Hairstreak	Endangered (1997)
<i>Cicindela marginipennis</i>	Cobblestone Tiger Beetle	Endangered (2015)
<i>Epeorus frisoni</i>	Roaring Brook Mayfly	Threatened (2015) / Endangered (2007)
<i>Erynnis brizo</i>	Sleepy Duskywing	Threatened (2007)
<i>Gomphus quadricolor</i>	Rapids Clubtail	Endangered (2007)
<i>Lycaena dorcas claytoni</i>	Clayton's Copper	Threatened (2015) / Endangered (1997)
<i>Lycia rachelae</i>	Twilight Moth	Threatened (2007)
<i>Oeneis polixenes katahdin</i>	Katahdin Arctic	Endangered (1997)
<i>Ophiogomphus colubrinus</i>	Boreal Snaketail	Threatened (2007)
<i>Satyrrium edwardsii</i>	Edwards' Hairstreak	Endangered (1997)
<i>Siphonisca aerodromia</i>	Tomah Mayfly	Threatened (1997)
<i>Williamsonia lintneri</i>	Ringed Boghaunter	Threatened (2007)
<i>Zanclognatha martha</i>	Pine Barrens Zanclognatha	Threatened (1997)
<u>Class Mammalia (Mammals)</u>		
<i>Myotis leibii</i>	Eastern Small-footed Bat	Threatened (2015)
<i>Myotis lucifugus</i>	Little Brown Bat	Endangered (2015)
<i>Myotis septentrionalis</i>	Northern Long-eared Bat	Endangered (2015)
<i>Sylvilagus transitionalis</i>	New England Cottontail	Threatened (2007)
<i>Synaptomys borealis</i>	Northern Bog Lemming	Endangered (1987)
<u>Class Reptilia (Reptiles)</u>		
<i>Clemmys guttata</i>	Spotted Turtle	Threatened (1987)
<i>Coluber constrictor</i>	Black Racer	Endangered (1987)
<i>Emydoidea blandingii</i>	Blanding's Turtle	Endangered (1997) / Threatened (1987)
<i>Terrapene carolina</i>	Box Turtle	Endangered (1987)

Appendix 1-3. Maine's list of state-designated Endangered and Threatened marine fish and wildlife administered by the Maine Department of Marine Resources (in statute; see Title 12 MRSA, §6975, <http://legislature.maine.gov/legis/statutes/12/title12sec6975.html>).

<u>Taxa group (class)</u>	Common name	State status (year listed)
<i>Scientific name</i>		
<u>Class Actinopterygii (Fish)</u>		
<i>Acipenser brevirostrum</i>	Short-nosed Sturgeon	Endangered (1975)
<u>Class Mammalia (Mammals)</u>		
<i>Balaenoptera borealis</i>	Sei Whale	Endangered (1975)
<i>Balaenoptera physalus</i>	Finback Whale	Endangered (1975)
<i>Eubalaena glacialis</i>	North Atlantic Right Whale	Endangered (1975)
<i>Megaptera novaeangliae</i>	Humpback Whale	Endangered (1975)
<i>Physeter macrocephalus</i>	Sperm Whale	Endangered (1975)
<u>Class Reptilia (Reptiles)</u>		
<i>Caretta caretta</i>	Loggerhead Sea Turtle	Threatened (1978)
<i>Dermochelys coriacea</i>	Leatherback Sea Turtle	Endangered (1975)
<i>Lepidochelys kempii</i>	Kemp's Ridley Sea Turtle	Endangered (1975)

Appendix 1-4. Maine's list of federally-designated Endangered and Threatened species administered by the U.S. Fish and Wildlife Service and National Marine Fisheries Service; see <http://ecos.fws.gov/ecp/>.

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

Appendix 1-5. Maine's 2005 SGCN that are removed from the 2015 Wildlife Action Plan.

<u>Taxa group (class)</u>	Common name	Factors contributing to loss of SGCN status in Maine (2005 → 2015)
<i>Scientific name</i>		
<u>Class Aves (Birds)</u>		
<i>Anas rubripes</i>	American Black Duck	revised regional significance criteria
<i>Ardea alba</i>	Great Egret	recent range expansion & low vulnerability
<i>Bubulcus ibis</i>	Cattle Egret	recent range expansion & low vulnerability
<i>Cistothorus palustris</i>	Marsh Wren	former decline insignificant in 2012 update
<i>Egretta tricolor</i>	Tricolored Heron	recent range expansion & low vulnerability
<i>Empidonax traillii</i>	Willow Flycatcher	former decline insignificant in 2012 update
<i>Grus canadensis</i>	Sandhill Crane	recent, general range expansion
<i>Haliaeetus leucocephalus</i>	Bald Eagle	full species recovery & habitat safeguards
<i>Lanius ludovicianus</i>	Loggerhead Shrike	long-term extirpation
<i>Myiarchus crinitus</i>	Great Crested Flycatcher	former decline insignificant in 2012 update
<i>Oxyura jamaicensis</i>	Ruddy Duck	revised regional significance criteria
<i>Plegadis falcinellus</i>	Glossy Ibis	recent range expansion & low vulnerability
<i>Poocetes gramineus</i>	Vesper Sparrow	revised regional significance criteria
<i>Poliophtila caerulea</i>	Blue-gray Gnatcatcher	former decline insignificant in 2012 update
<i>Sphyrapicus varius</i>	Yellow-bellied Sapsucker	revised regional significance criteria
<i>Strix varia</i>	Barred Owl	revised regional significance criteria
<i>Vireo flavifrons</i>	Yellow-throated Vireo	former decline insignificant in 2012 update
<u>Class Gastropoda (Snails)</u>		
<i>Amnicola decisus</i>	A Spire Snail	errant record: mistaken identification
<i>Catinella exile</i>	Pleistocene Catinella	uncertain identification & taxonomy
<i>Paravitrea lamellidens</i>	Lamellate Supercoil	errant record: mistaken identification
<i>Physella magnalacustris</i>	Great Lakes Physa	uncertain identification & taxonomy
<i>Vertigo nylanderi</i>	Deep-throat Vertigo	relatively secure status in recent surveys
<u>Class Insecta (Insects)</u>		
<i>Catocala pretiosa pretiosa</i>	Precious Underwing	long-term extirpation
<i>Nicrophorus americanus</i>	American Burying Beetle	long-term extirpation
<i>Nixe rusticalis</i>	A Mayfly	secure status in updated assessment
<i>Plauditus cestus</i>	A Mayfly	uncertain taxonomy
<i>Plebejus saepiolus amica</i>	Greenish Blue	likely non-native & range expansion
<i>Procloeon mendax</i>	A Mayfly	secure status in updated assessment
<i>Procloeon ozburni</i>	A Mayfly	errant record: mistaken identification
<i>Procloeon simplex</i>	A Mayfly	secure status in updated assessment
<i>Siphonurus securifer</i>	A Mayfly	secure status in updated assessment
<u>Class Mammalia (Mammals)</u>		
<i>Canis lupus</i>	Gray Wolf	long-term extirpation
<u>Class Reptilia (Reptiles)</u>		
<i>Crotalus horridus</i>	Timber Rattlesnake	long-term extirpation

Eptesicus fuscus (Big Brown Bat)

Priority 2 Species of Greatest Conservation Need (SGCN)

Class: *Mammalia* (Mammals)

Order: *Chiroptera* (Bats)

Family: *Vespertilionidae* (Common Bats)

General comments:

Since the introduction of WNS, indices used to track bat abundance have indicated a 30% decline. While this is not the catastrophic decline observed in other species, a decline of this magnitude raises serious concerns about the long term health of this species in Maine. This decline, combined with the absence of any trend data regarding this species suggests that population monitoring should be considered in Maine.

Species Conservation Range Maps for Big Brown Bat:

Town Map: [Eptesicus fuscus_Towns.pdf](#)

Subwatershed Map: [Eptesicus fuscus_HUC12.pdf](#)

SGCN Priority Ranking - Designation Criteria:

Risk of Extirpation: NA

State Special Concern or NMFS Species of Concern:

Eptesicus fuscus is listed as a species of Special Concern in Maine.

Recent Significant Declines:

Big Brown Bat is currently undergoing steep population declines, which has already led to, or if unchecked is likely to lead to, local extinction and/or range contraction.

Notes:

Since the discovery of white-nose syndrome, big brown bat populations in the northeastern US have declined by more than 30% (USFWS 2015). While this is not the same rate of decline that has been observed in some of the other bat species, the long term implications raise serious concern.

Regional Endemic: NA

High Regional Conservation Priority: NA

High Climate Change Vulnerability: NA

Understudied rare taxa: NA

Historical: NA

Culturally Significant: NA

Habitats Assigned to Big Brown Bat:

Formation Name Agricultural

Macrogroup Name Agricultural

Habitat System Name: Agricultural Macrogroup - Unknown Habitat System **Notes:** *Big Browns are considered true habitat generalists and occur from northern Alberta to northern South America. In maine, we suspect that they are found in most woodlands, with an emphasis on openings or edges of these woodlands. They are also known to inhabit and use developed areas.*

Formation Name Boreal Upland Forest

Macrogroup Name Boreal Upland Forest

Habitat System Name: Boreal Upland Forest Macrogroup - Unknown Habitat System **Notes:** *Big Browns are considered true habitat generalists and occur from northern Alberta to northern South America. In maine, we suspect that they are found in most woodlands, with an emphasis on openings or edges of these woodlands. They are also known to inhabit and use developed areas.*

Eptesicus fuscus* (Big Brown Bat)*Priority 2 Species of Greatest Conservation Need (SGCN)****Class:** *Mammalia* (Mammals)**Order:** *Chiroptera* (Bats)**Family:** *Vespertilionidae* (Common Bats)**Formation Name** **Boreal Wetland Forest****Macrogroup Name** **Boreal Forested Peatland****Habitat System Name:** Boreal Forested Peatland Macrogroup - Unknown Habitat System **Notes:** *Big Browns are considered true habitat generalists and occur from northern Alberta to northern South America. In Maine, we suspect that they are found in most woodlands, with an emphasis on openings or edges of these woodlands. They are also known to inhabit and use developed areas.***Formation Name** **Coastal Scrub-Herb****Macrogroup Name** **Coastal Grassland & Shrubland****Habitat System Name:** Coastal Grassland & Shrubland Macrogroup - Unknown Habitat System **Notes:** *Big Browns are considered true habitat generalists and occur from northern Alberta to northern South America. In Maine, we suspect that they are found in most woodlands, with an emphasis on openings or edges of these woodlands. They are also known to inhabit and use developed areas.***Formation Name** **Developed****Macrogroup Name** **Extractive****Habitat System Name:** Subsurface Mines & Caves **Notes:** *Regular but not obligate cave/mine dweller***Macrogroup Name** **Maintained Grasses and Mixed Cover****Habitat System Name:** Maintained Grasses and Mixed Cover Macrogroup - Unknown Habitat System **Notes:** *Big Browns are considered true habitat generalists and occur from northern Alberta to northern South America. In Maine, we suspect that they are found in most woodlands, with an emphasis on openings or edges of these woodlands. They are also known to inhabit and use developed areas.***Macrogroup Name** **Urban-Suburban Built****Habitat System Name:** Urban-Suburban Built Macrogroup - Unknown Habitat System **Notes:** *Big Browns are considered true habitat generalists and occur from northern Alberta to northern South America. In Maine, we suspect that they are found in most woodlands, with an emphasis on openings or edges of these woodlands. They are also known to inhabit and use developed areas.***Formation Name** **Freshwater Marsh****Macrogroup Name** **Wet Meadow-Shrub Marsh****Habitat System Name:** Wet Meadow-Shrub Marsh Macrogroup - Unknown Habitat System **Notes:** *Big Browns are considered true habitat generalists and occur from northern Alberta to northern South America. In Maine, we suspect that they are found in most woodlands, with an emphasis on openings or edges of these woodlands. They are also known to inhabit and use developed areas.***Formation Name** **Grassland & Shrubland****Macrogroup Name** **Ruderal Shrubland & Grassland****Habitat System Name:** Ruderal Shrubland & Grassland Macrogroup - Unknown Habitat System **Notes:** *Big Browns are considered true habitat generalists and occur from northern Alberta to northern South America. In Maine, we suspect that they are found in most woodlands, with an emphasis on openings or edges of these woodlands. They are also known to inhabit and use developed areas.***Formation Name** **Northeastern Upland Forest****Macrogroup Name** **Central Oak-Pine****Habitat System Name:** Central Oak-Pine Macrogroup - Unknown Habitat System **Notes:** *Big Browns are considered true habitat generalists and occur from northern Alberta to northern South America. In Maine, we suspect that they are found in most woodlands, with an emphasis on openings or edges of these woodlands. They are also known to inhabit and use developed areas.*

Eptesicus fuscus (Big Brown Bat)

Priority 2 Species of Greatest Conservation Need (SGCN)

Class: *Mammalia* (Mammals)

Order: *Chiroptera* (Bats)

Family: *Vespertilionidae* (Common Bats)

Formation Name **Northeastern Upland Forest**

Macrogroup Name **Exotic Upland Forest**

Habitat System Name: Exotic Upland Forest Macrogroup - Unknown Habitat System **Notes:** *Big Browns are considered true habitat generalists and occur from northern Alberta to northern South America. In maine, we suspect that they are found in most woodlands, with an emphasis on openings or edges of these woodlands. They are also konwn to inhabit and use developed areas.*

Macrogroup Name **Northern Hardwood & Conifer**

Habitat System Name: Northern Hardwood & Conifer Macrogroup - Unknown Habitat System **Notes:** *Big Browns are considered true habitat generalists and occur from northern Alberta to northern South America. In maine, we suspect that they are found in most woodlands, with an emphasis on openings or edges of these woodlands. They are also konwn to inhabit and use developed areas.*

Macrogroup Name **Plantation and Ruderal Forest**

Habitat System Name: Plantation and Ruderal Forest Macrogroup - Unknown Habitat System **Notes:** *Big Browns are considered true habitat generalists and occur from northern Alberta to northern South America. In maine, we suspect that they are found in most woodlands, with an emphasis on openings or edges of these woodlands. They are also konwn to inhabit and use developed areas.*

Formation Name **Northeastern Wetland Forest**

Macrogroup Name **Central Hardwood Swamp**

Habitat System Name: Central Hardwood Swamp Macrogroup - Unknown Habitat System **Notes:** *Big Browns are considered true habitat generalists and occur from northern Alberta to northern South America. In maine, we suspect that they are found in most woodlands, with an emphasis on openings or edges of these woodlands. They are also konwn to inhabit and use developed areas.*

Macrogroup Name **Northeastern Floodplain Forest**

Habitat System Name: Northeastern Floodplain Forest Macrogroup - Unknown Habitat System **Notes:** *Big Browns are considered true habitat generalists and occur from northern Alberta to northern South America. In maine, we suspect that they are found in most woodlands, with an emphasis on openings or edges of these woodlands. They are also konwn to inhabit and use developed areas.*

Macrogroup Name **Northern Swamp**

Habitat System Name: Northern Swamp Macrogroup - Unknown Habitat System **Notes:** *Big Browns are considered true habitat generalists and occur from northern Alberta to northern South America. In maine, we suspect that they are found in most woodlands, with an emphasis on openings or edges of these woodlands. They are also konwn to inhabit and use developed areas.*

Stressors Assigned to Big Brown Bat:

	Moderate Severity	High Severity
Stressor Priority Level based on Severity and Actionability	Highly Actionable	High
	Moderately Actionable	Medium-High
	Actionable with Difficulty	Low

IUCN Level 1 Threat **Energy Production and Mining**

IUCN Level 2 Threat: **Renewable Energy**

Severity: Moderate Severity **Actionability:** Highly actionable

Notes: There is a high probability that the cummulative effects of wind turbine mortalities would have a population level effect on this bat species in Maine.

Eptesicus fuscus (Big Brown Bat)

Priority 2 Species of Greatest Conservation Need (SGCN)

Class: *Mammalia* (Mammals)

Order: *Chiroptera* (Bats)

Family: *Vespertilionidae* (Common Bats)

IUCN Level 1 Threat Human Intrusions and Disturbance

IUCN Level 2 Threat: Recreational Activities

Severity: Moderate Severity **Actionability:** Moderately actionable

Notes: Caving activities w/o following disinfection procedures may spread WNS; also found on talus slopes but encounters with hikers would be rare.

IUCN Level 1 Threat Other Options

IUCN Level 2 Threat: Lack of knowledge

Severity: Moderate Severity **Actionability:** Moderately actionable

Notes: Little information regarding range and population trends have been gathered on this species in Maine. Efforts should be made to develop better baseline information on big brown bats and other bat spp in maine.

IUCN Level 1 Threat Invasive and Other Problematic Species, Genes and Diseases

IUCN Level 2 Threat: Problematic Species-Diseases of Unknown Origin

Severity: Severe **Actionability:** Actionable with difficulty

Notes: WNS will remain active in the soil for a long time; however, progress is being made in coming up with ways to disinfect hibernacula. Furthermore, the role of WNS in big brown bat populations is not well understood.

Species Level Conservation Actions Assigned to Big Brown Bat:

None. *Only species specific conservation actions that address high (red) or medium-high (orange) priority stressors are summarized here.*

Guild Level Conservation Actions:

This Species is currently not attributed to a guild.

Broad Taxonomic Group Conservation Actions:

Relevant conservation actions for this species are assigned within broader taxonomic groups in Maine's 2015 Wildlife Action Plan: Element 4, Table 4-1.

Habitat Based Conservation Actions:

Additional conservation actions that may benefit habitat(s) associated with this species can be found in Maine's 2015 Wildlife Action Plan: Element 4, Table 4-15. Click on the Habitat Grouping of interest to launch a habitat based report summarizing relevant conservation actions and associated SGCN.

The Wildlife Action Plan was developed through a lengthy participatory process with state agencies, targeted conservation partners, and the general public. The Plan is non-regulatory. The species, stressors, and voluntary conservation actions identified in the Plan complement, but do not replace, existing work programs and priorities by state agencies and partners.

Lasiurus borealis (Eastern Red Bat)

Priority 3 Species of Greatest Conservation Need (SGCN)

Class: *Mammalia* (Mammals)

Order: *Chiroptera* (Bats)

Family: *Vespertilionidae* (Common Bats)

General comments:

This species was previously designated as SC due to lack of information. Although this is no longer a criterion for special concern listing, the special concern status for this species should be retained because development of wind power (and possibly other tall structures) in Maine and other states within the migratory path of this species is expected to result in increased mortality.

Species Conservation Range Maps for Eastern Red Bat:

Town Map: [Lasiurus borealis_Towns.pdf](#)

Subwatershed Map: [Lasiurus borealis_HUC12.pdf](#)

SGCN Priority Ranking - Designation Criteria:

Risk of Extirpation: NA

State Special Concern or NMFS Species of Concern:

Lasiurus borealis is listed as a species of Special Concern in Maine.

Recent Significant Declines: NA

Regional Endemic: NA

High Regional Conservation Priority: NA

High Climate Change Vulnerability: NA

Understudied rare taxa: NA

Historical: NA

Culturally Significant: NA

Habitats Assigned to Eastern Red Bat:

Formation Name	Boreal Upland Forest	
Macrogroup Name	Boreal Upland Forest	
Habitat System Name:	Acadian Low Elevation Spruce-Fir-Hardwood Forest	Notes: "primary habitat" for this tree bat in many Maine woodlands: documented occurrence
Habitat System Name:	Acadian Sub-boreal Spruce Flat	Notes: "primary habitat" for this tree bat in many Maine woodlands: documented occurrence
Habitat System Name:	Acadian-Appalachian Montane Spr-Fir-Hwd Forest	Notes: "secondary habitat" for this tree bat in many Maine woodlands: presumed occurrence
Formation Name	Northeastern Upland Forest	
Macrogroup Name	Northern Hardwood & Conifer	
Habitat System Name:	Appalachian (Hemlock)-Northern Hardwood Forest	Notes: "secondary habitat" for this tree bat in many Maine woodlands: presumed occurrence
Habitat System Name:	Laurentian-Acadian Northern Hardwoods Forest	Notes: "primary habitat" for this tree bat in many Maine woodlands: documented occurrence
Habitat System Name:	Laurentian-Acadian Pine-Hemlock-Hardwood Forest	Notes: "primary habitat" for this tree bat in many Maine woodlands: documented occurrence
Habitat System Name:	Northeastern Coastal and Interior Pine-Oak Forest	Notes: "secondary habitat" for this tree bat in many Maine woodlands: presumed occurrence

***Lasiurus borealis* (Eastern Red Bat)**
Priority 3 Species of Greatest Conservation Need (SGCN)

Class: *Mammalia* (Mammals)

Order: *Chiroptera* (Bats)

Family: *Vespertilionidae* (Common Bats)

Formation Name **Northeastern Wetland Forest**

Macrogroup Name **Northern Swamp**

Habitat System Name: Laurentian-Acadian Alkaline Conifer-Hardwood Swamp **Notes:** "secondary habitat" for this tree bat in many Maine woodlands: "presumed occurrence"

Habitat System Name: Northern Appalachian-Acadian Conifer-Hardwood Acidic Swamp **Notes:** "secondary habitat" for this tree bat in many Maine woodlands: "presumed occurrence"

Stressors Assigned to Eastern Red Bat:

No Stressors Currently Assigned to Eastern Red Bat or other Priority 3 SGCN.

