

Conservation Actions

Abstract

The successful implementation of the 2015 NH Wildlife Action Plan will require coordinated and strategic involvement by all levels of government and by landowners, non-profit organizations, universities and varied interest groups throughout the state. 117 different actions are identified that span monitoring, research, species and habitat management, land protection, interagency and interstate coordination, local and regional planning, education and technical assistance. It is only through a broad-based, all-hands on deck approach that the state will continue to protect and manage species and habitat that improve the quality of life and the economy in New Hampshire.

Overview

As the name itself implies, the heart of the NH Wildlife Action Plan is a comprehensive set of initiatives designed to help wildlife thrive in the state. Because wildlife and habitat are impacted by land use decisions on public and privately owned lands, the job of protecting and managing species is not something NH Fish and Game can do on its own. The Wildlife Action Plan is designed to involve a wide range of partners including landowners, conservation groups, universities, municipalities, state and federal agencies, and more. To ascertain that actions were comprehensive, grounded and realistic, a broad range of individuals – both lay and professional, were invited to provide input. (See Chapter 1 for details.)

117 actions are recommended to address the threats identified in Chapter 4, as well as needs for more research and monitoring. Actions are grouped into categories to facilitate use by partners assisting with implementation, and to consolidate actions that address multiple threats.

This chapter summarizes conservation actions to address Element 4 of the NAAT Guidelines which requires that states identify “the actions necessary to conserve SGCN and their habitats and establishes priorities for implementing such conservation actions.” It also incorporates recommendations from species and habitat profiles that are common to most species or habitats. The actions are also meant to be inclusive of all wildlife, yet with a focus on priority wildlife and wildlife habitats named in Chapter 2.

Action Categories used in the Wildlife Action Plan

1000. Species and Habitat Actions

- 1100. Monitoring
- 1200. Research
- 1300. Population Management
- 1400. Habitat Management
- 1500. Land Protection
- 1600. Working with Landowners

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2000. Planning Actions

- 2100. Create Resources for Conservation of Wildlife Habitats and Species
- 2200. Local Conservation Planning, Land Use, Regulation and Policy
- 2300. Regional and Statewide Land Use Planning, Regulation and Policy
- 2400. Northeast Regional and National Coordination

3000. Agency Coordination, Regulation, and Policy

- 3100. NHFG Coordination and Policy
- 3200. Interagency Regulation and Policy
- 3210. Development
- 3220. Transportation and Service Corridors
- 3230. Water and Watersheds
- 3240. Climate Change
- 3250. Pollution
- 3260. Outdoor Economy
- 3300. Environmental Review

4000. Education and Technical Assistance

Actions were proposed through a variety of means. Proposed actions were considered by the NH Wildlife Action Plan revision team and were often consolidated or rewritten for clarity and to determine measurable outcomes.

Actions were collected, consolidated and refined from the following sources:

- 2005 Wildlife Action Plan
- 2012 Ecosystems and Wildlife Climate Change Adaptation Plan
- Seven stakeholder input sessions held during the 2015 WAP Revision (see Chapter 1)
- Individual species and habitat assessments (See Appendices A and B)
- Partners and stakeholders

Integration with other plans

Big Game Management Plan

Simultaneous with the revision of the NH Wildlife Action Plan, the state Big Game Plan – focused on management of black bear, moose, white-tailed deer and turkey - was also being updated. To ensure the long-term protection of all wildlife species and habitats in the state, we integrated the planning efforts of the Big Game Plan into the overarching Wildlife Action Plan. The integration of these two planning processes ensures consistency between the two conservation strategies and better integration of wildlife conservation actions in the state, whether directed toward game or non-game species.

Fisheries Operational Plan

The goals of the Wildlife Action Plan overlap with the objectives of the NHFG Inland Fisheries Division Master Operational Plan under the Fish Conservation Program. The goal of the Fish Conservation

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Program is to protect and restore healthy aquatic ecosystems so they can support the full array of New Hampshire's native fish species, both resident and migratory. Biologists with the Fish Conservation Program work on the following objectives as part of the implementation of the both plans:

- 1) Assess the distribution, abundance, and status of fish species identified as being in greatest need of conservation because of declining population trends, unique habitat associations, low reproductive rates, or other population and habitat characteristics which make them vulnerable in an increasingly developed landscape;
- 2) Assess key aquatic habitats essential to the conservation of the identified fish species;
- 3) Implement strategies to conserve the identified fisheries resources and their respective key habitats; and
- 4) Monitor the effectiveness of conservation strategies and make adjustments in response to new information or changing conditions.

1000. Species and Habitat Actions

Overview

Working directly with species and habitats is critical to address the specific needs of threatened and endangered species, as well as other SGCN. This work must be done at multiple spatial scales, from individual organisms or habitat patches to large populations and landscape scales. These actions may be implemented by NHFG biologists, universities, other agencies, conservation groups, consultants, land trusts, foresters, landowners, and volunteers/citizens.

1100. Monitoring

The goal of monitoring is to provide wildlife managers with meaningful data on the status of wildlife populations and habitats, and on how status and condition change over time. Traditionally, monitoring has included direct enumeration of species' populations, but also can focus on subjects as diverse as distribution, productivity, habitat variables, and risks to wildlife health. Monitoring provides essential input and feedback for all kinds of wildlife conservation efforts, and is almost unilaterally prescribed when concern arises over a particular species or habitat. It is not feasible to intensively monitor all species and habitats of concern, so indicator species or variables can be identified as proxies to provide an indication of the health of natural systems. Increasingly, data on social variables (e.g., public attitudes toward wildlife or management) are also collected to inform conservation of natural resource management decisions.

Monitoring programs must carefully evaluate statistical considerations to ensure that information is accurate and useful. The broad actions presented below represent different levels of statistical rigor and monitoring intensity. Although there is some overlap between objectives, it is important to evaluate each to ensure that the monitoring program is comprehensive and accurately reflects the condition of species

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or habitats. Specific details about monitoring needs can be found in species and habitat profiles (Appendix A and B).

Monitoring-related actions include:

1101. Conduct Surveys to Describe Distribution

Determination of presence/absence is the simplest form of monitoring, and often provides the only data available to guide conservation of rare or poorly understood species. Periodic assessment of distribution is also valuable for more common or widespread species, potentially showing range expansions and contractions that reflect the nature or distribution of broad scale threats (e.g., climate change). Examples of existing surveys in this category include the NH Reptile and Amphibian Reporting Program and New Hampshire Bird Records/NH eBird, although both lack a systematic underlying sample framework that would allow for the development of strong inferences. More targeted methods may be appropriate for under-surveyed species or groups, and could include broad-based (e.g., statewide or regional) projects such as Breeding Bird Atlases or butterfly distributional surveys. The NH Dragonfly Survey was a successful five-year survey using trained volunteers to survey for species statewide with over 18,000 records submitted. This method should be considered for other relatively easily identified taxa.

1102. Detect Changes in the Condition of Wildlife and Wildlife Habitats

The purpose of this objective is to detect emerging risk factors (threats) and population declines before they become critical ecological problems. Variables that may be monitored include indicators of the extent or composition of habitats and natural communities, indicators of long-term trends in populations, and levels of risk factors that pose a potential threat to wildlife. Generally, indicators of condition will be monitored regularly across a network of fixed locations with minimal statistical power to detect short-term local trends, but with increasing power at broader spatial and temporal scales. These monitoring locations could include lands under conservation easements, and plots surrounding existing fixed monitoring stations for climate change and water quality (e.g. stream gauges and the distributed sensor network developed by the Ecosystems & Society project of the NH EPSCoR).

Information on the current condition of indicator species or habitats can reflect broad patterns of distribution and abundance for all species and habitats. At a broad scale, monitoring programs such as the Breeding Bird Survey generate trend information for many common species, and thus serve as an early warning system. Also at large scales, the increasing resolution and availability of remotely-sensed data allows for periodic evaluation of habitat extent and condition. Early detection of broad changes in condition will allow management to adapt incrementally before species decline to threatened or endangered status, and before habitats are seriously degraded by emergent threats. Ultimately, this will preempt drastic and costly interventions. This type of monitoring is exceptionally important as wildlife and plants adapt to climate change and recover from extreme weather events, NHFG and its partners should consider participating in climate change monitoring that is developed by other agencies, organizations and universities.

1103. Monitor Populations of Threatened and Endangered Species

Intensive monitoring of threatened and endangered species helps ensure that actions implemented for recovery are effective. These data can lead to changes in listing status and potentially free resources for other threatened or endangered species. Indicators of population condition may include abundance, productivity, genetic diversity, or demographic structure. Generally, monitoring for population health should be able to detect local and relatively short-term trends with relatively high statistical power,

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although decreasing intensity of monitoring (and power) is acceptable with increasingly stable populations.

1104. Measure Direct Effects of Management

Measuring whether management efforts achieved their intended effect is a critical component of performance evaluation and adaptive management. Together, information on direct effects and ecological responses allows managers to evaluate linkages between problems and solutions. Species and habitats under restoration or management will benefit most. Examples of variables monitored under this objective include the amount of duff removed by wildfire, rate of survival of propagated plants, or changes in the abundance of lead sinkers after restrictions are implemented. Typically, change need only be measured over several intervals (i.e., before and after implementation), depending on the duration and frequency of management and the degree to which effects attenuate over time. Many broad-based threats (atmospheric pollution, population growth, etc.) are already extensively monitored, while local threats (effects of a particular dam on stream conditions, human use of beaches, etc.) are poorly monitored or not monitored at all.

1105. Monitor Ecological Responses to Management

Monitoring implemented under this objective should be designed to measure responses of wildlife populations to management efforts. Such follow-up monitoring is a critical component of performance evaluation and adaptive management, allowing managers to test the underlying assumption that management benefits targeted species or habitats. Together, information on direct effects and ecological responses allows managers to evaluate linkages between problems and solutions (i.e., whether management is actually improving the health of wildlife and habitats, and whether the problem being managed is actually the cause of diminished wildlife health).

1106. Establish or Expand a Network of Monitoring Plots to Observe Climate Related Changes, and Coordinate Among Monitoring Efforts

This includes continuing existing chemical and physical monitoring and the addition of new parameters and locations. Subjects of monitoring should include long-term changes in wildlife populations, invasive plant species, forest tree and other plant species composition, wetland hydrology, and phenology. In coastal areas, sentinel monitoring for climate change should be instituted to track primary stressors such as temperature, sea level rise, and changing physical and chemical regimes that affect ecosystem health. Collaborative partnerships between state and federal agencies, NGOs, universities, co-ops and others will be necessary for this to be accomplished, including developing protocols for data collection, compilation, analysis, storage and sharing. This monitoring should provide data to inform adaptive management of species and habitats and to direct necessary changes in policy.

1107. Select an Efficient Set of Indicators by Habitat

It is not feasible to monitor all species, risk factors, and management impacts within a given habitat. Choosing an appropriate set of indicators streamlines monitoring by reducing the number of species that need to be surveyed on a regular basis, allowing a finely-tuned system of detecting responses to changes in threats or management activity. For example, if available evidence indicates that a rare mussel is most sensitive to the availability of a fish host species, it may be more effective to monitor populations of the fish than the mussel, especially if the fish host is also a good indicator of other environmental variables such as stream temperature, sedimentation, or hydrologic alteration. Choosing indicators should not replace direct monitoring for the most threatened taxa, nor should it be assumed that threatened and endangered species are the best indicators.

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1108. Report the Condition of Wildlife Health by Habitat

Standardized reporting on a set of indicators selected by an informed process will provide critical information to summarize the status of ongoing monitoring and management, and serve as input to adapt management to current conditions. Funding used for ineffective management may be redirected to more effective approaches. Reports may lead to changes in listing status and potentially free resources for other threatened or endangered species. Chapter 3 summarizes wildlife habitat condition in NH. Also, a list of habitat indicators was identified by the Northeast Performance Monitoring Framework (Foundations of Success 2008) and NHFG will review this list for monitoring consideration in NH.

1200. Research

The goal of the research strategy is to develop an ongoing research program in New Hampshire that identifies and facilitates funding of priority surveys, research, and monitoring. Species and habitat profiles (Appendix A and B) contain research recommendations for:

- Providing information on the distribution of poorly understood species and habitats
- Assessing the current condition of species and habitats
- Identifying threats to these species and habitats
- Clarifying whether a conservation action will lead to a change in the threat and whether a change in the threat will lead to a change in the current condition of the species or habitat

These actions will help make a convincing, research-based case for conservation that will be helpful in building social and political support. Sound research will also make grant writing and donation requests more compelling and will make conservation more effective.

1201. Prioritize Research Needs

The process of prioritizing research will be incorporated into the process of prioritizing conservation actions identified in the Wildlife Action Plan. NHFG should develop an internal operational plan to identify where available resources (staff and money) can be most effectively allocated. Collaboration with other states directly or through regional working groups will allow shared research objectives and help address regional environmental issues. NHFG should collaborate with universities, NGOs and others to study wildlife species, habitat, management, impacts, and specifically identified research needs.

