

Conservation Strategies

OVERVIEW

Element 4 of the NAAT Guidelines requires “descriptions of conservation actions proposed to conserve the identified species and habitats and priorities for implementing such actions.” This chapter summarizes conservation actions to address challenging issues identified in chapter 4. It also incorporates recommendations from species and habitat profiles. The strategies and actions identified in species and habitat profiles were used to generate a preliminary list of objectives. The objectives that make up the WAP were developed to be inclusive of all wildlife, with a focus on priority wildlife and wildlife habitats named in chapter 2. Objectives were cross-referenced to information about threats, affected species and habitats, and feasibility. These linked data will form the basis for objective prioritization of the WAP (chapter 7). Throughout this chapter, specific objectives are referenced by their number (e.g., 101, 703, 1201).

Actions were developed at the following levels of detail:

- Four broad focus areas: regional air and water quality, local land and water conservation, statewide biodiversity stewardship, conservation science and information management
- The short summaries of objectives presented in this chapter, which are based on the strategy template (provided in Appendix O) and organized by strategic program areas
- The complete strategy templates (not provided) containing detailed information relevant to feasibility and priorities, which NHFG is using in-

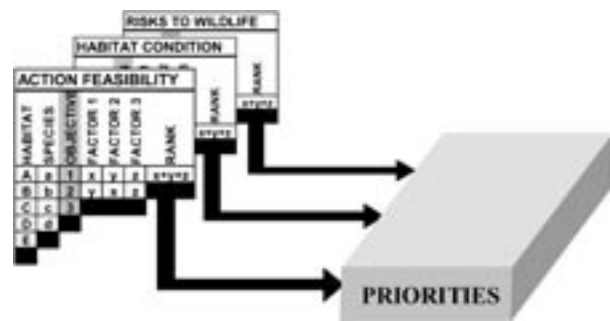


FIGURE 5-1. Risk assessments, condition assessments, and actions identified in species and habitat profiles were used to identify general strategies important to many wildlife species and habitats.

ternally to guide implementation. See chapter 6, page 6-6, for an example of a complete strategy.

- “Conservation Actions” section of the species and habitat profiles (Appendix A and B), containing detailed conservation actions and information about potential monitoring protocols for each species and habitat

Monitoring, performance evaluation, and adaptive management systems are integrated with all objectives and are the topic of Chapter 6. Since these subjects are an integral part of the WAP, they are introduced below.

Monitoring: Effective monitoring requires an efficient set of indicators that are surrogates for species or habitat health. The Monitoring Strategy prescribes a starting point for identifying an efficient set of indicators for each habitat.

Conservation Strategies

TABLE 5-1 A comparison of conservation strategies found in this chapter and corresponding Big Game Plan goals and objectives (Appendix E).

CONSERVATION STRATEGY	CORRESPONDING BIG GAME PLAN GOALS/OBJECTIVES
100 Intra-Agency Coordination and Policy	Not applicable
200 Conservation Planning	Black bear goal 4, objective 4-2 Moose goal 4, objective 4-2 White-tailed deer goal 4, objective 4-2
300 Education and Technical Assistance	Black bear goal 3, objective 3-1; goal 4, objectives 4-2 and 4-3 Moose goal 2, objectives 2-1 and 2-2; goal 3, objective 3-1; goal 4, objectives 4-1, 4-2, and 4-3 White-tailed deer goal 4, objectives 4-1, 4-2 and 4-3 Wild turkey goal 2, objectives 2-1 and 2-2
400 Environmental Review	Black bear goal 4 Moose goal 4 White-tailed deer goal 4
500 Habitat Management	Black bear goal 4, objectives 4-2 and 4-3 Moose goal 4, objectives 4-1, 4-2 and 4-3 White-tailed deer goal 4, objectives 4-1, 4-2 and 4-3 Wild turkey goal 2, objectives 2-1 and 2-2
600 Interagency Regulation and Policy	Black bear goal 4, objective 4-1
700 Land Protection	Black bear goal 4, objective 4-3 Moose goal 4, objectives 4-1 and 4-3 White-tailed deer goal 4, objective 4-1 and 4-3
800 Landowner Incentives	Black bear goal 4, objectives 4-2 and 4-3 Moose goal 4, objectives 4-1, 4-2 and 4-3 White-tailed deer goal 4, objectives 4-1, 4-2 and 4-3 Wild turkey goal 2, objectives 2-1 and 2-2
900 Monitoring	Black bear goal 1; goal 4, objectives 4-1 and 4-3 Moose goal 1; goal 4, objective 4-1 White-tailed deer goal 1; goal 3; goal 4, objective 4-1 Wild turkey goal 2, objective 2-1
1000 Population Management	Black bear goals 1 and 3 Moose goal 1 White-tailed deer goals 1 and 3 Wild turkey goal 1
1100 Regional Coordination	Not applicable
1200 Research	Not applicable
1300 Local Regulation and Policy	Black bear goal 4, objectives 4-2 and 4-3 Moose goal 4, objectives 4-2 and 4-3 White-tailed deer goal 4, objectives 4-2 and 4-3

Performance Evaluation: Performance evaluation is built into each objective by explicitly identifying affected threats, expected benefits, and critical inputs. Two monitoring objectives were developed to measure the first two aspects of performance, the direct effects of management (affected threats), and ecological response (expected benefits).

Adaptive Management: Annual summary reports will include baseline information, measured indicators, trends in threatened and endangered populations, changes in the level of managed threats, and a summary of inputs. This information will be used to adapt management to current conditions.

INTEGRATION WITH THE BIG GAME PLAN

As we prepared to develop the WAP, another major planning effort was scheduled to take place: the New Hampshire Big Game Plan (focused on black bear, moose, white-tailed deer and turkey, see Appendix E). 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 WAP. While the Big Game Plan and its goals and objectives may be viewed separately from the WAP, the integration of these two planning processes ensured that conservation strategies were consistent with each other. In Table 5-1, we identify those goals and objectives in the Big Game Plan that are parallel to the conservation strategies described in this chapter. In this way, we hope to more fully integrate wildlife conservation actions in the state, whether directed toward game or non-game species.

FISHERIES OPERATIONAL PLAN

The goals of the WAP overlap with the objective of the NHFG Anadromous and Inland Fisheries Operational Management Investigations to “monitor and assess the status of New Hampshire’s freshwater and anadromous fisheries resources through a planned scientific approach and to develop, implement, and evaluate management strategies that are consistent with resource capabilities”. Restoration efforts for anadromous species are guided by the Strategic Plan for the Restoration of Atlantic Salmon to the Connecticut River (revised 1998), the Status Review of the Anadromous Fish Restoration Program for the

Merrimack River (revised 1997), and The Saco River Fish Passage Assessment Plan 2004-2007 (approved 2003).

BROAD FOCUS AREAS

Regional Air and Water Quality Action Plan

Even the best-protected wildlife populations and habitats are increasingly threatened by climate change. Meanwhile, atmospheric pollutants in the form of acid deposition, mercury, and other heavy metals continue to degrade water quality and diminish forest health. The overarching goal is to reduce harmful air and water pollutants by promoting sustainable energy, transportation, and industrial development practices.

