



New Hampshire

WILDLIFE ACTION PLAN



2015 REVISED EDITION

New Hampshire Wildlife Action Plan 2015 Revised Edition



New Hampshire Fish and Game Department

Glenn, Normandeau, Executive Director

11 Hazen Drive

Concord, NH, 03301

(603) 271-3211

www.WildNH.com

Cover Photo Credits:

American Kestrel © Dennis Jacobsen / Dreamstime_com

Wood Turtle © Ondreicka / Dreamstime_com

Sedge Darner - public domain image

Brook trout © Photofisher / Dreamstime_com

New England Cottontail – Heidi Holman, NHFG

Table of Contents

Tables and Figures	v
Acknowledgements	vii
Commonly Used Acronyms	ix
Executive Summary	xi
Guide to the 8 Required Elements	xv
Introduction	xvii
Chapter 1: Public Participation	1-1
Chapter 2: New Hampshire Wildlife and Habitats at Risk	2-1
Chapter 3: New Hampshire's Wildlife Habitat Conditions	3-1
Chapter 4: Wildlife Risk Assessment	4-1
Agriculture and Aquaculture	4-14
Biological Resource Use	4-17
Climate Change and Severe Weather	4-25
Development – Residential and Commercial	4-37
Energy Production and Mining	4-44
Human Intrusions and Disturbance	4-48
Invasive and Other Problematic Species, Genes and Diseases	4-56
Natural System Modifications	4-67
Pollution	4-74
Transportation and Service Corridors	4-91
Chapter 5: Conservation Actions	5-1
Chapter 6: Monitoring, Performance Evaluation, and Adaptive Management	6-1
Chapter 7: Implementation	7-1

Appendices

Species and Habitats

- Appendix A: Species Profiles
- Appendix B: Habitat Profiles
- Appendix C: 2015 Wildlife Action Plan Habitats Crosswalk
- Appendix D: Rare Plant Species and Wildlife Habitats

Processes and Templates

- Appendix E: Threat Assessment Instructions
- Appendix F: IUCN Threat Categories Level 1 and 2 with Definitions
- Appendix G: Risks to Wildlife and Habitats: Change in Assessed Values 2005 to 2015
- Appendix H: Species and Habitat Profile Template
- Appendix I: Regulatory Protection Definitions

Partner and Stakeholder Input

- Appendix J: Findings from Key Informant Interviews

Appendix K: Stakeholder and Community Engagement Report

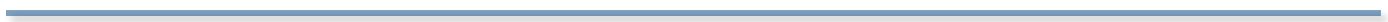
Appendix L: Wildlife Action Plan Survey Results

Appendix M: Public Relations efforts for Wildlife Action Plan Revision

Appendix N: Partners assisting in the Development of the Wildlife Action Plan

Performance Evaluation

Appendix O: Performance Evaluation of 2005 Wildlife Action Plan Implementation



List of Tables and Figures

Table 1-1. Key Informant Interviewees

Table 1-2. Input Sessions: Attendee Affiliations

Table 2-1. NH Species of Greatest Conservation Need

Table 2-2. Species and species guilds that were not included as NH SGCN 2015 but were identified as species in need of additional information to assess future SGCN listing

Table 2-3. Species removed from the Species in Greatest Conservation Need list for the 2015 NH Wildlife Action Plan Revision and justification comments for removal.

Table 2-4. Species of high responsibility in the northeast United States and generally considered low conservation concern in New Hampshire

Table 2-5. New Hampshire Wildlife Action Plan habitat list, 2015

Table 3-1. Summary of preliminary terrestrial and wetland habitat condition analysis results.

Table 3-2. Summary of potential biodiversity indicators.

Table 4-1. Summary of risk assessment results from 2015.

Table 4-2. Summary of NH risk assessment results for each IUCN Level 1 threat category

Table 4-3. Number of habitat types and SGCN evaluated for risk under each IUCN level

Table 4-4. Summary of NH risk assessment results for each IUCN Level 1 threat category

Table 4-5. Summary of NH risk assessment results for each IUCN Level 1 and Level 2 threat categories

Table 4-6. Summary of NH risk assessment results for each Wildlife Action Plan habitat type

Table 4-7. Summary of risk assessment results by habitat groupings

Table 4-8. Categorization of action categories for SGCN

Table 4-9. Frequencies and percentages of risk ranks that remained the same, increased, or decreased in risk rank between the 2005 NH Wildlife Action Plan and the 2015 Wildlife Action Plan

Table 4-10. Frequencies of risk categories for the 2005 NH Wildlife Action Plan and the 2015 Wildlife Action Plan.