1202. Facilitate Funding of Priority Conservation Research

Priorities for survey, monitoring, and research will be communicated to other entities that fund conservation research in NH. NHFG can facilitate the development of a process to disseminate conservation research money and encourage other conservation researchers and funding entities to focus their efforts on priority research. Research funded by NHFG should support the goals of the Wildlife Action Plan. NHFG administrators and biologists should discuss the most efficient method to disseminate conservation research funds that will advance the objectives of the Wildlife Action Plan.

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1203. Research the Effects of Climate Change on Forests and Develop Response Protocols to Climate Change Impacts

Forestry Inventory Analysis (FIA) and other data should be used to assess how forest communities have already changed to demonstrate potential associations with climate patterns, and this information should be used to predict change to future landscapes. Potential changes in fire risk from drier weather and increased down wood should be assessed. Research should be promoted on silvicultural techniques that can be used to manage forests for likely changes in species composition. Forest management techniques should be explored in southern states with similar geology and soils so preparations can be made for possible impacts. Research should be conducted on how climate change impacts soil and soil ecology, and should be used to determine how natural communities and habitats may change. Changes in phenology should be investigated that may cause species to become endangered. Information should be collected on the sustainability of biomass production in NH, and Best Management Practices should be developed for biomass harvesting as appropriate.

1204. Research the Direct and Cumulative Effects of Development on Wildlife and Habitats

Potential cumulative impacts of development on wildlife should be researched and monitored, including the effects of multiple new developments over time, the impacts of increased impervious surfaces and other infrastructure. Research and monitoring projects should look at issues associated with wind turbines, wetland mitigation, water withdrawals, transmission lines, migratory patterns, and other emerging topics. Findings of these studies should be communicated to state and federal agencies, natural resources consultants, industry, and the public.

1205. Develop Ecological Models to Identify Critical Processes for Recovery and Persistence

Successful management of imperiled species and their habitats involves identifying critical processes that, if not addressed, will limit recovery efforts. For populations, these may include vital rates and metapopulation dynamics. In the case of habitat degradation and loss, these may include the role of individual stressors and potentially combined or synergistic effects of multiple stressors. In the case of population management, prior research has demonstrated that management efforts are often targeted at life-history stages where the most mortality is seen, yet these may not be the factor limiting population recovery. For example, sea turtle conservation historically focused on increasing survival of nestlings on beaches, but population models demonstrated that unless adult mortality was decreased, populations could not increase. Similarly, efforts to recover habitats may focus on the most visible stressor while failing to identify those factors that must ultimately be addressed. Ecological models including population models, systems models, and sensitivity analyses provide a venue for "doing the math", i.e. objectively evaluating what individual or combined factors are most important in driving population or systems dynamics. They also allow researchers to prioritize research by incorporating parameter uncertainty and evaluating how important it is to refine these estimates through further scientific study. As such, ecological models can greatly increase the efficacy of both management and research efforts.

1300. Population Management

Protecting, enhancing, or augmenting scarce populations of wildlife may prevent their extinction, perpetuate naturally scarce populations, or increase populations to desired levels. Controlling diseases, introduced wildlife species, and over-population of certain wildlife is a way of protecting NH's vital natural resources. Responsible game harvesting promotes retention of wildlife populations while maintaining plant and animal biodiversity. Population management should be responsive and adapt to

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new information generated from monitoring and performance evaluations and changing biological conditions.

1301. Evaluate the Viability of Wildlife Populations and Vulnerability to Threats

For rare and declining species, long-term viability and potential management scenarios should be assessed based on current knowledge of wildlife demographics. This will identify opportunities to enhance the health of wildlife populations, especially those listed as threatened or endangered or those that likely will be considered for state listing status in the near future. Analyzing viability will inform decisions about the scarcity of wildlife populations and the sensitivity of species and potentially specific life-history stages to various threats including but not limited to unregulated take, loss of habitat to development, vulnerability to climate change, invasive species, and pollution.

1302. Augment Rare and Declining Populations

Augmentation can help to restore rare and declining populations to the size and genetic diversity needed for long-term viability and can help to maintain overall ecosystem diversity. Rare and declining populations should be higher priority for augmentation when abatement of limiting factors is feasible. Direct forms of augmentation include translocation and release of captive-bred animals. Indirect forms of augmentation include management of factors that limit population growth, such as predation, forage scarcity, and lack of nest or den sites. Protection and captive breeding should be implemented in zoos and other qualified facilities for rare and declining populations when augmentation in the wild or abatement of limiting factors are not feasible within the timeframe of potential extinction. This will counter factors, such as scarcity, genetic drift, and environmental caprice that threaten to extirpate some species. It will delay population extinction or catastrophic population losses so that other factors such as habitat loss and predation can be addressed.

1303. Prevent and Control Wildlife Diseases

New Hampshire should attempt to curtail the spread of wildlife diseases. Known diseases of concern include white-nose syndrome (bats), snake fungal disease, ranaviruses and chytrid fungi in amphibians, chronic wasting disease (CWD) in deer, avian cholera, and other avian diseases. Wildlife benefits from disease control will be diverse and will include both at-risk (e.g., bats, timber rattlesnakes) and harvested wildlife (e.g., deer). NHFG will work with the Northeast Wildlife Disease Cooperative, the USGS Wildlife Health Center, and other appropriate facilities to provide training to staff, identify concerns and priority diseases for wildlife, and identify funding and protocols for disease monitoring and testing.

1304. Prevent and Control Overpopulation Impacts of Native Wildlife

Some native subsidized wildlife such as gulls, corvids, and raccoons often become overpopulated and threaten native wildlife populations and human health. Overpopulation threatens ground nesting birds in particular (e.g. piping plovers and common terns). Responsible management of herbivores (such as deer) can help maintain plant and animal biodiversity in some forest ecosystems. Statewide and site-specific plans should be developed to control overpopulated wildlife, as should a comprehensive management plan for predators that threaten rare and endangered species. Development of a statewide plan should be coordinated by NHFG, USDA, and USFWS and should consider the possible role of town animal control officers.

1305. Prevent and Control Feral and Invasive Animal Impacts to Native Wildlife Populations

Invasive species such as zebra mussels and introduced species such as feral cats may threaten native wildlife populations. Feral cats threaten piping plovers and some other bird populations. Statewide and

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site-specific plans should be developed to control introduced wildlife. Planning for invasive wildlife should consider factors such as known or potential impacts of invasive wildlife on native wildlife, techniques for controlling invasive animals and potential effects on other native wildlife, and likelihood of success in controlling invasive wildlife. Education of the public to prevent the spread of invasives should be a priority along with identifying situations where rapid response to new occurrences of invasive animals is critical. Development of a statewide plan should be coordinated by NHFG (authority over all wildlife in NH), NH Division of Forest and Lands (e.g., invasive insects), NH Department of Environmental Services (e.g., invasive aquatic plants), USDA, USFWS, and should consider the possible role of lake associations and town animal control officers. *See Habitat Management Actions for additional actions related to invasive plants and wildlife.*

1306. Maintain an Adaptive Population Management Program for Harvested Species

Population management is most efficient and effective when it adapts to changing conditions and considers interactions among different species and habitats. Data on the response of populations to management will allow managers to improve and integrate management approaches. NHFG should continue and expand programs to assess the responses of wildlife populations to ongoing management (e.g., harvesting, augmentation and fish-stocking, control of diseases and over-population), identify potential negative interactions of management with non-target species (such as incidental take), and removal of species for purposes other than harvest, (e.g. collection of turtles of the pet trade or nuisance wildlife control). NHFG should adapt management to current conditions across multiple species and habitats. Adaptive population management allows NHFG to maintain wildlife diversity under changing ecological and social conditions.

1400. Habitat Management

Management and restoration can protect species and habitats that have languished due to historic and current development, or to natural processes such as succession. Initiatives could include programs such as backyard landscaping for improving habitat for songbirds, replacing culverts to restore stream flow and wildlife passage, creating and maintaining early successional stages, and allowing late-successional conditions to develop on selected tracts of forest. Habitat management will involve federal, state, non-government organizations, towns and private landowners. The goal of this strategy is to provide and maintain critical habitats for wildlife and natural communities via active restoration and management.

1401. Reclaim or Maintain Grassland Habitats

Priority areas should be identified for grassland management, and landowner objectives and current management should be assessed. Reclamation and maintenance of grasslands may benefit a number of at-risk wildlife species such as northern leopard frog, upland sandpiper, and grasshopper sparrow. Of greatest concern are the effects of high-intensity agriculture (e.g. mowing during the breeding and nesting season), development, altered natural disturbance regimes, and altered hydrology. For priority areas on state lands, NHFG staff should work with the appropriate agencies to conduct field assessments and recommend management objectives where appropriate. NHFG added a position to implement grassland and other habitat management for SGCN, following recommendations in the 2005 WAP.

1402. Generate Shrublands and Young Forest Habitats

Priority areas should be identified for shrubland restoration and management, building on the successful efforts to generate this habitat for New England cottontail, American woodcock, and several species of

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migratory songbirds. Landowners should be given opportunities to learn about this habitat and the tools to manage it. Using the “Talking About Young Forests: A Communication Handbook” and other resources from NEAFWA and elsewhere will help foresters, biologists and landowners in planning for this habitat. Support for cost sharing programs provided by NRCS and technical assistance to landowners by NHFG and UNH Cooperative Extension, are important. BMPs for vegetation control on power line corridors should be developed to encourage shrublands in these areas. These efforts can be assisted greatly by the state lands management team, UNH Cooperative Extension, Society of American Foresters, and NRCS.

1403. Restore and Maintain Late-Successional Forests

Late successional forests are not used exclusively by any particular vertebrate species yet are nevertheless important for other species such as mosses, lichens, and some invertebrates. Most of New Hampshire’s rare forest plants inhabit mid- to late-successional forests. Reserves of late-successional forest will eventually enhance overall habitat diversity through the addition of complex patterns of dead and downed wood, increased variation in forest canopies, and greater habitat complexity in forest streams. Many species would benefit from these conditions including American marten and three-toed woodpeckers. Deer, moose, and bear would benefit from the protection and maintenance of spruce-fir and hemlock stands that provide winter shelter, and old growth hardwood stands that provide hard mast. Most late-successional forests in New Hampshire were lost during the extensive timber harvesting of the nineteenth century. Areas that are currently allowed to grow unimpeded are those that are largely inaccessible because of steep slopes or other barriers to timber harvesting, particularly in the White Mountain National Forest and the Connecticut Lakes Natural Area, with smaller tracts owned by NHFG, SPNHF and TNC. An inter-agency forestry and wildlife team could assess how much late-successional forest is desired and develop goals by ecoregion subsection. Additional protection and management objectives can be based on the state lands management plan and Forest Resources Plan coordinated by DRED.

1404. Develop Restoration Plans That Meet Multiple Ecosystem and Ecosystem Service Objectives, and Consider the Effects of Climate Change, Including Those Pertaining to Human Adaptation

Demonstration sites should be created on public and private conservation lands to showcase management activities that build resiliency. Work should be focused in areas identified as being more resilient as modeled by Anderson et al. (2012) and subsequent modeling efforts.

1405. Develop and Implement an Urban Wildlife Management Plan

The development and implementation of an urban wildlife plan would help provide long-term nesting habitat for common nighthawks that have adapted to nesting atop flat roofed buildings. It would also enhance habitat for migrating songbirds, wintering bald eagles, little and big brown bats, and pine barrens Lepidoptera. Migrating songbirds require suitable stopover areas for resting and foraging. In addition, they are at risk for mortality from building collisions in heavily-lit urban areas. In winter, bald eagles roost and forage along major rivers even in urban areas. Pine barrens Lepidoptera require certain plants for larval foraging and adult nectaring that would be suitable to incorporate in backyard landscaping, and are sensitive to backyard bug zappers. Bat houses and outbuildings could enhance habitat for bats, especially those evicted from occupied structures. An urban wildlife management plan should include detailed strategies for education, habitat management and monitoring, targeted to building owners. It should also outline funding needs for implementation. Educational efforts and

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resource guides that address rooftop and backyard habitat should be targeted to landowners, building managers, developers, landscapers, and municipal officials.

1406. Restore Rare Habitats and Natural Communities

Some critical habitats and natural communities have become so rare and degraded that restoration is necessary to maintain associated wildlife. Restoration should focus first on pine barrens, lowland spruce-fir forests, salt marshes, floodplain forests, and coastal dunes. Restoration of pine barrens would benefit a suite of rare Lepidoptera, common nighthawks, whip-poor-wills, and other species. TNC and NHFG are involved in pine barrens restoration in the Ossipee-Madison area and Concord airport. Prescribed burning is the primary tool needed to restore pine barrens habitat, and prescribed burning is primarily administered by NHDFL, USFS, TNC, and NHFG. As recommended in the 2005 WAP, a Prescribed Burn Council was formed in 2010 to establish recommended standards for planning and implementing prescribed burns, including staff training requirements and other recommendations. Agencies also established a MOA that allows sharing of resources. Restoration of lowland spruce-fir will benefit marten, three-toed woodpecker, spruce grouse, and others. This will entail forest management that promotes the growth of spruce-fir in areas that may have been managed for hardwoods but whose soils support the growth spruce and fir. Successful restoration of salt marshes will improve habitat conditions for Nelson's sparrow, saltmarsh sparrow, seaside sparrow, willet, black duck, and others. Restoration of sand dunes will benefit piping plovers. Thus far, over 700 acres of salt marsh have been restored and more restorations are planned. NHFG should work with NHCP and its partners (NH Estuaries Partnership, NRCS, county Conservation Districts, Ducks Unlimited, the Great Bay Estuarine Research Reserve, and local towns) to support salt marsh restoration and to prioritize and implement coastal sand dune restoration. These efforts should complement efforts to identify, protect and manage lands where salt marshes can migrate as sea level rises.