- Promote the adoption of structured risk assessments by state and federal agencies engaged in energy, transportation, and industrial development projects. Assessments include a goal, identification of risks, risk monitoring, and mitigation for unavoidable impacts (601, 602, 603, 604, 607)
- Promote the use of regional and national air and water quality policies and funding in New Hampshire (1103, 1104)
- Advise the coordinators of regional conservation initiatives on air and water quality issues in New Hampshire that need to be addressed at the regional or national level (1103, 1104)

Local Land and Water Conservation Action Plan

Wildlife habitats are diminished or destroyed by rapid urban development in many parts of New Hampshire. Many areas are degraded by indirect effects of development, such as non-point source pollution and light pollution. We must promote sustainable development and resource use to support wildlife health and diversity through a combination of coordinated working groups, technical guidance, and the production of targeted educational materials.

- Develop and disseminate up-to-date information, including maps, about wildlife and sensitive habitat areas that is pertinent to developers, permit applicants, land managers, municipalities, conservation commissions, and regional planning commissions

(206, 401, 1301)

- Develop and promote guidelines and best management practices to mitigate common development and land use impacts in sensitive habitat areas (304, 305, 403, 406)
- Provide technical guidance on the application of conservation science, planning tools, maps, and other information to land planning (609, 1302, 1303)
- Provide technical guidance on monitoring protocols so the success of restoration and mitigation can be clearly demonstrated (408, 904, 905)
- Promote inter-agency working groups to address broad threats with strategies outlined in the WAP (104, 105, 106, 605, 606, 608)
- Develop and implement a program to provide landowner incentives for land conservation (703, 802, 803)
- Educate the public about smart growth, safe resource use, sensitive habitat areas, and sustainable development (302, 307)

Statewide Biodiversity Stewardship Program

To maintain New Hampshire's biodiversity and habitats, the state needs coordinated voluntary and regulatory management, restoration, and land protection.

- Protect and restore rare and declining plants and animals (101, 102, 103, 208, 804, 1004, 1005)
- Protect and restore threatened habitats and natural communities (405, 407, 409, 502, 503, 505, 507, 508, 701, 702, 801)
- Coordinate agencies to protect populations and habitats (107, 402, 404, 410)
- Coordinate agencies to plan and implement restoration (610, 1101, 1102)
- Manage human impacts on plant and animal diversity (501, 504, 506, 1003, 1006)

Conservation Science and Information Management Program

There is a critical need to obtain, store, and manage data on the status and condition of New Hampshire's species and habitats of greatest conservation concern. Protection, restoration, and management activities all require knowledge of on-the-ground priority locations. Successful management activities must as-

sess ecological responses of habitats and organisms. Protocols for monitoring and management will help ensure consistency, efficacy, and a measured response. Therefore, the overall goal of this focal area is to use best available science and protocols to monitor those species and habitats of greatest conservation concern.

- Gather and refine information about the locations of New Hampshire's wildlife and habitats and maintain a database to map populations and habitats (201, 202, 901)
- Gather and refine information about the condition of New Hampshire's landscape and maintain a database to assess the status of populations and habitats to help direct management actions (204, 205, 902, 903)
- Research and comparatively analyze threats to the condition of wildlife populations and habitats to identify critical problems (203, 204, 1001)
- Prioritize proposed conservation actions before implementation to ensure that resources are targeted effectively (207, 1201, 1202)
- Track and evaluate performance to determine the success of management actions. This entails measuring changes in the level of a risk factor, demonstrating a beneficial ecological response, and establishing a correlation between management and changes in threat levels (207, 904, 905)
- Continually refine and adapt management activities to reflect new conservation science (207, 904, 905, 1002)
- Manage information and develop media for dissemination to all levels in conservation (201, 202, 206, 401)
- Develop a system to monitor ecological health that includes under-surveyed taxa, indicators of condition, threatened and endangered species, effects of management, and ecological responses to management. Produce succinct, standardized annual reports on wildlife health by habitat (901, 902, 903, 904, 905, 906, 907)

Intra-Agency Coordination and Policy

Native New Hampshire wildlife should be adequately protected by state laws and regulations for the enjoyment of New Hampshire's residents and visitors. 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.

101 Objective: 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 revised to provide more comprehensive habitat protection for endangered and threatened wildlife and protect buffers around critical habitats. Representatives from state agencies, business, timber, energy, agriculture, and government should be engaged in the development of revisions to the RSA 212-A, and an advisory committee with a legislative liaison should be established to assure successful implementation.

102 Objective: Revise endangered wildlife list

Resources for wildlife conservation are limited, and a revision of the NHFG 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 moni-

toring, 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 WAP, and NHFG rules (Chapter FIS 1000) identify threatened and endangered species.

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. For taxa where expertise is readily available, the organizational framework for revision is already in place and simply requires that the appropriate parties convene and develop a plan for reviewing existing lists. For more obscure taxa, experts must first be identified.

103 Objective: 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. Adopting rules that specify where these areas are and how they can be properly protected would improve enforcement. Sensitivity to private property rights is necessary when considering the approach to this objective. We recognize the value of working cooperatively with landowners to balance use of their property with the need to protect threatened and endangered species of wildlife (also see "Safe Harbor Agreements" objective 804).

104 Objective: Revise/Enforce Chapter FIS 800: The Importation, Possession, and Use of Wildlife

Revising administrative rules on the importation,

possession, and use of wildlife (Administrative Rule FIS 800) will help prevent unnecessary take, diseases, and invasive species from harming wild populations. A number of species are unregulated, and reptiles and amphibians are particularly vulnerable. New rules might prohibit the sale of any native New Hampshire wildlife, add new rules for reptiles, amphibians, and some invertebrates, add protected wildlife from neighboring states to New Hampshire's rules, eliminate non-native species, and change wording from no possession of 'venomous reptiles' to 'venomous species'.

105 Objective: Minimize OHRV wildlife impacts

Eliminating OHRV use in sensitive endangered and threatened species habitats, such as coastal dunes and pine barrens, removes a potential mortality factor especially for piping plovers and rare pine barrens species such as the Karner blue butterfly. 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 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.

The Cooperative State Lands Management Program needs to review and implement policies that reduce impacts to wildlife and provide OHRV riders with safe and reliable recreational opportunities. DRED and NHFG staff need to develop and implement trail management practices that minimize environmental degradation and avoid impacts to significant habitats.

106 Objective: Reduce public water access impacts

Use of lakes and rivers by motorized and non-motorized boats can harm 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 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. When projects are proposed, wetland permits must be requested from the NHDES Wetlands Bureau.

107 Objective: 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 will help ensure that wildlife rules and regulations are enforceable and that conservation officers are trained to enforce regulations pertaining to species of conservation concern, and other fish and wildlife.

Conservation Planning

Conservation planning entails organizing and analyzing data derived from direct observation of wildlife and habitats. Scientists with advanced training in conservation biology and wildlife ecology are needed to lead efforts to use computer models to synthesize statewide patterns of wildlife health and to develop strategies for conserving biodiversity. Critical analysis of perceived threats to wildlife is an important part of strategy development. One of the outputs of conservation planning are maps that depict the ability of lands to support wildlife health and help guide land use planning decisions. The goals of conservation planning are as follows:

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

201 Objective: Model Validation and Refinement

Continually validate and refine maps of predicted distributions of wildlife populations and habitats, beginning with the most scarce and imperiled and progressing to the most abundant and stable. 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.