Table 4-11. Habitats and species at highest risk from the effects of agriculture and aquaculture

Table 4-12. Habitats and species at highest risk from the effects of biological resource use

Table 4-13. Habitats and species at highest risk from the effects of climate change and severe weather

Table 4-14. Habitats and species at highest risk from the effects of commercial and residential development

Table 4-15. Habitats and species at highest risk from the effects of energy production & mining

Table 4-16. Habitats and species at highest risk from the effects of human intrusions and disturbance

Table 4-17. Habitats and species at highest risk from the effects of invasive & other problematic species, genes & diseases

Table 4-18. Habitats and species at highest risk from the effects of natural system modifications

Table 4-19. Habitats and species at highest risk from the effects of pollution

Table 4-20. Habitats and species at highest risk from the effects of transportation & service corridors

Figure 1-1. A banner displaying the Wildlife Action Plan cover

Figure 1-2. Participants at each input session were asked to place a dot indicating the two top threats to wildlife

Figure 2-1. Northeast Terrestrial Wildlife Habitat Classification System

Figure 2-2. NH Wildlife Sightings homepage

Figure 3-1. New Hampshire Habitat Landcover.

Figure 3-2. River and Stream classification by NH Department of Environmental Services. Lake and Pond classification by NHFG.

Figure 3-3. Highest Ranked Wildlife Habitat by Ecological Condition in New Hampshire

Figure 3-4. The Ecoregional Subsections classification was based on land formations, geology, topography, regional climate, and dominant natural vegetation.

Figure 3-5. Aquatic Resource Mitigation Regions developed by NHDES and based on major watersheds.

Figure 6-1. Flow chart of the adaptive management process (Jones 2009).

Acknowledgments

The following people were integral to the creation of this NH Wildlife Action Plan. We thank them for their dedication, creativity, persistence and hard work for the protection of wildlife and habitats throughout New Hampshire.

New Hampshire Fish and Game Executive Director: Glenn Normandeau
New Hampshire Fish and Game Wildlife Division Chief: Mark Ellingwood

Project Supervisor: John Kanter, *Nongame and Endangered Wildlife Program, NHFG*

Wildlife Action Plan Revision Project Directors

Emily Preston, *Wildlife Biologist, NHFG*
Michael Marchand, *Wildlife Biologist, NHFG*
Loren Valliere, *Biological Technician, NHFG – Assistant Director*

Wildlife Action Plan Implementation Team

Pamela Hunt, *Senior Conservation Biologist, New Hampshire Audubon*
Peter Bowman, *Wildlife Specialist, NH Natural Heritage*
Peter Steckler, *GIS & Conservation Project Manager, The Nature Conservancy in NH*
Matthew Carpenter, *Fisheries Biologist, NHFG*
Heidi Holman, *Wildlife Biologist, NHFG*
Rachel Stevens, *Stewardship Coordinator and Wildlife Ecologist, Great Bay National Estuarine Research Reserve and NHFG*
Katie Callahan, *GIS specialist, NHFG*
Jillian Kilborn, *Wildlife Biologist, NHFG*
Brendan Clifford, *Wildlife Biologist, NHFG*
Mark Zankel, *Executive Director, The Nature Conservancy in New Hampshire*

Wildlife Action Plan Outreach and Engagement Team

Molly Donovan, *Ext. Specialist, Community & Economic Development, UNH Cooperative Extension*
Amanda Stone, *Extension Specialist, Land & Water Conservation, UNH Cooperative Extension*
Casey Hancock, *Program Coord., Community & Economic Development, UNH Cooperative Extension*
Melissa Paly, *CrossCurrent Communications*
Barbara MacLeod, *CrossCurrent Communications*
Jane Vachon, *Public Affairs Specialist, NHFG*