1407. Restore or Maintain Natural Flow Regimes

Since European settlement, many aquatic habitats in New Hampshire have undergone alterations from impoundments, hydroelectric production, seasonal lake drawdowns, water withdrawals, and runoff from impervious surfaces. Restoring natural flow regimes can benefit migratory and local fish populations, as well as many species of amphibians, reptiles, and invertebrates that depend on natural fluctuations in water levels to fulfill critical life history functions. The following actions will help restore natural flow regimes:

- *Dam Removal*

Dam removal projects offer some of the best long term solutions for both restoring natural flow regimes and improving aquatic habitat connectivity in a watershed. Dam removals can be expensive projects, and include many permitting and logistical challenges.

- *Hydropower regulation*

Hydropower facilities should minimize unnatural flow fluctuations and provide safe and timely passage for fish species. Flow and fish passage requirements are negotiated through the Federal Energy Regulatory Commission (FERC) dam licensing process and through incentives provided by government or nonprofit organizations such as the Low Impact Hydropower Institute.

- *Protect instream flow*

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Adequate flows for supporting native aquatic species should be provided by limiting excessive water withdrawals for municipal water supplies, industry or agricultural use, and by providing sufficient release of water at dams. Seasonal changes in flow patterns should be maintained as much as possible. New dam construction and stream channelization should be avoided.

- *Reduce the impacts of impervious surfaces*

Impervious surface runoff causes flashy flows in nearby rivers and streams and prevents groundwater recharge, which reduces base flows during low flow conditions. Impervious surface coverage should be kept to a minimum during new construction. Low Impact Development Techniques for managing stormwater runoff should be used to promote infiltration into the ground. Existing infrastructure that directs runoff into surface waters should be inventoried and replaced.

- *Reduce unnatural water level fluctuations at dams*

Water levels in lakes and ponds are managed for a variety of stakeholders, including lakefront property owners, recreational boaters, anglers, and hydroelectric companies. Flood control and property damage are a major consideration, but the needs of aquatic species are often overlooked. Excessive water level fluctuations should be avoided upstream of dams. Water levels should be allowed to rise and fall as naturally as possible.

1408. Restore and Maintain Watershed Connectivity

Stream crossings (e.g., bridges and culverts at roads, railroads, and trails) and dams fragment aquatic ecosystems. Constricted flow and perched culverts can prevent passage of fish, amphibians and other aquatic organisms, denying them access to certain habitats and isolating populations. Stream crossings may also alter the natural geomorphology of a river or stream, changing sediment deposition and natural erosion patterns above and below the crossing. Reducing fragmentation in a watershed can be especially beneficial for species such as migratory fish that need to move long distances throughout their lives. Dams prevent movement of fish and other aquatic organisms up and downstream., although fish ladders allow fast-swimming species to move upstream. In 2009 an interagency task force developed the New Hampshire Stream Crossing Guidelines document (http://www.streamcontinuity.org/pdf_files/nh_stream_crossing_guidelines_unh_web_rev_2.pdf) as a resource for NHDOT, towns, and others to help ensure that new and replaced culverts are designed appropriately for the size and sediment transport characteristics of the river or stream on which they are built.

- *Stream Crossing Surveys*

Standardized stream crossing assessment protocols have been developed for New Hampshire and stream crossing survey data is compiled in a statewide database maintained by the New Hampshire Geological Survey (NHGS). Potential stream crossing restoration sites can be prioritized using watershed-wide stream crossing assessments combined with fish survey data. Incorporating stream flow modeling, based on predicted flow increases due to climate change, can be used to identify crossings that are vulnerable to flood damage, which are often the same crossings that restrict the movement of aquatic species.

- *Stream Crossing Replacement*

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Since 2010, when the revised stream crossing rules were implemented, habitat connectivity in streams has increased. However, there are still thousands of crossings throughout New Hampshire that fragment river and stream habitat. In the long term, these NHDES rules will help restore aquatic connectivity and increase the resilience of infrastructure to flood damage, but cost is a major barrier to the implementation of stream crossing replacement projects. Providing additional grant funding, streamlining the application process, and developing innovative, lower cost stream crossing designs would help facilitate aquatic connectivity restoration projects. Most crossings are replaced after they fail. Taking a proactive approach to stream crossing replacement would increase the pace of restoration and help prioritize work in areas of high ecological importance.

1409. Establish Statewide Fire Management Plans for Wildfires with Goals for Response and Fuel Reduction

Wildlife risk may increase due to drought conditions brought on by climate change. There should be a program to educate the public on the importance of fire to reduce wildfire risk and maintain habitat condition. This program could also include information on how allowing small fires to burn may enhance habitat.

1410. Maintain Forested Landscapes by Promoting Sustainable Forestry

Maintaining working landscapes is essential to avoiding habitat loss from conversion to other land uses such as development. NHFG should work with SPNHF, NRCS, DRED, UNH Cooperative Extension, NH Timberland Owners Association and the NH Land Trust Coalition to support the retention of working landscapes while encouraging stewardship of the land that best supports wildlife. Encourage implementation of the NH Forest Action Plan.

1411. Encourage Creation of Collaborative, Landscape-Scale Management Projects to Develop a Mosaic of Habitat Types and Forest Age Classes

Bring together landowners whose lands form large forest blocks to create multi-organizational collaborative land management projects focused on habitats and climate change adaptation. Funding agencies such as NRCS should assist in the development of such plans and their implementation. An example of this collaboration is the Northwood Area Land Management Collaborative.

1412. Develop a Statewide Invasive Management Plan That Prioritizes Areas for Control

A statewide invasive species management plan should consider invasive plants and animals in all habitat types, including terrestrial, aquatic and marine habitats. The plan needs to identify likely new invaders coming from the south as well as potential imports from other regions of the world. The plan should recommend types of pest monitoring, as well as ecologically sensitive control methods such as Integrated Pest Management (IPM). This plan could utilize cooperative invasive species management areas (CISMA) to provide baseline information on the geographic range of each invasive species. The plan should include the “Picking Your Our Battles” invasive species prioritization program which focuses on upland and wetland invasive plants. Products developed during the planning process should include BMPs for preventing spread of invasive species from one site to another through equipment movement, horticulture, firewood, and other sources. See Population Management action subcategory: *Prevent and Control Feral and Invasive Animal Impacts to Native Wildlife Populations*

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1413. Educate the Public, Businesses, and Agencies on Invasive Plant Identification and Management

A program to educate the public about invasive plants should be developed, and should include information on identifying species that have the potential to arrive in New Hampshire in the near future. BMPs for invasive control should be developed and promoted, particularly for timber management and the wood products industry, construction and road maintenance, shipping activities, and the horticulture industry. The program should encourage the use of an existing reporting program (e.g. EDDMaps) for the public to report invasive species, which will assist in early identification and control. The Stewardship Network New England should be utilized for public outreach and control efforts.

1414. Support Funding For Habitat Management on Public and Private Lands

NHFG should work with NRCS, other agencies, and private funding sources to assist in habitat management and restoration projects that benefit SGCN.

1500. Land Protection

New Hampshire requires a network of permanently conserved lands that effectively represent the diversity of the state's wildlife and habitat. Land protection by landowners, communities and conservation groups through conservation easements and acquisitions ensures the long-term protection of our wildlife resources. Over 31% of New Hampshire's land is currently in conservation ownership through fee ownership by natural resource agencies, conservation organizations, and municipalities, or by permanent conservation easement. However, the current system of conservation lands is not equitably distributed across the state's geography, ecological regions, and critical wildlife habitats. About two thirds of the state's conservation land is located in or north of the White Mountains, and the elevation distribution of conserved areas is heavily skewed towards areas higher than 1,700 feet. Coastal areas, southern forests, sand plains, large river valleys, and floodplains—many of which are vital for wildlife conservation—are poorly conserved. Highly threatened and essential habitat resources should be priorities, such as riparian/shoreland habitat, larger unfragmented blocks, and wildlife corridors that connect significant habitat. The Wildlife Action Plan maps of Wildlife Habitat Ranked by Ecological Condition, first created in 2006 and updated in 2010, have been invaluable in targeting important wildlife habitats for protection. Over 234,000 acres of highest ranked habitat was conserved since the maps were created.

1501. Develop a Comprehensive Land Protection Support Program

In addition to continuing and fully funding state funding sources such as the Land and Community Heritage Investment Program (LCHIP), agencies should work to increase funds available for land conservation. This could include an increase in local sources of funding for land conservation, such as increasing the percentage of Land Use Change Tax directed to town conservation funds. Other funding options to consider include amendments to the Current Use Tax program, decreased capital gains taxes on timber, the use of current use tax rates for evaluating estate and inheritance taxes, and tax credits given to people or companies who invest in forestland. Climate adaptation scoring criteria could be added to land protection funds such as LCHIP and the Aquatic Resource Mitigation program (ARM). Financial resources should be made available to support efforts to maintain connectivity across political boundaries, including across state and country boundaries (US/Canada). NHFG should explore ways to more fully develop a land protection staff and budget.

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1502. Protect Land Identified As Highly Ranked by Ecological Condition in Wildlife Action Plan Maps

Conservation easements and other land conservation options should be used to protect critical habitats on private and public properties. NHFG biologists should collaborate with UNH Cooperative Extension and other organizations to work with local landowners, land trusts, conservation commissions, regional land trusts, and other conservationists to identify and contribute to land protection projects. Landowners should be educated about land conservation options and funding opportunities. NHFG and partners should use the Wildlife Action Plan maps and other datasets such as aquifers and productive soils, and should create a plan for a statewide green infrastructure network that includes large blocks of unfragmented forest, protection for significant wildlife habitat areas, and landscape permeability for wildlife movement.

- **Landowners and communities** should be encouraged to learn about conservation options and consider putting a conservation easement on their property.
- **Landowners, communities, and conservation groups** should be encouraged to concentrate land conservation efforts to protect unfragmented blocks of land, significant wildlife habitat areas, and corridors that enable wildlife movement across the landscape.

1503. Protect Riparian and Shoreland Habitats and Other Important Wildlife Corridors through Conservation within the Shoreland Protection Zone

Maps of prioritized wildlife habitat should be used as guides when selecting riparian or shoreland areas to protect or restore. Using these maps and other resources, agencies should educate the conservation community about how to maintain connectivity of aquatic habitats through targeted riparian protection. Habitat management in riparian and shoreland habitat should be held to the highest standards, especially when supported by state agencies, and should incorporate relevant BMPs. Proper protection and management of these areas is an important part of climate adaptation planning, and agencies should encourage the preservation and restoration of important wetlands that absorb floodwaters or release water during droughts to help mitigate the impacts of climate change. The creation of BMPs for forestry that help wetlands retain water during droughts will also help mitigate the impacts of climate change.

- **Communities, conservation groups, landowners and others** should use the Wildlife Action Plan Maps (Habitats Land Cover and Highest Ranked Habitats) to prioritize conservation of riparian and shoreland habitats and other important wildlife corridors.

1504. Protect Large Diverse Areas with Multiple Habitat Types That Will Allow For Habitat Migration and Create Resilient Landscapes

Land protection efforts should be focused on establishing linkages along latitudinal and elevation gradients that have been identified as corridors for wildlife movement across the landscape. Efforts should include consideration of stable physical features such as topography and soils to protect the biodiversity spectrum. In order to allow for habitat migration due to sea level rise, agencies, communities, and conservation groups can protect low-lying land adjacent to existing coastal habitats with techniques that may include rezoning and restriction for rebuilding of infrastructure after flooding. Protecting large unfragmented forest blocks will also help promote habitat migration. Agencies and conservation groups should use innovative conservation methods, like land exchanges and rolling easements, to prepare for the eventual abandonment of inundated lands and allow for natural coastal habitat migration. There are currently several state funding sources that serve as good models for

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identifying and funding important land protection projects (LCHIP, NH Aquatic Resource Mitigation Fund Program) and for land conservation of unfragmented blocks (Forest Legacy).

1505. Protect lands critical for persistence of threatened and endangered wildlife and plants

Protecting large, diverse areas will typically benefit the greatest number of wildlife species. However, in some specific cases, smaller areas may harbor critical resources that do not occur elsewhere. Some species of wildlife have small home ranges and may not need expansive landscapes to persist if habitat quality is high. Also, if habitat or population distribution is extremely limited, protecting remaining populations is often critical. Habitat for threatened and endangered species should be prioritized. Prioritized areas should be integrated into revisions of NH Wildlife Action Plan maps. See Appendix A for species-specific actions.