Computer models predicting the distributions of species and habitats were developed to produce maps for the WAP. NHFG has adequate expertise, facilities, and equipment for oversight of model development and validation, but staff for ground-truthing is lim-

ited. NHFG will likely partner with DRED for this objective because NHNHB ecologists are trained to identify habitats and natural communities and can train others to do so. Model validation and refinement is highly feasible because staff and resources already exist, and efforts can begin immediately.

202 Objective: Maintain Wildlife Database

New Hampshire should maintain its ability to acquire, verify, and maintain records of wildlife observations. Improved knowledge of species distributions, particularly species of conservation concern, will greatly benefit conservation and regulatory actions.

NHFG and NHNHB currently have staff dedicated to acquiring, verifying, and maintaining wildlife records derived from NHFG, partner organizations (e.g., NHA, RAARP, contractors), and the New Hampshire Wildlife Sightings web page. Staff may be inadequate to address incoming records in a timely manner.

203 Objective: Assess Threats to Wildlife Health

Assess threats to wildlife and habitats based on methodologies developed during the WAP. Focus efforts on taxa with significant knowledge gaps, such as invertebrates, amphibians, and fish, as well as on emerging 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 resources for other potentially threatened or endangered species.

204 Objective: Map Landscape Potential for Wildlife Habitat

Create maps that portray the potential of the land-

scape to support a sustainable and diverse array of wildlife and wildlife habitats. Maps should incorporate wildlife distributions, ecological processes, and influence of human activities on the landscape. Maps will identify critical areas to support priority wildlife habitats and biodiversity, resulting in more efficient and effective protection.

Much of the data gathering and mapping has already been completed for the WAP. NHFG has adequate expertise, facilities, and equipment to conduct analyses to assess the potential condition of the landscape; however, expert consultation will be required to develop and refine methodology. Key partners include TNC and NHNHB.

205 Objective: Map Potential Wildlife Corridors and Buffers

Map landscape connectivity using models to represent spatial processes, such as dispersal, migration, colonization, and foraging. Mapping connectivity and buffering critical wildlife areas can target lands that help retain ecological connectivity and sustain wildlife diversity.

Mapping landscape connectivity will be achieved through coordinated inter-agency and inter-organizational efforts, and NHFG is not likely to lead the effort. TNC and NHFG have completed a fragmentation model that will contribute to mapping of connectivity, and NHFG has contracted UNH to develop methodology for modeling movements of large carnivores. Initiatives are in place to secure funding to model landscape connectivity from transportation planning resources.

206 Objective: Produce and Deliver Planning Maps

Produce and distribute summary maps of wildlife habitat at town and ecoregional scales. Summary maps will provide town and regional planners with easily interpreted information that supports wildlife conservation objectives. Technical guidance will help planners use available tools for implementing a range of objectives, from land protection to mitigating impacts of development. In the long-term, conservation planning practices will be integrated with land use planning. Maps will guide the public, developers, land-use planners, regulatory agencies, and land

managers in decision-making.

NHFG developed preliminary wildlife conservation maps and distributed them to planning organizations during 2004-2005. Coordinated data management and publication mechanisms will be required to publish and distribute updated maps to all towns and regions. GRANIT and Complex Systems are equipped to manage, publish, and distribute mapped data via the Internet and other media.

207 Objective: 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 to abate 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.

208 Objective: Use Natural Communities and Systems as Surrogates for Poorly Represented Taxa

There is 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 2004) 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 2005). 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.

Education, Information, and Technical Guidance

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 has the appropriate skills to identify and help resolve environmental challenges and participate in activities that lead to positive action on behalf of the wildlife resources. Through an educated citizenry many of the issues facing wildlife can be ameliorated. The ultimate goal is a change in human behavior leading to a sustainable and environmentally friendly quality of life.

This strategy identifies both immediate, discrete actions and long-term processes that can be taken to address conservation issues through education, information and technical guidance. While we recognize the importance of prioritizing education, information and technical guidance needs and supporting actions (objective 301), the WAP process has allowed us to better understand many of the critical conservation needs. We have provided direction to address some of the most critical needs in objectives 302-307.

301 Objective: Identify actions to address through education, information, and technical guidance

Identify and implement conservation actions that can productively be addressed through various means of education, information and technical guidance. Public support will lead to additional conservation, management, and legislation that will protect wildlife and habitat.

There is great potential for partnerships to develop in the process of reaching this general education,

information and technical guidance goal. NHFG has a Public Affairs Division, with personnel, training, facilities, and equipment for conducting education activities. UNH Cooperative Extension has personnel, training, and facilities for conducting education and technical guidance. Funding and personnel are needed to develop curricula and other educational materials.

302 Objective: Landowner education series

Work with partners to inventory and evaluate existing homeowner/landowner wildlife educational materials. Assess need for additional materials in light of new information. Work with partners to develop and distribute a homeowner/landowner education series including brochures, web based information, and program presentations. These projects would address issues such as living with wildlife, landscaping native plants and preventing the spread of invasive species.

Programs can be developed either on the regional or national level and could benefit the state regarding homeowner education series and guide. NHFG and UNH Cooperative Extension currently have the capacity to implement and distribute such materials. In addition there are many willing partners including state agencies and non-government organizations who could be involved, including USDA -Wildlife Services, Association of Federated Garden Clubs, DRED, and NHDES.

303 Objective: Foster supply of native plants

New Hampshire should encourage landowners and landscapers to use native plants. Increasing the availability of native plants from nurseries is important to encourage the use of more native plants with wildlife benefits in lieu of introduced and invasive species. By fostering the supply of native plants we also reduce the risk that non-native pests and diseases will be introduced into New Hampshire.

Ornamental horticulture in New Hampshire is a \$380 million industry, representing 56% of total agricultural productivity in the state. This industry has more than adequate resources and potential to develop a healthy supply of native plants if there is a financial incentive to do so. The New England Wild Flower Society has nurseries in Massachusetts that supply native plants to New Hampshire and other states, but are limited in capacity. NHDFL maintains a state nursery that provides more than 50 species of trees, shrubs, and vines for forestry, conservation and education purposes, including many native species. The Jordan Institute, UNH Cooperative Extension, NHFG, and UNH Thompson School are collaborating on a grant-funded project to complete a manual on integrated landscaping practices. This new manual describes natural landscaping techniques and encourages people to buy native plants from local growers.

NHFG and UNH Cooperative Extension can play a key role in organizing and motivating partners to foster an increased supply of native plants. The first step would be to organize a meeting of the potential partners to develop a feasible approach to fostering an increased supply of native plants. NHFG can work with the NHDFL State Nursery to assess the potential to increase their supply of native plants, including expansion into the perennial and aquatic plants areas. With funding, UNH Cooperative Extension can develop demonstration sites based on the new integrated landscaping practices manual and provide education, information and technical guidance to growers, homeowners, landscapers, and other relevant audiences.

304 Objective: Revise and promote agricultural best management practices

Work with partners in the agricultural community to revise voluntary best management practices that would improve conditions for key wildlife species and habitats, particularly in grasslands, floodplain forests, and aquatic habitats. Potential revisions to best management practices would include mowing techniques and timing, pesticide and fertilizer applications, stream buffer widths, vegetation composition buffers, and floodplain farming recommendations.