Other Contributing Authors

Benjamin Nugent, *Fisheries Biologist, NHFG*
Robert Eckert, *Marine Biologist, NHFG*
Conor O'Donnell, *Marine Biologist, NHFG*
Brett Ferry, *Biological Technician, NHFG*
Joshua Megysey, *Biological Aide, NHFG*
Jessica Carloni, *Waterfowl Project Leader, NHFG*
Kristine Rines, *Moose Project Leader, NHFG*

Karen Bordeau, *Small Game and Pheasant Project Leader, NHFG*
David Patrick, *Director of Conservation Programs, The Nature Conservancy in New Hampshire*
Tony Tur, *Endangered Species Biologist, USFWS*
Christian Martin, *Senior Conservation Biologist, New Hampshire Audubon*
Rebecca Suomala, *Senior Conservation Biologist, New Hampshire Audubon*
Laura Deming, *Senior Conservation Biologist, New Hampshire Audubon*

And thanks to the many people who came to share their knowledge, ideas and thoughts during the revision process. See Tables 1-1, 1-2 and Appendix N for lists of stakeholders and partners.

Commonly Used Acronyms

Many acronyms are used throughout the chapters and appendices. This list only includes the most commonly used acronyms. Those not listed here are spelled out the first time they are used in each chapter or appendix.

BMPs Best Management Practices

DRED Department of Resources and Economic Development

FERC Federal Energy Regulatory Commission

GIS Geographic Information System

GRANIT NH's GIS library, hosted by UNH

IUCN International Union for Conservation of Nature

LCHIP Land and Community Heritage Program

NAAT National Advisory Acceptance Team

NE Lexicon *The Northeast Lexicon: Terminology Conventions and Data Framework for State Wildlife Action Plans in The Northeast Region*

NHA New Hampshire Audubon

NHBR New Hampshire Bird Records

NHDES New Hampshire Department of Environmental Services

NHDOT New Hampshire Department of Transportation

NHFG New Hampshire Fish and Game Department

NHNHB New Hampshire Natural Heritage Bureau

NHWS New Hampshire Wildlife Sightings database

NRCS Natural Resource Conservation Service

OHRV Off Highway Recreational Vehicle

RAARP Reptile and Amphibian Reporting Program

SGCN Species of Greatest Conservation Need

SPNHF Society for the Protection of New Hampshire's Forests

TNC The Nature Conservancy

TRACS The USFWS reporting system for state activities using USFWS funds

UNH University of New Hampshire

UNHCE University of New Hampshire Cooperative Extension

USDA United States Department of Agriculture

USEPA United States Environmental Protection Agency

USFS United States Forest Service

USFWS United States Fish and Wildlife Service

USGS United States Geologic Survey

WAP Wildlife Action Plan

WMNF White Mountain National Forest

Executive Summary

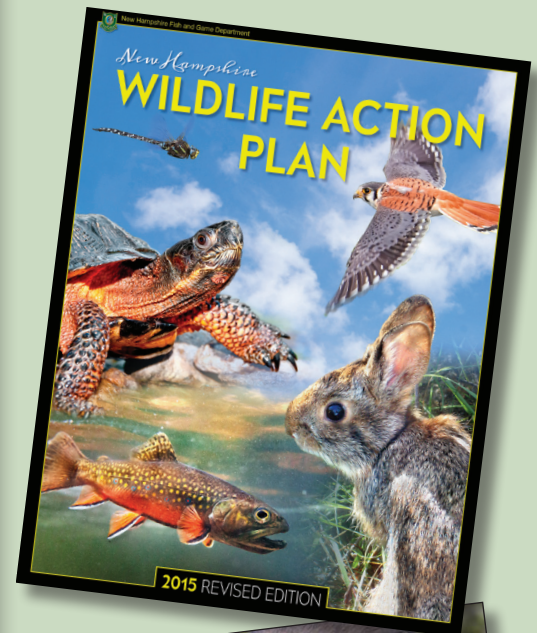
New Hampshire Wildlife Action Plan

The 2015 revision of the Wildlife Action Plan incorporates new data, methodologies and extensive public input to identify species in greatest need of conservation, habitats that are at the greatest risk, as well as land uses and activities that present the greatest threats to wildlife and habitat. It outlines more than 100 actions that can be taken by diverse stakeholders to protect and manage wildlife and habitat in New Hampshire.