Species Level Conservation Actions Assigned to Eastern Red Bat:

No Species Specific Conservation Actions Currently Assigned to Eastern Red Bat or other Priority 3 SGCN.

Guild Level Conservation Actions:

This Species is currently not attributed to a guild.

Broad Taxonomic Group Conservation Actions:

Relevant conservation actions for this species are assigned within broader taxonomic groups in Maine's 2015 Wildlife Action Plan: Element 4, Table 4-1.

Habitat Based Conservation Actions:

Additional conservation actions that may benefit habitat(s) associated with this species can be found in Maine's 2015 Wildlife Action Plan: Element 4, Table 4-15. Click on the Habitat Grouping of interest to launch a habitat based report summarizing relevant conservation actions and associated SGCN.

The Wildlife Action Plan was developed through a lengthy participatory process with state agencies, targeted conservation partners, and the general public. The Plan is non-regulatory. The species, stressors, and voluntary conservation actions identified in the Plan complement, but do not replace, existing work programs and priorities by state agencies and partners.

Myotis leibii (Eastern Small-footed Myotis)

Priority 1 Species of Greatest Conservation Need (SGCN)

Class: *Mammalia* (Mammals)

Order: *Chiroptera* (Bats)

Family: *Vespertilionidae* (Common Bats)

General comments:

Northeast endemic with few records from Maine and considered rare throughout its range.

Species Conservation Range Maps for Eastern Small-footed Myotis:

Town Map: [Myotis leibii_Towns.pdf](#)

Subwatershed Map: [Myotis leibii_HUC12.pdf](#)

SGCN Priority Ranking - Designation Criteria:

Risk of Extirpation:

Maine Status: Threatened

State Special Concern or NMFS Species of Concern: NA

Recent Significant Declines: NA

Regional Endemic: NA

High Regional Conservation Priority:

Northeast Endangered Species and Wildlife Diversity Technical Committee:

Risk: No, Data: Yes, Area: Yes, Spec: No, Warrant Listing: Yes, Total Categories with "Yes": 3

Northeast Regional Synthesis (RSGCN):

Responsibility: High, Concern: Very High

NatureServe:

Global Rank: G2

High Climate Change Vulnerability: NA

Understudied rare taxa: NA

Historical: NA

Culturally Significant: NA

Habitats Assigned to Eastern Small-footed Myotis:

Formation Name Boreal Upland Forest

Macrogroup Name Boreal Upland Forest

Habitat System Name: Acadian Low Elevation Spruce-Fir-Hardwood Forest **Notes:** "secondary habitat" for upland forests within its range: documented occurrence

Habitat System Name: Acadian Sub-boreal Spruce Flat **Notes:** "secondary habitat" for upland forests within its range: documented occurrence

Formation Name Cliff & Rock

Macrogroup Name Cliff and Talus

Habitat System Name: Laurentian-Acadian Acidic Cliff and Talus ****Primary Habitat**** **Notes:** "primary habitat" for ledge roosts & some hibernacula within its range: documented occurrence

Habitat System Name: Laurentian-Acadian Calcareous Cliff and Talus **Notes:** "secondary habitat" for ledge roosts & some hibernacula within species range: presumed potential occurrence but the habitat availability is primarily north of the documented range of this species in Maine

Myotis leibii (Eastern Small-footed Myotis)

Priority 1 Species of Greatest Conservation Need (SGCN)

Class: *Mammalia* (Mammals)

Order: *Chiroptera* (Bats)

Family: *Vespertilionidae* (Common Bats)

Formation Name Developed

Macrogroup Name Extractive

Habitat System Name: Subsurface Mines & Caves ****Primary Habitat**** **Notes:** "primary habitat" for hibernacula within its range: documented occurrence

Formation Name Grassland & Shrubland

Macrogroup Name Outcrop & Summit Scrub

Habitat System Name: Laurentian-Acadian Calcareous Rocky Outcrop **Notes:** "secondary habitat" for ledge roosts & some hibernacula within species range: presumed potential occurrence but the habitat availability is primarily north of the documented range of this species in Maine

Habitat System Name: Northern Appalachian-Acadian Rocky Heath Outcrop ****Primary Habitat**** **Notes:** "primary habitat" for ledge roosts & some hibernacula within its range: documented occurrence

Formation Name Northeastern Upland Forest

Macrogroup Name Central Oak-Pine

Habitat System Name: Central Appalachian Dry Oak-Pine Forest **Notes:** "secondary habitat" for upland forests within its range: documented occurrence

Habitat System Name: Central Appalachian Pine-Oak Rocky Woodland **Notes:** "secondary habitat" for upland forests within its range: documented occurrence

Habitat System Name: North Atlantic Coastal Plain Hardwood Forest **Notes:** "secondary habitat" for upland forests within its range: presumed occurrence (2005) but undocumented & dubious affinity for this coastal plain woodland

Macrogroup Name Exotic Upland Forest

Habitat System Name: Introduced Upland Vegetation - Tree **Notes:** "secondary habitat" for upland forests within its range: presumed occurrence (2005) but undocumented & dubious affinity for this non-native woodland

Macrogroup Name Northern Hardwood & Conifer

Habitat System Name: Appalachian (Hemlock)-Northern Hardwood Forest **Notes:** "secondary habitat" for upland forests within its range: presumed occurrence

Habitat System Name: Laurentian-Acadian Northern Hardwoods Forest **Notes:** "secondary habitat" for upland forests within its range: documented occurrence

Habitat System Name: Laurentian-Acadian Pine-Hemlock-Hardwood Forest **Notes:** "secondary habitat" for upland forests within its range: documented occurrence

Habitat System Name: Northeastern Coastal and Interior Pine-Oak Forest **Notes:** "secondary habitat" for upland forests within its range: presumed occurrence

Stressors Assigned to Eastern Small-footed Myotis:

Stressor Priority Level based on Severity and Actionability		Moderate Severity	High Severity
	Highly Actionable	Medium-High	High
	Moderately Actionable	Medium	Medium-High
	Actionable with Difficulty	Low	Low

IUCN Level 1 Threat Energy Production and Mining

IUCN Level 2 Threat: Renewable Energy

Severity: Moderate Severity **Actionability:** Highly actionable

Notes: There is a high probability that the cumulative effects of wind turbine mortalities would have a population level effect on this bat species in Maine.

Myotis leibii (Eastern Small-footed Myotis)

Priority 1 Species of Greatest Conservation Need (SGCN)

Class: *Mammalia* (Mammals)

Order: *Chiroptera* (Bats)

Family: *Vespertilionidae* (Common Bats)

IUCN Level 1 Threat **Human Intrusions and Disturbance**

IUCN Level 2 Threat: Recreational Activities

Severity: Moderate Severity **Actionability:** Highly actionable

Notes: Caving activities w/o following disinfection procedures may spread WNS; also found on talus slopes but encounters with hikers would be rare.

IUCN Level 1 Threat **Other Options**

IUCN Level 2 Threat: Lack of knowledge

Severity: Moderate Severity **Actionability:** Highly actionable

Notes: Few records of occurrence in Maine

IUCN Level 1 Threat **Invasive and Other Problematic Species, Genes and Diseases**

IUCN Level 2 Threat: Invasive Non-native-Alien Species-Diseases

Severity: Severe **Actionability:** Actionable with difficulty

Notes: WNS will remain active in the soil for a long time; however, progress is being made in coming up with ways to disinfect hibernacula

Species Level Conservation Actions Assigned to Eastern Small-footed Myotis:

None. *Only species specific conservation actions that address high (red) or medium-high (orange) priority stressors are summarized here.*

Guild Level Conservation Actions:

This Species is currently not attributed to a guild.

Broad Taxonomic Group Conservation Actions:

Relevant conservation actions for this species are assigned within broader taxonomic groups in Maine's 2015 Wildlife Action Plan: Element 4, Table 4-1.

Habitat Based Conservation Actions:

Additional conservation actions that may benefit habitat(s) associated with this species can be found in Maine's 2015 Wildlife Action Plan: Element 4, Table 4-15. Click on the Habitat Grouping of interest to launch a habitat based report summarizing relevant conservation actions and associated SGCN.

The Wildlife Action Plan was developed through a lengthy participatory process with state agencies, targeted conservation partners, and the general public. The Plan is non-regulatory. The species, stressors, and voluntary conservation actions identified in the Plan complement, but do not replace, existing work programs and priorities by state agencies and partners.

Lasiurus cinereus* (Hoary Bat)*Priority 3 Species of Greatest Conservation Need (SGCN)**Class: *Mammalia* (Mammals)Order: *Chiroptera* (Bats)Family: *Vespertilionidae* (Common Bats)**General comments:**

This species was previously designated as SC due to lack of information. Although this is no longer a criterion for special concern listing, the special concern status for this species should be retained because development of wind power (and possibly other tall structures) in Maine and other states within the migratory path of this species is expected to result in increased mortality.

Species Conservation Range Maps for Hoary Bat:Town Map: [Lasiurus cinereus Towns.pdf](#)Subwatershed Map: [Lasiurus cinereus HUC12.pdf](#)**SGCN Priority Ranking - Designation Criteria:****Risk of Extirpation: NA****State Special Concern or NMFS Species of Concern:***Lasiurus cinereus* is listed as a species of Special Concern in Maine.**Recent Significant Declines: NA****Regional Endemic: NA****High Regional Conservation Priority: NA****High Climate Change Vulnerability: NA****Understudied rare taxa: NA****Historical: NA****Culturally Significant: NA****Habitats Assigned to Hoary Bat:****Formation Name Boreal Upland Forest****Macrogroup Name Boreal Upland Forest****Habitat System Name:** Acadian Low Elevation Spruce-Fir-Hardwood Forest **Notes:** "primary habitat" for this tree bat in many Maine woodlands: documented occurrence**Habitat System Name:** Acadian Sub-boreal Spruce Flat **Notes:** "primary habitat" for this tree bat in many Maine woodlands: documented occurrence**Habitat System Name:** Acadian-Appalachian Montane Spr-Fir-Hwd Forest **Notes:** "primary habitat" for this tree bat in many Maine woodlands: documented occurrence**Formation Name Northeastern Upland Forest****Macrogroup Name Northern Hardwood & Conifer****Habitat System Name:** Appalachian (Hemlock)-Northern Hardwood Forest **Notes:** "secondary habitat" for this tree bat in many Maine woodlands: presumed occurrence**Habitat System Name:** Laurentian-Acadian Northern Hardwoods Forest **Notes:** "primary habitat" for this tree bat in many Maine woodlands: documented occurrence**Habitat System Name:** Laurentian-Acadian Pine-Hemlock-Hardwood Forest **Notes:** "primary habitat" for this tree bat in many Maine woodlands: documented occurrence**Habitat System Name:** Northeastern Coastal and Interior Pine-Oak Forest **Notes:** "secondary habitat" for upland forests within its range: presumed occurrence

Lasiurus cinereus* (Hoary Bat)*Priority 3 Species of Greatest Conservation Need (SGCN)****Class:** *Mammalia* (Mammals)**Order:** *Chiroptera* (Bats)**Family:** *Vespertilionidae* (Common Bats)**Formation Name** **Northeastern Wetland Forest****Macrogroup Name** **Northern Swamp****Habitat System Name:** Laurentian-Acadian Alkaline Conifer-Hardwood Swamp **Notes:** "secondary habitat" for this tree bat in many Maine woodlands: "presumed occurrence"**Habitat System Name:** Northern Appalachian-Acadian Conifer-Hardwood Acidic Swamp **Notes:** "secondary habitat" for this tree bat in many Maine woodlands: "presumed occurrence"**Stressors Assigned to Hoary Bat:**

No Stressors Currently Assigned to Hoary Bat or other Priority 3 SGCN.

Species Level Conservation Actions Assigned to Hoary Bat:

No Species Specific Conservation Actions Currently Assigned to Hoary Bat or other Priority 3 SGCN.

Guild Level Conservation Actions:

This Species is currently not attributed to a guild.

Broad Taxonomic Group Conservation Actions:

Relevant conservation actions for this species are assigned within broader taxonomic groups in Maine's 2015 Wildlife Action Plan: Element 4, Table 4-1.

Habitat Based Conservation Actions:

Additional conservation actions that may benefit habitat(s) associated with this species can be found in Maine's 2015 Wildlife Action Plan: Element 4, Table 4-15. Click on the Habitat Grouping of interest to launch a habitat based report summarizing relevant conservation actions and associated SGCN.

The Wildlife Action Plan was developed through a lengthy participatory process with state agencies, targeted conservation partners, and the general public. The Plan is non-regulatory. The species, stressors, and voluntary conservation actions identified in the Plan complement, but do not replace, existing work programs and priorities by state agencies and partners.

Myotis lucifugus (Little Brown Bat)

Priority 1 Species of Greatest Conservation Need (SGCN)

Class: *Mammalia* (Mammals)

Order: *Chiroptera* (Bats)

Family: *Vespertilionidae* (Common Bats)

General comments:

This species hibernates in large groups in caves and mines during the winter. Since the discovery of White-nose Syndrome (WNS) in 2006 in northeastern United States little brown bat populations have experienced die-offs of greater than 90 percent. Specific population decline information for little brown bats in Maine is lacking however, WNS is present in neighboring states. It is predicted that WNS could extirpate cave/ mine hibernating bats from the northeastern United States. Population monitoring should be considered in Maine.

Species Conservation Range Maps for Little Brown Bat:

Town Map: [Myotis lucifugus Towns.pdf](#)

Subwatershed Map: [Myotis lucifugus_HUC12.pdf](#)

SGCN Priority Ranking - Designation Criteria:

Risk of Extirpation:

Maine Status: Endangered

State Special Concern or NMFS Species of Concern: NA

Recent Significant Declines:

Little Brown Bat is currently undergoing steep population declines, which has already led to, or if unchecked is likely to lead to, local extinction and/or range contraction.

Notes:

95% decline in winter hibernating bats from pre-WNS counts in Maine

Regional Endemic: NA

High Regional Conservation Priority: NA

High Climate Change Vulnerability: NA

Understudied rare taxa: NA

Historical: NA

Culturally Significant: NA

Habitats Assigned to Little Brown Bat:

Formation Name	Boreal Upland Forest	
Macrogroup Name	Boreal Upland Forest	
Habitat System Name:	Acadian Low Elevation Spruce-Fir-Hardwood Forest	Notes: "secondary habitat" for this (formerly) widespread bat present in a variety of Maine habitats: documented occurrence
Habitat System Name:	Acadian Sub-boreal Spruce Flat	Notes: "secondary habitat" for this (formerly) widespread bat present in a variety of Maine habitats: documented occurrence
Formation Name	Developed	
Macrogroup Name	Extractive	
Habitat System Name:	Subsurface Mines & Caves	**Primary Habitat** Notes: "primary habitat" for hibernacula within its range: documented occurrence
Macrogroup Name	Urban-Suburban Built	
Habitat System Name:	Residential - Low Intensity	
Habitat System Name:	Residential - Rural-Sparse	

Myotis lucifugus (Little Brown Bat)

Priority 1 Species of Greatest Conservation Need (SGCN)

Class: *Mammalia* (Mammals)

Order: *Chiroptera* (Bats)

Family: *Vespertilionidae* (Common Bats)

Formation Name **Northeastern Upland Forest**

Macrogroup Name **Northern Hardwood & Conifer**

Habitat System Name: Appalachian (Hemlock)-Northern Hardwood Forest **Notes:** "secondary habitat" for this (formerly) widespread bat presnt in a variety of Maine habitats: documented occurrence

Habitat System Name: Laurentian-Acadian Northern Hardwoods Forest **Notes:** "secondary habitat" for this (formerly) widespread bat presnt in a variety of Maine habitats: documented occurrence

Habitat System Name: Laurentian-Acadian Pine-Hemlock-Hardwood Forest **Notes:** "secondary habitat" for this (formerly) widespread bat presnt in a variety of Maine habitats: documented occurrence

Habitat System Name: Northeastern Coastal and Interior Pine-Oak Forest **Notes:** "secondary habitat" for upland forests within its range: presumed occurrence

Formation Name **Northeastern Wetland Forest**

Macrogroup Name **Northeastern Floodplain Forest**

Habitat System Name: Laurentian-Acadian Floodplain Systems **Notes:** "secondary habitat" for this (formerly) widespread bat presnt in a variety of Maine habitats: documented occurrence

Macrogroup Name **Northern Swamp**

Habitat System Name: Laurentian-Acadian Alkaline Conifer-Hardwood Swamp **Notes:** "secondary habitat" for this (formerly) widespread bat presnt in a variety of Maine habitats: documented occurrence

Habitat System Name: Northern Appalachian-Acadian Conifer-Hardwood Acidic Swamp **Notes:** "secondary habitat" for this (formerly) widespread bat presnt in a variety of Maine habitats: documented occurrence

Stressors Assigned to Little Brown Bat:

		Moderate Severity	High Severity
Stressor Priority Level based on Severity and Actionability	Highly Actionable	Medium-High	High
	Moderately Actionable	Medium	Medium-High
	Actionable with Difficulty	Low	Low

IUCN Level 1 Threat **Energy Production and Mining**

IUCN Level 2 Threat: Renewable Energy

Severity: Severe **Actionability:** Highly actionable

Notes: There is a high probability that the cummltve effects of wind turbine mortalities would have a population level effect on this bat species in Maine.

IUCN Level 1 Threat **Human Intrusions and Disturbance**

IUCN Level 2 Threat: Recreational Activities

Severity: Moderate Severity **Actionability:** Highly actionable

Notes: Caving w/o following disinfection procedures can spread WNS or introduce other variants of the fungus.

IUCN Level 1 Threat **Other Options**

IUCN Level 2 Threat: Lack of knowledge

Severity: Moderate Severity **Actionability:** Highly actionable

Notes: Monitoring efforts for this species are currently insufficient, making it difficult to identify areas where they still occur or areas where they are at greatest risk.

Myotis lucifugus (Little Brown Bat)

Priority 1 Species of Greatest Conservation Need (SGCN)

Class: *Mammalia* (Mammals)

Order: *Chiroptera* (Bats)

Family: *Vespertilionidae* (Common Bats)

IUCN Level 1 Threat **Invasive and Other Problematic Species, Genes and Diseases**

IUCN Level 2 Threat: Invasive Non-native-Alien Species-Diseases

Severity: Severe

Actionability: Actionable with difficulty

Notes: WNS may extirpate the LBB in the east; there is some evidence that a disinfectant may work in hibernacula; there is also some indication that some LBB may not be as susceptible to WNS as other individuals.

Species Level Conservation Actions Assigned to Little Brown Bat:

None. *Only species specific conservation actions that address high (red) or medium-high (orange) priority stressors are summarized here.*

Guild Level Conservation Actions:

This Species is currently not attributed to a guild.

Broad Taxonomic Group Conservation Actions:

Relevant conservation actions for this species are assigned within broader taxonomic groups in Maine's 2015 Wildlife Action Plan: Element 4, Table 4-1.

Habitat Based Conservation Actions:

Additional conservation actions that may benefit habitat(s) associated with this species can be found in Maine's 2015 Wildlife Action Plan: Element 4, Table 4-15. Click on the Habitat Grouping of interest to launch a habitat based report summarizing relevant conservation actions and associated SGCN.