1600. Working with Landowners

With 85% of NH's wildlife habitats privately owned, helping private landowners to create, improve, or maintain wildlife habitats is critical to the health of wildlife populations throughout the state. There are many actions that state agencies and organizations can take to provide such assistance to landowners, as well as actions individual landowners can take to access the assistance available to them. Those interested in learning more about what they can do should visit www.takingactionforwildlife.org. *Also see Education and technical assistance action category for additional related actions.*

1601. Ensure that Financial Assistance is Available to Landowners for the Creation, Improvement, Maintenance, and Protection of Important Wildlife Habitats

Financial assistance is an important motivator for landowners to take action on their property that may otherwise be cost-prohibitive. These programs are especially important to forest and agricultural landowners, and often promote sustainable management practices through associated technical assistance. Current financial and technical assistance programs include the NH Current Use program, Forest Land Enhancement Program (FLEP) administered by NHDFL and USFS, Environmental Quality Incentives Program (EQIP) administered by NRCS, and the Partners for Wildlife Program administered by the US Fish and Wildlife Service. Agencies should continue to support such programs and when possible provide additional financial assistance to landowners. Consistent long-term funding is critical for the success of these programs, and regional and national efforts are needed to help secure funding. On private lands, state agencies such as NHFG should encourage landowners to keep their lands open for outdoor recreation opportunities and for nature exploration including wildlife surveys and citizen science projects.

1602. Support Use of EQIP Funding from NRCS to Enhance Wildlife Habitat on Private Lands

NHFG should coordinate with NRCS and others working on EQIP funding (such as UNH Cooperative Extension) to focus efforts in areas with the most need and that will result in the greatest benefit to wildlife. Projects can include the development of forest management plans, wetland restoration and enhancement, tree and shrub establishment, riparian buffers, in stream wood additions, and other projects. To be successful, large landowners with significant wildlife resources should be targeted proactively. Plans should consider the balance of young forest and old-growth forests. Agencies can invest in financial assistance programs that promote good wildlife habitat management practices and access management projects on private lands (e.g., Small Grants Program). Other collaborators could

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include the NH Timberland Owners Association, NH Timber Harvesting Council, Granite State Division of the Society of American Foresters, Tree Farm Program, SPNHF, and private consulting foresters.

- **Forest and agricultural landowners** (individuals, communities, and organizations) can utilize financial incentives to inventory natural resources and incorporate that information into a forest management plan.
- **Landowners, communities, and conservation groups** can contact and work with organizations and agencies that provide financial and technical assistance for wildlife habitat management (e.g. NRCS, USFWS, NHFG). Landowners can learn more about forest management and stewardship, including the importance of a balance of young and old-growth forests. Practical recommendations and information on sustainable forestry practices can be found in ‘Good Forestry in the Granite State.’

1603. Protect Habitat of Threatened and Endangered Species through Candidate Conservation Agreement with Assurances and Safe Harbor Agreements

Many property owners are concerned about land use restrictions that may occur if listed species colonize their property or increase in number because of habitat management. Safe harbor and candidate conservation agreements provide a mechanism to ensure that private landowners will not face any further restrictions under the U.S. Endangered Species Act if they take actions to improve habitat of candidate, threatened, or endangered species on their property. Safe harbor agreements have yet to be enacted in NH but have been in other states. Since 2005, NHFG and the USFWS enacted a programmatic Candidate Conservation Agreement with Assurances (CCAA) for New England cottontail. Similar agreements could be developed for other federally listed and candidate species that are found in the state.

1604. Provide and Promote Best Management Practices (BMPs) for reducing negative impacts from forestry, agriculture, and recreational activities

NHFG and other partners should work together to publicize and promote existing BMPs that have already been developed (i.e. Good Forestry in the Granite State, Best Management Practices for Forestry: Protecting New Hampshire’s Water Quality, etc.). In cases where no such BMPs exist, or if additional wildlife-specific BMPs are necessary, NHFG will work with partners in the forestry and agricultural community to improve conditions for wildlife particularly in grasslands, floodplain forests, and aquatic habitats. Collaborating agencies and organizations (e.g., NRCS, UNH Cooperative Extension, NHFG) could initiate the formulation of new or revised BMPs. Other partners can help publicize and encourage adoption. BMPs should address mowing techniques and timing, pesticide and fertilizer applications, stream buffer widths, buffer vegetation composition, and floodplain farming recommendations. Increased education about the use of pesticides could be a combined effort with the Department of Agriculture’s pesticide board. Recreational BMPs should address siltation into brooks and streams from the use of woods roads and municipal dirt roads. BMPs should also provide guidance of trail placement, especially on conservation lands where fewer trails may be better for wildlife. Recreation near rivers should avoid trail placement close to the water because of documented negative impacts to wood turtles, bald eagles and other SGCN. BMPs should provide guidance on salvage logging after ice storms and pest infestations such as hemlock woolly adelgid to ensure persistence of wildlife habitat.

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- **Landowners, communities, and conservation groups** should be encouraged to use BMPs - including those for forestry, agriculture and recreation - when managing land for wildlife habitat, development, or other reasons.
- **Landowners, communities, and conservation groups** should be encouraged to consider impacts of pollution on wildlife when maintaining agricultural land, applying fertilizer or pesticides, and developing trails on private and public lands.
- **Communities and conservation groups** can educate private landowners on BMPs related to reducing pollution from agriculture and recreational activities.

1605. Provide technical assistance to landowners on habitat management that benefits wildlife.

Work with landowners, foresters and loggers on forest management practices that benefit a range of wildlife species, including both game and nongame species. Provide BMPs and restoration guidelines for SGCN.

- **Landowners** (individuals, communities, and organizations) should work with licensed foresters, biologists, county Extension foresters, and other conservationists for guidance on managing land for wildlife.
- **Landowners, communities, and conservation groups** can learn more about approaches to promoting wildlife habitat on their properties (visit www.takingactionforwildlife.org for more information).

1606. Provide guidance and assistance to owners of smaller parcels interested in providing wildlife habitat on their property

NHFG and other partners should promote practices and resources for small landowners who are interested in providing various wildlife habitats on their properties. Agencies will promote land management to enhance pollinator habitat by planting fruit and nectar-producing plants. Materials should be provided to lake and river-front property owners that show ways to minimize erosion and storm water runoff. NHFG and other partners should facilitate peer to peer networks in order to convey issues of climate change and strategies that landowners can use to mitigate impacts.

- **Landowners** (individuals, communities, and organizations) should work with licensed foresters, biologists, county Extension foresters, and other conservationists for guidance on managing land for wildlife.
- **Landowners, communities, and conservation groups** can learn more about approaches to promoting wildlife habitat on their properties (visit www.takingactionforwildlife.org for more information). This includes planting and encouraging the growth of native plants, especially near shorelands, that are beneficial to wildlife.

2000. Planning Actions

Overview

To protect wildlife and habitats, we need an understanding of their location and condition. Data collection, management and analysis are necessary foundations of this understanding. Implementation of

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conservation strategies requires that land use planning occur at multiple scales. Helping local, regional and state government, NGOs, and others create plans to identify and take action to protect key habitats is critical to ensuring that today's high-quality habitats remain so into the future. Planning at a regional and national scale is critical for many Species of Greatest Conservation Need.

2100. Create Resources for Conservation of Wildlife Habitats and Species

Wildlife conservation planning entails organizing and analyzing data derived from confirmed occurrences of wildlife and habitats. Scientists with advanced training in conservation biology and wildlife ecology are needed to create computer models to synthesize statewide patterns of wildlife occurrence, assess status and trends in populations, and develop strategies for conserving biodiversity. Critical analysis of perceived threats to wildlife is an important part of strategy development. Maps depicting the ability of lands to support healthy wildlife populations that can guide land use planning decisions are a key output of conservation planning. The goals of wildlife conservation planning are as follows:

- Describe the potential of the land to sustain wildlife
- Develop conservation objectives that balance human interests with the health of wildlife populations and avoid costly interventions for endangered species
- Prioritize projects that contribute towards ecological integrity across the landscape
- Deliver information supporting conservation objectives in media that can be integrated into state and local planning processes

2101. Maintain and Enhance NH Wildlife Sightings Database

New Hampshire should continue to acquire, verify, and maintain records of wildlife observations. Improved knowledge of species distributions, particularly species of conservation concern, will greatly benefit proactive conservation planning efforts. NHFG and NHHB currently have staff dedicated to acquiring, verifying, and maintaining wildlife records submitted to the New Hampshire Wildlife Sightings web page. Non-sensitive data should be made more easily available to planners, conservation commissions, biologists, and others to use for conservation planning and wildlife and habitat research, monitoring and protection.

- **Communities and Conservation Groups** can encourage residents, members, and constituents to use the NH Wildlife Sightings database to report wildlife sightings by hosting a workshop or posting it on their websites.
- **Communities, Landowners and NH citizens** can report their wildlife sightings to the NH Wildlife Sightings Database at www.nhwildlifesightings.unh.edu. These reports will help to add to the database of wildlife records across the state.

2102. Assess Threats to the Health of Wildlife Populations

New Hampshire should continue to assess threats to wildlife and habitats based on methodologies developed for the Wildlife Action Plan. These efforts should focus on: (1) taxa with significant knowledge gaps such as invertebrates, amphibians, and fish; (2) taxa where increased knowledge of threats and subsequent targeted action may prevent continued declines to threatened or endangered status; and (3) new or emerging threats that may pose significant risk to wildlife populations. Repeated standardized assessments over time will produce scientific data that enable the development of actions to mitigate the

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threats. Identifying patterns of risk to wildlife may allow management to adapt incrementally, before species decline to threatened or endangered status and before habitats are seriously degraded. This may preempt drastic and costly interventions and increase the availability of resources for other potentially threatened or endangered species. *Also see: Monitoring and Population management sub-action categories.*

- **Communities, Conservation Groups, Landowners and others** should become aware of the threats to wildlife and take steps, such as permanently conserving habitats, necessary to reduce or abate threats.

2103. Produce and Deliver Maps of Priority Ecologically Intact Habitats (Wildlife Action Plan Maps)

NHFG produced data on wildlife habitats and their ecological condition and has used them to prioritize areas of the state for conservation. These data and the set of Wildlife Action Plan maps created from them portrayed the potential of the landscape to support a sustainable and diverse array of wildlife and habitats. Additionally, they have incorporated priority wildlife distributions, ecological processes, and influence of human activities on the landscape. They have also identified critical areas to support priority wildlife habitats and biodiversity, resulting in more efficient and effective protection. These data have been used by municipalities, land trusts, state and federal agencies, and funders of land conservation to prioritize land for permanent protection, resulting in 234,000 acres of high ranking habitat being protected. These data have been updated twice, most recently for this revision of the WAP in 2015 using data for the entire northeast region of the US as a basis. Other regional GIS data will be added to the suite of tools, including data on climate change resilience. These maps should be updated every five years, or when newly available data will significantly increase the value of resulting maps for management action. Widespread distribution of these data and technical assistance will be continued.

- **Communities, Conservation Groups, Landowners and others** should become familiar with the latest version of the Wildlife Action Plan Maps (Habitats Land Cover and Highest Ranked Habitats) and the data behind them, and use them in local conservation planning, natural resources inventories, natural resources chapters of master plans, the development of local regulations and policies, etc.

2104. Validate and Refine Models of Species and Habitat Distribution

NH Fish and Game and its partners will work to continually validate and refine maps of predicted distributions of wildlife populations and habitats, prioritizing species based on both imperilment and sensitivity to habitat change. Refining models for more abundant species expected to be sensitive to habitat alteration will result in better models that can be used to improve understanding of changes in the landscape. Confirming or refuting predicted locations of wildlife populations and habitats will improve efficacy of and support for the implementation of local and statewide conservation strategies and actions.

- **Communities and Conservation Groups** should be aware of updates to the Wildlife Action Plan maps and incorporate updated information about the distribution of wildlife and habitats into conservation planning and municipal documents.

2105. Map Potential Wildlife Corridors and Habitat Connectivity

NH Fish and Game and its partners will map landscape connectivity using models to represent spatial

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processes such as dispersal, migration and foraging. Mapping connectivity and buffering critical wildlife areas can target lands that help retain ecological connectivity and sustain wildlife diversity. Mapping connectivity across the landscape can provide an understanding of the potential for adaptation of wildlife and plants to climate change. Data and maps can then be used to prioritize critical corridors for protection and /or restoration. Mapping landscape connectivity will be achieved through coordinated inter-agency and inter-organizational efforts. Northeast regional resources should be used as well as NH based resources.

- **Communities and Conservation Groups** should incorporate information about wildlife corridors and landscape connectivity into their land conservation projects, conservation planning, natural resources inventories, and other activities/documents as appropriate.
- **Communities** should consider collaborative conservation efforts with neighboring communities since corridors and connectivity of habitats span political boundaries.