In 2005 the U.S. Fish and Wildlife Service approved New Hampshire's first 10-year Wildlife Action Plan, a document that was two years in the making and which laid out strategies for managing and protecting the full array of wildlife that occurs in the state and the habitats that support them.

Successful implementation of the NH Wildlife Action Plan has been documented. Since 2005, New Hampshire Fish & Game (NHFG) staff, in partnership with dozens of organizations, agencies, universities, municipalities, scientists, professionals and volunteers in every part of the state, has been guided by the Wildlife Action Plan during land use planning and decision-making, landscape conservation planning, and species and habitat management and conservation. 495 species and habitat actions were implemented from 2005-2015 (forty-five percent of all actions identified in the 2005 plan). Over 4,250 acres were targeted by NHFG for land acquisition or habitat management for specific species or habitat, and overall 235,000 acres of highest ranked habitat was conserved by partners. Technical assistance was provided to over 3,500 citizens, landowners, and land managers. Over 1,300 structures were installed (such as bat gates and nesting structures) or removed (such as dams and other fish passage barriers) to benefit wildlife populations. Additionally, the northeast states have worked together to conserve the wildlife that topped their lists of Species of Greatest Conservation Need including New England cottontails (work that prevented federal listing), Blanding's and wood turtles.

The benefits of investing in the Wildlife Action Plan's strategies go well beyond "saving" rare species. Wildlife-associated recreation is a significant economic engine for New Hampshire. The U.S. Fish and Wildlife Service's 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation determined expenditures for these activities to be nearly \$551 million in New Hampshire.



Executive Summary

Outdoor recreation brings in \$4.2 billion annually from New Hampshire residents and tourists (Trust for Public Land 2014). Any downturn in participation in these activities would have a negative impact on the state's economy, whereas efforts to improve wildlife and habitat in New Hampshire would likely bring more revenue into the system from hunters, anglers, wildlife watchers and outdoor enthusiasts.

There are additional economic benefits to healthy wildlife populations and habitats. People live in and visit New Hampshire, and spend money here, in large part because it is a place of great natural beauty. Yet increased development, and the associated conversion of forest and other wildlife habitat into roads, houses, and businesses, degrades the land's value to New Hampshire's wildlife. New Hampshire can support a growing population and economy while maintaining the overall health of wildlife and their habitat with better planning, new understandings of wildlife populations and their needs, increased support, and strong collaboration throughout the public, private and non-profit sectors.

All wildlife species native to New Hampshire were eligible for identification as Species of Greatest Conservation Need (SGCN) including game species, nongame species, fish and marine animals. Information on their populations, habitats, risks and status throughout the northeast were considered during the process. A total of 169 species are identified as SGCN, of which 27 species are listed as state endangered and 14 listed as state threatened. The 2005 Wildlife Action Plan listed 118 species as SGCN, and 13 of those species were deemed recovered enough or stable enough not to be included on the 2015 list. The 2015 Wildlife Action Plan also identifies 27 distinct habitats that support both common species and SGCN. By identifying and protecting high quality examples of all of New Hampshire's natural communities, all of the state's native wildlife species will have access to intact habitats.

The revised NH Wildlife Action Plan (2015) habitats are based on habitat types developed by the Northeast Terrestrial Habitat Classification and the Northeast Aquatic Habitat Classification. Wildlife habitat condition was assessed for 27 habitat types. NH Fish and Game developed a methodology to assess the relative ecological condition of habitats through the use of statewide GIS data that represent species diversity, landscape context, and human impacts. Habitats were then ranked to identify priority conservation targets across all habitat types. These maps and the underlying data are used for species recovery, land conservation, and habitat restoration efforts.