The Wildlife Action Plan was developed through a lengthy participatory process with state agencies, targeted conservation partners, and the general public. The Plan is non-regulatory. The species, stressors, and voluntary conservation actions identified in the Plan complement, but do not replace, existing work programs and priorities by state agencies and partners.

Myotis septentrionalis* (Northern Long-eared Myotis)*Priority 1 Species of Greatest Conservation Need (SGCN)****Class:** *Mammalia* (Mammals)**Order:** *Chiroptera* (Bats)**Family:** *Vespertilionidae* (Common Bats)**General comments:**

This species hibernates in large groups in caves and mines during the winter. Since the discovery of White-nose Syndrome (WNS) in 2006 in northeastern United States bat populations for species that co-hibernate with northern long-eared myotis have decreased more than 90 percent. Specific population decline information for northern long-eared myotis is lacking however, WNS does affect northern long-eared myotis. It is predicted that WNS could extirpate cave/ mine hibernating bats from the northeastern United States. Population monitoring should be considered in Maine.

Species Conservation Range Maps for Northern Long-eared Myotis:Town Map: [Myotis septentrionalis_Towns.pdf](#)Subwatershed Map: [Myotis septentrionalis_HUC12.pdf](#)**SGCN Priority Ranking - Designation Criteria:****Risk of Extirpation:**Maine Status: **Endangered**Federal Status: **Threatened****State Special Concern or NMFS Species of Concern: NA****Recent Significant Declines:**

Northern Long-eared Myotis is currently undergoing steep population declines, which has already led to, or if unchecked is likely to lead to, local extinction and/or range contraction.

Notes:

95% decline in winter hibernating bats from pre-WNS counts in Maine

Regional Endemic: NA**High Regional Conservation Priority:**

NatureServe:

Global Rank: G2

High Climate Change Vulnerability: NA**Understudied rare taxa: NA****Historical: NA****Culturally Significant: NA****Habitats Assigned to Northern Long-eared Myotis:****Formation Name Boreal Upland Forest****Macrogroup Name Boreal Upland Forest**

Habitat System Name: Acadian Low Elevation Spruce-Fir-Hardwood Forest **Notes:** "secondary habitat" for this (formerly) widespread but present in a variety of Maine habitats: presumed occurrence

Habitat System Name: Acadian Sub-boreal Spruce Flat **Notes:** "secondary habitat" for this (formerly) widespread but present in a variety of Maine habitats: documented occurrence

Habitat System Name: Acadian-Appalachian Montane Spr-Fir-Hwd Forest **Notes:** "secondary habitat" for this (formerly) widespread but present in a variety of Maine habitats: presumed occurrence

Myotis septentrionalis (Northern Long-eared Myotis)

Priority 1 Species of Greatest Conservation Need (SGCN)

Class: *Mammalia* (Mammals)

Order: *Chiroptera* (Bats)

Family: *Vespertilionidae* (Common Bats)

Formation Name	Developed
Macrogroup Name	Extractive
Habitat System Name:	Subsurface Mines & Caves **Primary Habitat** Notes: "primary habitat" for hibernacula within its range: documented occurrence

Formation Name	Northeastern Upland Forest
Macrogroup Name	Northern Hardwood & Conifer
Habitat System Name:	Appalachian (Hemlock)-Northern Hardwood Forest Notes: "secondary habitat" for this (formerly) widespread but present in a variety of Maine habitats: presumed occurrence
Habitat System Name:	Laurentian-Acadian Northern Hardwoods Forest Notes: "secondary habitat" for this (formerly) widespread but present in a variety of Maine habitats: presumed occurrence
Habitat System Name:	Laurentian-Acadian Pine-Hemlock-Hardwood Forest Notes: "secondary habitat" for this (formerly) widespread but present in a variety of Maine habitats: presumed occurrence
Habitat System Name:	Northeastern Coastal and Interior Pine-Oak Forest Notes: "secondary habitat" for upland forests within its range: presumed occurrence

Stressors Assigned to Northern Long-eared Myotis:

Stressor Priority Level based on Severity and Actionability		Moderate Severity	High Severity
	Highly Actionable	Medium-High	High
	Moderately Actionable	Medium	Medium-High
	Actionable with Difficulty	Low	Low

IUCN Level 1 Threat	Energy Production and Mining
IUCN Level 2 Threat:	Renewable Energy
Severity:	Moderate Severity Actionability: Highly actionable
Notes:	While cave bats are considered less susceptible to wind turbine collision than tree bats, potentially additive mortality events, especially in the aftermath of WNS, has been observed.

IUCN Level 1 Threat	Human Intrusions and Disturbance
IUCN Level 2 Threat:	Recreational Activities
Severity:	Moderate Severity Actionability: Highly actionable
Notes:	Cavers can spread WNS if they do not follow disinfection protocols.

IUCN Level 1 Threat	Other Options
IUCN Level 2 Threat:	Lack of knowledge
Severity:	Moderate Severity Actionability: Highly actionable
Notes:	Information related to location and types of hibernacula used, use of managed forest, and the location and selection of maternity roosts in Maine is unknown at this time.

IUCN Level 1 Threat	Invasive and Other Problematic Species, Genes and Diseases
IUCN Level 2 Threat:	Invasive Non-native-Alien Species-Diseases
Severity:	Severe Actionability: Actionable with difficulty
Notes:	White-nose syndrome (WNS) is a fungal disease that has caused the precipitous decline in most cave hibernating bat species in the eastern half of the US.

Species Level Conservation Actions Assigned to Northern Long-eared Myotis:

Myotis septentrionalis (Northern Long-eared Myotis)

Priority 1 Species of Greatest Conservation Need (SGCN)

Class: *Mammalia* (Mammals)

Order: *Chiroptera* (Bats)

Family: *Vespertilionidae* (Common Bats)

None. ***Only species specific conservation actions that address high (red) or medium-high (orange) priority stressors are summarized here.***

Guild Level Conservation Actions:

This Species is currently not attributed to a guild.

Broad Taxonomic Group Conservation Actions:

Relevant conservation actions for this species are assigned within broader taxonomic groups in Maine's 2015 Wildlife Action Plan: Element 4, Table 4-1.

Habitat Based Conservation Actions:

Additional conservation actions that may benefit habitat(s) associated with this species can be found in Maine's 2015 Wildlife Action Plan: Element 4, Table 4-15. Click on the Habitat Grouping of interest to launch a habitat based report summarizing relevant conservation actions and associated SGCN.

The Wildlife Action Plan was developed through a lengthy participatory process with state agencies, targeted conservation partners, and the general public. The Plan is non-regulatory. The species, stressors, and voluntary conservation actions identified in the Plan complement, but do not replace, existing work programs and priorities by state agencies and partners.

Lasionycteris noctivagans* (Silver-haired Bat)*Priority 2 Species of Greatest Conservation Need (SGCN)****Class:** *Mammalia* (Mammals)**Order:** *Chiroptera* (Bats)**Family:** *Vespertilionidae* (Common Bats)**General comments:**

This species was previously designated as SC due to lack of information. Although this is no longer a criterion for special concern listing, the special concern status for this species should be retained because development of wind power (and possibly other tall structures) in Maine and other states within the migratory path of this species is expected to result in increased mortality.

Species Conservation Range Maps for Silver-haired Bat:Town Map: [Lasionycteris noctivagans_Towns.pdf](#)Subwatershed Map: [Lasionycteris noctivagans_HUC12.pdf](#)**SGCN Priority Ranking - Designation Criteria:****Risk of Extirpation: NA****State Special Concern or NMFS Species of Concern:***Lasionycteris noctivagans* is listed as a species of Special Concern in Maine.**Recent Significant Declines: NA****Regional Endemic: NA****High Regional Conservation Priority:**

Northeast Endangered Species and Wildlife Diversity Technical Committee:

Risk: No, Data: Yes, Area: No, Spec: Yes, Warrant Listing: No, Total Categories with "Yes": 2

High Climate Change Vulnerability: NA**Understudied rare taxa: NA****Historical: NA****Culturally Significant: NA****Habitats Assigned to Silver-haired Bat:****Formation Name Boreal Upland Forest****Macrogroup Name Boreal Upland Forest****Habitat System Name:** Acadian Low Elevation Spruce-Fir-Hardwood Forest **Notes:** "primary habitat" for this tree bat in many Maine woodlands: "documented occurrence"**Habitat System Name:** Acadian Sub-boreal Spruce Flat **Notes:** "primary habitat" for this tree bat in many Maine woodlands: "documented occurrence"**Habitat System Name:** Acadian-Appalachian Montane Spr-Fir-Hwd Forest **Notes:** "primary habitat" for this tree bat in many Maine woodlands: "documented occurrence"**Formation Name Northeastern Upland Forest****Macrogroup Name Northern Hardwood & Conifer****Habitat System Name:** Appalachian (Hemlock)-Northern Hardwood Forest **Notes:** "secondary habitat" for this tree bat in many Maine woodlands: "presumed occurrence"**Habitat System Name:** Laurentian-Acadian Northern Hardwoods Forest **Notes:** "primary habitat" for this tree bat in many Maine woodlands: "documented occurrence"**Habitat System Name:** Laurentian-Acadian Pine-Hemlock-Hardwood Forest **Notes:** "primary habitat" for this tree bat in many Maine woodlands: "documented occurrence"**Habitat System Name:** Northeastern Coastal and Interior Pine-Oak Forest **Notes:** "secondary habitat" for upland forests within its range: presumed occurrence

Lasiorycteris noctivagans (Silver-haired Bat)

Priority 2 Species of Greatest Conservation Need (SGCN)

Class: *Mammalia* (Mammals)

Order: *Chiroptera* (Bats)

Family: *Vespertilionidae* (Common Bats)

Formation Name **Northeastern Wetland Forest**

Macrogroup Name Northern Swamp

Habitat System Name: Laurentian-Acadian Alkaline Conifer-Hardwood Swamp **Notes:** "primary habitat" for this tree bat in many Maine woodlands: "documented occurrence"

Habitat System Name: Northern Appalachian-Acadian Conifer-Hardwood Acidic Swamp **Notes:** "primary habitat" for this tree bat in many Maine woodlands: "documented occurrence"

Stressors Assigned to Silver-haired Bat:

Stressor Priority Level based on Severity and Actionability		Moderate Severity	High Severity
	Highly Actionable	Medium-High	High
	Moderately Actionable	Medium	Medium-High
	Actionable with Difficulty	Low	Low

IUCN Level 1 Threat Energy Production and Mining

IUCN Level 2 Threat: Renewable Energy

Severity: Moderate Severity **Actionability:** Highly actionable

Notes: Regular mortality for tree bats at windpower installations is widely reported and potentially most problematic for these migratory tree bats, but curtailment on nights with low wind speeds greatly minimizes (nearly avoids) these losses. The status of tree bat populations in Maine is not quantified but all species have long been considered "Special Concern" based on apparent low densities.

IUCN Level 1 Threat Other Options

IUCN Level 2 Threat: Lack of knowledge

Severity: Moderate Severity **Actionability:** Actionable with difficulty

Notes: Population status, numbers, and distribution of tree bats are poorly documented in Maine. Their marked vulnerability to mortality at wind turbines requires better information.

Species Level Conservation Actions Assigned to Silver-haired Bat:

None. *Only species specific conservation actions that address high (red) or medium-high (orange) priority stressors are summarized here.*

Guild Level Conservation Actions:

This Species is currently not attributed to a guild.

Broad Taxonomic Group Conservation Actions:

Relevant conservation actions for this species are assigned within broader taxonomic groups in Maine's 2015 Wildlife Action Plan: Element 4, Table 4-1.

Habitat Based Conservation Actions:

Additional conservation actions that may benefit habitat(s) associated with this species can be found in Maine's 2015 Wildlife Action Plan: Element 4, Table 4-15. Click on the Habitat Grouping of interest to launch a habitat based report summarizing relevant conservation actions and associated SGCN.

***Lasionycteris noctivagans* (Silver-haired Bat)**

Priority 2 Species of Greatest Conservation Need (SGCN)

Class: *Mammalia* (Mammals)

Order: *Chiroptera* (Bats)

Family: *Vespertilionidae* (Common Bats)

The Wildlife Action Plan was developed through a lengthy participatory process with state agencies, targeted conservation partners, and the general public. The Plan is non-regulatory. The species, stressors, and voluntary conservation actions identified in the Plan complement, but do not replace, existing work programs and priorities by state agencies and partners.

Perimyotis subflavus (Tri-colored Bat)

Priority 2 Species of Greatest Conservation Need (SGCN)

Class: *Mammalia* (Mammals)

Order: *Chiroptera* (Bats)

Family: *Vespertilionidae* (Common Bats)

General comments:

This species hibernates in large groups in caves and mines during the winter. Since the discovery of White-nose Syndrome (WNS) in 2006 in northeastern United States bat populations for species that co-hibernate with northern long-eared myotis have decreased more than 90 percent. Specific population decline information for eastern pipistrelles is lacking however, WNS does affect eastern pipistrelles but to what extent is unclear at this time. It is predicted that WNS could extirpate cave/ mine hibernating bats from the northeastern United. Population monitoring should be considered in Maine.

Species Conservation Range Maps for Tri-colored Bat:

Town Map: [Perimyotis subflavus Towns.pdf](#)

Subwatershed Map: [Perimyotis subflavus HUC12.pdf](#)

SGCN Priority Ranking - Designation Criteria:

Risk of Extirpation: NA

State Special Concern or NMFS Species of Concern:

Perimyotis subflavus is listed as a species of Special Concern in Maine.

Recent Significant Declines: NA

Regional Endemic: NA

High Regional Conservation Priority:

Committee on the Status of Endangered Wildlife in Canada (COSEWIC):

Status: E, Last Examination: 11/1/2013, Change: No Change, Canada Occurrence: ON, QC, NB, NS

NatureServe:

Global Rank: G3

High Climate Change Vulnerability: NA

Understudied rare taxa: NA

Historical: NA

Culturally Significant: NA

Habitats Assigned to Tri-colored Bat:

Formation Name	Boreal Upland Forest
Macrogroup Name	Boreal Upland Forest
Habitat System Name:	Boreal Upland Forest Macrogroup - Unknown Habitat System
	Notes: "secondary habitat" for this tree bat in many Maine woodlands: "presumed occurrence"
Formation Name	Developed
Macrogroup Name	Extractive
Habitat System Name:	Subsurface Mines & Caves
	Notes: "primary habitat" for hibernacula within its range: documented occurrence
Formation Name	Northeastern Upland Forest
Macrogroup Name	Northern Hardwood & Conifer
Habitat System Name:	Northeastern Coastal and Interior Pine-Oak Forest
	Notes: "secondary habitat" for upland forests within its range: presumed occurrence
Habitat System Name:	Northern Hardwood & Conifer Macrogroup - Unknown Habitat System
	Notes: "secondary habitat" for this tree bat in many Maine woodlands: "presumed occurrence"

Perimyotis subflavus (Tri-colored Bat)

Priority 2 Species of Greatest Conservation Need (SGCN)

Class: *Mammalia* (Mammals)

Order: *Chiroptera* (Bats)

Family: *Vespertilionidae* (Common Bats)

Formation Name **Northeastern Wetland Forest**

Macrogroup Name **Northern Swamp**

Habitat System Name: Laurentian-Acadian Alkaline Conifer-Hardwood Swamp **Notes:** "secondary habitat" for this tree bat in many Maine woodlands: "presumed occurrence"

Habitat System Name: Northern Appalachian-Acadian Conifer-Hardwood Acidic Swamp **Notes:** "secondary habitat" for this tree bat in many Maine woodlands: "presumed occurrence"

Stressors Assigned to Tri-colored Bat:

Stressor Priority Level based on Severity and Actionability		Moderate Severity	High Severity
	Highly Actionable	Medium-High	High
	Moderately Actionable	Medium	Medium-High
	Actionable with Difficulty	Low	Low

IUCN Level 1 Threat **Energy Production and Mining**

IUCN Level 2 Threat: Renewable Energy

Severity: Severe

Actionability: Highly actionable

Notes: This status of this bat species in Maine is poorly documented, but numbers imply a very small population. Any mortality associated with windpower installations could be extremely influential given the apparent vulnerability of tri-colored bats in Maine.

IUCN Level 1 Threat **Human Intrusions and Disturbance**

IUCN Level 2 Threat: Recreational Activities

Severity: Moderate Severity

Actionability: Moderately actionable

Notes: Disturbances to cave-hibernating bats can result from winter visits to caves, cave exploration and photography.

IUCN Level 1 Threat **Other Options**

IUCN Level 2 Threat: Lack of knowledge

Severity: Moderate Severity

Actionability: Moderately actionable

Notes: This species critically needs attention in Maine given its poorly understood status, population aize and current distribution in combination with its marked vulnerability to other stressors.

IUCN Level 1 Threat **Invasive and Other Problematic Species, Genes and Diseases**

IUCN Level 2 Threat: Invasive Non-native-Alien Species-Diseases

Severity: Severe

Actionability: Actionable with difficulty

Notes: Losses to white nose syndrome have occurred elsewhere but numbers of tri-colored bats in Maine hibernacula are so low that the problem is not well documented here., but any mortalities are a concern given the marginal status of this species.

Species Level Conservation Actions Assigned to Tri-colored Bat:

None. *Only species specific conservation actions that address high (red) or medium-high (orange) priority stressors are summarized here.*

Guild Level Conservation Actions:

This Species is currently not attributed to a guild.

Broad Taxonomic Group Conservation Actions:

***Perimyotis subflavus* (Tri-colored Bat)**
Priority 2 Species of Greatest Conservation Need (SGCN)

Class: *Mammalia* (Mammals)

Order: *Chiroptera* (Bats)

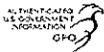
Family: *Vespertilionidae* (Common Bats)

Relevant conservation actions for this species are assigned within broader taxonomic groups in Maine's 2015 Wildlife Action Plan: Element 4, Table 4-1.

Habitat Based Conservation Actions:

Additional conservation actions that may benefit habitat(s) associated with this species can be found in Maine's 2015 Wildlife Action Plan: Element 4, Table 4-15. Click on the Habitat Grouping of interest to launch a habitat based report summarizing relevant conservation actions and associated SGCN.

The Wildlife Action Plan was developed through a lengthy participatory process with state agencies, targeted conservation partners, and the general public. The Plan is non-regulatory. The species, stressors, and voluntary conservation actions identified in the Plan complement, but do not replace, existing work programs and priorities by state agencies and partners.



List of Subjects in 48 CFR Parts 601, 606, 608, 615, 616, 623, 627, 633, 651 and 652

Administrative practice and procedure, Government procurement.

For the reasons stated in the preamble, the Department of State amends 48 CFR chapter 6 as follows:

- 1. The authority citation for 48 CFR parts 601, 606, 608, 615, 616, 623, 627, 633, 651 and 652 continues to read as follows:

Authority: 22 U.S.C. 2651a, 40 U.S.C. 121(c) and 48 CFR chapter 1.

PART 601—DEPARTMENT OF STATE ACQUISITION REGULATION SYSTEM

601.602-1 [Amended]

- 2. In section 601.602-1, paragraph (b), remove “601.603-70” and add in its place “601.601-70”.

PART 606—COMPETITION REQUIREMENTS

606.304 [Amended]

- 3. In section 606.304, in paragraph (a)(2), remove “a advocate for competition” and add in its place “an advocate for competition”.

Subpart 606.5—Advocates for Competition

- 4. Revise the heading for subpart 606.5 to read as set forth above.
■ 5. In section 606.501, in the second sentence of paragraph (b), remove “competition advocate” and add in its place “advocate for competition”.

PART 608—REQUIRED SOURCES OF SUPPLIES AND SERVICES

- 6. Add subpart 608.4 to read as follows:

Subpart 608.4—Federal Supply Schedules

608.405 Ordering procedures for Federal Supply Schedules.
608.405-3 Blanket Purchase Agreements.

Subpart 608.4—Federal Supply Schedules

608.405 Ordering procedures for Federal Supply Schedules.

608.405-3 Blanket Purchase Agreements.
(a) Establishment.
(3)(ii) The Procurement Executive is the head of the agency for the purposes of FAR 8.405-3(a)(3)(ii).

PART 615—CONTRACTING BY NEGOTIATION

615.205-70 [Amended]

- 7. In section 615.205-70, remove “DOSAR”.