2106. Prioritize and Refine Strategies to Conserve Wildlife

The efficacy of wildlife conservation efforts will be improved by focusing on the most effective and feasible strategies for sustaining wildlife populations, habitats and landscapes, and for abating the most pressing causes of degraded wildlife health. Information gathered for the WAP should guide this effort in coming years. Input on strategies from partners, stakeholders, and the public has been obtained via collaboration, review, forum, and web-based survey. For each objective, feasibility will be reviewed thoroughly by NHFG with input from relevant experts upon completion of the WAP and prior to implementation.

2107. Use Natural Communities and Systems as Surrogates for Poorly Represented Taxa

There are a wide variety of taxa, predominantly invertebrates, for which very little information exists. By identifying and protecting the full range of natural communities and systems that occur in the state, it should be possible to provide habitat for all native species, including those not represented in the WAP. Natural Communities of New Hampshire (Sperduto and Nichols 2011) provides the most up-to-date descriptions of natural communities in the state. Likewise, systems are described in Natural Community Systems of New Hampshire (Sperduto 2011). The NHNHB database contains records of all known occurrences of exemplary natural communities and systems throughout the state, and NHNHB staff is continuously updating it as new information is gathered.

- **Communities and Conservation Groups** should incorporate information about natural communities in their natural resources inventories, conservation plans, municipal documents, etc.

2108. Provide Conservation Planning Resources to the Public

Communities, Conservation Groups, and others can use several programs to disseminate data, maps, and technical assistance on the conservation of wildlife and habitats. These programs include: Taking Action for Wildlife, NH Land Trust Coalition, UNH Cooperative Extension volunteer programs such as the NH Coverts Project and Natural Resource Stewards, Stewardship Network New England, NH Association of Conservation Commissions, NH Association of Natural Resources Scientists, and other programs.

- **Communities, Conservation Groups, Landowners and others** should refer to the above resources, all of which are linked on the Taking Action for Wildlife website:

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www.takingactionforwildlife.org. The website also provides specific actions that communities, conservation groups and landowners can take to protect habitats and wildlife in NH.

2200. Local Conservation Planning, Land Use, Regulation and Policy

Local conservation planning is an important part of prioritizing and protecting important habitats in a town. A Natural Resources Inventory provides the natural resources information necessary to develop a conservation plan. A conservation plan can include a variety of conservation measures, with a primary focus on voluntary permanent conservation (e.g. conservation easements), along with local regulations and other means of protecting important habitats. Communities and conservation groups can use conservation planning for wildlife to focus protection on large tracts of land and connecting existing protected parcels for wildlife travel corridors. Wildlife information should also be incorporated into the natural resources chapter of the municipal master plan, which forms the basis for developing local regulations. Municipalities have the power to regulate land use, but broad policies and visionary statements are not always translated into meaningful planning or conservation. Communities should have a sound, scientific basis for developing and implementing traditional and innovative land use incentives, regulations, and other measures that conserve habitat and landscape connections, maintain ecological function, and protect water quality and supply. In order for municipalities to develop master plans, zoning ordinances, subdivision regulations, and other innovative land use tools that will lead to greater protection of these habitats, conserve water quality, and maintain landscape connections, they will need to understand what species and habitats may be located within their borders. Municipalities also need to know what tools may be most beneficial to protecting resources given the ecology and culture of their towns, and how those protections lead to economic opportunities and retention of the quality of life that is important to the town.

2201. Incorporate Habitat Conservation into Conservation Planning and Land Use Planning

NHFG and UNH Cooperative Extension have partnered since 2009 to provide technical assistance to municipalities and conservation groups on land conservation, conservation planning, and local land use planning through a program called Taking Action for Wildlife. This successful program provides information on critical habitats and species, using the Wildlife Action Plan maps and other resources, to assist communities and conservation groups in planning for habitat conservation by identifying critical wildlife habitats for protection. The program also provides assistance with natural resource inventories, conservation plans, master plans, management of publicly and privately-owned conservation land, outreach to community members, development of town ordinances, and other activities. A website, www.takingactionforwildlife.org, provides information and how-to's on all these topics for communities, conservation groups and landowners. This program should be continued, and broadened to respond to the needs of these audiences. It should also provide climate-smart actions and tools to assist in municipal and regional conservation planning.

- **Communities** can incorporate wildlife and habitat into local land use and conservation planning by creating a Natural Resource Inventory (NRI) to catalog the important natural resources in their town. The NRI should include a comprehensive wildlife section, using information from the Wildlife Action Plan. Communities can then use that information along with NH Wildlife Action Plan maps to prioritize important habitats and focus land conservation efforts. By including wildlife and other natural resources information in their master plans, municipalities can use this information to help develop local regulations to protect wildlife habitats.

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- **Conservation groups** should incorporate current information about wildlife and protection of habitats and species in land conservation projects and landscape-level conservation planning.
- **Communities** should connect with the land trust that covers their town/region to identify common priorities for protecting wildlife habitats and other natural resources.

2202. Increase Funding for Conservation Planning

Adequate funding should be provided so that all municipalities can develop a conservation plan, including the creation of a natural resources inventory with appropriate mapping and a set of goals, objectives and actions. Incentives and recognition for conservation planning and implementation should be provided.

- **Communities** should investigate local funding options (e.g. line item, conservation fund, etc.) that could help support the development of these documents.

2203. Incorporate Climate Change and Wildlife into Conservation Plans and Municipal Plans

NH Fish and Game and its partners will assist communities and conservation groups in incorporating climate change considerations into conservation plans, land-use plans, municipal and regional master plans, hazard mitigation plans, transportation plans, and infrastructure decision-making. Climate change can be incorporated into planning documents by identifying ecological services provided by wildlife habitats such as floodplain habitats and wetland buffers mitigating flood events; dunes and salt marshes buffering storm surge; vegetated shorelands protecting lake and stream banks; natural habitats promoting groundwater recharge; and other processes and functions that natural areas provide at little or no cost. Technical assistance should be provided on how human adaptations to climate change, such as infrastructure modifications, can affect wildlife, and how natural systems can mitigate those effects in a more cost-effective manner. Technical assistance should be provided on the use of natural areas and improved infrastructure for the purpose of flood management.

- **Municipalities** should incorporate climate change and wildlife into their conservation plans, master plans, hazard mitigation plans, and other plans. **Municipal boards** should seek out assistance from UNHCE, NHFG, regional planning commissions, and other organizations to help incorporate important climate change and wildlife information into municipal plans.
- **Communities and Conservation Groups** should become familiar with the information in the NH Ecosystems and Wildlife Climate Adaptation Plan and incorporate this information into their work.

2204. Technical Assistance on “Smart” Development Practices

Provide examples of techniques to assist towns in making better choices for wildlife habitat protection and the retention of town character, while also allowing for economic opportunities. These techniques can include town ordinances, zoning changes, site review practices, transportation development and maintenance, “open space” development criteria, and other documents.

- **Municipalities** should work to better understand, encourage, and favor “smart” development practices that help to protect wildlife habitats. Regional Planning Commissions are a good source of assistance for developing municipal regulations, regional transportation issues, and “smart” development practices.

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2205. Technical Assistance for the Protection and Management of Town- or City-Owned Lands

Communities should be encouraged to consider placing conservation easements on town/city-owned lands which are acquired for conservation purposes, to prevent future development of these properties for municipal purposes. Technical assistance should be provided on habitat management and restoration opportunities on town/city-owned lands. Guidelines for trail planning should be provided to balance recreational access and enjoyment while minimizing wildlife disturbance. Guidance should be provided on invasive species control through the Picking Your Battles program, the Stewardship Network New England, and other resources.

- **Communities** should work to permanently conserve town/city-owned lands through conservation easements.
- **Communities** should seek professional guidance (e.g. county extension foresters, licensed foresters) to create management plans for town-owned properties and, where appropriate, manage these lands for wildlife through actions such as timber management, invasive plant removal, and native plant plantings. Town-owned lands can serve as important demonstration areas of good, responsible stewardship.
- **Communities** should include wildlife considerations when planning trails on municipal lands.

2206. Increase Conservation Commission Training and Communications

Communications between agencies and conservation commissions should be improved. Tools, training and information should be provided to enhance their work in environmental review, town planning, and town land protection and management. Agencies should engage with the NH Association of Conservation Commissions.

2300. Regional and Statewide Land Use Planning, Regulation and Policy

Planning occurs at many scales, both within regions of the state and at the state level. There are nine Regional Planning Commissions that work with individual towns and across town borders. They create a variety of regional plans on subjects such as transportation and economics. There are a number of regional and statewide conservation organizations, agencies, and others that have created regionally-based conservation plans. Agencies create plans and policies and implement regulations regarding all aspects of development, related infrastructure, and management of man-made and natural resources. This planning affects wildlife and habitats.

2301. Promote Role of the Regional Planning Commissions in Landscape-Scale Conservation

Regional Planning Commissions (RPCs), established by RSA 36, are required to “prepare a coordinated plan for the development of a region” and may assist their member and nonmember towns with implementing the plan and with other local planning issues. From a land use planning perspective, RPCs are in the best position to look beyond municipal political boundaries to advance landscape-scale conservation goals such as maintaining large blocks of forest, large wetland complexes, natural communities, and connectivity across all habitats. NHFG should collaborate with Regional Planning Commissions on opportunities to incorporate landscape-scale conservation goals and strategies into the comprehensive master plan and other planning efforts in their region. Efforts should focus in particular on expanding and promoting the sustainability principles and plans created during the Granite State Future program.

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- **Communities** should look beyond municipal boundaries and consider working with neighboring towns on larger scale conservation planning. Communities should connect with existing regional landscape-level work that their regional planning commission might have done.
- **Conservation groups** (e.g., land trusts) can work with communities in their region to promote landscape-scale conservation, and can help connect communities and regional planning commissions.

2302. Develop Regional Conservation Plans Throughout the State

There are several existing regional conservation plans in the state, for example: The Quabbin to Cardigan Conservation Partnership, The Coastal Conservation Plan, the Lakes Region and Merrimack Valley Conservation Plans, Bear Paw Regional Greenways Conservation Plan, and the Staying Connected Initiative in the North Country. Regional Conservation Plans should be developed for other areas in the state. Preparation of these plans should engage a variety of partners and stakeholders including trails and paddling interests as well as traditional conservation groups.

2303. Incorporate Wildlife and Climate Change Considerations into State Agency Planning, Policies and Regulations

State Agencies should consider the needs of wildlife and habitats as well as those of humans when creating plans for transportation, development, energy infrastructure, flood hazard mitigation, wetland mitigation, and other plans where the decisions made will affect wildlife or habitats. Agencies such as NHDES have already modified their policies to reduce impacts to wildlife through the Aquatic Resources Mitigation and other programs. NHFG will work with these agencies to identify priority plans, policies and regulations that affect wildlife the most.

2304. Promote the Consideration of Ecological Services in Planning Efforts at All Scales

Wildlife habitat provides valuable ecological services to the people of New Hampshire. For example: floodplain habitats and wetland buffers mitigate flood events; dunes and salt marshes buffer storm surges; vegetated shorelands protect lake and stream banks; natural habitats promote groundwater recharge; and clean streams and lakes provide critical drinking water resources. Consideration of ecological services should be incorporated into land-use planning efforts, municipal and regional master plans, hazard mitigation plans, transportation plans, and infrastructure decision-making at all scales. Approval and design of new or re-engineered engineering/infrastructure should be considered in light of the potential effects on ecosystem services. Preference should be given to the use of natural systems that also provide wildlife habitat rather than built infrastructure to address issue such as erosion and flooding. Applications for state funding available for infrastructure planning efforts should give priority to proposals that explicitly address the consequences of climate change, such as increased severe weather events and sea level rise.

2400. Northeast Regional and National Coordination

Regional coordination builds consensus on the most critical conservation issues. The majority of wildlife species at risk in New Hampshire are not restricted to the state, and thus it is imperative that conservation efforts take into consideration their status in neighboring states. In addition, many regional planning documents identify threats that are common throughout the region. Given that many of the threats identified in this WAP occur over a large area (e.g., mercury, acid deposition, invasive species), they are best approached in a regional or multi-state manner. Species and habitats of regional concern

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have been identified by both the Northeast Fish and Wildlife Diversity Technical Committee (NEFWDTC) and North American Bird Conservation Initiative (NABCI).

2401. Develop and Implement Conservation Actions for Issues, Threats, and Opportunities That Are Most Effectively Addressed at a Regional/Multi-State Scale

The small size of many northeastern states has engendered a culture of cooperative and/or complementary management approaches. The Northeast Association of Fish and Wildlife Agencies traditionally has supported a strong technical committee structure to further wildlife conservation. NEFWDTC is comprised of leaders of wildlife diversity programs. In addition, technical and ad hoc committees focus on species, habitats, or planning, and exchange ideas and develop common approaches to wildlife issues. Typically, these conservation actions are implemented by individual states using their own funds; however in some cases additional funding has been made available through the Northeast Directors. The Regional Conservation Needs (RCN) Program formalizes a cooperative approach to address SGCN needs across multiple states. The purpose of the RCN program is to develop, coordinate, and implement conservation actions that are regional/sub-regional in scope, and build upon the many regional initiatives that already exist. The RCN program utilizes a funding mechanism that is equitable to all Northeast states and the District of Columbia, creating a base of funding for regional projects. Since 2007, thirty-seven different projects have been funded. The resulting reports and products can be found at RCNgrants.org.