Executive Summary

Risk assessments were conducted for 27 habitats and 169 Species of Greatest Conservation Need using a standard methodology adopted by the northeast states. Eleven different threat categories with 37 sub-categories were ranked in terms of their potential impact on each species and habitat throughout New Hampshire. Saltmarshes, warmwater rivers and streams, dunes, lowland spruce-fir forest, and vernal pools had the greatest number of high-ranking threats. Commercial and residential development, pollution, disease, and climate change are among the higher-ranking risk factors that impact the health of wildlife populations and habitats. As a part of the revision process, scientists identified where and how wildlife will be affected over the next ten years and what actions need to be taken to prevent further losses of the most vulnerable species and habitats.

The revision of the Wildlife Action Plan included an extensive amount of public participation. Over 90 wildlife experts throughout New Hampshire and neighboring states assisted in the evaluation of species for inclusion as Species of Greatest Conservation Need and assessed threats to those species and their habitats. Five public engagement sessions were held throughout the state, attended by 166 participants representing 79 communities and an array of non-profit, municipal, state and federal agencies, and private landowners. During these sessions participants identified a wide range of actions to help conserve wildlife and habitats. In addition, 1,142 people responded to an online survey to express their concerns and priorities for wildlife in New Hampshire. A complete draft of the Plan was posted on the NH Fish and Game website for 30 days and received comments from 123 people.

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

New Hampshire Fish and Game uses many techniques, data sets and programs to monitor changes in wildlife populations and habitat. Where available, NHFG uses standardized protocols for



Executive Summary

monitoring to allow for consistency and comparison among states. New research and data is continually integrated into conservation planning, implementation, monitoring, and performance evaluation. This approach to adaptive management has been ongoing since the original Wildlife Action Plan was developed in 2005 and will continue through the next 10 years until this document is revised again.

Through existing and new partnerships, NHFG is moving forward with implementing the Wildlife Action Plan. Doing this effectively will require additional sources of financial support over the coming 10 years. It also requires prioritization of action items and participation of partner organizations. Prompt action is crucial—not only for the health and diversity of wildlife and habitats in the state - but also to ensure that future generations will have the opportunity to experience and enjoy the Wild New Hampshire we love and appreciate today.

Information from the Wildlife Action Plan is accessible through the NHFG website (wildlife.state.nh.us/wildlife/wap.html) and “Taking Action for Wildlife” (takingactionforwildlife.org).

New Hampshire Fish & Game Department
New Hampshire Wildlife Sightings

Home Species of Interest Related Links Contact Us Login

Tell us what you've seen!
WELCOME to NH Wildlife Sightings, a web tool for reporting wildlife observations in New Hampshire.
It's for everyone — landowners, foresters, outdoor sportspersons, wildlife enthusiasts... And it's easy!

- Begin by creating your own user account...
- Learn how to use the reporting tools
- Review our wildlife species of interest
- Visit links of related information.

NH Fish & Game's Nongame and Endangered Wildlife Program
Protecting over 400 species of mammals, birds, reptiles, and amphibians, as well as thousands of insects and other invertebrates.
Read more...

Tips for Wildlife Watching in New Hampshire
Get ideas on tools for wildlife viewing, viewing ethics and responsibilities, photo tips, and how to increase your

NH Wildlife Management Conservation Areas
Find locations of undeveloped land owned by N.H. Fish and Game Dept. and designated as areas for wildlife conservation.

Help update New Hampshire's Wildlife Action Plan
TAKING ACTION TO PROTECT NATURAL LANDS AND WILDLIFE



Guide to Eight Required Elements

We used the eight required elements as the building blocks for New Hampshire’s Wildlife Action Plan. Each element is an important piece of the wildlife puzzle. You will find these elements interwoven throughout the text, figures and forms. We provide this table as a guide to help you find the eight elements.