PART 616—TYPES OF CONTRACTS

- 8. Revise the heading for section 616.103 to read as follows:

616.103 Negotiating contract type.
* * * * *

- 9. Add section 616.504 to read as follows:

616.504 Indefinite-quantity contracts.

(c) Multiple award preference—(1) Planning the acquisition.

(ii)(D)(1) The Procurement Executive is the head of the agency for the purposes of FAR 16.504(c)(1)(ii)(D)(1).

PART 623—ENVIRONMENT, ENERGY AND WATER EFFICIENCY, RENEWABLE ENERGY TECHNOLOGIES, OCCUPATIONAL SAFETY, AND DRUG-FREE WORKPLACE TYPES OF CONTRACTS

623.506 [Amended]

- 10. The text of section 623.506 is designated as paragraph (e).

PART 627—PATENTS, DATA, AND COPYRIGHTS

627.304-1 [Amended]

- 11. In the third sentence of section 627.304-1, add “proposed to be” between “Determinations” and “issued”.

PART 633—PROTESTS, DISPUTES, AND APPEALS

Subpart 633.214—Alternative dispute resolution (ADR)

- 12. Add a subpart 633.214 heading to read as set forth above.

- 13. Revise the heading for section 633.214-70 to read as follows:

633.214-70 DOS ADR program.
* * * * *

PART 651—USE OF GOVERNMENT SOURCES BY CONTRACTORS

651.701 [Redesignated as 651.7001]

- 14. Section 651.701 is redesignated as section 651.7001.

PART 652—SOLICITATION PROVISIONS AND CONTRACT CLAUSES

652.100-70 [Amended]

- 15. In section 652.100-70, revise “Subpart” to read “subpart” in paragraphs (a) and (b).

Subpart 652.2—Text of Provisions and Clauses

- 16. Revise the subpart 652.2 heading to read as set forth above.

652.232-72 [Amended]

- 17. In the introductory text of section 652.232-72, remove “632.705-70” and add in its place “632.706-70”.

Corey M. Rindner,
Procurement Executive, Department of State.
[FR Doc. 2016-09570 Filed 4-26-16; 8:45 am]
BILLING CODE 4710-24-P

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS-R3-ES-2016-0052; 4500030113]

RIN 1018-AZ62

Endangered and Threatened Wildlife and Plants; Determination That Designation of Critical Habitat Is Not Prudent for the Northern Long-Eared Bat

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Critical habitat determination.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), have reconsidered whether designating critical habitat for the northern long-eared bat (Myotis septentrionalis) is prudent. We have determined that such a designation is not prudent. We listed the northern long-eared bat as a threatened species under the Endangered Species Act of 1973, as amended (Act), on April 2, 2015. At the time the species was listed, we determined that designation of critical habitat was prudent, but not determinable. Since that time, information has come available that demonstrates that designating the wintering habitat as critical habitat for the bat would likely increase the threat from vandalism and disturbance, and could, potentially, increase the spread of white-nose syndrome. In addition, designating the summer habitat as critical habitat would not be beneficial to the species, because there are no areas within the summer habitat that meet the definition of critical habitat. Thus, we have determined that the designation of critical habitat is not prudent for the northern long-eared bat.
DATES: The determination announced in this document was made on April 27, 2016.

ADDRESSES: This document is available on the Internet at <http://www.regulations.gov> at Docket No. FWS-R3-ES-2016-0052. Supporting documentation we used in preparing this document will be available for public inspection, by appointment, during normal business hours at the Twin Cities Ecological Services Office, U.S. Fish and Wildlife Service, 4101 American Blvd. E., Bloomington, MN 55425.

FOR FURTHER INFORMATION CONTACT: Peter Fasbender, Field Supervisor, 952-252-0092, extension 210. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Information Relay Service (FIRS) at 800-877-8339.

SUPPLEMENTARY INFORMATION:

Background

The northern long-eared bat (*Myotis septentrionalis*) is a wide-ranging species that is found in a variety of forested habitats in summer and hibernates in caves and mines (or habitat with similar conditions to suitable caves or mines) in winter. The fungal disease, white-nose syndrome (WNS), is the main threat to this species and has caused a precipitous decline in bat numbers (in many cases, 90–100 percent) where the disease has occurred. Declines in the numbers of northern long-eared bats are expected to continue as WNS extends across the species' range, provided no cure to the disease is found. For more information on the northern long-eared bat, its habitat, and WNS, please refer to the October 2, 2013, proposed listing (78 FR 61046) and the April 2, 2015, final listing (80 FR 17974) rules.

Summer Habitat

Suitable summer habitat for the northern long-eared bat consists of a wide variety of forested and wooded habitats where they roost, forage, and travel (Foster and Kurta 1999, p. 668), and may also include some adjacent and interspersed non-forested habitats (Yates and Muzika 2006, p. 1,245). This includes forests and woodlots containing potential roosts, as well as linear features such as fence rows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure (Lacki and Schwierjohann 2001, p. 487; Perry and Thill 2007, p. 223; Sasse and Pekins 1996, p. 95; Timpone *et al.* 2010, p. 118).

After hibernation ends in late March or early April (as late as May in some northern areas), most northern long-

eared bats migrate to summer roosts. The spring migration period typically runs from mid-March to mid-May (Caire *et al.* 1979, p. 405; Easterla 1968, p. 770; Whitaker and Mumford 2009, p. 207). The northern long-eared bat is not considered to be a long-distance migrant (typically 40–50 miles (64–80 kilometers)). Males and non-reproductive females may summer near or in their winter habitat (hibernacula), or migrate to summer habitat some distance from their hibernaculum.

After emerging from hibernacula in the spring, female northern long-eared bats actively form colonies in the summer (Foster and Kurta 1999) and exhibit fission-fusion behavior (Garroway and Broders 2007), where members frequently coalesce to form a group, but composition of the group is in flux (Barclay and Kurta 2007, p. 44). As part of this behavior, northern long-eared bats switch tree roosts often (Sasse and Pekins 1996, p. 95), typically every 2 to 3 days (Foster and Kurta 1999, p. 665; Owen *et al.* 2002, p. 2; Carter and Feldhamer 2005, p. 261; Timpone *et al.* 2010, p. 119). Northern long-eared bat maternity colonies range widely in size (reported range of 7 to 100; Owen *et al.* 2002, p. 2; Whitaker and Mumford 2009, p. 212), although colonies of 30–60 individuals may be most common, at least prior to the onset of WNS (Whitaker and Mumford 2009, p. 212; Caceres and Barclay 2000, p. 3; Service 2014, p. A16).

Northern long-eared bats show interannual fidelity to roost trees and maternity areas. They use networks of roost trees often centered around one or more central-node roost trees (Johnson *et al.* 2011, p. 228) with multiple alternate roost trees. Northern long-eared bats roost in cavities, crevices, hollows, or underneath bark of both live and dead trees and snags (typically ≥ 3 inches (in) (8 centimeters (cm)) in diameter at breast height (dbh)). Northern long-eared bats are known to use a wide variety of roost types, using tree species based on presence of cavities or crevices or presence of peeling bark. Northern long-eared bats have also been found roosting in structures such as buildings, barns, sheds, houses, and bridges (Benedict and Howell 2008, p. 5; Krochmal and Sparks 2007, p. 650; Timpone *et al.* 2010, p. 119; Service 2014, p. 2).

The best available information indicates that northern long-eared bats seem to be flexible in roost selection, using varying roost tree species and types of roosts throughout their range. They do not depend on certain species of trees for roosts; rather, they opportunistically use many tree species

that form suitable cavities or retain bark (Foster and Kurta 1999, p. 668).

Additionally, the bats may use either live trees or snags; the use of live trees versus snags may reflect the availability of such structures (Perry and Thill 2007, p. 224) and the presence of sympatric bat species (*e.g.*, Indiana bat (*Myotis sodalis*)) (Timpone *et al.* 2010, p. 120), as opposed to a specific preference of tree or other habitat characteristics. Results from studies have also found that the diameters of roost trees selected by northern long-eared bats vary greatly (Sasse and Pekins 1996, pp. 95–96; Schultes 2002, pp. 49, 51; Perry 2014, pers. comm.; Lereculeur 2013, pp. 52–54; Carter and Feldhamer 2005, p. 263; Foster and Kurta 1999, p. 663; Lacki and Schwierjohann 2001, pp. 484–485; Owens *et al.* 2002, p. 3; Timpone *et al.* 2010, p. 118; Lowe 2012, p. 61; Perry and Thill 2007, p. 223; Lacki *et al.* 2009, p. 1,171) and that northern long-eared bats can forage in a variety of forest types (Brack and Whitaker 2001, p. 207; LaVal *et al.* 1977, p. 594; van Zyll de Jong 1985, p. 94). Northern long-eared bats change roost trees frequently (*e.g.*, Cryan *et al.* 2001, p. 50; Foster and Kurta 1999, p. 665) within their summer home range; this behavior suggests they are adapted to responding quickly to changes in roost availability and ephemeral roosts. For a more detailed discussion on summer habitat, refer to the April 2, 2015, final listing rule (80 FR 17974).

Winter Habitat (Hibernacula)

Northern long-eared bats hibernate during the winter months to conserve energy from increased thermoregulatory demands and reduced food resources (Thomas *et al.* 1990, p. 475; Thomas and Geiser 1997, p. 585; Bouma *et al.* 2010, p. 623). Suitable winter habitat includes caves and cave-like structures (*e.g.*, abandoned or active mines, railroad tunnels) (Service 2015, unpublished data; Goehring 1954, p. 435; Kurta *et al.* 1997, p. 478). Other landscape features may be used by northern long-eared bats during the winter, but they have yet to be documented. Generally, northern long-eared bats hibernate from October to April, depending on the local climate (November/December through March in southern areas, with emergence as late as mid-May in some northern areas) (Caire *et al.* 1979, p. 405; Whitaker and Hamilton 1998, p. 100; Amelon and Burhans 2006, p. 72).

Hibernacula used by northern long-eared bats vary in size (Raesly and Gates 1987, p. 20; Kurta 2013, in litt.), and these hibernacula have relatively constant, cooler temperatures (0 to 9 degrees Celsius (°C) (32 to 48 degrees

Fahrenheit (°F)) (Raesly and Gates 1987, p. 18; Caceres and Pybus 1997, p. 2; Brack 2007, p. 744), with high humidity and minimal air currents (Fitch and Shump 1979, p. 2; van Zyll de Jong 1985, p. 94; Raesly and Gates 1987, p. 118; Caceres and Pybus 1997, p. 2). The sites favored by northern long-eared bats are often in very high humidity areas, to such a large degree that droplets of water are often observed on their fur (Hitchcock 1949, p. 52; Barbour and Davis 1969, p. 77). Within hibernacula, northern long-eared bats are typically found roosting in small crevices or cracks in cave or mine walls or ceilings, sometimes with only the nose and ears visible (Griffin 1940, pp. 181–182; Barbour and Davis 1969, p. 77; Caire *et al.* 1979, p. 405; van Zyll de Jong 1985, p. 9; Caceres and Pybus 1997, p. 2; Whitaker and Mumford 2009, pp. 209–210).

To a lesser extent, northern long-eared bats have also been observed overwintering in other types of habitat that resemble cave or mine hibernacula, including abandoned railroad tunnels (Service 2015, unpublished data).

Although similar bat species (*e.g.*, big brown bats (*Eptesicus fuscus*)) have been found using non-cave or non-mine hibernacula, including attics and hollow trees (Neubaum *et al.* 2006, p. 473; Whitaker and Gummer 1992, pp. 313–316), northern long-eared bats have only been observed overwintering in suitable caves, mines, or habitat with the same types of conditions found in suitable caves or mines.

Northern long-eared bats tend to roost singly or in small groups (Service 2013, unpublished data), with hibernating population sizes rarely recorded in concentrations of more than 100 bats in a single hibernaculum (Barbour and Davis 1969, p. 77). Northern long-eared bats display more winter activity than other cave species, with individuals occasionally moving between hibernacula throughout the winter (Griffin 1940, p. 185; Whitaker and Rissler 1992, p. 131; Caceres and Barclay 2000, pp. 2–3). Northern long-eared bats have shown a high degree of philopatry (*i.e.*, using the same site multiple years) to the hibernacula used (Pearson 1962, p. 30).

Northern long-eared bat hibernacula have fairly specific physical and biological requirements that make them suitable for northern long-eared bats. In general, bats select hibernacula because they have characteristics that allow the bats to meet specific life-cycle requirements. Factors influencing a hibernaculum's suitability include its physical structure (*e.g.*, openings, interior space, depth), air circulation,

temperature profile, and location relative to foraging sites (Tuttle and Stevenson 1978, pp. 108–121). For a more detailed discussion on winter habitat, refer to the April 2, 2015, final listing rule (80 FR 17974).

Previous Federal Actions

Refer to the proposed (78 FR 61046; October 2, 2013) and final (80 FR 17974; April 2, 2015) listing rules for the northern long-eared bat for a detailed description of previous Federal actions concerning this species. On April 2, 2015, we published in the *Federal Register* (80 FR 17974) a final rule listing the northern long-eared bat as a threatened species. In the April 2, 2015, rule, we also established an interim rule under section 4(d) of the Act (16 U.S.C. 1531 *et seq.*). The final listing rule and the interim 4(d) rule both became effective on May 4, 2015. On January 14, 2016 (81 FR 1900), we published a final 4(d) rule, which became effective on February 16, 2016.

Critical Habitat

Background

Section 4(a)(3) of the Act, as amended, and implementing regulations (50 CFR 424.12), require that, to the maximum extent prudent and determinable, we designate critical habitat at the time the species is determined to be an endangered or threatened species. Critical habitat is defined in section 3 of the Act as:

(1) The specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the Act, on which are found those physical or biological features

(a) Essential to the conservation of the species, and

(b) Which may require special management considerations or protection; and

(2) Specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species.

Our regulations at 50 CFR 424.02 defines the geographical area occupied by the species as: An area that may generally be delineated around species' occurrences, as determined by the Secretary (*i.e.*, range). Such areas may include those areas used throughout all or part of the species' life cycle, even if not used on a regular basis (*e.g.*, migratory corridors, seasonal habitats, and habitats used periodically, but not solely by vagrant individuals).

Conservation, as defined under section 3 of the Act, means to use, and

the use of, all methods and procedures that are necessary to bring an endangered or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary. Such methods and procedures include, but are not limited to, all activities associated with scientific resources management such as research, census, law enforcement, habitat acquisition and maintenance, propagation, live trapping, and transplantation, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regulated taking.

Critical habitat receives protection under section 7 of the Act through the requirement that Federal agencies ensure, in consultation with the Service, that any action they authorize, fund, or carry out is not likely to result in the destruction or adverse modification of critical habitat. The designation of critical habitat does not affect land ownership or establish a refuge, wilderness, reserve, preserve, or other conservation area. Critical habitat designation does not allow the government or public to access private lands, nor does it require implementation of restoration, recovery, or enhancement measures by non-Federal landowners. Where a landowner requests Federal agency funding or authorization for an action that may affect a listed species or critical habitat, the Federal agency would be required to consult under section 7(a)(2) of the Act, but even if consultation leads to a finding that the action would likely cause destruction or adverse modification of critical habitat, the resulting obligation of the Federal action agency and the landowner is not to restore or recover the species, but rather to implement reasonable and prudent alternatives to avoid destruction or adverse modification of critical habitat.

Under the first prong of the Act's definition of critical habitat, areas within the geographical area occupied by the species at the time it was listed are included in a critical habitat designation if they contain physical or biological features (1) which are essential to the conservation of the species and (2) which may require special management considerations or protection. For these areas, critical habitat designations identify, to the extent known using the best scientific and commercial data available, those physical or biological features that are essential to the conservation of the species (such as space, food, cover, and protected habitat). In identifying those physical or biological features, we focus

on the specific features that support the life-history needs of the species, including but not limited to, water characteristics, soil type, geological features, prey, vegetation, symbiotic species, or other features. A feature may be a single habitat characteristic, or a more complex combination of habitat characteristics. Features may include habitat characteristics that support ephemeral or dynamic habitat conditions. Features may also be expressed in terms relating to principles of conservation biology, such as patch size, distribution distances, and connectivity.

Under the second prong of the Act's definition of critical habitat, we can designate critical habitat in areas outside the geographical area occupied by the species at the time it is listed if we determine that such areas are essential for the conservation of the species. For example, an area that is currently occupied by the species, but was not occupied at the time of listing, may be essential to the conservation of the species and may be included in the critical habitat designation.

Section 4 of the Act requires that we designate critical habitat on the basis of the best scientific data available. Further, our Policy on Information Standards Under the Endangered Species Act (published in the *Federal Register* on July 1, 1994 (59 FR 34271)), the Information Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Pub. L. 106-554; H.R. 5658)), and our associated Information Quality Guidelines, provide criteria, establish procedures, and provide guidance to ensure that our decisions are based on the best scientific data available. For example, they require our biologists, to the extent consistent with the Act and with the use of the best scientific data available, to use primary and original sources of information as the basis for recommendations to designate critical habitat.

Critical Habitat Prudency Determination

Section 4(a)(3) of the Act, as amended, and implementing regulations (50 CFR 424.12), require that, to the maximum extent prudent and determinable, we designate critical habitat at the time the species is determined to be an endangered or threatened species. Our regulations (50 CFR 424.12(a)(1)) state that the designation of critical habitat is not prudent when any of the following situations exist: (i) The species is threatened by taking or other human activity, and identification of critical habitat can be expected to increase the

degree of threat to the species, or (ii) such designation of critical habitat would not be beneficial to the species. The regulations also provide that, in determining whether a designation of critical habitat would not be beneficial to the species, the factors the Services may consider include but are not limited to: Whether the present or threatened destruction, modification, or curtailment of a species' habitat or range is not a threat to the species, or whether any areas meet the definition of "critical habitat" (50 CFR 424.12(a)(1)(ii)).

We have determined that both situations when a critical habitat designation would not be prudent apply to the northern long-eared bat. With respect to summer habitat, we have determined that designating critical habitat would not be beneficial to the species. Further, with respect to wintering habitat, we have determined that the species is threatened by taking or human activity and identification of critical habitat could be expected to increase the degree of this threat to the species. An explanation of these determinations follows.

Designating Summer Habitat Would Not Be Beneficial to the Species

The northern long-eared bat is widely distributed throughout much of its range during the summer months and is considered to be flexible with regards to summer habitat requirements.

The best scientific information available on summer habitat suggests that where the northern long-eared bat is found, it is widely distributed in a variety of wooded habitats (ranging from highly fragmented forest habitats to contiguous forest blocks from the southern United States to Canada's Yukon Territory), with generally non-specific habitat elements. There are elements of summer habitat that the northern long-eared bat needs (forests for roosting, raising young, foraging, and commuting between roosting and foraging habitat); however, the best available information indicates that the species' specific needs and preferences for these habitat elements are relatively flexible, plentiful, and widely distributed. Thus, summer habitat for the northern long-eared bat does not have specific physical or biological features that are essential to the conservation of the species and, therefore, does not meet the definition of critical habitat.

Furthermore, as discussed in the final listing rule (80 FR 17974; April 2, 2015), northern long-eared bat summer habitat is not limited or in short supply, and summer habitat loss is not a rangewide threat to the species. Based on a

compilation of the total forested acres for each State in the northern long-eared bat's range (from the U.S. Forest Service's 2015 State and Private Forestry Fact sheets (available at <http://stateforesters.org/regional-state>)), there are an estimated 281,528,709 acres (113,213,960 hectares) of available forested habitat for the northern long-eared bat throughout its range in the United States (Service 2016, p. 28). This is assuming that all forested acres are suitable for the northern long-eared bat, which probably overestimates habitat availability, but such an assumption is not unreasonable given the northern long-eared bat's flexible selection of summer habitat and ability to use very small trees (≥ 3 in (8 cm) in dbh) (Service 2016, p. 18).

As we documented in the final listing rule (80 FR 17974; April 2, 2015), the extent of conversion from forest to other land cover types has been fairly consistent with conversion to forest (cropland reversion/plantings). Further, the recent past and projected future amounts of forest loss to conversion was, and is anticipated to be, only a small percentage of the total amount of forest habitat. For example, the U.S. Forest Service expects only 4 to 8 percent of the forested area found in 2007 across the conterminous United States to be lost by 2060 (U.S. Forest Service 2012, p. 12). Additionally, as discussed above, the northern long-eared bat has been documented to use a wide variety of forest types across its wide range (living in highly fragmented forest habitats to contiguous forest blocks from the southern United States to Canada's Yukon Territory). Because summer habitat for the northern long-eared bat is not limiting, and because the northern long-eared bat is considered to be flexible with regards to summer habitat, the availability of forested habitat does not now, nor will it likely in the future, limit the conservation of the northern long-eared bat.