2402. Develop and Implement Regional Species and Habitat Conservation Plans

Conservation plans have been or are being developed for several species of conservation concern in the Northeast and beyond. These include plans created for species identified by the SWAPs as SGCN that cottontail. The North American Bird Conservation Initiative has developed, or is developing, broad conservation strategies for birds across the two Bird Conservation Regions that include parts of New Hampshire. Such plans have the potential to conserve species at risk when implemented over a large region. Other species have been identified through the Regional SGCN process which would benefit from similar planning efforts.

2403. Develop Regional and National Landscape-Scale Conservation Processes and Plans

The limited funds available for protecting and enhancing habitat must be targeted towards protecting core areas and their linkages across the range of the species. Identifying these cores and linkages is therefore critical. Several efforts are under way to do this work, including Regional Conservation Opportunity Areas, the Connecticut River Landscape Conservation Design pilot, and others. NHFG should participate in projects initiated by NEFWDTC, the North Atlantic Landscape Conservation Cooperative, the Northeast Climate Center, and others to develop processes for large scale conservation planning.

2404. Prevent Importation of Non-Native Species

Measures should be developed to reduce or prevent the importation of non-native species, genes, diseases, and other pathogens into the region and into NH that have the potential to harm native wildlife. Coordination amongst states will strengthen protections.

3000. Agency Coordination, Regulation, and Policy

Overview

State and federal agencies regulate activities in many sectors, and are influential in encouraging developers, farmers, industries and others in voluntarily making environmentally sustainable choices. Government agencies must work together and with other organizations to promulgate, implement and enforce regulations and promulgate and encourage the use of BMPs.

3100. NHFG Coordination and Policy

NHFG’s mission is “As the guardian of the state's fish, wildlife and marine resources, the New Hampshire Fish and Game Department works in partnership with the public to: conserve, manage and protect these resources and their habitats; inform and educate the public about these resources; and provide the public with opportunities to use and appreciate these resources.” Native wildlife should be adequately protected by state laws and regulations for the enjoyment of New Hampshire’s residents and visitors, and to maintain healthy or sustainable populations. These laws should be clearly understood by all individuals, agencies, and organizations affected by them. Conservation officers should be trained, equipped, and funded to enforce wildlife laws, including those pertaining to non-game, threatened, and endangered species. NHFG oversees the protection, restoration, and conservation of wildlife in New Hampshire, and regulates its take, sale, and possession. RSA 212-A and associated rules protect endangered and threatened wildlife. Under this law, other state agencies that authorize, fund, or carry out activities must consider potential impacts to state-listed wildlife.

3101. Revise Endangered Wildlife List

Resources for wildlife conservation are limited, and a revision of the NH Threatened and Endangered Wildlife List (Administrative Rule FIS 1000) would ensure that these resources are directed toward those species most in need of management, intensive monitoring, or similar recovery efforts. Revising the threatened and endangered wildlife list also would ensure that regulatory protection goes to those species in greatest need. Detailed assessments have been completed for those species of greatest conservation concern as part of the Wildlife Action Plan. A revision of the NH endangered and threatened species list is required to be considered every eight years, and will be due in 2016 and 2024. Conservation partners and taxonomic experts from universities should assist in identifying those species in need of greater protection or those no longer in need of protection under RSA 212-A. This objective is best accomplished through the formation of taxon-specific technical committees.

3102. Revise Protocols to Review Threatened and Endangered Wildlife Habitat

Long-term recovery of endangered and threatened species is best achieved by focusing on protecting high quality habitat rather than only preventing the take of individuals. New Hampshire’s Endangered Species Conservation Act (RSA 212-A) should be reviewed for potential modifications that would provide more comprehensive habitat protection for endangered and threatened wildlife. Representatives from state agencies and business, timber, energy, and agriculture interests should be engaged in the development of revisions to RSA 212-A, and an advisory committee with a legislative liaison should be established to assure successful implementation.

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3103. Revise/Enforce Chapter FIS 800: The Importation, Possession, Sale and Use of Wildlife

Revising administrative rules on the importation, possession, sale, and use of wildlife (Administrative Rule FIS 800) will help prevent unnecessary take, diseases, and invasive species from harming native wild populations. A number of species are unregulated or warrant additional protection. Rules adopted in 2007 added new protections for reptiles and amphibians, and prohibited the possession of several invasive invertebrates.

3104. Develop Protocols for Limiting Activity in Sensitive Habitats

Fragile and sensitive ecosystems can be damaged by human presence, even when no harm is intended. To prevent disturbance, sensitive threatened and endangered species areas should be buffered from human disturbance. State lands management should continue to prioritize wildlife when considering work in sensitive habitats. Private landowners should be encouraged to do the same. Protocols for each habitat type should be developed and widely disseminated. (*also see "Safe Harbor Agreements" action*).

3105. Minimize OHRV wildlife impacts

Prevention of OHRV use in sensitive endangered and threatened species habitats, such as coastal dunes and pine barrens, would remove a potential mortality factor, especially for piping plovers and rare pine barrens species such as the Karner blue butterfly. The designation of sensitive habitats should include some areas of unfragmented forests, to reduce overall impacts on wildlife. Where OHRV use is deemed appropriate, well designed and maintained trail systems will reduce impacts to wildlife and will provide OHRV riders with safe and reliable recreational opportunities. NHFG conservation officers, land managers, and biologists, in cooperation with DRED staff, have the training and capabilities to implement this objective. The Cooperative State Lands Management Program is an interagency agreement among NHFG, DRED, NHDES, and NHDOT that coordinates state land management, including OHRV use. Local OHRV clubs develop and maintain trails under the guidance of the DRED Trails Bureau. The Cooperative State Lands Management Program should review and implement policies that reduce impacts to wildlife and provide OHRV riders with safe and reliable recreational opportunities. DRED and NHFG staff should continue to develop and implement trail management practices that minimize environmental degradation and avoid impacts to significant habitats. NHFG law enforcement officers and other law enforcement agencies should continue to enforce OHRV rules to minimize impacts on wildlife and habitats.

3106. Manage Public Water Access Impacts

Overuse of lakes and rivers by motorized and non-motorized boats can harm wildlife populations and habitats. Public access discussions should integrate considerations of impacts to fish and wildlife populations and habitats. Coordinated planning prior to the initiation of specific projects, and prioritizing projects based on potential impacts to natural resources, will help protect wildlife and habitats. Boat access projects should consider ecological significance and potential effects on the entire waterbody before selecting priority sites for public water access. Access sites that will harm significant natural resources should not be funded. The Public Water Access Advisory Board advises, monitors, and coordinates state public access efforts.

3107. Enforce Wildlife Regulations

The NHFG has a law enforcement division with approximately 40 conservation officers spread across six districts. These conservation officers are primarily responsible for enforcing NHFG rules and regulations. Biologists at NHFG have extensive knowledge regarding the identification and biology of regulated species. Greater coordination among conservation officers and biologists at NHFG would help

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to ensure that wildlife rules and regulations are enforceable and that conservation officers are trained to enforce regulations pertaining to species of conservation concern. This coordination should continue.

3108. Manage State Lands for SGCN as Appropriate

The state owns State Forests, State Parks, and Wildlife Management Areas which are managed cooperatively between NHFG and DRED through the State Lands Management Team. Habitat management on these lands should continue to include priorities for management activities that benefit SGCN in appropriate locations.

3109. Incorporate the Wildlife Action Plan into the Activities of All Divisions and Programs of NHFG

The needs of SGCN as well as other wildlife should be addressed throughout the agency in a more integrated and publically acknowledged manner. This will increase public support for NHFG by demonstrating how NHFG serves all its constituents while still serving its traditional ones. The NHFG Commission should be regularly updated on the progress of WAP implementation to increase support for the program.

3110. Ensure that the Wildlife Action Plan is Accessible and Usable on the NHFG Website and Associated Sites

Create webpages that make the WAP easy to navigate so those interested in particular threats, types of actions, audiences, species, and habitats can find them and thus act on them. The WAP will be more than a static PDF, but a call to action by the agencies, organizations and citizens of NH, and regional partner agencies and organizations.

3200. Interagency Coordination, Regulation and Policy

Improved coordination among agencies removes obstacles and creates opportunities to maintain and restore wildlife health. To improve air and water quality, efforts should focus on reducing air and water pollution through science-based decisions. An interdisciplinary, interagency risk assessment team could identify selected indicator species and habitats that could be used to monitor changes in water and air quality that may negatively impact sustainability of wildlife populations. Topics for additional working groups include development, transportation, recreation, and forest management.

Actions under this broad category were grouped into the following categories recognizing that many actions interact across multiple categories:

- *Development*
- *Transportation and service corridors*
- *Water and Watersheds*
- *Climate Change*
- *Pollution*
- *Outdoor economy (recreation and forestry)*

3210. Development Actions

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3211. Promote a Sustainable Development Working Group

Promote a New Hampshire non-regulatory working group that proactively identifies opportunities to improve decisions on how and where development occurs. This would help maintain and improve the ecological integrity of landscapes and would promote a commitment to environmentally sustainable development. Many organizations and agencies in New Hampshire can help plan sustainable development and reduce impacts to wildlife. The working group may be best coordinated by a non-regulatory non-governmental agency, and would require a consistent long-term funding source. Any effort to develop a sustainable development working group should build off of the work of the Minimum Impact Development Partnership coordinated by the Jordan Institute and NHA and work completed by the NH Department of Environmental Services and the Granite State Future statewide sustainable planning project.

3212. Support Residential, Commercial, and Energy Development Regulations, Policies, and Incentives That Support Healthy Wildlife Populations

Wildlife considerations, especially impacts to threatened and endangered wildlife populations, are incorporated into permitting reviews and approvals (i.e., Department of Environmental Services, NH Site Evaluation Committee). Existing policies and regulations should be evaluated to ensure that projects minimize impacts in the most appropriate manner, and that changing information about conditions of rare populations and sensitive habitats are updated and addressed as needed.

3213. Evaluate Impervious Surface and Vegetated Cover Thresholds and Buffers That Degrade Watershed Water Quality

Water quality typically declines with increased impervious surface and corresponding reduction in vegetated cover within a watershed. Local, state, and federal regulatory agencies and land conservation planners should incorporate threshold values and standardized riparian buffers into decisions and policies. Riparian buffer setbacks should be present on all perennial streams and wetlands.

3214. Encourage Reductions in Light Pollution at Priority Locations

Some wildlife species may be sensitive to artificial sources of light during nighttime. Provide education, technical assistance, and recommendations during project review to reduce light pollution.

3220. Transportation Actions

3221. Integrate NH Wildlife Action Plan into Transportation Planning

NHFG should work with NHDOT, the Federal Highway Administration, and communities to integrate maps, data, threats, and actions identified in the NH Wildlife Action Plan into NHDOT's long-range and project specific planning efforts, and promote relevant information to communities for transportation planning.

3222. Provide Education and/or Trainings to Community Road Agents

Community road agents may assist in identifying wildlife threats, identifying priority restoration or opportunity areas, and/or implementing best management practices. NHFG should work with community road agents to prioritize stream crossing replacement projects.

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3223. Promote a Transportation Working Group

A New Hampshire transportation-wildlife working group can proactively identify opportunities to maintain or improve the ecological integrity of landscapes impaired by existing or proposed roads. Improved planning and coordination among state agencies (NHDES, NHFG, NHDOT), federal agencies (USEPA, ACOE, FHWA), conservation groups, researchers, and local planners would have a statewide benefit to wildlife. It would also produce broad project support, increased permitting predictability and improved highway safety. A multidisciplinary working group should include biologists, land-use planners, engineers, transportation project managers, and technical assistance specialists. Goals of a transportation working group could include prioritizing research needs, identifying funding opportunities, improving data sharing and coordination, and increasing education and technical assistance.

3224. Determine Road Mortality ‘Hot Spots’

Determine which wildlife species are most at risk of mortality or cause concerns for driver safety due to vehicle-wildlife collisions. Develop methodologies for assessing priority road stretches where wildlife and vehicle collisions are a concern.

3225. Initiate On-The-Ground Strategies, to Facilitate Movement Through Wildlife Linkages Identified Through Modeling

Research should be conducted to determine the most effective techniques for reducing wildlife road mortality such as road barrier mitigation and efforts to influence driver awareness of wildlife crossings. Other strategies might include increasing road visibility, signage, modification of guardrails, improved culverts, and reduced salt use in sensitive areas. A possible model to emulate would be the “Staying Connected in the Northern Appalachians” project.