NHFG and UNH Cooperative Extension could take the lead in revising agricultural best management practices. They could work with partners to publicize and encourage adoption of the revised best

management practices. There are many potential collaborators, including UNH Cooperative Extension, New Hampshire Department of Agriculture, New Hampshire Farm Bureau, USDA-NRCS, and County Conservation Districts.

305 Objective: Promote sustainable forestry practices

Continue to work with partners in the forestry and conservation communities to strategically promote sustainable forestry. This will benefit many species and habitats throughout New Hampshire. Encouraging sustainable forestry can encourage landowners to derive economic benefit from their forestlands and maintain them in an undeveloped state. A key element of a successful program is the proactive, purposeful targeting of owners of larger lands with significant wildlife resources. This program should consider actions mentioned in the sustainable forest management recommendation of the Northern Forest Lands Council Tenth Anniversary Forum Final Report.

NHFG, NHDFL, and UNH Cooperative Extension should continue to work with the land trust community (e.g., through the Center for Land Conservation Assistance) to promote the acquisition of easements (targeting lands with high wildlife value) that help maintain land in private ownership. Such groups should encourage easements to be accompanied by resources needed to support sustainable management.

Other potential collaborators include the New Hampshire Timberland Owners Association, New Hampshire Timber Harvesting Council, Granite State Division of the Society of American Foresters, Tree Farm Program, SPNHF, USDA-NRCS, USDA Forest Service, local and regional conservation organizations, and private consulting foresters. Forest Legacy and other easement programs represent funding sources for the purchase of development value of land and ensure that forestry is sustainable.

306 Objective: Advise town conservation commissions and planning boards

Develop a program to provide technical assistance to town conservation commissions and planning boards regarding key wildlife species and habitats in and around their communities. Key species and habitats

will benefit from local actions to protect additional lands, manage habitats in an ecologically sustainable manner, and encourage appropriate stewardship on private lands. As this increased awareness leads to action, conservation commissions and planning boards may seek changes in regulations and policies that would benefit targeted wildlife and habitats. Access to data and maps depicting key wildlife species and habitat focal areas should be provided to both partners and the target audiences. The availability of educational materials, information and technical guidance on this new information should be marketed by partners via multiple communications media.

Potential collaborators include NHFG, UNH Cooperative Extension, Regional Planning Commissions, NHDES, New Hampshire Office of Energy and Planning, New Hampshire Municipal Association, New Hampshire Association of Conservation Commissions, and Center for Land Conservation Assistance, and other non-government organizations. NHFG will work with potential partners to develop such a program, although NHFG will require funding for personnel, training, equipment, and communications media. A grant proposal is currently pending from one potential funding source, the Landowner Incentives Program, which would aid greatly in achieving this objective.

307 Objective: Educate recreational users regarding threats to wildlife and natural communities

Reduce the impact of recreation through informational materials and programs developed for recreational users, including climbers, hikers, boaters, wildlife watchers, and others. This will benefit many species and habitats, including cliffs, dunes, marsh and shrub wetlands, alpine, and aquatic habitats.

There is great potential to develop educational materials and programs on the regional or national level, particularly working with national or regionally based recreational users. There is a need for a coordinated effort to target recreation users on specific issues in New Hampshire.

There are many willing partners including state agencies, non-government organizations and recreationally based user groups who could support the work described in this objective. There is a role for NHFG to provide information regarding impacts and to foster collaboration on education programs and materials.

Environmental Review

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 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.

401 Objective: Release Wildlife Maps to the Public

The state should make wildlife-related information accessible to developers and public, while also protecting sensitive information 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.

Data layers are currently available or are being developed which could be made available to the public on a limited basis. The Complex Systems Research Center at UNH (GRANIT) or a state agency website would be a proper venue for public access to this data. NHDES currently provides public access to environmental information through its OneStop database.

402 Objective: Improve inter-agency coordination for environmental reviews

Revise protocols to improve coordination and efficiency among state and local regulators and advisory boards. State and local regulators and advisory boards should coordinate with NHDES, NHFG, and NHNHBB to establish the order in which projects are reviewed and responded to. This will reduce redundancy, provide critical information for formulating recommendations, and ensure that recommendations made by different groups are not contradictory.

403 Objective: 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.

NHFG has developed informal guidelines for reviewing projects threatening some species (e.g., freshwater mussels). However, guidelines have not been developed for all species. NHFG staff should work with species experts and other state and federal wildlife agencies to develop guidelines for reviewing projects.

404 Objective: Expand environmental review to other projects potentially threatening wildlife

Many projects receiving minimal environmental review could be improved by having access to information and resources from NHFG and NHNHBB, which may help reduce impacts to rare wildlife, plants, and natural communities. Expanding the review process

to include both agencies will facilitate habitat and species conservation in these projects. For example, review of site-specific permits will allow NHFG and NHHNB to evaluate threats to uplands where wetland impacts do not occur.

Expanding the scope of environmental reviews may be as simple as applying existing procedures to other projects. New or revised rules may be needed for programs that currently lack a review process. Cooperation between NHDES, NHFG, NHHNB, NHDFL, and Division of Parks and Recreation will be necessary to determine which projects warrant additional review procedures. The NHDES Site Specific Program is currently working on rule revisions; NHFG and NHHNB should provide input on these rule changes.

405 Objective: Expand existing protection to include significant wildlife habitats that currently lack protection.

Wetlands are currently regulated by the NHDES Wetlands Bureau. Protection should be expanded for other significant wildlife habitats that currently lack adequate regulatory protections in New Hampshire. Providing additional protection for these habitats will be critical to maintaining the biodiversity of New Hampshire, especially in the rapidly developing southern part of the state. Examples of unprotected or inadequately protected significant wildlife resources might include vernal pools, floodplains, and beaver impoundments (See Appendix B, Habitat Profiles).

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. Vernal pools have existing protection as wetlands but need to be explicitly protected as significant wildlife habitat. In other cases, new regulations may be needed to expand protection, and this process will require interdisciplinary coordination and support.

406 Objective: Develop stream crossing guidelines and restoration protocols

Roads, driveways, and trails frequently bisect streams, rivers, and wetlands. Structures may impede passage of aquatic organisms and change the natural flow and

structure of streams or rivers. Upgrading or replacing ineffective structures (e.g., culverts and bridges) with well-designed ones will enhance connectivity of wildlife populations and will increase population viability.

Project designers and engineers are more likely to incorporate environmentally friendly designs if information is readily available. Various BMP guidelines have been developed in New Hampshire or elsewhere (e.g., erosion and sedimentation control), and further guidance and training will bolster this objective. Recommendations for stream crossing design have been developed in Massachusetts and a New Hampshire Stream Team has been formed to focus on this topic. Two meetings have been hosted recently by the NHDES, in cooperation with the NHFG, in an effort to initiate this objective. Sources of funding should be identified to upgrade ineffective culverts during scheduled maintenance or replacement.

407 Objective: Support wetland compensatory mitigation program at NHDES

NHFG and NHHNB should be active participants and supporters of the NHDES wetland mitigation in-lieu-fee program by participating in drafting rules and becoming active on the site selection committee. A bill to establish an in-lieu wetland compensation program is currently under consideration. The program will allow permit applicants that propose to harm wetlands to pay a fee rather than selecting land for protection or restoration. Payment into the fund would be allowed only after applicants demonstrated that wetland harm was minimized. Once established, this program could generate up to several million dollars annually for the protection and restoration of wetland habitats in New Hampshire.