The critical habitat regulations at 50 CFR 424.12(a)(1)(ii) provide two examples of when designating critical habitat may not be beneficial to the species and, therefore, may be not prudent: Where the present or threatened destruction, modification, or curtailment of a species' habitat or range is not a threat to the species, or where there are no areas that meet the definition of critical habitat for the species. The summer habitat for the northern long-eared bat falls within both examples. First, there are no areas of summer habitat that meet the definition of critical habitat for the northern long-eared bat. Second, the present or

threatened destruction, modification, or curtailment of summer habitat is not a threat to the species; rather, disease is the primary threat to the species within its summer habitat. In the final rule revising the critical habitat regulations (81 FR 7414; February 11, 2016), the Services expressly identified this situation as an example where designating critical habitat may not be beneficial to the species: "In some circumstances, a species may be listed because of factors other than threats to its habitat or range, such as disease, and the species may be a habitat generalist. In such a case, on the basis of the existing and revised regulations, it is permissible to determine that critical habitat is not beneficial and, therefore, not prudent" (see 81 FR 7425; February 11, 2016). Therefore, we conclude that designating the summer habitat of the northern long-eared bat as critical habitat is not prudent.

Increased Threat to the Taxon by Designating Critical Habitat in Their Hibernacula

Disturbance of hibernating bats (as discussed under Factor A of the final listing rule (80 FR 17974, April 2, 2015; see 80 FR 17989–17990)) has long been considered a threat to cave-hibernating bat species, including the northern long-eared bat. Northern long-eared bats hibernate during the winter months to conserve energy from increased thermoregulatory demands and reduced food resources. To increase energy savings, individuals enter a state of torpor, when internal body temperatures approach ambient temperature, metabolic rates are significantly lowered, and immune function declines (Thomas *et al.* 1990, p. 475; Thomas and Geiser 1997, p. 585; Bouma *et al.* 2010, p. 623). Each time a bat arouses from torpor, it uses a significant amount of energy to warm its body and increase its metabolic rate. These arousals during hibernation cause the greatest amount of energy depletion in hibernating bats (Thomas *et al.* 1990, p. 477). The cost and number of arousals are the two key factors that determine energy expenditures of hibernating bats in winter (Thomas *et al.* 1990, p. 475). Human disturbance at hibernacula can cause bats to arouse more frequently, causing premature energy store depletion and starvation (Thomas 1995, p. 944; Speakman *et al.* 1991, p. 1103), leading to marked reductions in bat populations (Tuttle 1979, p. 3) and increased susceptibility to disease.

The primary forms of human disturbance to hibernating bats result from recreational caving, vandalism, cave commercialization (cave tours and

other commercial uses of caves), and research-related activities (Service 2007, p. 80). Fire building is also a common form of disturbance that, in addition to elevating interior temperatures (which is detrimental during hibernation) and accumulating smoke, can deposit soot on ceilings and eventually result in site abandonment by bats (Tigner and Stukel 2003, p. 54). In addition to unintended effects of commercial and recreational caving, intentional killing of bats in caves by shooting, burning, and clubbing has been documented (Tuttle 1979, pp. 4, 8). Intentional killing of northern long-eared bats has been documented at a small percentage of hibernacula (e.g., one case of shooting disturbance in Maryland, and one case of bat torching in Massachusetts where approximately 100 bats (northern long-eared bats and other species) were killed) (Service, unpublished data).

Prior to the outbreak of WNS, Amelon and Burhans (2006, p. 73) indicated that "the widespread recreational use of caves and indirect or direct disturbance by humans during the hibernation period pose the greatest known threat to this species (northern long-eared bat)." In addition, human disturbance at hibernacula has been identified by many States as the next greatest threat to the bat after WNS. Of 14 States that assessed the possibility of human disturbance at bat hibernacula within the range of the northern long-eared bat, 13 identified at least 1 known hibernacula as having been negatively affected by human disturbance (Service 2012, unpublished data). Eight of these 14 States (Arkansas, Kentucky, Maine, Minnesota, New Hampshire, North Carolina, South Carolina, and Vermont) indicated the potential for human disturbance at over 50 percent of the known hibernacula in that State. Nearly all States without WNS identified human disturbance as the primary threat to hibernating bats, and all others (including WNS-positive States) noted that human disturbance either is of significant concern or is the next greatest threat after WNS (Service 2012, unpublished data).

Since the time of listing (April 2, 2015), additional information has become available that demonstrates that designating critical habitat for the northern long-eared bat would likely increase the threat from vandalism and disturbance, and could, potentially, increase the spread of WNS. In November 2015, we sought information from State fish and wildlife agencies and other public landowners with known bat caves or mines to determine: (1) How prevalent accounts of disturbance to bats and vandalism to

hibernacula are throughout the species' range; and (2) the level and types of concerns that State fish and wildlife agencies and other landowners with known bat caves or mines have regarding the release of known bat hibernacula location information.

Prevalence of Disturbance—State and other agency or organization personnel provided information regarding specific incidents of disturbance of hibernating bats within their State or area of jurisdiction. Incidents were reported throughout the range of the northern long-eared bat. Evidence of vandalism of caves and mines and disturbance of bats included: dead bats, graffiti, trash, evidence of camp fires, bottle rockets, fireworks, digging or excavation, attempts to remove rock or minerals, alteration of cave or mine entrances, and damage to and breach of gates. There were also a few reported incidents of intentional killing of bats, including clubbing, thrown rocks, and burning. In addition, materials found in hibernacula, such as tennis rackets and blow torches, indicate harm inflicted on bats (NJDFW 2015, pers. comm.). There are few law enforcement reports regarding these incidents, either due to a lack of law enforcement actions or because reporting these incidents would publicize mine or cave locations (SCDNR 2015, pers. comm.).

Examples of incidents of vandalism and disturbance to bats at publicly known hibernacula have been found throughout the range of the northern long-eared bat; we received examples of vandalism and disturbance to bats from 20 State fish and wildlife agencies and 9 other public landowners (including Federal, State, and local agencies and organizations) with known northern long-eared bat hibernacula. Due to the large number of specific incidents, a small, representative subset of the examples we received is presented below. For purposes of illustrating that these incidents occur throughout the species' range, the information is organized into four geographic areas: Northeast, southeast, midwest, and west.

Northeast: In northeastern States such as Pennsylvania and New York, vandalism and disturbance to bats within hibernacula occurs frequently. Evidence of human use of caves and mines in Pennsylvania, including digging for new passage, waste, all-terrain-vehicle use, guns being shot, and burning, are common. There are also many examples of people trying to cut, remove, or get around gates to access gated hibernacula (PGFC 2015, pers. comm.). Due to the large numbers of people trespassing in Pennsylvania

caves and mines, especially during winter months while bats are hibernating, the Pennsylvania Game Commission installed cameras at many caves to capture visual proof of those illegally entering caves and send automated messages to alert a wildlife conservation officer of the entry. Since January 2015, conservation officers have confronted at least 50 suspected trespassers, resulting in more than 20 citations (PGFC 2015, pers. comm.). Similarly, in New York, nearly all un-gated hibernacula, both on public and private lands, are visited by people, and many gated caves and mines have been compromised. Some sites have signs informing visitors that caves and mines are closed to visitation in the winter; however, this does not stop individuals from accessing those sites (NYDEC 2015, pers. comm.).

Southeast: In southeastern States such as South Carolina, North Carolina, and Kentucky, vandalism and disturbance to bats within hibernacula occurs often. For example, in South Carolina reports exist of bottle rockets being shot into a gated mine, missing locks on bat-friendly gates, litter inside a cave, and individuals barricading an entrance to a cave (SCDNR 2015, pers. comm.). In North Carolina, there are multiple incidents of vandalism to caves and mines. One particular mine in North Carolina has had repeated vandalism issues over several years, and multiple security fences, gates, and locks have been compromised by vandalism (NCWRC 2015, pers. comm.). In Kentucky, 82 of 118 total hibernacula where northern long-eared bats have been observed are exposed to human disturbance; in 2007, two people were convicted of intentionally killing more than 100 federally-listed Indiana bats in a Kentucky cave (USFWS 2010).

Midwest: There are multiple records of vandalism and disturbance of bats in Midwestern States, including Michigan, Indiana, Wisconsin, Missouri, and Minnesota. The first mine to have WNS-associated bat mortality in Michigan had been illegally accessed in 2013, when people used a torch to break the gate. The WNS-associated mortality was “likely as a direct result of this disturbance” (MIDNR 2015, pers. comm.). Winter visitation to caves in Indiana is relatively common, and in one particular incident, hibernating Indiana bats were intentionally burned (INDNR 2015, pers. comm.). In Wisconsin, five State-owned underground sites were sealed for use if there was a need for artificial hibernacula for WNS treatment trials; all five were breached (welded doors were ground off) during the spring of 2015.

Additionally, one private landowner filled in a cave on their property when they learned it was occupied by bats (WDNR 2015, pers. comm.). In Missouri, there has been evidence of digging at cave entrances, parties, fires, fireworks, graffiti, off-highway vehicle use, gate damage, and trash left behind at caves throughout the State. In fact, there is an ongoing investigation and prosecution regarding illegal entry at a Missouri cave (MDC 2016, pers. comm.). Issues with breached gates and broken locks occurred at several Minnesota caves; approximately 4 years ago, surveyors found bat bones and shotgun shells in one cave.

West: In States such as South Dakota, Arkansas, and Oklahoma in the western portion of the northern long-eared bat's range, there are several records of incidents of vandalism and disturbance to bats as well. The South Dakota Department of Game, Fish, and Parks provided literature with evidence of both historical and ongoing vandalism at their State's hibernacula. Increasing disturbance of known hibernacula throughout the Black Hills area is noted as one of the greatest threats to bat populations in the area (Tigner and Stukel 2003, p. 11). Some of the more disruptive and damaging activities inside caves and abandoned mines include discharging firearms and fireworks, spray-painting, campfire construction, and intentionally killing bats and other wildlife (Tigner and Stukel 2003, p. 54). At one particular cave, campfires are common during hibernation, and only a small fraction of the bats identified in the cave in the early 1990s still use the cave (Tigner 2002, p. 7). In Arkansas, approximately 200 endangered gray bats (*Myotis grisescens*) were killed at a major gray bat hibernaculum on National Park Service land (AGFC 2015, pers. comm.). In Oklahoma, there have been multiple incidents involving cutting fences around gate entrances, breaching cave gates (by cutting, digging under, or removing structures around gates to gain access), and campfires near cave entrances (Service 2015, pers. comm.).

Summary: As illustrated by the examples above, which are only a small subset of the reported incidents, we have extensive rangewide evidence that indicates known northern long-eared bat hibernacula have been, and are likely to continue to be, disturbed and vandalized. These acts not only lead to increases in disturbance during the northern long-eared bat's sensitive hibernation period, which, in turn, leads to decreased survival, but also may lead to direct mortality of northern long-eared bats.

Concerns over Release of Location Information—Northern long-eared bats that are infected with WNS are believed to be less resilient to disturbance and resulting arousal, and the northern long-eared bat is one of the most highly susceptible bat species to WNS (Langwig *et al.* 2014). As discussed in the final listing rule (80 FR 17974, April 2, 2015; see 80 FR 17993–17998), WNS-causing fungal spores can be transmitted not only by bat-to-bat transmission, but also by human actions (USGS National Wildlife Health Center, Wildlife Health Bulletin 2011–05), and decontamination remains one of the only management options available to reduce the risk of human-assisted transmission. State, Federal, and local agencies and organizations are especially concerned with the spread of WNS if cave and mine locations are made public, especially in sites where WNS has not been found or in areas that have not yet been inundated with the disease. Several agency and organization personnel expressed concern regarding those visiting caves and mines and not properly decontaminating after leaving hibernacula, which may result in these visitors spreading WNS fungal spores by using contaminated gear in uninfected caves or mines (ANHC 2015, pers. comm.; CDEEP 2015, pers. comm.; KDFWR 2015, pers. comm.; NBSRP 2015, pers. comm.; NJDVW 2015, pers. comm.; WDNR 2015, pers. comm.; WGFD 2015, pers. comm.). It is possible that the spread of WNS was enhanced by human transfer of fungal spores in some States, such as Connecticut (CDEEP 2015, pers. comm.).

State, Federal, and local agencies that gather specific location information exercise extra efforts to protect hibernacula location information from becoming readily available to the public. In fact, many States reported that they are concerned that release of location information could significantly increase human visitation, thereby increasing disturbance to bats, and, therefore, they do not share hibernacula location information with the public. For example, the Wisconsin Department of Natural Resources stated, “we have not shared locational information as to maternity sites and hibernacula. Under state law, locations deemed critical to the survival of the species may be withheld from the public. All data in the WI Natural Heritage Inventory are exempt from State open records laws” (WDNR 2015, pers. comm.). Some agencies and organizations state that when location information is disclosed, an agreement typically must be in place with those requesting the location

information to protect the data, and point data are buffered to conceal the specific locations. Similarly, in Missouri, the Missouri Department of Conservation (MDC) does not release hibernacula locations to the general public, and location information for caves not owned by MDC cannot be disclosed by the State (MDC 2016, pers. comm.).

In addition to protecting location information, State, Federal, and local agencies and organizations use other means to protect bat hibernacula, such as installation of bat-friendly gates. Direct protection of caves and mines can be accomplished through installation of bat-friendly gates that allow passage of bats while reducing disturbance from human entry as well as reducing changes to the cave microclimate from air restrictions. Bat-friendly gates are generally thought to be effective in preventing disturbance of hibernating bats and vandalism of hibernacula (AGFC 2015, pers. comm.; ANF 2015, pers. comm.; ANHC 2015, pers. comm.; BNR 2015, pers. comm.; CDEEP 2015, pers. comm.; DMCC 2015, pers. comm.; IADNR 2015, pers. comm.; ILDNR 2015, pers. comm.; INDNR 2015, pers. comm.; KDFWR 2015, pers. comm.; MANG 2015, pers. comm.; MDC 2016, pers. comm.; MIDNR 2015, pers. comm.; NBSRP 2015, pers. comm.; NGDFW 2015, pers. comm.; NYDEC 2015, pers. comm.; ONF 2015, pers. comm.; ONSR 2015, pers. comm.; OSFNF 2015, pers. comm.; PGC 2015, pers. comm.; SCDNR 2015, pers. comm.; SDGFP 2015, pers. comm.; SMP 2015, pers. comm.; WDNR 2015, pers. comm.), although attempts to protect hibernacula from disturbance have varying degrees of effectiveness. In most States for which we have information, a small percentage of caves and mines are gated, and a majority of State agencies indicated that there is a need to gate additional caves and mines used by bats. For example, in Missouri, less than approximately 2 percent of known hibernacula have bat-friendly gates Statewide (MDC 2015, pers. comm.). Attempts to remove gates at hibernacula are numerous and pervasive throughout the northern long-eared bat's range, although the success of removal attempts varies. Some State and Federal agencies and other organizations state that attempts to remove gates are rarely successful; others, such as the Kentucky Department of Fish and Wildlife Resources, state that removal attempts are almost always successful: "When parties wish to gain access, they are very resourceful and come prepared to cut, dig, pry, or use any other means necessary to enter. The remote nature of

some sites does not seem to deter vandalism either" (KDFWR 2015, pers. comm.). See *Prevalence of Disturbance*, above, for more examples of attempts to remove gates.

The process of designating critical habitat would increase human threats to the northern long-eared bat by increasing the vulnerability of this species to disturbance during its sensitive hibernation period and by increasing the likelihood of vandalism to its winter hibernacula by publicly disclosing the locations of those hibernacula. Northern long-eared bats are particularly sensitive to disturbance while hibernating, and such disturbance further reduces survival chances of already compromised, WNS-infected bats. Additionally, increased human access to hibernacula may facilitate or accelerate the spread of WNS to uninfected sites, as people may carry the fungal spores from site to site. Designation of critical habitat requires the publication of maps and a specific narrative description of critical habitat in the *Federal Register*. The degree of detail in those maps and boundary descriptions is far greater than the general location information provided in the final listing rule (80 FR 17974; April 2, 2015). Furthermore, a critical habitat designation normally results in the news media publishing articles in local newspapers and on special interest Web sites, usually with maps of the critical habitat. We have determined that the publication of maps and descriptions outlining the locations of this species' wintering areas would increase awareness and visitation of hibernacula, and thus disturbance of bats, as those interested in accessing caves and mines would then have detailed location information for these hibernacula. As expressed by many State bat biologists and land managers with hibernacula within their area of jurisdiction, there is a strong concern regarding publicizing cave and mine location information due to the increased threat of disturbance to the northern long-eared bat, and bats in general. Furthermore, human disturbance may exacerbate the effect of WNS on northern long-eared bats; providing a literal map of bat hibernacula in the form of critical habitat will likely facilitate human disturbance and may further compound threats to the species. We, therefore, conclude that the northern long-eared bat is threatened by taking and other human activity, and identification of critical habitat can be expected to increase the degree of threat to the species. Designating critical habitat is

therefore not prudent under the regulations at 50 CFR 424.12(a)(1)(i). As discussed earlier, the risk of increased threats from publishing hibernacula locations is significant. The northern long-eared bat, and bats in general, are very sensitive to disturbance while hibernating, and there are numerous known incidents of vandalism, targeted killing, and disturbance of hibernating northern long-eared bats throughout the species' range. The public has great interest in visiting caves and mines for recreational purposes, and human-caused disturbance has clear effects on hibernating bats. Thus, any action that publicly discloses the location of northern long-eared bat hibernacula (such as a critical habitat designation) puts the species in further peril. One of the basic measures to protect northern long-eared bats from vandalism and disturbance while hibernating is restricting access to information pertaining to the location of the species' hibernacula. Publishing maps and narrative descriptions of northern long-eared bat critical habitat would significantly affect our ability to reduce the threat of vandalism and disturbance of hibernacula and hibernating bats and may facilitate or intensify the spread of WNS by humans.

Summary of Prudency Determination

We have determined that designating critical habitat for the northern long-eared bat is not prudent. Designating summer habitat as critical habitat is not beneficial to the species, because there are no areas within the summer habitat of the species that meet the definition of critical habitat. Further, the primary threat to the species is the disease WNS; the destruction, modification, or curtailment of summer habitat is not a threat to the species as suitable summer habitat continues to exist and is not limited throughout the species' range. Therefore, designating critical habitat in the summer habitat areas would not be beneficial. Moreover, designating winter habitat as critical habitat would disclose hibernacula location information, and thereby increase the threat to the northern long-eared bat from vandalism and disturbance at hibernacula and could, potentially, increase the spread of WNS. Disturbance of hibernating bats has long been considered a threat to cave-hibernating bat species, and has been identified as the next greatest threat to this taxon after WNS. Human disturbance at hibernacula causes bats to arouse more frequently, leading to premature energy store depletion and, possibly, starvation. Further compounding the effects of disturbance, northern long-eared bats that are

infected with WNS are believed to be less resilient to disturbance and resulting arousal. Furthermore, increased human visitation of hibernacula could intensify the spread of WNS from infected to uninfected sites. We have, therefore, determined in accordance with 50 CFR 424.12(a)(1) that it is not prudent to designate critical habitat for the northern long-eared bat.

References Cited

A complete list of references cited in this document is available on the Internet at <http://www.regulations.gov> and upon request from the Twin Cities Ecological Services Office (see ADDRESSES and FOR FURTHER INFORMATION CONTACT).

Authors

The primary authors of this document are the staff members of the Twin Cities Ecological Services Office.

Authority

The authority for this action is the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Dated: April 12, 2016.

Michael J. Bean,

Principal Deputy Assistant Secretary for Fish and Wildlife and Parks.

[FR Doc. 2016-09673 Filed 4-26-16; 8:45 am]

BILLING CODE 4333-15-P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 648

[Docket No. 150903814-5999-02]

RIN 0648-XE564

Fisheries of the Northeastern United States; Summer Flounder Fishery; Quota Transfer

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Temporary rule; quota transfer.