3226. Update or Modify Infrastructure (Roads, Culverts, Bridges, Critical Facilities) to Account for Sea Level Rise and Larger Riverine Flooding Events when due for replacement or when new *See also Planning and Climate Change Actions*

3227. Provide Information on Climate Adaptation, Particularly Culverts and Wildlife Road Crossings, at Professional Meetings of Road Agents, Insurance Agents and Engineers

NHFG should work with the University of New Hampshire Technology Transfer Center program to educate road agents and engineers.

3230. Water and Watersheds

3231. Implement Best Management Practices (BMPs) for shoreline buffers, and improve riparian buffer protection for rivers and streams

Goals and guidelines should be created for vegetated shoreline buffers to improve habitat for wildlife and water quality, allow for flood storage, and reduce storm erosion. This should include limitations on shoreline armoring and protections on natural vegetated buffers. Outreach efforts should be targeted to increase awareness among town planning boards of the importance of riparian buffer protection on headwater streams. Incentives should be provided to increase buffer protection in areas of high impact land use, such as agriculture or high density development. BMPs should address the timing and use of fertilizers, pesticides and riparian buffer protection in agricultural and landscaping practices. NHFG should work with the Aquatic Resource Mitigation Program to strengthen restoration projects, and with the agricultural community to implement nutrient management programs that protect water quality in wetlands, streams, rivers, lakes and ponds.

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3232. Develop policies to predict and respond to sea level rise that will allow for habitat migration.

The Sea Level Affecting Marshes Model (SLAMM) should be used to measure and predict habitat shifts within NH's 17 tidally influenced communities at a range of sea level rise and time line scenarios around Great Bay and Hampton/Seabrook. These can then be compared to Fort Point data, the nearest active National Water Level Observation Network tide station. SLAMM has been used to identify current restrictions/barriers to tidal flow, which present opportunities for restoration. Integrating SLAMM results with an evaluation of current conditions can help identify for conservation the upland parcels with the greatest potential for allowing salt marsh migration. Research should be continued into ways to integrate tidal and freshwater habitat research into a comprehensive hydrodynamic model. Strategies and decision trees should be developed to respond to infrastructure that will be impaired or destroyed by sea level rise, placing importance on areas where there may be obstacles to habitat migration. Conservation activities should focus on areas that may be able to evolve to productive coastal habitats. The activities could include abandonment, insurance cost increases, altering culvert sizes or financial incentives.

3233. Restore or Maintain Watershed Connectivity to Provide Areas for Fish and Wildlife Passage and the Ability to Compensate For Increased Storm Events

NHFG should continue to work with municipalities, NHDOT, NHDES Wetlands Bureau, and non-government organizations to improve the habitat connectivity of river and stream crossings throughout the state at the watershed level. Standardized stream crossing assessment protocols should be followed and all data should be compiled in the statewide database maintained by the NH Geological Survey (NHGS). Watershed-wide stream crossing assessments intended to prioritize replacement of culverts that pose a flood risk should incorporate fish and aquatic species data to identify crossings that may cause potential flood damage and restrict aquatic organism passage. Information on costs associated with maintaining/replacing culverts and potential funding sources should be distributed to towns, road agents, and select boards. Incentives should be provided for removal or modification of infrastructure identified as barriers to ecosystem services integrity.

3234. Implement Methods to Decrease the Impact of Impervious Surfaces by Using Best Management Practices (BMP's) That Address a Wide Variety of Land Uses

BMPs should incorporate climate predictions in recommendations for low impact stormwater management systems that protect aquatic habitats and water quality. Low impact development techniques include the use of existing and new technology to increase infiltration of water into the ground through permeable pavement and surfaces, catchment systems, and green roofs. Incentives should be created for developers and planners to use low impact development techniques, and buy-out programs should be considered to reduce development density on shorelines. The effects of impervious surfaces should be assessed and monitored across a range of watersheds, focusing on runoff, water temperature and altered flow patterns.

3235. Identify and Prioritize Protection of Watersheds Where Flooding or Drought Conditions Pose Serious Threats to Humans and Natural Systems

Climate models and the US Geological Survey precipitation models should be used to model changes to hydrologic systems. Fluvial erosion and floodplain zones should be identified and mapped for management and protection. Encourage collaborations between US Army Corps of Engineers, FEMA, USGS, NHGS, NHDES, and GRANIT to update floodplain maps with climate change information.

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Climate change considerations should be incorporated into river management plans with a focus on identifying at-risk reaches and sensitive habitats, and prioritizing opportunities for dam removal and culvert upgrades. Barriers to flooding and habitat migration should be identified, and recommendations and incentives should be provided for removal of problematic infrastructure that could be impaired or destroyed by sea level rise, increased storm surge, or riverine flooding.

3236. Implement methods to decrease the amount of development in floodplains

Efforts should be made to advance the use and acceptance of town-based ordinances that define, map, and regulate flood hazard zones along rivers. Incentive programs should be developed that compensate landowners for removing infrastructure in floodplains, which includes floodplain easements and river meander easements in agricultural areas. Model ordinance language and/or policies and incentives should be developed to reduce redevelopment in flood prone zones. Support policy changes at FEMA, Coastal Zone Management, and other agencies to increase setbacks and change building codes to help municipalities plan for sea level rise and storm flooding. Educational materials should be developed explaining how flooding impacts both aquatic life and human safety, and provide this to key partners (NH Silver Jackets Team, a multi-agency flood response team, and the Coastal Adaptation Working Group). Vegetated buffer requirements should be developed for transportation, development, and post-flood restoration. The Shoreland Water Quality Protection Act should be strengthened in response to predicted climate change impacts, which would entail increasing the amount of natural vegetation required to be left in the shore zone. The straightening of stream and river channels and the mining of gravel from stream beds should be discouraged, and the ability of culverts to handle higher flows should be improved. Collaborate with FEMA, Homeland Security and Emergency Management, NHDES, NHDOT, and the New England Interstate Water Pollution Control Commission.

3237. Coordinate and Provide Guidance on Dam Management to Improve Wildlife Connectivity and Habitat Resilience

NHFG should continue to participate in Federal Energy Regulatory Commission (FERC) relicensing, which addresses issues with water level management and fish passage at existing hydropower dams. More information should be provided (at the local level) on the impacts of excessive water level drawdowns. The NHDES Dams Bureau is currently working to reduce or eliminate excessive drawdowns on certain waterbodies. NHDES has produced a number of guidance documents that promote managing water levels with natural flow regimes in mind. Outreach efforts should target shorefront property owners to increase awareness of the negative impacts caused by unnatural water level fluctuations. This may help develop support for water level management policy changes in the future.

Wildlife managers should explore ways to be more involved in water release regimes and scheduling, especially in areas with sensitive species. In the future, a central program office in a single agency to coordinate statewide flow regimes would be extremely helpful, and would help bridge the gap between researchers working on ways to better manage flow and those responsible for dam management.

The River Restoration Task Force, a group of experts from government agencies and nonprofit conservation organizations, was convened in 2001 to help coordinate dam removal projects in New Hampshire. There have been a number of success stories including removal of the McGoldrick Dam on the Ashuelot River and the Merrimack Village Dam on the Souhegan River. Although the task force has been a success, it is difficult for a group of individuals with other responsibilities to sustain the focus

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that is necessary to complete most dam removal projects. Hiring full time project managers would greatly increase the number of dam removal projects that could be completed each year in New Hampshire. Although most dam removal projects are opportunistic by nature, more funding is needed for dam removals based on regional and statewide models (including Northeast Association of Fish and Wildlife Agencies projects) that demonstrate environmental benefits such as habitat restoration or flood storage.

3238. Restore or Mimic Natural Flows to Streams and Rivers

Statewide instream flow regulations should be implemented that sustain vegetative communities and aquatic species (i.e., fish and mussels), and water rights to sustain those flows should be established. NHFG employs biologists capable of providing technical input on the impacts of altered flow regimes on habitats used by aquatic species. NHDES, along with other agencies, is conducting an instream flow pilot study to establish minimum flow regulations necessary for fish, wildlife, and other interests. Lessons learned from these pilot projects, currently in the Lamprey River and Souhegan River watersheds, should be applied to other watersheds throughout the state.

The dam relicensing process regulated by FERC provides an opportunity to incorporate natural flow requirements into the licensing agreements issued to dam owners. Studies of the impacts that fluctuating flows have on the ecology of the Connecticut River are currently being conducted as part of the relicensing process for the dams owned by TransCanada Corporation. These studies will be useful in guiding management strategies for other dams throughout the state.

NHFG and NHDES should work with dam owners, including utilities, to manage more natural water flow in rivers and streams and to protect fragile shallow water habitats from winter drawdowns. Hydropower dam owners should be encouraged or compelled to develop and maintain fish passage and run-of-river hydropower through the use of incentives or regulations.

3240. Climate Change Actions

Responding to the effects of climate change requires multiple actions by many people in different areas of expertise and responsibility. Climate change actions are found throughout the Actions chapter, including actions requiring interagency collaboration. This section includes actions that do not fit other categories of work.

3241. Revise Ranking Criteria for Grants and Loans That Provide Funding for Land Protection, Habitat Management, Planning, and Development to Include Climate Adaptation Elements

A set of metrics should be defined that describe the effects of climate change on proposed projects. Funding sources should be encouraged to use such metrics into their ranking process for determining project priorities. Funding sources could include LCHIP, The State Revolving Fund, The Renewable Energy Fund, ARM, Drinking Water funds, wetlands restoration funds, NRCS funds, and others. Major federal grant and funding programs should be increased and include climate adaptation points in proposal scoring. Each strategy should include an explanation and justification of economic and human benefits, such as health and safety, to build community support for funding. Cost-benefit analyses should be conducted for both short and long-term costs.

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3242. Develop and Use Sea Level Rise Data to Address Coastal Habitat Issues

The Sea Level Affecting Marshes Model (SLAMM) and other appropriate sea level rise response models should be used to understand where coastlines and habitats might migrate. The models should create future scenarios that demonstrate changes if obstacles to habitat migration are removed or mitigated (e.g. roads abandoned, culverts appropriately sized, head-of-tide dams removed). The feasibility of these mitigation measures should be assessed.

3243. Consider the Adoption of Changes in the Planning Board and Conservation Commission New Hampshire Revised Statutes Annotated (RSAs) (i.e. NH Laws) To Include Adaptation Management Strategies

Considering climate change adaptation is crucial to all NH communities. Coastal communities have been working to plan for sea level rise and increased storm damage. Several other communities, especially those who have experienced the increase in storm-related flooding first hand, have also begun to include climate change adaptation. Consideration of the effects of climate change is critical to protecting wildlife habitat and human communities. Planning for these events will lead to considered, cost-effective solutions.

3244. Increase Public Knowledge on the Impact of Climate Change

State agencies, NGOs and educators should work together to increase public understanding and acceptance of the science of climate change, the issues for wildlife and habitats that will and are arising due to climate change, and what rules, regulations and voluntary practices are needed to address those issues.

3250. *Pollution*

3251. Incorporate Wildlife Concerns into Pollution Monitoring Programs and Reduce Pollution from Septic and Wastewater, Agriculture, Roads, and Other Sources

New Hampshire should adopt practices that minimize the effects of pollution on wildlife and habitat through actions at the state and local level. These include: (1) addressing issues associated with nutrient inputs from wastewater treatment plants and septic systems through proper siting and design and enforcing existing regulations; (2) adopting and promoting agricultural practices that minimize applications rates of herbicides and fertilizers; (3) upgrading wastewater treatment plants to remove pharmaceuticals from treated waters, and promoting strategies to reduce the input of pharmaceuticals into wastewater in the first place; (4) adopting BMPs for winter road management including reduced salt application and considering the use of alternative and less harmful deicing agents; and (5) working with NHDOT, the White Mountain National Forest, and DRED on human waste management near trailheads and other heavily used recreation areas to address impacts to water quality.

3252. Provide Education On Pollution That Impacts Wildlife and Habitats

Residents should be educated on proper septic system care and management to reduce impacts to water quality and wildlife. Education should be targeted to landowners near streams, ponds, lakes and wetlands, and should focus on reducing the use of chemicals, fertilizers and pesticides, and how these things can impact aquatic life. Road agents and towns should be educated about ways to reduce road salt and understand its impacts to the environment. Education about proper disposal of hazardous materials should also be provided.

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3253. Step Down Federal Air and Water Quality Policy

New Hampshire's air and water quality will largely depend on regional and national standards. Regional and national mercury databases and policies should be adapted to New Hampshire. Mercury, carbon, and other emission sources in New Hampshire are minor compared to sources within and outside of New England. Establishing a formal link with scientists and policy makers within New England will increase leverage for improving water quality, particularly on the Connecticut River and along the Atlantic coast. The benefits of working together at a regional level are crucial to improving ecological condition in New Hampshire. Reductions in major pollutants, including nitrogen oxides, sulfur dioxide, carbon dioxide, and mercury need to be made outside of New Hampshire. The establishment of RGGI was an important step in reducing carbon emissions, and has proven to also be an economic booster. Key participants outside of New Hampshire agencies are Northeast States for Coordinated Air Use Management, New England Interstate Water Pollution Control Commission, Northeast Waste Management Officials' Association, federal agencies such as the USEPA, USFWS, USGS, and NOAA, and university and other nonprofit research (such as BioDiversity Research Institute) and policy groups.