NHDES Wetlands Bureau has held multiple meetings with many stakeholders including representatives from state (e.g., NHFG) and federal regulators (e.g., EPA, USFWS) and other agencies, conservation organizations, private consultants, the New Hampshire Association of Conservation Commissions, the New Hampshire Association of Natural Resources Scientists, and the Conservation Law Foundation. When the program is implemented, a committee will need to make recommendations for disbursement of mitigation funds.

408 Objective: Require monitoring to demonstrate success of mitigation

Monitoring the effects of a project on habitats and wildlife will enable biologists to determine if mitigation procedures were effective. Landowners involved in projects that have the potential to endanger rare species or natural communities, or who have engaged in habitat restoration as part of a mitigation requirement, should be required to provide scientifically sound habitat or species monitoring. Environmental consultants, University faculty, and graduate students may be contracted to conduct monitoring research.

Existing NHDES permit requirements involving restoration or creation of wetlands as mitigation currently require a minimum of 3 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.

409 Objective: Integrate environmental review to include all natural resources on a site

The quality of wildlife habitat in a defined location will 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 will allow for the protection of the most significant natural resources.

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.

410 Objective: Increase biologist interaction on project reviews

Staff at NHFG, NHNHB, and NHDES should increase 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 NHNHB, and develop an efficient review process.

Habitat Management

Management and restoration can protect species and habitats that have languished due to historic and current development or natural processes such as succession. Initiatives could include everything from backyard landscaping to improve habitat for songbirds, to replacing culverts to restore stream flow and wildlife passage, to creating and maintaining early successional stages, to allowing late-successional conditions to develop on selected tracts of forest. Habitat management will involve federal, state, non-government organizations, local, 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.

501 Objective: Reclaim or maintain grassland and shrubland habitats

This objective will involve identifying priority areas for grassland and shrubland management and working with landowners to assess landowner objectives and current management. Reclamation and maintenance of grasslands and shrublands will benefit a number of at-risk wildlife species such as northern leopard frog, American bitterns, New England cottontails, migratory songbirds, and wood turtles. Of greatest concern are the effects of high intensity agriculture (e.g., mowing during the breeding and nesting season), development, altered natural disturbance, and altered hydrology.

NHFG is currently identifying priority grasslands and is evaluating methods for mapping shrublands. For priority areas on state lands, NHFG staff should work with the appropriate agencies to conduct field assessments and recommend management objectives. Implementation will likely require the addition of at least one NHFG state lands staff member dedicated to maintaining grasslands and shrublands on state lands. Early efforts to implement this strategy could focus on critical species such as New England cottontails.

502 Objective: Generate early successional and young forest habitats

Some wildlife species that prefer early successional habitats—such as New England cottontail, American woodcock, and several species of migratory songbirds—are declining in New Hampshire due to habitat limitation. Early-successional aspen and birch stands and sapling-dominated forests are increasingly uncommon in New Hampshire because of silvicultural practices. However, current early successional habitat availability in northern New Hampshire is higher than prior to the 1600s. Even-aged management would help to create new stands and expand existing stands, thereby improving habitat for critical species and increasing foraging opportunities for game animals (such as moose, deer, bear, and turkey).

New Hampshire has many forest managers for both public and private lands that can help address this objective. UNH Cooperative Extension can provide workshops on forest management to benefit wildlife. An inter-agency forestry and wildlife team could assess how much aspen, birch, and young forest is desired to maximize wildlife health and develop management goals by ecoregion subsection (see Strategy 600, Interagency Regulation and Policy). This effort can coincide with the development of the state lands management plan and Forest Resources Plan coordinated by DRED. It would take one year to develop management goals and less than five years for education and technical assistance.

503 Objective: Restore and maintain late-successional forests

Late successional forests are not exclusively relied on by any vertebrates, 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. American marten would benefit from the plethora of coarse-woody debris. Three-toed woodpeckers would benefit from abundant snags commonly found in late-successional high-elevation spruce-fir stands. 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 some other barrier to timber harvesting. The greatest amount of late-successional forestland is within the White Mountain National Forest, 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 currently being coordinated by DRED.

504 Objective: 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, and pine barrens Lepidoptera. Migrating songbirds require suitable stopover areas for resting and foraging. 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.

An urban wildlife management plan should include detailed strategies for education, habitat management, and monitoring. It should also outline funding needs for implementation. Educational ef-

orts should include developing resource guides that address rooftop and backyard habitat, geared toward landowners, building managers, developers, landscapers, and municipal officials. NHFG should collaborate to develop and implement the urban wildlife habitat plan. This objective could commence in less than two years, and educational efforts would be a long-term endeavor.

505 Objective: 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, and coastal dunes. Restoration of pine barrens would benefit a suite of rare Lepidoptera, common nighthawks, whip-poor-wills, and other species. Restoration of lowland spruce-fir will benefit marten, three-toed woodpecker, spruce grouse, and others. Successful restoration of salt marshes will improve habitat conditions for Nelson's sharp-tailed sparrow, saltmarsh sharp-tailed sparrow, seaside sparrows, willets, black ducks, and others. Restoration of sand dunes will benefit piping plovers.

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. A number of agencies and organizations will need to coordinate a statewide prescribed burn program to address limiting factors associated with that management tool (e.g., liability and training).

A number of organizations are involved with salt marsh monitoring and restoration, including the NHCP. Thus far, over 700 acres of salt marsh have been restored and more restorations are planned. NHCP is the lead agency on salt marsh and coastal sand dune restorations. NHFG should work with NHCP and its partners (NHEP, 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.

506 Objective: Develop and implement a terrestrial invasive species control program

The NHDES Exotic Plant Program is currently developing a comprehensive management plan for the prevention and control of aquatic nuisance species. Under this objective, a strategic plan would be developed to create and implement a comprehensive terrestrial invasive species control plan, primarily focusing on plants and invertebrates. In a separate but related effort, NHFG, NHA, and USDA-Wildlife Services should collaborate to develop a predator control plan for coastal islands and dune habitats. If successful, an invasive species control program would reduce the effects of invasive species in a variety of habitats and improve conditions for native species. A staff person dedicated to the development of a terrestrial invasive species control plan (e.g., plants, invertebrates) should be housed within the New Hampshire Department of Agriculture.

507 Objective: Restore or maintain natural flow regimes

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

The River Restoration Task Force regulates dam removals in New Hampshire. 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. TNC and the USACE are collaborating in the Sustainable Rivers Project to modify the way dams are managed to improve the ecological health of rivers. The NHDES Dams Bureau is currently working on a guidance document that will better protect water levels. Currently there is a gap between researchers working on ways to better manage flow, such as the Sustainable Rivers Project, and those responsible for dam management, such as the

NHDES Dams Bureau.

In the short term, this gap must be bridged by better interagency communication and training sessions related to managing flow regimes. In the future, it would be extremely helpful to have a central program office in a single agency to coordinate all activities related to flow regimes in the state. There is an immediate need for personnel to provide input on flow-related issues and guidance documents, but restoring natural flow regimes will likely take a long-term effort of more than 10 years.

508 Objective: Restore and maintain watershed continuity

Stream crossings (e.g., bridges, culverts, railroads) 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. Reducing fragmentation in a watershed will be especially beneficial for species such as migratory fish that require different habitats throughout their lives. Stream crossings may also alter the natural geomorphology of a river or stream, changing sediment deposition patterns above and below the crossing.