SUMMARY: NMFS announces that the Commonwealth of Virginia is transferring a portion of its 2016 commercial summer flounder quota to the Commonwealth of Massachusetts. These quota adjustments are necessary to comply with the Summer Flounder, Scup and Black Sea Bass Fishery Management Plan quota transfer provision. This announcement informs

the public of the revised commercial quotas for Virginia and Massachusetts.

DATES: Effective April 26, 2016, through December 31, 2016.

FOR FURTHER INFORMATION CONTACT: Elizabeth Scheimer, Fishery Management Specialist, (978) 281-9236.

SUPPLEMENTARY INFORMATION: Regulations governing the summer flounder fishery are found in 50 CFR 648.100 through 648.110. The regulations require annual specification of a commercial quota that is apportioned among the coastal states from Maine through North Carolina. The process to set the annual commercial quota and the percent allocated to each state are described in § 648.102.

The final rule implementing Amendment 5 to the Summer Flounder Fishery Management Plan, as published in the *Federal Register* on December 17, 1993 (58 FR 65936), provided a mechanism for transferring summer flounder commercial quota from one state to another. Two or more states, under mutual agreement and with the concurrence of the NMFS Greater Atlantic Regional Administrator, can transfer or combine summer flounder commercial quota under § 648.102(c)(2). The Regional Administrator is required to consider the criteria in § 648.102(c)(2)(i)(A) through (C) in the evaluation of requests for quota transfers or combinations.

Virginia is transferring 6,525 lb (2,959 kg) of summer flounder commercial quota to Massachusetts. This transfer was requested by Virginia to repay landings by a Virginia-permitted vessel that landed in Massachusetts under a safe harbor agreement.

The revised summer flounder quotas for calendar year 2016 are now: Virginia, 1,755,829 lb (796,430 kg); and Massachusetts, 577,777 lb (262,075 kg) based on the initial quotas published in the 2016-2018 Summer Flounder, Scup and Black Sea Bass Specifications, (December 28, 2015, 80 FR 80689) and previous 2016 quota transfers (March 8, 2016, 81 FR 12030 and April 14, 2016, 81 FR 22032).

Classification

This action is taken under 50 CFR part 648 and is exempt from review under Executive Order 12866.

Authority: 16 U.S.C. 1801 *et seq.*

Dated: April 21, 2016.

Emily H. Menashes,

Acting Director, Office of Sustainable Fisheries, National Marine Fisheries Service.

[FR Doc. 2016-09726 Filed 4-26-16; 8:45 am]

BILLING CODE 3510-22-P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 679

[Docket No. 150817730-6320-02]

RIN 0648-BF29

Fisheries of the Exclusive Economic Zone Off Alaska; Bering Sea and Aleutian Islands Management Area; American Fisheries Act; Amendment 111

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Final rule.

SUMMARY: NMFS issues this final rule to implement Amendment 111 to the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area (FMP). This final rule reduces bycatch limits, also known as prohibited species catch (PSC) limits, for Pacific halibut in the Bering Sea and Aleutian Islands (BSAI) groundfish fisheries by specific amounts in four groundfish sectors: The Amendment 80 sector (non-pollock trawl catcher/processors); the BSAI trawl limited access sector (all non-Amendment 80 trawl fishery participants); the non-trawl sector (primarily hook-and-line catcher/processors); and the Western Alaska Community Development Quota Program (CDQ Program). This final rule establishes the following halibut PSC limits: 1,745 mt for the Amendment 80 sector; 745 mt for the BSAI trawl limited access sector; 710 mt for the BSAI non-trawl sector; and 315 mt for the CDQ Program. This results in an overall BSAI halibut PSC limit of 3,515 mt. This action is necessary to minimize halibut bycatch in the BSAI groundfish fisheries to the extent practicable and to achieve, on a continuing basis, optimum yield from the BSAI groundfish fisheries. This action is intended to promote the goals and objectives of the Magnuson-Stevens Fishery Conservation and Management Act, the FMP, and other applicable laws.

DATES: Effective May 27, 2016.

ADDRESSES: Electronic copies of the Environmental Assessment (EA), Regulatory Impact Review (RIR), and Finding of No Significant Impact (FONSI) prepared for this action, collectively "the Analysis;" the FMP; and the proposed rule are available from <http://www.regulations.gov> or from the

DEED OF CONSERVATION EASEMENT

THIS DEED OF CONSERVATION EASEMENT, given this ^{18th} day of June, 2010, by **THE NATURE CONSERVANCY**, 4245 North Fairfax Drive, Arlington, Virginia 22203-1606 and a local address at 14 Maine Street, Suite 401, Brunswick, Maine 04011, a non-profit corporation incorporated under the laws of the District of Columbia (hereinafter referred to as the "Grantor" which word is intended to include, unless the context clearly indicates otherwise, the above named party and its successors and assigns), to **MAHOOSUC LAND TRUST, INC.**, P.O. Box 981, Bethel, Maine 04217, a non-profit corporation organized and existing under the laws of the State of Maine (hereinafter referred to as the "Holder"),

WITNESSETH:

WHEREAS, the Grantor is the owner in fee simple of certain real property situated in the Towns of Woodstock, Rumford, and Milton Township, Oxford County, Maine (hereinafter referred to as the "Protected Property"), described in Exhibit A and shown in Exhibit B attached hereto; and

WHEREAS, the Protected Property consists of woodland currently managed for forest products on a long-term sustainable basis; and

WHEREAS, Maine has a clearly delineated policy for the preservation of healthy productive forestland, which promotes the contribution forest products make to the economy and communities of the State; and

WHEREAS, the Protected Property contains relatively natural habitat for wildlife, plants and similar ecosystems, and includes an exemplary example of an enriched northern hardwood forest and a buffer to a known bat hibernacula; and

WHEREAS, the zoning adopted by the Towns of Woodstock, Rumford, and Milton Township currently permit a more intense land use than is allowed within the purposes of this Conservation Easement; and

WHEREAS, the Protected Property will be managed in accordance with a forest management plan ("Forest Management Plan") developed by Grantor under the supervision of a Maine Licensed Forester to conserve natural resources consistent with the terms of this Conservation Easement, under which the Grantor shall manage future activities on the Property consistent with the Forest Management Plan; and

WHEREAS, development and use of the Protected Property beyond that permitted in this Conservation Easement would remove the Protected Property from the State's inventory of healthy productive forestland and have an adverse effect on the Protected Property as a natural area suitable as habitat for flora and fauna and on the purity of air, water and the environment in and around the Protected Property; and

WHEREAS, the Holder is qualified to hold conservation easements pursuant to Title 33, Maine Revised Statutes Annotated, Section 476(2)(b), as amended, and is a qualified organization under Section 170(h)(3) of the Code being a publicly funded, non-profit organization within the meaning of Section 501(c)(3) of the Code which meets the requirements of Section 509(a)(2) of the Code, whose purpose it is to preserve and conserve natural areas for aesthetic, scientific, charitable and educational; and preserving long-term sustainable forest management; and

WHEREAS, the Grantor and Holder have a common purpose to substantially preserve the current level of forestation on the Protected Property subject to certain limited rights as hereinafter provided in this Conservation Easement; and

WHEREAS, the Grantor and the Holder, recognizing the value of the Protected Property as described above, have the common purpose of conserving the open space and natural values of the Protected Property;

WHEREAS, this Conservation Easement is being conveyed by Grantor to Holder in order to protect the Protected Property in accordance with this Conservation Easement in anticipation of Grantor's sale of the fee interest in the Protected Property to a third party who may not be a conservation organization such as Grantor or Holder.

NOW, THEREFORE, in consideration of the foregoing and of the covenants, terms, conditions, and restrictions herein contained, the Grantor does hereby give, grant and convey with warranty covenants as an absolute and unconditional gift, unto the Holder, its successors and assigns forever, for the benefit of the Protected Property and the general public, a Conservation Easement in gross over the Protected Property pursuant to Title 33, Maine Revised Statutes, Sections 476 through 497-C, inclusive, as amended (hereinafter "Maine Uniform Conservation Easement Act" or "MUCEA", TO HAVE AND TO HOLD to the said Holder, its successors and assigns forever, subject to the following rights, terms, covenants and restrictions which the Grantor makes on its own behalf and on behalf of its successors and assigns and which will run with and burden the Protected Property in perpetuity:

1. Name.

In regard to this Conservation Easement, the Protected Property shall be known as Concord River Conservation Easement.

2. Purposes.

The purposes of this Conservation Easement are to foster long-term sustainable forest management on the Protected Property so as to provide for harvests of forest products while maintaining a healthy and ecologically diverse forest and to protect the open space, natural habitat, and ecologic features and values of the Protected Property.

To promote the conservation of an exemplary example of an enriched northern hardwood forest and a buffer around a known bat hibernacula.

3. Prohibited Activities.

Any activity on or use of the Protected Property that is inconsistent with the purposes of this Conservation Easement is prohibited. Without limiting the generality of the foregoing, the following activities are expressly prohibited.

- A. Residential, commercial or industrial use, development or the placement of any structures on the Protected Property of any kind whatsoever, except for Forest Management in accordance with Section 4 and the fences, bridges, gates, and stonewalls permitted under Section 5.C.
- B. Division, partition, subdivision or conveyance of the Protected Property in other than its current configuration, except that with the Holder's prior written consent the Grantor shall have the right to enter into boundary line agreements to resolve boundary discrepancies.
- C. Disposal on the Protected Property of any waste including hazardous or special waste, matter, material, or substances as defined in local, state or federal law.
- D. Filling, excavation, sand or gravel excavation, or other alterations to the surface, including new roads, or the widening of existing roads on the Protected Property except in accordance with the Forest Management Plan described in Section 4.
- E. The removal of topsoil, sand, gravel, rock, minerals or other materials, except for the removal of gravel and sand; (i) for use on the Protected Property in connection with the permitted uses of the Conservation Easement and (ii) undertaken in accordance with the Forest Management Plan and in a manner consistent with the purposes of this Conservation Easement.
- F. There shall be no deliberate introduction of non-native plants or animals (for purposes of this Conservation Easement, the term "non-native" shall mean species occurring in a given place that is outside of its native range. Exotic, non-native, non-indigenous, introduced, and alien are synonymous terms, grazing of domestic animals, or disturbance in any way except native plants may be used to restore degraded areas and except that forest management consistent with Section 4 shall be allowed.)
- G. The commercial extraction of ground water is prohibited.
- H. Grantor and Holder acknowledge that, in view of the perpetual nature of this Conservation Easement, they are unable to foresee all potential future land uses,

future technologies and future evolution of the land and other natural resources, and other future occurrences affecting the purposes of this Conservation Easement. Therefore, Holder, upon written request of the Grantor, may determine whether (a) proposed uses or proposed improvements not contemplated by or addressed in this Conservation Easement or (b) alterations in existing uses or structures, are consistent with the purposes of this Conservation Easement. Any such proposed improvements or alterations which Holder, at its sole discretion, determines to be an amendment to this Conservation Easement must comply with the requirements of Paragraph 18.

- I. All rights to develop or use the Property that are prohibited by or inconsistent with the Easement are extinguished, and cannot be used to transfer development rights to other land, or to permit increased development density or increased natural resource use or extraction on other land, or to achieve other regulatory mitigation credits for fiber, discharge of pollutants, or other similar accommodation on land not subject to this Conservation Easement.

4. Forest Management

The Grantor shall have the right to conduct commercial and noncommercial Forest Management on the Protected Property. Forest Management means all activities for the management of the forest and the harvesting of forest products. All Forest Management shall be conducted in a manner that is consistent with the Purposes of this Conservation Easement and that ensures a long term strong, healthy, vigorous and productive forest ecosystem.

- A. Forest Management shall be carried out in accordance with third party certification standards (Forest Management Standards) according to the following principles:
 - (1) Maintenance of soil productivity;
 - (2) Conservation of water quality, wetlands, and riparian zones;
 - (3) Maintenance or creation of different forest age classes;
 - (4) Maintenance or improvement of the overall quality and health of the timber resource;
 - (5) Protection of open space;
 - (6) Protection of rare or fragile natural areas and rare and endangered species habitat;
 - (7) Conservation of viable populations of native plant and animal species; and
 - (8) Consideration for protection of cultural and historic features such as stonewalls, cellar holes and cemeteries.

- B. Forest Management Standards. For purposes of this Conservation Easement, "Forest Management Standards" shall mean the Forest Stewardship Council (FSC) standard for sustainable forest management practices, the Sustainable Forestry Initiative Standard (SFIS), the American Tree Farm Standard as described in the current or successor standards applicable for the region at the time (ATFS), or other recognized certification standard acceptable to the Holder.
- (1) On the date of this Conservation Easement no Forest Management Standards have been adopted for the Protected Property. Sale of the fee interest in the Protected Property by Grantor will be conditioned upon its Grantee (who becomes the Grantor for the purposes of this Conservation Easement) providing an acceptable time table for obtaining Forest Management Standards certification for the property to the Holder within 90 days of sale.
 - (2) Thereafter, a valid certificate will be maintained by Grantor as long as the Grantor holds the property. A copy of the certificate, annual audit reports, and resolution of any corrective action requests will be sent to the Holder. In the case of FSC certification, a valid contract with a Certified Forest Manager will suffice. Grantor acknowledges that the purpose of the Forest Management Plan and the above-described third party certification is to guide forest management activities in compliance herewith, and that the actual activities and outcomes on the Protected Property will determine compliance with this Conservation Easement.
 - (3) Grantor shall to take any necessary corrective action so that there will be no outstanding corrective action requests against the certificate at the time Grantor sells the Protected Property.
 - (4) Upon sale, the successor of title to the Conservancy shall provide to a future buyer a complete copy of the then current Forest Management Standards that are applicable to the Protected Property.
- C. No Forest Management shall be conducted on the Protected Property until there is a written Forest Management Plan in accordance with the requirements of this Section 4 prepared for the Protected Property by a Maine Licensed Professional Forester and approved by the Holder. The Forest Management Plan shall be updated or revised by the Grantor not less often than every 10 years. Each Plan update or revision shall be subject to approval by the Holder that the Plan is consistent with the requirements of this Section 4 and the purposes of this Conservation Easement. Upon approval a copy of the updated or revised Plan shall be filed with the Holder. Each Forest Management Plan shall include, at a minimum, the following:

- (1) Grantor's short and long term forest management objectives.
 - (2) A description of and an appropriately scaled and accurate map identifying the natural and physical features of the Protected Property. The description and/or map should include:
 - a. Property boundary lines
 - b. Forest type, stocking, age and stand history;
 - c. Wetlands and water bodies, including rivers, streams, ponds and lakes, both intermittent and year-round;
 - d. Roads, trails, or other unforested areas;
 - e. Special plant and wildlife habitats, including rare or endangered plant or wildlife species or communities, to the extent identified or known by the Maine Department of Inland Fisheries and Wildlife or other similar agency then recognized by the State of Maine or the U.S. Government as having responsibility for identification and/or conservation of such species;
 - f. Cultural features, including, but not limited to, stonewalls, cemeteries, cellar holes, or other features known to exist on the Protected Property;
 - g. Other features known to exist on the Protected Property requiring protection.
 - (3) An access plan indicating principal routes of ingress and egress for all areas in which Forest Management is to be conducted, including roads and log landing areas, which minimizes new forest openings.
 - (4) Erosion control measures to be employed during Forest Management and at the completion of each Forest Management activity to ensure soil stabilization and to prevent erosion and sediment run off adjacent to wetlands and water bodies.
 - (5) A list including product name, amount and location of each pesticide (herbicide, insecticide, fungicide, rodenticide, etc.) or fertilizer used in Forest Management.
 - (6) Harvesting practices and silvicultural techniques to be employed.
- D. All Forest Management shall be carried out in accordance with the Forest Management Plan approved by the Holder and all applicable laws and regulations.
- E. Commercial Timber harvesting shall be supervised by a Licensed Professional Forester.

- F. The Grantor, not less than 30 days prior to commencement of harvesting activities, shall notify the Holder of the proposed activities and shall provide the Holder with sufficient information concerning the nature, location, extent and timing of the proposed activities to enable the Holder to determine whether such activities are consistent with the terms of this Conservation Easement, the Forest Management Plan and the requirements of this Section 4.
 - G. Within 30 days of completion of harvesting activities, the Grantor shall notify the Holder in writing of such completion and shall include confirmation of the nature, location, extent and timing of harvesting activities.
 - H. Within 10 days of (i) notice to the Grantor that the Holder intends to conduct monitoring of the Protected Property or (ii) Holder's request, the Grantor shall report to the Holder the information required in subsection F above for any Forest Management activity not previously reported.
 - I. Forest management is generally discouraged within the mapped enriched northern hardwood forest consisting of 25.4 acres, more or less, and identified in Exhibit B. If forest management occurs, it must be conducted in association with a long-term management plan approved by the Department of Conservation Maine Natural Areas Program or successor agency. The management plan must be designed to protect the structure and composition of the natural community and any rare species associated with it.
 - J. Timber harvesting is prohibited within 150 feet of the bat hibernacula identified in Exhibit B.
5. Other Reserved Rights of the Grantor.

The Grantor reserves those rights as owner of the Protected Property, not precluded by or inconsistent with the purpose or terms of this Conservation Easement, including specifically the right:

- A. To use the Protected Property as open space for recreational use including, but not limited to, hiking, hunting (for purposes of this Conservation Easement, temporary tree stands shall not be considered structures and are permitted), fishing, cross country skiing, and snow-shoeing that does not detrimentally affect the conservation values of the Protected Property.
- B. To use, and allow third parties to use and maintain existing snowmobile trails, subject to a use agreement between the Grantor and a registered club and prior written approval of Holder. Grantor may allow additional snowmobile trails to be created with the written permission of the Holder so long as the installation and

use thereof does not have a material adverse affect on the conservation values of the Protected Property.

- C. To construct and maintain trails, fences, bridges, gates, stone walls in a manner that will minimize new forest openings and that does not detrimentally affect the conservation values of the Protected Property.

6. Public Access.

- A. The Grantor may control public access to the Protected Property. Any permitted public access shall be only for uses of the type identified in Sections 5 and 8.F.
- B. Nothing herein shall be construed to preclude the rights of Grantor and Holder, as the case may be, to assert any defense against claims for injury to the public on the Protected Property, including the statutory limitations of liability contained in Section 159-A of Title 14 of the Maine Revised Statutes Annotated or any successor provisions thereto.

7. Affirmative Obligations of the Grantor.

The Grantor shall have the following affirmative obligations:

- A. The Grantor shall mark and maintain the boundaries of the Protected Property.
- B. The Grantor shall pay all property taxes and assessments levied against the Protected Property and retain all responsibilities and bear all costs and liabilities of any kind related to the ownership, operation, upkeep and maintenance of the Protected Property. The Grantor shall keep the Holder's ownership of the Conservation Easement free of any liens or encumbrances, including without limitation those arising out of any work performed for, materials furnished to or obligations incurred by the Grantor. Grantor acknowledges that Holder has no possessory rights in the Protected Property, nor any responsibility or right to control, maintain or keep up the Protected Property.
- C. The Grantor shall take such actions as other owners of similar land, whether or not burdened by a conservation easement, would take to oversee, protect and maintain the land, including but not limited to:
 - (1) Protecting against and remedying illegal trespass, destruction or dumping; and
 - (2) Taking action which is practical to protect against and remedy natural disasters.

8. Rights of the Holder.

The Holder is granted the following rights:

- A. To hold this Conservation Easement in perpetuity and to assign the same, but only to an entity qualified both as a "holder" under Section 476 of Maine Uniform Conservation Easement Act and as an "eligible donee" under Section 170(h) of the Internal Revenue Code and the regulations issued pursuant thereto.
- B. To enter upon the Protected Property for inspection and monitoring purposes, and for enforcement of the terms of this Conservation Easement, including over roads owned by Grantor or rights of way or other access ways available to Grantor, at a reasonable time and in a reasonable manner that is consistent with the conservation purposes hereof. Except in emergency circumstances, Holder will make reasonable efforts to contact Grantor prior to entry onto any area of the Protected Property. "Emergency circumstances" shall mean that the Holder has a good-faith basis to believe a violation of the easement is occurring or is imminent.
- C. To restrict or limit any activity or use of the Protected Property otherwise permitted hereunder which is exercised in a manner inconsistent with the purposes of this Conservation Easement.
- D. To conduct a survey of the Protected Property or any part thereof and to obtain the services of a registered land surveyor to prepare such a survey; and to prepare a forest management plan for the Protected Property or any part thereof and to obtain the services of a Maine licensed professional forester to prepare such a plan, to the extent necessary to determine whether there is a violation of the Conservation Easement, when proof of the boundary or any line which marks permitted land uses or the appropriateness of a forest management plan is material to this determination, such survey or forest management plan to be made at Grantor's cost if the Holder has a good faith basis for believing that a violation has occurred;
- E. To enforce by proceedings at law or in equity the covenants of this Conservation Easement; to require, upon a breach of any such covenant, the immediate cessation of any activity prohibited under the terms hereof and the restoration of the Protected Property, as the case may be, to its condition as of the date hereof, subject, however, to any permitted changes as defined in Section 11 H.
- F. To conduct tours of the Protected Property in furtherance of Holder's educational purpose at reasonable times and in a reasonable manner.