3260. Outdoor Economy

3261. Develop a Recreation Working Group to Review Issues and Prescribe Actions to Address Threats to Forests, Natural Communities, and Wildlife Health

Currently, a statewide Comprehensive Outdoor Recreation Plan allows input and prioritization about recreational issues and use, and is primarily implemented by DRED. Many state, federal, and non-governmental organization are involved in recreation in different ways, and wildlife could benefit from increased planning and coordination among state and federal regulatory agencies, conservation groups and recreation groups. Prescribed actions may include outlining further research, recommending and assisting with policy or regulations at that agency or state level, and recommending best management practices.

3262. Develop and Advocate for the Implementation of Best Management Practices for Biomass Production That Promotes Sustainable Production and Wildlife Habitat

The implications of harvesting woody biomass in existing forest (largely through whole-tree chipping) for wildlife habitat remain unclear. However, the increased focus on biofuel production, coupled with the known effects of changes in forest structure on wildlife, point towards the need to develop BMPs. These BMPs should be incorporated into the guidance document *Good Forestry in the Granite State*, and should be regularly updated to reflect the best available science on this topic. Efforts should be made to continue to evaluate biomass project guidelines for potential impact on different forest types, including research that looks at community shifts in certain habitats.

3263. Provide Guidance on Trail Placement and Discuss Long-Term Recreational Impacts on Conserved Lands

Decisions regarding the establishment, placement, and usage of recreational trails should include consideration of wildlife impacts. Wildlife professionals should collaborate with other state agency representatives to discuss trail management on state lands, and support local stakeholders including town additional trails in different areas of the state, consideration of 'set-aside' areas where certain human activities might be prohibited, and consideration of areas where pet restrictions may be beneficial to sensitive wildlife. Guidelines should be created that help determine which activities should be prioritized in which areas of the state, and consider rare and sensitive wildlife and habitats when planning trails for

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both motorized and non-motorized use. Both economic and ecological impacts should be considered when determining trail placement for OHRVs.

3300. Environmental Review Actions

Various state, federal, and local agencies or boards currently have the authority to review potential environmental impacts of a proposed activity on protected resources (e.g., wetlands, threatened and endangered species). Project evaluation ranges from database searches to extensive interactions with developers, engineers and environmental consultants. Site inspections by a biologist are often essential to provide the recommendations needed to minimize and mitigate impacts. Several potential enhancements could be pursued to improve the established environmental review process in New Hampshire, and subsequently species conservation. In particular, greater coordination among agencies and dissemination of information to stakeholders will improve the environmental review process. The identification and implementation of changes will be done in collaboration with other state agencies, non-government organizations, and the public.

3301. Release Wildlife Maps and Other Non-Sensitive Wildlife Data to the Public

The state should make wildlife-related information accessible to developers and the public, while also protecting sensitive information (e.g., rare species locations) and landowner rights. If developers and consultants have access to information prior to planning their projects, they will know which agencies to contact for a full review or for help in developing project designs before investing large amounts of time and money in a project. This will also help to streamline the review process and reduce redundancy in review requests. Wildlife Action Plan mapping layers are available on the Complex Systems Research Center at UNH (GRANIT) and on the NHFG website as pdf maps. Data and maps will be replaced as they are updated by NHFG. NHDES currently provides public access to environmental information through its OneStop database and would be a potential location for future data releases.

3302. Improve Intra and Inter-Agency Coordination for Environmental Reviews

Evaluate and revise protocols to improve coordination and efficiency among federal, state, and local regulators and advisory boards. Numerous positive changes to protocols were made in the previous 10 years and regulatory agencies will continue to evaluate protocols, efficiencies and effectiveness. This will reduce redundancy, provide critical information for formulating recommendations, and ensure that recommendations made by different groups are not contradictory. NHDES is proposing to develop a Coordination webpage as part of a pending USEPA grant request. An established environmental review committee will continue within the NHFG to address some of these issues.

3303. Develop Guidelines to Minimize Impacts to Endangered, Threatened and Special Concern Species

NHFG should develop guidelines for reviewing projects affecting threatened, endangered and special concern species. Guidelines will allow the NHFG to provide a more consistent and effective response to proposed development projects. Through these guidelines, the expectations of NHFG reviewers will be better understood by developers and engineers so that conflicts can be avoided prior to the permit process. Minimization and mitigations options may be discussed to the extent known. Guidelines were drafted for some species in the previous 10 years and should be finalized.

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3304. Review All Projects Potentially Threatening Protected Wildlife

Projects receiving minimal environmental review could be improved by increasing access to information and resources from NHFG and NHNHB, which could help reduce impacts to rare wildlife, plants and natural communities. Cooperation between NHDES, NHFG, NHNHB, and other involved parties will be necessary to determine which projects warrant additional review procedures.

3305. Include Significant Wildlife Habitats in Environmental Reviews

Wetlands are currently regulated by the NHDES Wetlands Bureau. As part of the current NHDES Wetlands Rules revision process, stakeholders recommended NHDES develop guidance for minimizing and avoiding impacts to wetlands function. Methods of protection should be considered for other significant wildlife habitats that currently lack adequate regulatory controls in New Hampshire. Providing additional protection for these habitats may be critical to maintaining the biodiversity of New Hampshire, especially in the rapidly developing southern part of the state. This objective will require meetings among many parties (i.e., regulatory agencies, conservation groups, private wetland consultants) to identify specific tasks and timelines. In some cases, existing rules and regulations may be adjusted relatively easily. In other cases, expanded protection may be required, and this process will require interdisciplinary coordination and support.

3306. Maximize Effectiveness of Wetland Mitigation in Implementing NH Wildlife Action Plan

In the previous 10 years, the Aquatic Resource Mitigation fund has been one of the most effective programs for efficiently implementing the NH Wildlife Action Plan (e.g., land protection, wetland and stream restoration). NHFG and NHNHB participate on the NHDES Aquatic Resource Mitigation Fund site selection committee, providing critical technical input on wildlife, plant, and natural community resources, and participation should continue. The site selection committee has also included critical participation from The Nature Conservancy, the Forest Society, the Association of Conservation Commissions, the NH Association of Natural Resources Scientists, and Office of Energy and Planning, along with ACOE and USEPA. Other mitigation proposals should be reviewed to maximize effectiveness of Wildlife Action Plan implementation.

3307. Require Monitoring To Demonstrate Success of Mitigation for Wildlife and Habitats

Monitoring the effects of a project on habitats and wildlife will enable biologists to determine if mitigation procedures were effective. Existing NHDES permit requirements involving restoration or creation of wetlands as mitigation currently require a minimum of three years of monitoring to determine project success. Longer periods may be needed to accurately determine the impacts to a given species or community and could be expanded to include more specific monitoring. Monitoring results should be shared broadly and be used to adapt future recommendations and management.

3308. Integrate Environmental Review to Include All Natural Resources on a Site

The quality of wildlife habitat in a defined location could depend on the relationship among various interconnected habitats. Reviewing proposed wetland impacts separate from proposed upland impacts might not protect the most significant wildlife resources in the long-term. For instance, the functions and values of a wetland often are directly tied to the adjacent uplands, and most wildlife that use wetlands also use surrounding uplands. Therefore, an integrated review process could allow for the protection of the most significant natural resources.

Conservation Actions

NHDES currently regulates wetlands and requires mitigation for wetland impacts, but there is not an equivalent process for terrestrial habitats, some of which are considered globally rare (e.g. pitch-pine barrens). The structure for reviewing and requiring mitigation for wetland impacts would be a useful template for review of upland habitats. However, this objective will require input and coordination among a large number of individuals and organizations to be successful.

3309. Secure Funding To Increase Biologist Interaction on Project Reviews

Staff at NHFG, NHNH, and NHDES should increase their interaction with project designers, engineers, developers and environmental consultants. This interaction would increase communication among natural resources agencies and developers, leading to a shared understanding of expectations and options for reducing impacts to wildlife habitat. Site visits are currently uncommon because of limited time and personnel. Funding is needed to conduct reviews, coordinate with NHDES, NHFG, and NHNH, and develop an efficient review process.

4000. Education, Information, and Technical Guidance

Overview

Education includes formal (school-based) and non-formal (camp, agency, adult, non-government, volunteer, conservation commission and professional) instruction and involvement across a variety of media. Technical guidance is primarily non-formal instruction and direction through workshops, field tours, one-on-one consultation, publications and presentations.

Education and technical assistance create an aware and ecologically knowledgeable citizenry who have the appropriate skills to identify and help resolve environmental challenges and participate in activities that lead to positive action on behalf of wildlife resources. Through an educated citizenry, many of the issues facing wildlife can be ameliorated. The ultimate goal is a change in human behavior that leads to a sustainable and environmentally friendly quality of life.

Many education and technical assistance actions are included throughout this chapter where the specific action targets a particular group of people, such as landowners. This strategy identifies both immediate, discrete actions, as well as long-term processes that can be taken to address conservation issues through education, information and technical guidance.

4001. Develop Education and Awareness Initiatives for Policy Makers Emphasizing the Importance of Addressing Wildlife Issues throughout the State

NHFG should provide government staff and the legislature with specific stories of wildlife concerns and climate change. Wildlife Action Plan and other maps should be used to illustrate issues. NHFG should engage in consistent communication with state level committees and commissions (for example, the NH Site Evaluation Committee), and include discussions about the best way to use and make energy efficiently in the state. The concept of ecosystem services should be incorporated into a variety of education workshops that highlight how intact ecosystems help in flood mitigation, drinking water protection, storm surge protections, water storage during droughts, improved air quality, and a robust tourism economy.

Conservation Actions

4002. Provide Resources about Wildlife and Habitats to Teachers, Schools and Families

Connections should be established between schools, teachers and other youth organizations, and existing conservation education groups like Project Learning Tree, NHFG, NH Audubon, Marine Docents, and 4-H, among others. NHFG should work with schools to incorporate wildlife into activities and curricula. Towns should be encouraged to plan education projects with their conservation commissions on town lands. Nature walks, tours, trail hikes, or volunteer workdays can be hosted on conserved properties to educate families and other members of the public about wildlife, habitats, and the importance of public lands.

4003. Educate Recreational Users Regarding Threats to Wildlife and Natural Communities

Impact of recreation should be reduced through informational materials and programs developed for recreational users including climbers, hikers, boaters, wildlife watchers and others. Use should be made of educational materials and programs developed at the regional or national level, and a coordinated effort should target recreation users on issues specific to NH. There should be an effort to bring together many willing partners including state agencies, non-government organizations, and recreation-based user groups who could support this work. NHFG can provide information regarding impacts to wildlife and habitats, and foster collaboration on education programs and materials.

4004. Improve Use of Communication Tools and Outlets to Educate the Public on Wildlife and Habitats

Easy access to the Wildlife Action Plan and maps should be provided, and all information should be made more accessible and user-friendly. This should include publicizing the Wildlife Action Plan revision completion--what it is, how someone can access it, and how they can be part of implementation. Awareness should be increased of the work that state agencies and private organizations are doing to protect wildlife, including education about how conservation supports tourism, the economy, and NH's way of life. The public should be educated on restrictions and protections of wildlife species (i.e., collection regulations). The public should be educated on overpopulation of certain species and help to dispel misconceptions. Education should be provided on forestry and the importance of young or open habitats, and the importance of less-conventional valuable habitats such as airports, gravel pits, and power line rights-of-way. Attempts should be made to help the public better understand beaver and wetland dynamics and implement proactive ways to minimize impacts to roads, culverts and property. The public should be educated about impacts of lead ammunition on wildlife by providing signage at heavily used areas.

4005. Implement a Landowner Education Series

NHFG, UNHCE, SPNHF, NH Timberland Owners Association and others should work together to inventory and evaluate wildlife educational materials, and assess need for new materials. Information should be distributed via brochures, websites, and program presentations that address issues such as living with wildlife, landscaping with native plants, and preventing the spread of invasive species. The availability of native plants from nurseries should be increased to encourage the use of more native plants with wildlife benefits. Landowners should be educated about land conservation options and how they can manage habitats for wildlife. Land trusts can serve as models of proper stewardship of conservation lands and provide demonstration areas and workshops to encourage others to take action for wildlife on their properties.

Conservation Actions

4006. Provide More Rounded Education on Climate Change That Includes How It Will Impact Wildlife Corridors and Connectivity, and Engage Local Volunteer Groups to Educate Others on Issues Related To Climate Change

Information should be provided to decision makers to help them understand possible scenarios of habitat loss and flooding problems if proactive measures are not taken. Training on ecosystem services and climate adaptation should be provided to the private sector so this can be used in development of adaptation plans and projects. Volunteer groups (Great Bay Stewards, NH Coverts Project, etc.) should be engaged in climate change activities. A short set of talking points should be developed that includes ecosystem services and illustrates their ability to mitigate the effects of climate change. Messages should be kept positive and incorporate human values about natural areas, rural character and the economy, including the popularity of maple syrup and fall foliage.

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