In 2004 the River and Stream Continuity Steering Committee, composed of representatives from state, federal, and non-government organizations, established technical guidelines for river and stream crossings in Massachusetts. The “River Continuity Assessment of the Ashuelot River Watershed” project, initiated by the Nature Conservancy, will incorporate volunteer-gathered data on dams, stream crossings, and culverts that impede fish passage or alter hydrology. This survey could be easily expanded to other watersheds and can be used to prioritize and evaluate potential restoration projects.

The NHDES Wetlands Bureau currently has the authority to regulate and mitigate the impacts of stream crossings. NHFG should work with the NHDES Wetlands Bureau, NHDOT, and non-government agencies to establish new guidelines for river and stream crossings in New Hampshire. A stream crossing assessment and guidelines could be completed within one year, but it would be a long-term endeavor to restore river continuity throughout New Hampshire.

Interagency 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 pollutants through science-based decisions. An interdisciplinary, interagency risk assessment team can identify selected indicator species and habitats 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.

601 Objective: Integrated inter-agency risk assessment teams for air and water quality

Interagency risk assessment teams can work together for the common goal of high air and water quality in New Hampshire. Teams can further identify and prioritize pollutants, habitats, and species at greatest risk, measurable outcomes and endpoints, and milestones.

The National Atmospheric Deposition Program (NADP) operates air-monitoring stations in New Hampshire. Currently only one NADP site is in operation in New Hampshire (at Hubbard Brook Research Station) and includes collection of wet deposition of mercury as part of the Mercury Deposition Network. The USGS and NHDES operates many water quality and flow monitoring stations across New Hampshire. The New Hampshire Lakes Association monitors lake quality statewide.

The BioDiversity Research Institute tracks methylmercury availability in aquatic (i.e., Global Loon Mercury Monitoring and Research Program (GLMMR) and terrestrial (i.e., Appalachian Mountain Mercury Network) ecosystems. NHDES is providing resources for developing a statewide risk assessment for mercury in loons and some funding for aquatic system monitoring of mercury.

Formulating state regulations will require net-

working among various state and federal (EPA, USFWS, USGS, and NOAA) agencies and a strong commitment between NHDES and NHFG. Regional regulation and policy representation for New Hampshire are best met through the New England Governors and Eastern Canadian Premiers.

602 Objective: Incorporate reduced wildlife mercury levels as a priority endpoint for air and water quality assessments

By reducing methylmercury availability in New Hampshire's aquatic and terrestrial systems, mercury body burdens in fish and wildlife will also lower. Any decreases will be timely; a comprehensive analysis of air, water, fish, bird, and mammal data shows that mercury levels are high and pervasive in New Hampshire. Intelligent mercury management will use indicator species (e.g., long-lived species, or high-trophic level predators) to detect system-wide changes in mercury content.

603 Objective: 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 (NHDES, NHFG) and federal regulatory (EPA, ACOE) and transportation agencies (NHDOT, FHWA), conservation groups, researchers, and local planners would have a statewide benefit to wildlife, as well as 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 may include prioritiz-

ing research needs, identifying funding opportunities, improving data sharing and coordination, and increasing education and technical assistance. Also, the products from the WAP should be integrated into NHDOT's long-range project planning effort that is currently underway.

604 Objective: 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.

605 Objective: Recreation Working Group

The state needs a better understanding of the effects of different forms of recreation on species and habitats of concern. New Hampshire's wildlife and habitats could greatly benefit from better planning and coordination among state and federal regulatory agencies, conservation groups and recreation groups. The state should coordinate a New Hampshire recreation-wildlife working group that identifies issues, trends, and solutions to potential impacts caused by recreational activities. NHOEP currently coordinates the Statewide Comprehensive Outdoor Recreation Plan that allows for input and prioritization about recreational issues and use, that is primarily implemented by DRED. Many other state, federal, and non-government organizations are involved in different ways and could contribute to a statewide working group.

606 Objective: Promote reactivation of the Forest Sustainability Work Team

The Forest Advisory Board assists the State Forester in carrying out the provisions of the forest resources education, promotion, and planning chapter. The New Hampshire Forest Sustainability Standards Work Team was created in 1997. It developed "Good Forestry in the Granite State: Recommended Voluntary Forest Management Practices for New Hampshire", which outlined voluntary actions that forestland owners could take to ensure forest and ecological sustainability. The Work Team is now defunct but could be reactivated with staff from NHDFL, NHFG, SPNHF, UNH Cooperative Extension, and others.

The team should review issues and prescribe actions to address threats to forests, natural communities, and wildlife health. Prescribed actions may include outlining further research, recommending and assisting with policy or regulations at the agency or state level (502, 503, 803) and recommending additional best management practices.

607 Objective: Explore a wildlife biologist licensing program

To provide increased opportunities for communities, developers, agencies, and others to access qualified wildlife biologists, we propose to explore the development of a wildlife biologist licensing program. We expect that this will increase access to qualified wildlife technical assistance. Relevant laws and regulations would need to be modified accordingly. UNH Cooperative Extension, ASNH, UNH, NHFG, NHDES, USFWS, private consultants, and non-government organizations have the expertise to educate wildlife biologists.

Land Protection

New Hampshire requires a network of permanently conserved lands that effectively represents the state's wildlife and habitat diversity. Land protection through conservation easements and acquisition ensures the long-term protection of our wildlife resources. Approximately 25% 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. The current system of conservation lands is not equitably distributed across the state's geography, ecological regions, and critical wildlife habitats. More than 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. Specific targets for land protection will be identified via analysis of habitat maps to identify critical areas that will support priority wildlife habitats and biodiversity (see Conservation Planning strategy).

701 Objective: Protect riparian/shoreland habitat and other wildlife corridors

NHFG and others involved in land protection should promote the protection or restoration of wildlife corridors, including riparian and shoreland habitats. Maps of prioritized wildlife habitat should be used as guides when selecting areas to protect or restore. Habitat management that is implemented in these areas should be held to the highest standards, especially when promoted or supported by state agencies. Additional protection could also be provided through

environmental review of proposed development projects within the shoreland protection zone. This objective will retain and restore sufficient habitat to sustain populations of wildlife species that require or benefit from riparian and shoreline ecosystems, and from the landscape connectivity often provided by these features. Wildlife such as turtles, amphibians, common loon, bald eagle, terns, bear, bobcat, New England cottontail, and mussels will benefit.

Riparian and shoreline areas are among the most expensive lands in the state, and effective protection at meaningful scales will require multi-million dollar investments. With limited funds, it is important to prioritize areas for protection. The conservation community needs to continue advancing our understanding of how to conserve aquatic habitat through targeted riparian protection, and which riparian and shoreland areas to focus on for habitat and connectivity goals.

702 Objective: Protect unfragmented blocks and other key wildlife habitats

NHFG should use maps of prioritized unfragmented blocks and other key habitat information to review and identify land protection projects. These maps should also be distributed to the conservation community. There are a number of large unfragmented blocks in northern New Hampshire and in the Monadnock Highlands of southwestern New Hampshire, with far fewer unfragmented blocks of similar size in southeastern New Hampshire. Therefore, prioritization of unfragmented blocks in New Hampshire should consider in which part of the state they occur and the relative size of other blocks in the region. Virtually all wildlife and habitats will directly or indirectly benefit from habitat protection, and the land protection strategy should be viewed as one of the most important ways to ensure long-term wildlife protection.