- G. To place, maintain and replace signs on the Protected Property visible from public roads identifying the land as Protected Property on which a Conservation Easement is held by the Holder.
- H. To annually report to the State of Maine, Executive Department, State Planning Office the information with regard to the Conservation Easement as required in the Maine Uniform Conservation Easement Act, 33 MRSA §479-C. Upon request of the Holder, the Grantor shall reimburse the Holder for any fee required for the filing of this report.
- I. If the Holder ceases to exist or is unable or unwilling to monitor and enforce the terms of this Conservation Easement, The Nature Conservancy, a non-profit corporation incorporated under the laws of the District of Columbia and having a Maine Office at 14 Maine Street, Brunswick, Maine, 04011, shall have the right and duty to enforce the terms of this Conservation Easement.

9. Title.

The Grantor covenants, warrants and represents that Grantor is the sole owner and is seized of the Protected Property in fee simple and has good right to convey this Conservation Easement; that the Protected Property is free and clear of encumbrances, including but not limited to, mortgages not expressly subordinated to this Conservation Easement.

10. Hazardous Waste.

The Grantor covenants and represents that to the best of Grantor's knowledge, no hazardous substance, or toxic waste exists nor has been generated, treated, stored, used, disposed of, or deposited on or on the Protected Property, and that there are not now any underground storage tanks located on the Protected Property. In the event that any such substances, wastes or tanks are found on the Protected Property, the Grantor shall dispose of the same, and take any other remedial measures, in accordance with all legal requirements applicable at the time. In addition the Grantor shall indemnify, defend and hold the Holder harmless from and against any and all liabilities, costs, damages, or expenses of any kind that the Holder may suffer or incur as a result of or arising out of the breach of this covenant and warranty.

11. Enforcement Rights.

- A. Holder shall have the right to enforce this Conservation Easement by proceedings at law and in equity, to recover any damages to which it may be entitled for violation of the terms of this Conservation Easement and to require the restoration of the Protected Property to the condition that existed prior to such injury. Notwithstanding such right of Holder, the parties desire that issues arising from time to time concerning compliance with the terms of this Easement will be resolved through open communication and dialogue. To this end, the parties state their mutual intention that, if a party has a concern about an actual or

possible noncompliance with the terms of this Easement, wherever reasonably possible the concerned party will informally notify the other party of the potential problem and explore the possibility of reaching an agreeable resolution, prior to initiating a Notice of Breach.

- B. If the parties cannot resolve the matter by informal dialogue, either may give Notice of Breach to the other party. The Notice of Breach shall state the corrective action necessary to remedy the noncompliance and, in the case of noncompliance by the Grantor, any action necessary to restore the Protected Property to its condition prior to the breach.

If the breaching party fails to abate or remedy the asserted noncompliance within thirty (30) days of the Notice of Breach or if the breach is one which can not be remedied within thirty (30) days, the breaching party has not commenced action to remedy the breach within thirty (30) days and does not diligently pursue such remedy to completion then enforcement of this Conservation Easement may be pursued as follows.

- C. After Notice of Breach and failure to remedy, the parties shall first attempt to resolve any disputes by mediation. The parties shall agree on a single mediator who shall be an attorney licensed to practice law in Maine who has experience with conservation easements, including applicable tax law and training and experience in mediation. Mediation shall be conducted at a mutually agreed upon location in the State of Maine. Each party shall pay its own attorney's fees and the costs of mediation shall be split equally between the parties.
- D. If the dispute has not been resolved by mediation within sixty (60) days after Notice of Breach, or the parties are unable to agree to a mediator, within thirty (30) days after Notice of Breach, then, the dispute may, upon agreement of the parties, be resolved by binding arbitration in accordance with the Maine Uniform Arbitration Act, and judgment upon the award rendered by the arbitrator may be enforced in any court of competent jurisdiction. The parties shall agree on a single arbitrator who shall be an attorney licensed to practice law in Maine who has experience with conservation easements, including applicable tax law and training or experience in arbitration. The arbitrator shall be bound by and follow the substantive law of Maine and the applicable provisions of the United States Internal Revenue Code. The arbitrator shall render a decision within thirty (30) days of the arbitration hearing. Arbitration shall be conducted in Augusta, Maine.
- E. If the parties do not agree to resolve the dispute by arbitration, then either party may bring an action at law or in equity in any court of competent jurisdiction to enforce the terms of this Easement, to enjoin the violation by permanent injunction, and to require the restoration of the Property to its condition prior to the breach and for such damages as appropriate.

- F. Anything else in this provision notwithstanding, if the Holder, at any time, believes that some action by the Grantor is damaging or will imminently damage the Protected Property, the Holder may obtain a temporary restraining order, preliminary injunction or other equitable relief from any court of competent jurisdiction to cause the cessation of any such damage pending resolution of any dispute in accordance with this provision.
- G. If the Holder has a good faith basis for initiating enforcement by arbitration or civil action, Grantor will reimburse Holder for its costs of enforcement including reasonable attorneys' and consultants' fees, and court costs.
- H. The Grantor will not be responsible for any injury to or change in the Protected Property resulting from causes beyond the Grantor's control, such as, but not limited to, fire, flood, storm, earth movement, and other forces of nature, or from any prudent action taken by the Grantor under emergency conditions to prevent, abate or mitigate significant injury to the Protected Property.
- I. Nothing herein may be construed to preclude the Grantor's and the Holder's rights to recover damages from or obtain injunctive relief against any third party for trespass or any other violation of their respective rights, arising under this Conservation Easement or otherwise, in the Protected Property.
- J. The failure of the Holder, for any reason whatsoever, to enforce any of the terms, covenants or other provisions of this Conservation Easement does not constitute a waiver of its right to enforce the same or of any other provision hereof.

12. Baseline Documentation Report.

- A. In order to establish the present condition of the Protected Property and its natural and aesthetic resources, so as to be able to monitor properly future uses of the Protected Property and assure compliance with the terms hereof, the Holder and the Grantor have prepared a Baseline Documentation Report of the Protected Property's showing the relevant features and conditions of the Protected Property as known to them as of the date hereof. The cost of the preparation of the Baseline Data Report shall be borne by Grantor.
- B. The Holder acknowledges by its acceptance hereof that the Grantor's present uses of the Protected Property and the present condition of the Protected Property as reflected in the Baseline Documentation Report are compatible with the purposes of this Conservation Easement.
- C. The Baseline Documentation Report may be amended upon discovery of features present at the date of the grant of the Conservation Easement.

13. Interpretation.

This instrument shall be construed to promote the purposes set out in Section 2 hereof and in a manner that shall cause the Conservation Easement hereby created to qualify as a valid conservation easement under MUCEA and as a qualified conservation contribution under Section 170(h)(1)-(6) and Sections 2031(c), 2055 and 2522 of the Code and the Treasury Regulations promulgated thereunder at Title 26 C.F.R. Section 1.170A-14 et seq. Nothing herein shall be construed to permit any activity otherwise prohibited by the valid laws and regulations of any federal, state or local government or governmental agency having jurisdiction over the Protected Property.

14. Grant in Perpetuity.

- A. This Conservation Easement and any amendment or assignment hereof shall be recorded at the Oxford County Registry of Deeds and is intended to burden and run with the Protected Property in perpetuity binding the Grantor, its successors and assigns forever. Any subsequent deed or legal instrument by which the Grantor conveys any interest (including mortgage or leasehold) in the Protected Property shall be subordinated to, refer to and shall incorporate by reference this Conservation Easement.
- B. The Grantor shall advise the Holder in writing not less than 30 days prior to any lease, transfer, assignment or sale of the Protected Property, by providing to the Holder the name, address and telephone number of the transferee, the nature of the transfer and the anticipated effective date of the transfer. The document of conveyance shall expressly refer to this Deed of Conservation Easement.
- C. Any time the Protected Property or a portion thereof is transferred by Grantor to any third party, Grantor shall pay to the Holder one tenth of a percent (0.10 percent) of the sale price as a transfer fee based on the acreage of land sold to be added to the funds held by Holder for the purpose of protecting conservation easements against the increase risk associated with new ownership or for other purposes consistent with the Holder's mission. Said transfer fee shall be waived if the Property is transferred to a person related to the Grantor by blood or marriage.

15. Responsibility of Grantor.

Grantor shall retain all responsibilities and shall bear all costs and liabilities of any nature related to the ownership, operation, upkeep, improvement and maintenance of the Protected Property.

16. Compliance Certificates; the Grantor's continuing Obligations.

- A. Upon request by the Grantor, or its successors or assigns, at the cost of the requesting party, the Holder will execute, acknowledge, and deliver a written certificate of compliance in a form suitable for recording, stating whether, and with what exceptions or limitations, the Protected Property complies with the terms and conditions of this Conservation Easement, after an inspection, which inspection the Holder will conduct within 30 days of the written request of the Grantor.
- B. The Grantor's obligation and the obligation of any successor owner hereunder shall cease if and when the Grantor or such owner, as the case may be, ceases to have any present legal or beneficial interest in the Protected Property, except that any responsibility of the Grantor and any owner for breaches of this Conservation Easement which occur during the Grantor's or such other owner's period of legal or beneficial interest in the Protected Property, as the case may be, shall survive a transfer and shall continue as an obligation.

17. Subsequent Holders.

By acceptance of this Conservation Easement, the Holder covenants and agrees, as covenants that run with and burden the land in perpetuity, and not as conditions to this Conservation Easement or as restraints on alienability, (1) that it will, except as expressly authorized herein, hold this Conservation Easement in perpetuity for conservation purposes; (2) that it will not transfer this Conservation Easement, except to an entity which, as a condition of such transfer, gives the Holder satisfactory assurance that it is committed to carrying out the purposes of this Conservation Easement, is able to and agrees to enforce the rights granted in this Conservation Easement and has sufficient resources to do so; and (3) that any such transferee shall be both a "qualified donee" as defined in Section 170(h)(3) of the Code and the regulations promulgated thereunder, and a "holder" as defined in MUCEA.

18. Amendment.

- A. The Grantor and the Holder recognize that circumstances may arise which would justify modification of certain of the terms and restrictions contained herein. The Grantor and the Holder therefore reserve the right to agree to amendments to this Conservation Easement; provided, however, that any such amendment shall be in writing and signed by the Holder and the Grantor. The Holder's costs, including legal fees, for such an amendment shall be paid for by the Grantor. Any such amendment shall become effective upon execution by the Grantor and the Holder, and changes made pursuant to any such amendment shall be "Permitted Changes" for purposes of this instrument.
- B. This Conservation Easement may not be terminated or amended in such a manner as to materially detract from the conservation values intended for protection without the prior approval of the court in an action in which the Attorney General

is made a party in accordance with the Maine Uniform Conservation Easement Act, 33 MRSA §477-A (2)(B) and §478(3).

- C. Notwithstanding the foregoing, the Holder and the Grantor have no right or power to agree to any amendments that would result in termination of this Conservation Easement or that would cause it to fail or cease to qualify as a valid conservation easement or adversely affect the status of the Holder under either MUCEA or Section 170(h) of the Code.

19. Notice.

All notices or other communications required or authorized to be given hereunder shall be deemed given (i) upon delivery if delivered personally, (ii) one business day after being sent by a commercial overnight delivery service, or (iii) three business days after mailing by Certified or Registered Mail, Postage Prepaid, Return Receipt Requested as follows:

- (a) If to the Holder, to:

Mahoosuc Land Trust, Inc.
P.O. Box 981
Bethel, Maine 04217

Addresses to which notice shall be sent may be changed from time to time by written notice of the change of address.

20. Miscellaneous.

- A. Qualification and Severability. If it is determined that any provision of this instrument would prevent this Conservation Easement from qualifying as a conservation contribution under Section 170(b) of the Code, such provision shall be void. If any provision of this Conservation Easement or the application thereof to any person or circumstance is found to be invalid, the remainder of the provisions of this Conservation Easement and the application of such provisions to persons or circumstances other than those as to which it is found to be invalid, shall not be affected thereby and shall remain in effect.
- B. The Holder's Approval. Whenever the prior approval of the Holder is required under this Conservation Easement, the Grantor shall provide a written request to the Holder, providing sufficiently detailed information to enable the Holder to make an informed decision regarding the requested approval. The Holder shall reply in writing within 30 days. Any decision by the Holder other than approval shall include an explanation citing the applicable terms of the Conservation Easement. If approval is denied or conditioned in a manner unacceptable to the Grantor, the parties will resolve such dispute in accordance with Section 11.

- C. Eminent Domain. The Grantor agrees that this Conservation Easement gives rise to a property right which vests immediately in the Holder. If the Protected Property, or any portion thereof, is taken by eminent domain or is lawfully sold without the restrictions contained in this Conservation Easement, the proceeds therefrom will be divided by the Grantor and Holder in proportion to their respective interests in the Protected Property, excepting any part of such proceeds attributable to permitted improvements by Grantor to the Protected Property made after the effective date hereof. For this purpose, the Holder's proportional interest in the Protected Property is the percent by which the fair market value of the Protected Property immediately prior to the execution of this instrument is reduced by the rights, restrictions and covenants imposed hereby. The Holder will use any proceeds received pursuant to this paragraph for its conservation purposes.
- D. Succession and Assignment. This Conservation Easement shall be binding upon and inure to the benefit of the Holder, its successors and assigns, and to the Grantor, , its successors and assigns.
- E. References. As used in this instrument, "MUCEA" shall be construed to refer to the Maine Uniform Conservation Easement Act, Me. Rev. Stat. Ann. Title 33, Sections 476 through 479-C, inclusive, as in effect on the date hereof and as hereafter amended, and to any successor statute of substantially similar content and purpose. References in this instrument to the "Code" shall refer to the United States Internal Revenue Code of 1986, as heretofore or hereafter amended, and to any successor statute of substantially similar content and purpose. Reference to particular sections of MUCEA or the Code in this instrument shall be construed to refer also to analogous sections of any statute succeeding MUCEA or the Code, notwithstanding that any such analogous section may be differently numbered or designated.
- F. Choice of Law. The interpretation and performance of this Conservation Easement shall be governed by the laws of the State of Maine.
- G. Captions. The captions herein have been inserted solely for convenience of reference and are not a part of this Conservation Easement and shall have no effect upon construction or interpretation.

IN WITNESS WHEREOF, the said Grantor The Nature Conservancy, has caused these presents to be signed and sealed in its corporate name and behalf by Hans P. Birle, hereunto duly authorized, this 15th day of June, 2010, and in acceptance whereof, the said Holder, MAHOOSUC LAND TRUST, INC., has caused these presents to be executed by James Mitchell, its Executive Director thereunto duly authorized, this 18th day of June, 2010.

SIGNED, SEALED AND DELIVERED THE NATURE CONSERVANCY
In the presence of:

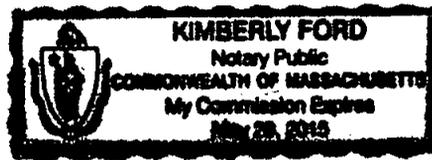

Witness JAMES QUILLAN

 (L.S.)
By: Hans P. Birle
It: Assistant Secretary

COMMONWEALTH OF MASSACHUSETTS)
COUNTY OF SUFFOLK)

On this 15th day of June, 2010, before me, the undersigned notary public, personally appeared Hans P. Birle, to me personally known or otherwise proved to me through satisfactory evidence of identification to be the person whose name is signed on the preceding document, and acknowledged to me that he signed such document voluntarily for its stated purpose.


Notary Public
My Commission Expires:

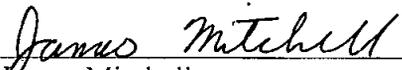


SIGNED, SEALED AND DELIVERED
In the presence of:

MAHOOSUC LAND TRUST, INC.

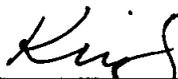


Witness

 (L.S.)
By: James Mitchell
Its: Executive Director

STATE OF MAINE
COUNTY OF OXFORD, ss.

On this th18 day of June, 2010, personally appeared before me James Mitchell, the Executive Director of Mahoosuc Land Trust, Inc., a Maine non-profit corporation, and acknowledged the foregoing instrument to be his free act and deed in his said capacity, and the free act and deed of said non-profit corporation.



Notary Public – Attorney-at-Law
Kirk G. Siegel, Esq.

EXHIBIT A

LEGAL DESCRIPTION OF THE PROTECTED PROPERTY

TRACT ONE:

PARCEL #1:

A certain lot or parcel of land formerly made up of three separate parcels situated in Woodstock in the County of Oxford and State of Maine, in that part of said Woodstock known as East Woodstock, and being the same property described in deed from Clarence A. Smith to A. W. Davis and Thomas L. Dickson recorded at Book 472, Page 263.

Also another certain lot or parcel of land situated in said Woodstock and described as follows: lot numbered twenty-five (25) in the East part of said Woodstock containing one hundred (100) acres, more or less.

Also another certain lot or parcel of land described as follows: lot numbered forty-five (45) in the East part of said Woodstock.

Also another lot or parcel of land situated in said Woodstock and being in the Easterly part thereof, viz: all of said lot which lies Westerly of the brook running Northerly through said lots numbered twenty-three (23) and twenty-four (24).

Also a certain lot or parcel of land situated in Rumford in said County and bounded and described as follows: Beginning at a point marking the corner of land of Stevens and Morse; thence Northerly to land formerly owned by Cynthia Walker and at right angle to said Walker line; thence Southerly on said Walker line and land of Frank Elliott and Richard L. Mencher to the Milton Plantation line; thence on said Milton Plantation line Westerly to land of Charles F. Stevens; thence on said Stevens land Northwesterly to a fence on the road; thence Westerly following said fence to the corner of said Stevens' hen house; thence Northerly to a Pine tree spotted for a corner; thence Westerly following a spotted line to the point of beginning. Excepting and reserving whatever rights Charles F. Stevens - in and to a spring of water on said land which his house and rights which William F. Stevens has to pasture any part of said premises. Containing three hundred (300) acres, more or less.

Also a certain other lot or parcel of land situated in said Rumford and bounded and described as follows: commencing at the Southeasterly corner of William F. Stevens' homestead farm on line between Rumford and Milton Plantation, running Northerly on the line of said homestead farm to a wire fence on the upper side of the road; thence running by the wire fence to the hen house which is included in said tract of land; thence on wire fence to the pasture; thence Southerly to an Oak tree; thence Southeasterly to a spotted Maple tree by the ledge; thence to a spotted Maple tree; thence on the same direction to the Milton Plantation line; thence on the Rumford-Milton line to the point of beginning.

Included in this conveyance is all wood both standing and cut, logs and pulpwood, located on any of the above parcels.

PARCEL #2:

A certain lot or parcel of land situated in Milton Plantation, in the County of Oxford and State of Maine, and bounded and described as follows: Commencing at a stake and stones on the town line between the Town of Rumford and Milton Plantation at the Northwesterly corner of land formerly of Ruth Bryant and Mark C. Allen; thence in an Easterly direction along said town line to line of the Cyr Land, so-called; thence in a Southerly direction along the Easterly line of said Bryant and Allen land to a corner, which corner is the Southwesterly corner of said Cyr land; thence in an Easterly direction to a corner on line of land now or formerly of W. E. Bean; thence in a Southerly direction along line of said Bean land to a corner on line of land now or formerly of Joseph Spofford; thence in a Westerly direction along line of said Spofford land seventy-one (71) rods to a corner; thence in a Southerly direction along line of said Spofford land twenty (20) rods to a brook; thence in a Westerly direction along said brook to the Morey Road, so-called; thence in a Southerly direction along said Morey Road to the Zircon Road, so-called; thence in a Westerly direction along said Zircon Road to the line of land formerly of Louis Farnum; thence in a Northerly direction along line of land of said Farnum, line of land of Asa H. Sessions, used as a board yard, and line of land of W. E. Bean to a corner, which corner is the Northeasterly corner of the said W. E. Bean land; thence in a Westerly direction along line of said Bean land to a corner marked by a stake; thence in a Northerly direction to the point of beginning.

Also a certain other lot or parcel of land situated in said Milton Plantation containing ten (10) acres, more or less, and known as the Hannibal Cranberry Bog lot, bounded and described as follows: Beginning at the Northwesterly corner of the Alonzo Russell farm; thence along said Russell line in a Northeasterly direction to a corner in a small stream made with a pile of stones; thence in a Northwesterly direction along an old wire fence on the line of the Russell Heirs to a large yellow Birch tree; thence in a Westerly direction to the so-called Morey Road; thence Southerly along said Morey Road to the so-called Zircon Road; thence in a straight line to the point of beginning.

PARCEL #3:

All right, title and interest in and to a certain Woodlot or parcel of land situated in Woodstock, in the County of Oxford and State of Maine, and known as the Joseph Wermenchuk Woodlot, and being the North half of Lot numbered fifty-four (54), as set in from Milton Plantation and containing fifty (50) acres, more or less.

PARCEL #4:

A certain lot or parcel of land situated in Milton Plantation and being lot numbered fifty-two (52) according to Alexander Greenwood's Plan dated October 1814, supposed to contain one hundred (100) acres, more or less.

Also another lot or parcel of land situated in said Milton Plantation and being the South half of lot numbered fifty-four (54), and supposed to contain fifty (50) acres, more or less.

PARCEL #5:

All of lot numbered one hundred (100) in the East part of Woodstock; that part of lot numbered one hundred and one (101) in the East part of said Woodstock, which lies on the Westerly side

of the road leading from Woodstock to Peru; those parts of Lots numbered 74, 75, 76, 77, 78 and 79, in Milton Plantation which lie on the Northeast side of Concord River; all of Lots 43 and 44 in Milton Plantation; those parts of Lots 45 and 46 in Milton Plantation which lie Northeast of Concord River; five (5) acres of lot numbered seventy-three (73) in Milton Plantation with the mill privileges, the mill and all other buildings thereon situated including all water rights and rights of flowage connected with said mill.

Also that part of the Hanibal Andrews Farm, so-called, in said Milton Plantation that lies Northeasterly of the road leading from Abbott's Mills to Concord Pond, excepting parcel previously sold to Henry Lapham, now supposed to be owned by the Heirs of Harry Farnum.

Also a certain lot or parcel of land situated in said Milton Plantation and bounded and described as follows: Beginning at the Southeasterly corner of land formerly owned by Mary Jane Rice on the Gore line, so-called; thence running Easterly eighty (80) rods, more or less, to land formerly owned by A. W. Russell; thence Northerly on said Russell line seventy (70) rods, more or less, to the Zircon Road near the meadow dam; thence Westerly on said Zircon Road eighty (80) rods, more or less, to land formerly owned by A. W. Harlow; thence Southerly to the point of beginning.

Also the Gore lot, so-called, situated Northerly of Lots 74, 77 and 78 in said Milton Plantation and being the last parcel named in deed from Jeannette E. Tebbets to Asa H. Sessions.

Parcel #6:

A one-fourth (1/4) interest in and to the following described lot or parcel of land situated in the Town of Woodstock, County of Oxford, State of Maine, and being Lot No. 46 according to the Plan of said Town, and containing approximately one hundred (100) acres.

Excepting and reserving all mineral deposits on said land hereby conveyed, with the right to enter and remove the same and to prospect for the same.

PARCEL #7:

All of the right, title and interest in and to a certain lot or parcel of land, together with the buildings thereon, situated in the Town of Woodstock, County of Oxford and State of Maine, lying on the Northerly side of the highway leading from Milton to West Peru, and bounded as follows: On the South by land now or formerly of Albert B. Kimball, Stuart Cross, Donald Cross and Norton Cross; on the East by land now or formerly of Silas D. Nutting to Peru Corner; on the North by the Milton and Woodstock Town line, and on the West by land owned by Albert B. Kimball et als.

PARCEL #8:

The following lots of land situated in the Easterly part of the Town of Woodstock, in said County of Oxford and State of Maine, Lots 51, 52, 53, 54, 55, 74, 75, 76, 79, 80 and also a small parcel off Lot 81 which small parcel is contained in Quitclaim Deed from Charles D. Bradbury et al. to Asa H. Sessions, dated May 19, 1913, and recorded in Oxford County Registry of Deeds in Book 318, Page 455.

PARCEL #9:

A three-fourths (3/4) interest in and to the following described lot or parcel of land situated in the Town of Woodstock, County of Oxford, State of Maine, and being Lot No. forty-six (46) according to the Plan of said Town and containing approximately one hundred (100) acres.

Excepting and reserving all mineral deposits on said land hereby conveyed, with the right to enter and remove the same and to prospect for the same.

PARCEL #10:

A one-fourth (1/4) in common and undivided interest in and to a certain lot or parcel of land situated in the East part of Woodstock, County of Oxford and State of Maine, and containing twenty and one-half (20-1/2) acres, more or less, of Lot No. forty-seven (47) being the Northerly part of said lot and bounded on the North by land of Ernest L. Billings.

PARCEL #11:

A three-fourths (3/4) in common and undivided interest in and to a certain lot or parcels of land situated in the East part of Woodstock, County of Oxford and State of Maine, and containing twenty and one-half (20-1/2) acres, more or less, of number forty-seven (47) being the Northerly part of said lot and bounded on the North by land of Ernest L. Billings.

PARCEL #12:

Two (2) certain lots or parcels of land situated in Milton Plantation, County of Oxford, State of Maine, and numbered 41 and 42 in said Plantation, according to Survey and Plan of said Plantation in 1814, containing about two hundred (200) acres, and being the same property conveyed to Robert L. Paquette by Asa H. Sessions, by his Warranty Deed dated August 6, 1953, and recorded in Oxford County Registry of Deeds, Eastern District.

To all of which deeds and records thereof, reference is hereby made for a more particular description of the premises herein conveyed.

Excepting from the within conveyance, the following:

EXCEPTION #1:

A five (5) acre lot, being a portion of Lot #73, located in Milton Plantation, upon which stands a mill, including all water rights and rights of flowage connected with said mill, being a portion of the premises described in a deed from Asa Sessions to Albert B. Kimball, Stuart A. Cross, Donald E. Cross and Norton L. Cross, recorded in the Oxford County Registry of Deeds, Book 537, Page 361.

This Exception reserving to these Grantors a portion of the property conveyed in Parcel #5 of this deed.

EXCEPTION #2:

Excepting and reserving to these Grantors, their heirs and assigns, a right-of-way on the old Zircon Road, so-called.

EXCEPTION #3:

Excepting therefrom a certain parcel of land previously transferred by these Grantors to Paul A. Hillquist by deed recorded in the Oxford County Registry of Deeds, Book 672, Page 229. This conveyance being described as follows:

"A certain lot or parcel of land situate in Milton Plantation, County of Oxford, State of Maine, near the Southwesterly corner of said Plantation, bounded as follows:

Beginning at a job in the Southwesterly line of Milton Plantation at the Northwest corner of that portion of the South half of original Lot #54 in said Plantation which remains in said Plantation; then running Southerly by the Woodstock-Milton Town line 961 feet to a stake and stones; thence North 30° East by remaining land of the Grantors 795 feet to a stake and stones on the South side of a knoll; then running North 42° West by

remaining land of the Grantors 528 feet to a stake in the Milton-Woodstock Town Line; then South-westerly by said Town Line (separating the parcel hereby conveyed from that part of Lot #54 heretofore set off into said Town of Woodstock), a distance of 310 feet, to the bound begun at."

EXCEPTION #4:

Excepting therefrom certain land transferred to the Central Maine Power Company by these Grantors, as described in deed recorded in the Oxford Registry of Deeds, Book 780, Page 041, bounded and described as follows:

STRIP #1: Being a strip of land 150 feet in width extending from land now or formerly of Albert D. Nutting, Trustee, in a general Southwesterly direction by three tangents to land now or formerly of Maurice Benson.

The sidelines of said strip of land being 75 feet on each side Grantee's survey base line and its projection at both ends as now staked across the strip herein conveyed for the purpose of establishing a center line for the proposed construction of the Grantee's 115 KV transmission line presently designated as Section #211 extending from Rumford to Bryant Pond.

Said survey base line is more particularly located and described as follows: Beginning at a point in the dividing line between land of said Nutting and the strip herein conveyed, said point being 125 feet, more or less, distant Southerly measured along said dividing line from the Northeasterly corner of land of the Grantors at the Peru-Woodstock Town Line; thence extending S 48° 06' W at a distance of 2,270 feet, more or less, to an angle point; thence extending S 74° 07' W a distance of 8,426 feet, more or less, to an angle point; thence extending S 63° 50' W a distance of 7,070 feet, more or less, to land of said Benson.

Excepting herefrom that part of land owned by Norman O. Mills (being part of Lot #78 in the Town of Woodstock) which lies within the limits of said Strip #1 conveyed herein.

STRIP #2: Being a strip of land 66 feet in width extending from the Northerly sideline of Strip #1 conveyed herein in a general Northerly direction a distance of 550 feet, more or less, to land now or formerly of Donald Farnham, the center of said 66-foot strip of land being approximately 1,592 feet distant Northeasterly measured along the Northerly side of Strip #1 conveyed herein from land of said Benson.

It is the intention of these Grantors that the reservation contained in the deed of transfer to Central Maine Power Company be and is, by this instrument, transferred to this Grantee.

EXCEPTION #5:

Excepting therefrom certain land transferred to the Central Maine Power Company by these Grantors, as described in deed recorded in the Oxford County Registry of Deeds, Book 787, Page 169, bounded and described as follows:

STRIP #1: Being a strip of land 150 feet in width extending from land now or formerly of Maurice G. Benson in a Southwesterly direction to land now or formerly of Milton Mills.

The sidelines of said strip of land being 75 feet distant measured at right angles from the Grantee's survey base line and its projection at both ends as now staked across the strip

herein conveyed for the purpose of establishing a center line for the proposed construction of the Grantee's transmission line to be known as Section #211, Rumford to Bryant Pond.

Said survey base line as staked across the strip herein conveyed is more particularly located and described as follows: Beginning at a point in the dividing line between land of said Maurice Benson and the strip herein conveyed; thence extending S 44° 31' W a distance of 2,855 feet, more or less, to a point in the dividing line between land of the said Milton Mills and land of the Grantors.

STRIP #2: Being a strip of land 150 feet in width extending from land now or formerly of Milton Mills in a Southwesterly direction to other land now or formerly of Milton Mills.

The sidelines of said strip of land being 75 feet distant measured at right angles from the Grantee's survey base line and its projection at both ends as now staked across the strip herein conveyed for the purpose of establishing a center line for the proposed construction of the Grantee's transmission line to be known as Section #211, Rumford to Bryant Pond.

Said survey base line as staked across the strip herein conveyed is more particularly located and described as follows: Beginning at a point in the dividing line between land of the said Milton Mills and the strip herein conveyed; thence extending S 44° 31' W a distance of 269 feet, more or less, to a point in the dividing line between land of the said Milton Mills and land of the Grantors.

It is the intention of these Grantors that the reservation contained in the deed of transfer to Central Maine Power Company be and is, by this instrument, transferred to this Grantee.

EXCEPTION #6:

Excepting therefrom certain land transferred to the Central Maine Power Company by The Nature Conservancy, as described in deed dated June 10, 1999 and recorded in the Oxford County Registry of Deeds, Book 2725, Page 200, bounded and described as follows:

Strip #1: Bounded southeasterly by the northwesterly sideline of said 150 foot wide strip of land owned by this Grantee and northwesterly by a line parallel to and 75 feet distant northwesterly, measured at right angles from said northwesterly sideline of said 150 foot wide strip of land of this Grantee. Said Strip #1 extends from land now or formerly of Sheila E. Curtis, on the northeast, in a general southwesterly direction approximately 7,027 feet to land now or formerly of Sterling A. Mills, on the southwest. Containing 12.1 acres more or less.

Strip #2: Bounded southeasterly by said northwesterly sideline of said 150 foot wide strip of land owned by this Grantee, and northwesterly by a line parallel to and 75 feet distant northwesterly, measured at right angles from said northwesterly sideline of said 150 foot wide strip of land of this Grantee. Said Strip #2 extends from land now or formerly of Western Maine Assessment, Inc., on the northeast, in a general southwesterly direction approximately 4,020 feet to land now or formerly of Daniel Kuczwarra, on the southwest. Containing 6.92 acres more or less.

Strip #3: Bounded southeasterly by said northwesterly sideline of said 150 foot wide strip of land of this Grantee, and northwesterly by a line parallel to and 75 feet distant northwesterly, measured at right angles from said northwesterly sideline of said 150 foot wide strip of land of

this Grantee. Said Strip extends from land now or formerly of Kalin Hashimoto, et al., on the northeast, in a general southwesterly direction approximately 2,855 feet to land now or formerly of Nathan Mills on the southwest. Containing 4.92 acres more or less.

Strip #4: Bounded southeasterly by said northwesterly sideline of said 150 foot wide strip of land of this Grantee, and northwesterly by a line parallel to and 75 feet distant northwesterly, measured at right angles from said northwesterly sideline of said 150 foot wide strip of land of this Grantee. Said Strip #4 extends from land of said Nathan Mills, on the northeast, in a general southwesterly direction approximately 269 feet to other land of said Nathan Mills, on the southwest. Containing .46 acres more or less.

The above described four strips of land being parts of the premises conveyed to the Grantor by Bear Paw Timber Corp. by deed dated May 21, 1998 and recorded in Oxford County Registry of Deeds in Book 2663, Page 189.

It is the intention of these Grantors that the reservation contained in the deed of transfer to Central Maine Power Company be and is, by this instrument, transferred to this Grantee.

TOGETHER WITH all rights and easements granted and conveyed to The Nature Conservancy by Grant of Access Easement from Brian M. Magnussen, dated September 30, 2003 and recorded in the Oxford County Registry of Deeds, Book 3430, Page 69.

TOGETHER WITH all rights and easement granted and conveyed to The Nature Conservancy by Grant of Access Easement from Donald Farnum, dated October 23, 2003, and recorded in the Oxford County Registry of Deeds at Book 3430, Page 66.

TOGETHER WITH AND SUBJECT TO the terms of the Right-of-Way Easement Agreement – Spruce Mountain between The Nature Conservancy, Bayroot LLC and Kenneth Poland, dated July 7, 2008 and record in the Oxford County Registry of Deeds at Book 4327, Page 58.

TOGETHER WITH AND SUBJECT TO the terms of the Right-of-Way Easement Agreement – Spruce Mountain between Harland Harlow and Louella Harlow, The Nature Conservancy and Bayroot LLC, dated July 15, 2008 and recorded in the Oxford Registry of Deeds at Book 4327, Page 53.

TRACT TWO:

Three (3) certain lots or parcels of land situated on or near the shore of Concord Pond in said Town of Woodstock, and being Lots numbered Nine (9), Ten (10), and Twelve (12), as shown on Plan entitled "Plan of Subdivision of David Ellingwood and Gwendolyn Ellingwood and Duane C. Hayes and Avis M. Hayes", dated October 1972, and recorded in the Oxford County Registry of Deeds, Eastern District, on November 13, 1972, being Plan Number 1358.

Said Lot numbered Nine (9) has a frontage on the shore of said Concord Pond of 117.1 feet, more or less, and contains 29,150 square feet in area; said Lot numbered Ten (10) has a frontage on the shore of said Concord Pond of 119 feet, more or less, and contains 34,400 square feet in area; and said Lot numbered Twelve (12) contains 50,155 square feet in area, all as more particularly shown on said Plan.

Also conveyed a right of way, or easements, for purposes of ingress and egress, over, upon and across a certain access road shown as Existing Access Road on the aforesaid plan, leading from the Sumner-Dixfield Road, so-called, said right of way to be used in common with others.

MEANING AND INTENDING to describe and convey the same premises conveyed by Warranty Deed of Duane C. Hayes, Avis M. Hayes, David E. Ellingwood and Gwendolyn A. Ellingwood to Bear Paw Timber Corp. dated November 16, 1973 recorded at Oxford County Registry of Deeds at Book 806, Page 269.

TRACT THREE:

A certain lot or parcel of land situated in the Town of Woodstock, County of Oxford and State of Maine, being a right of way or easement in common with others, by vehicle or otherwise including utilities over and across the Billings Hill Road as shown on Plan of Land entitled "Land of Patten Realty Corporation of Maine, Woodstock, Oxford County, Maine, dated January 23, 1984", by D. Bruce Verrill Associates, Inc., and recorded in Plan Book #1985, together with a similar right of way in common with others, leading Southerly from the said Billings Hill Road thru Lot #7 as depicted on said Plan to other land of the Grantee herein.

MEANING AND INTENDING to describe and convey the same premises conveyed by Warranty Deed of Patten Realty Corporation to Bear Paw Timber Corp. dated April 15, 1985 recorded at Oxford County Registry of Deeds at Book 1310, Page 22.

HEMINGWAY MOUNTAIN TRACT

A certain lot or parcel of land situated in Milton Plantation, in the County of Oxford and State of Maine, together with the buildings located thereon, and being the same premises commonly known as the homestead farm of the late Eliza D. Penley, and outlying lots, described and bounded as follows: On the North by the Rumford Town line; on the East by land formerly of Joseph Sloan; on the South by land now owned by the Bethel Savings Bank, and the Gore lot, so-called; and on the West by the Glines Farm, so-called, now or formerly owned by the Mount Glines Gold & Silver Company.

Excepting and reserving, however, so much of the above-described premises as conveyed and described in the deed of warranty given by Willis W. Waite and Harry Brown to the Rumford and Mexico Water District. Said deed being dated January 18, 1934, and recorded in Oxford County Registry of Deeds in Book 405, Page 495.

Meaning and intending hereby to convey to the above-named Grantee all that portion of the property formerly owned by Willis W. Waite and Harry Brown, lying upon the Westerly side of the following-described line, which in a general way may be said to mark the boundary of the Westerly watershed of Mount Zircon Brook.

Beginning at a stake and stones on the town line of Rumford and Milton Plantation forty-six (46) rods Westerly from the stake and stones marking the Southwesterly corner of Lot Seven, Second Division of Lots in Rumford; thence South six (6) degrees West two hundred (200) rods to a stake and stones on the Southerly slope of Hemingway Mountain; thence South sixteen (16) degrees West forty-seven (47) rods to a stake and stones on the Southerly side of Hemingway Mountain; thence South thirty-seven (37) degrees East seventy-seven and one-fourth (77-1/4) rods to stake and stones on a ledge; thence South twenty-eight (28) degrees West thirty-five (35) rods fourteen and one-half (14-1/2) feet, to a stake and stones on a ledge; thence South sixty-eight (68) degrees East eighty-one (81) rods nine and one-half (9-1/2) feet to a stake and stones twenty-six (26) feet Easterly from the center of the old highway near the site of the old Penley buildings; thence South seven (7) degrees West forty-three and one-fourth (43-1/4) rods and passing just Westerly of the Penley private cemetery to a stake and stones at

the intersection with the Northerly line of "The Meighan Lot" so-called, now or formerly owned by Arthur N. Stowell.

BEAN MOUNTAIN TRACT

A certain lot or parcel of land situated in Milton Plantation, County of Oxford, State of Maine, and bounded and described as follows: Lot Number eighty (80), in said Milton Plantation containing one hundred (100) acres, more or less.

Exhibit B. Concord River Conservation Easement

Doc# 6165
BK# 4599 Pg# 149

RUMFORD

Location of the
Bat Hibernaculæ

PERU

MILTON TWP

Received
Recorded Register of Deeds
Jan 21 2010 02:07P
Lorain East County
Jane Kitch

Location of the
Enriched Northern
Hardwoods Forest

WOODSTOCK

Legend

March 30, 2010

- ★ Bat Hibernaculæ
- ▭ Conservation Easement Boundaries
- Enriched Northern Hardwood Forest

1:40,000

1 in = 1 miles

0 0.25 0.5 1 Miles