SPNHF and TNC have led the identification and protection of unfragmented resources. Through the creation and dissemination of information about natural resource inventories, coarse filter wildlife habitat maps, and significant wildlife habitat, many partners have been engaged in implementing this objective. Land trusts, local conservation commissions, regional planning commissions, regional, state and national conservation organizations, and state agencies have all considered the importance of unfragmented blocks and key wildlife habitats when planning land conservation projects. Forest Legacy has been an important funding source for land conservation of unfragmented blocks. LCHIP is a good model for identifying and funding important land protection projects.

703 Objective: Develop a comprehensive land protection support program

NHFG needs to take on a statewide leadership role in the land protection strategy. Using maps generated during the WAP development process as a framework, NHFG should work with partners to incorporate other important natural resources such as aquifers and productive soils to 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.

NHFG should more fully develop a land protection staff and budget. Much of the GIS infrastructure and knowledge to generate conservation planning maps exists in NHFG. UNH Cooperative Extension should be viewed as a strong education and technical assistance partner. Wildlife biologists, both at NHFG headquarters and in regional offices should have the responsibility and time to work with local landowners, land trusts, conservation commissions, regional land trusts, and other members of the conservation community to identify and contribute in a substantial way to land protection projects.

Landowner Incentives

With over 80% of the land in New Hampshire under private ownership, the land use decisions of private landowners have an enormous effect on habitat quality and sustainability. Thus, it is imperative to work with landowners to protect, manage, and restore habitat on their property. Landowner incentives may include tax benefits, financial and technical assistance to private landowners to restore and/or manage at-risk species and critical habitats, or the purchase of conservation easements.

801 Objective: Financial and Technical Assistance for Habitat Management and Restoration

Develop new programs and better coordinate existing programs to manage and restore critical habitats and natural communities on private lands. Financial incentives would be provided in the form of cost sharing for implementation, management, and restoration plans with potential of payments for maintaining practices. Existing financial and technical assistance programs include the Wildlife Habitat Incentives Program and Environmental Quality Incentives Program administered by the NRCS, the Conservation Reserve Program administered by the Farm Services Agency, the Partners for Fish and Wildlife Program administered by USFWS, the Forestland Enhancement Program (FLEP) administered by NHDFL, and the Habitat Small Grants Program administered by NHFG. NHFG should work with partners to focus resources on the most critical habitats.

These programs are typically limited in funding and scope and therefore are unable to adequately address many relevant threats. Consistent long-term funding is critical for the success of financial and technical assistance programs. Regional and national efforts will be needed to help secure long-term funding for programs.

802 Objective: Financial Incentives to Maintain Private Land in Open Space

Development pressure and rising carrying costs (e.g., taxes, liability insurance, and workers compensation benefits for industrial forests) have created numerous disincentives for long-term forest ownership. Under this strategy, critical wildlife habitats and natural communities on private lands would be conserved through tax incentives that make owning land more affordable or through the purchase of conservation easements. Maintaining private land in open space will benefit many types of habitats and wildlife, and with careful planning, may help mitigate the effects of fragmentation and population isolation maintaining habitat linkages.

Existing incentives to maintain private land in open space include the Current Use Taxation program (RSA 79-A), which helps conservation-minded landowners maintain their land in open space by reducing their property taxes. However, in areas of the state where land values are high, the economic incentive is high to sell land for development. There are a number of local and state conservation organizations, municipalities, and state and federal agencies that will purchase conservation easements on private lands, but all are limited in funding.

Options to consider include amendments to the Current Use Tax program, decreased capital gains taxes on timber harvested on land, the use of current use tax rates for valuating estate and inheritance taxes, and tax credits given to people or companies who invest in forestland.

803 Objective: Financial Incentives to Promote Sustainable Forestry Practices

Sustainable forestry will benefit many types of upland and aquatic habitats and associated wildlife. This strategy aims to provide financial incentives to

forestland owners who practice sustainable forestry. It would provide funding to landowners for inventories of critical resources (e.g., wildlife, natural communities, plants, etc.) so the information can be incorporated into forest management plans.

Financial and technical assistance programs include the Current Use program (see objective 802), FLEP, and EQIP. FLEP, administered by NHDFL and USFS, encourages long-term sustainability of non-industrial private forestlands. Financial and technical assistance is provided to develop and implement management plans. Through an agreement with UNH Cooperative Extension and NRCS and EQIP funding, private lands are enhanced via the development of a forest management plan, wetland restoration and enhancement, tree and shrub establishment, and establishment of riparian forest buffers, among other projects. NHFG should coordinate with NRCS, UNH Cooperative Extension, and NHDFL to focus EQIP and FLEP efforts in areas with the most need and that will result in the most benefit to wildlife.

Options to consider include amendments to the Current Use program, decreased capital gains taxes on harvested timber, or deduction of forest management costs for lands that are managed sustainably.

804 Objective: Safe Harbor Agreements to Protect Habitat of Threatened and Endangered Species

Because many endangered and threatened species occur on private property, it is critical to involve the private sector in their conservation and recovery. Many property owners, however, are concerned about land use restrictions that may occur if listed species colonize their property or increase in numbers because of land management. Thus they often avoid or limit land and water management practices that could enhance and maintain habitat. A Safe Harbor agreement provides that private landowners will not face any further restrictions under the Endangered Species Act if they take actions to improve habitat of candidate, threatened, or endangered species that occur on their property.

This incentive requires landowners to enter into a legal agreement with USFWS. Safe Harbor agreements have yet to be enacted in New Hampshire, but have been applied in other states. NHFG would be

able to enter into such agreements with private landowners if a statewide agreement is enacted between USFWS and NHFG. The USFWS would provide a permit to the state, which can then offer individual landowners authorizations through a “certificate of inclusion.” NHFG would then assist landowners with habitat enhancements as outlined in objective 801.

STRATEGY 900

Monitoring

The monitoring strategy is discussed in Chapter 6: Monitoring, Performance Evaluation, and Adaptive Management (page 6-6). The detailed strategy template was completed and included for this strategy as an example of the type of information collected that will be used in the next phases of prioritization and implementation.

Population Management

Protecting, enhancing, or augmenting scarce populations of wildlife may prevent their extinction, may perpetuate naturally scarce populations, or may increase populations to desired levels. Controlling disease, introduced wildlife, and over-population of certain wildlife is a way of protecting resources that are valued by human society. Responsible game harvesting promotes retention of wildlife populations while maintaining plant and animal biodiversity. Population management should be responsive and adapt to new information generated from monitoring and performance evaluations and changing biological conditions.

1001 Objective: Evaluate the viability of wildlife populations

For rare and declining species, assess long-term viability and potential management scenarios 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 (e.g., timber rattlesnake, piping plover, Karner blue butterfly, American marten) or those that likely will be considered for state listing status in the near future (e.g., Blanding's turtle, New England cottontail). Analyzing viability will inform decisions about the scarcity of wildlife populations and indirectly affect underlying causes for scarcity, such as unregulated take and loss of habitat to development.

NHFG will lead viability assessments, with contracted support from experts on individual species. Existing contracts with UNH may be negotiated to accomplish the objective for select species. Endangered species recovery teams may provide technical support.

1002 Objective: 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 only be augmented 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.

Implement protection and captive breeding in zoos for rare and declining populations when augmentation in the wild or abatement 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.

Existing programs under the Association of Zoos and Aquariums are dedicated to supporting field conservation initiatives. Roger Williams Park Zoo (RWPZ) currently provides support for the Karner blue butterfly captive rearing program and is committed to developing support for other field conservation efforts. RWPZ has had success in captive breeding for other rare invertebrates and reptiles as well.

1003 Objective: Prevent and control wildlife diseases and overpopulation

New Hampshire should attempt to curtail the spread of wildlife diseases and damaging effects of overpopulated wildlife. Diseases of greatest concern include chronic wasting disease (CWD), avian cholera, and West Nile virus. A number of diseases impacting wildlife (e.g., amphibians) are under study elsewhere. Introduced wildlife, such as zebra mussels and feral cats, and some native subsidized wildlife such as gulls, corvids, and raccoons, often become overpopulated and threaten native wildlife populations and human health. Wildlife benefits from disease and popula-

tion control will be diverse and will include both at-risk (e.g., common terns, roseate terns, piping plovers) and harvested wildlife (e.g., deer). Control of herbivores (such as deer) will maintain plant and animal biodiversity in some forest ecosystems.

The existing partnership with USDA to control nuisance wildlife could be expanded. Authority to regulate introduced wildlife under existing legislative rules needs to be evaluated (see Agency Regulation and Policy). A statewide plan should be developed to control introduced and 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.

1004 Objective: 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 negative interaction of management with non-target species, and 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.

Regional 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), these are best approached in a regional or multi-state manner. Species and habitats of regional concern have been identified by both the Northeast Endangered Species and Wildlife Diversity Technical Committee (ESWD) and North American Bird Conservation Initiative (NABCI).

1101 Objective: Develop and implement existing regional conservation plans

Conservation plans have been or are being developed for several species of conservation concern in the Northeast. These include plans created for species identified by the ESWD as being potential candidates for federal listing, including three species that occur in New Hampshire: Blanding's turtle, timber rattlesnake, and New England cottontail. NABCI 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.

1102 Objective: Regional conservation planning for species and habitats at risk

While structures such as the ESWD and NABCI provide valuable fora for regional discussion, there are limited staff at the regional level to facilitate actual conservation activity within the states in the region.

Dedicated regional staff could ensure that committed conservationists from different areas collaborate. In this way, many disparate conservation efforts and funding sources can be concentrated more effectively.

1103 Objective: Step down federal air and water quality policy

Mercury emission sources in New Hampshire are minor compared to sources within and outside of New England. 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. 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 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. Key participants outside of New Hampshire agencies are NESCAUM, NEIWPC, NEWMOA, federal agencies such as the USEPA, USFWS, USGS, and NOAA, and university and other nonprofit research (such as BioDiversity Research Institute) and policy groups.

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

If a convincing, research-based case is made for conservation, social and political support will be more likely. Sound research will also make grant writing and donation requests more compelling and will make conservation more effective.

1201 Objective: Prioritize Research Needs

NHFG biologists should lead a group of conservation research partners to prioritize wildlife and habitat research needs identified in the WAP. The process of prioritizing research will be similar to and incorporated into the process of prioritizing conservation strategies and actions identified in the WAP. As part of this process, NHFG must develop an internal operational plan to identify where available resources (staff and money) can be most effectively allocated.

Funding is limited for the many research needs identified for species and habitats in the WAP. Therefore, it will be critical to identify which research is needed immediately and which partners can help implement the research. Also, collaboration with other states

directly or through regional working groups (e.g., Northeast Endangered Species and Diversity Technical Committee, NEPARC) would be an effective way of sharing research objectives and addressing regional environmental issues.

1202 Objective: Facilitate funding of priority conservation research

To facilitate priority survey, monitoring, and research efforts, priorities (as determined in objective 1201) will be communicated to other entities that fund conservation research in New Hampshire. 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. Substantial, yet limited, conservation research money at the federal level has come to New Hampshire from many sources (e.g., from the USFS, USFWS, USEPA, and congressional appropriations). Research funded by the NHFG should support the goals of the WAP. NHFG administrators and biologists must discuss the most efficient method to disseminate conservation research funds, while receiving a desired designated product (e.g., request for proposals).

Local Regulation and Policy

Municipalities have broad 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 innovative land use incentives, legislation, and other measures that conserve habitat and landscape connections, maintain ecological function, and protect water quality and quantity.

1301 Objective: Incorporate Habitat Conservation into Local Land Use Planning

Master plans, zoning ordinances, subdivision regulations, and other innovative land use tools that use scientific basis for addressing wildlife habitat will lead to greater protection of these habitats, will conserve water quality, and will maintain landscape connections. NHFG should provide technical guidance to New Hampshire municipalities on master plan goals and land use policies and regulations aimed at protecting significant or sensitive wildlife habitats. An integrated approach to land use decisions can maintain unfragmented blocks of upland forests and protect species of concern such as the Karner blue butterfly and common nighthawk. It will also protect functional connections that support wide-ranging species such as moose, bear, and deer. This approach will better protect the integrity of aquatic and wetland systems such as marsh and shrub wetlands, floodplain forests, and rivers, which are habitat for American bittern, common moorhen, spotted, Blanding's and wood turtles, cobblestone tiger beetles, and other species.

The critical gap that NHFG can address is the scientific basis for implementing land use policies and regulations that protect the ecological function and health of wildlife populations and their habitats. This technical assistance needs to be combined with an integrated approach to land use decisions among local decision-makers. NHFG should work with

UNH Cooperative Extension and New Hampshire Office of Energy and Planning, key outreach partners to facilitate training for NHFG biologists on the integration of wildlife habitat information into local land use planning and regulation. Likewise, Cooperative Extension can facilitate training for town planners, planning boards, regional planners, and others involved in writing master plans and local ordinances, on how to integrate wildlife considerations into local planning. NHA and The Jordan Institute are other important partnering entities, through their Three Infrastructures Analysis with local communities.

1302 Objective: Advise Conservation Commissions and Open Space Committees

Many Conservation Commissions are permanently protecting lands using current use change tax revenues that accumulate in their conservation fund. In recent years many communities have passed multi-million dollar open space bonds through town warrant articles. Despite many successful individual land conservation efforts, most local efforts are not informed by conservation science. Moreover, other local land use decisions continue to fragment, degrade, and eliminate critical lands and waters. NHFG should guide municipal Conservation Commissions and Open Space Committees in identifying critical wildlife habitats in their communities for protection using conservation funds, open space bonds, and through engagement in land use planning decisions within their community. The Center for Land Conservation Assistance (CLCA) and regional land trusts are critical partners for NHFG and local communities.

1303 Objective: Promote Role of the Regional Planning Commissions in Landscape-Scale Conservation

Regional Planning Commissions (RPCs), established

Conservation Strategies

by RSA 36, are required to “prepare a coordinated plan for the development of a region” and may assist their member or 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, connectivity along river corridors, natural communities, and natural community systems.

Few professional planners in New Hampshire have any background in natural resource protection, ecological sciences, or wildlife biology. 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. NHFG can also work with watershed coalitions and their partners at NHDES to ensure that watershed planning addresses aquatic habitats and associated species.