Required Element	Chapters and Appendices	Sections of Species Profiles (Appendix A)
<p>1. Information on the distribution and abundance of species of wildlife, including low and declining populations as the State fish and wildlife agency deems appropriate, that are indicative of the diversity and health of the State’s wildlife. These species are referred to as Species of Greatest Conservation Need (SGCN)</p>	<p><i>Chapter 2:</i> New Hampshire Wildlife and Habitats at Risk</p> <p><i>Appendix A:</i> Wildlife Species Profiles</p>	<p><i>Appendix A:</i> Justification Species And Habitat Distribution Habitat NH Wildlife Action Plan Habitats Population Management Status Regulatory Protection References, Data Sources and Authors</p>
<p>2. Descriptions of the location and relative condition of key habitats and community types essential to the conservation of each State’s SGCN;</p>	<p><i>Chapter 2:</i> New Hampshire Wildlife and Habitats at Risk <i>Chapter 3:</i> Condition of New Hampshire’s Priority Wildlife Habitats</p> <p><i>Appendix B:</i> Habitat Profiles <i>Appendix D:</i> Rare Plant Species and Wildlife Habitats</p>	<p><i>Appendix A:</i> Species And Habitat Distribution Habitat NH Wildlife Action Plan Habitats Quality of Habitat Habitat Protection Status Habitat Management Status</p>
<p>3. Descriptions of the problems which may adversely affect SGCN or their habitats, and priority research and surveys needed to identify factors which may assist in restoration and improved conservation of SGCN and their habitats;</p>	<p><i>Chapter 4:</i> Threats to New Hampshire’s Wildlife</p> <p><i>Appendix A:</i> Wildlife Species Profiles <i>Appendix B:</i> Habitat Profiles <i>Appendix E:</i> Threat Assessment Instructions <i>Appendix F:</i> IUCN Threat Categories Level 1 and 2 with Definitions <i>Appendix G:</i> Change in Assessed Values 2005 to 2015</p>	

<p>4. Descriptions of conservation actions necessary to conserve SGCN and their habitats and establishes priorities for implementing such conservation actions</p>	<p><i>Chapter 4: Conservation Actions</i></p> <p><i>Appendix A: Wildlife Species Profiles</i> <i>Appendix B: Habitat Profiles</i></p>	<p><i>Appendix A: Actions</i></p>
<p>5. The provisions for periodic monitoring of SGCN and their habitats, for monitoring the effectiveness of conservation actions, and for adapting conservation actions as appropriate to respond to new information or changing conditions;</p>	<p><i>Chapter 6: Monitoring, Performance Evaluation, and Adaptive Management</i></p> <p><i>Appendix A: Wildlife Species Profiles</i> <i>Appendix B: Habitat Profiles</i></p>	<p><i>Appendix A: Actions</i></p>
<p>6. The provisions to review its Strategy at intervals not to exceed ten years;</p>	<p><i>Chapter 7: Implementation</i></p>	
<p>7. Provisions for coordination during the development, implementation, review, and revision of its Strategy with Federal, State, and local agencies and Indian Tribes that manage significant areas of land or water within the State, or administer programs that significantly affect the conservation of species or their habitats.</p>	<p><i>Chapter 5: Conservation Actions - Agency Coordination and Policy; Strategy Interagency Regulation and Policy</i></p> <p><i>Acknowledgements</i></p> <p><i>Appendix A: Wildlife Species Profiles</i> <i>Appendix B: Habitat Profiles</i> <i>Appendix N: Partner Participation</i></p>	<p><i>Appendix A: Actions</i></p>
<p>8. The provisions to provide the necessary public participation in the development, revision, and implementation of the Wildlife Action Plan.</p>	<p><i>Chapter 1: Public Participation</i></p> <p><i>Appendix J: New Hampshire Wildlife Action Plan Update Findings from Key Informant Interviews</i> <i>Appendix K: Stakeholder and Community Engagement Wildlife Action Plan Revision 2015</i> <i>Appendix L: Wildlife Action Plan Survey 2015</i> <i>Appendix M: Public Relations efforts for Wildlife Action Plan Revision</i></p>	

Introduction

From Mount Washington to our Atlantic coastline, New Hampshire supports a wealth of wildlife species and habitats. Through the 1700s and 1800s, a majority of the state’s forests were cleared for fields, pastures, and timber. Rivers and streams, dammed and degraded, became largely impassable for migratory fish. During this period, many fish and wildlife—already beleaguered by deforestation and diminished water quality—were nearly extirpated by market hunting and fishing.

New Hampshire, like other states, reacted to this “era of exploitation” with efforts to conserve fish, wildlife, and land. In 1865, the New Hampshire Fisheries Commission was established to restore sea-run fish to the Merrimack and Connecticut rivers, and to introduce other species into lakes, ponds and streams for their food and recreational value. Later, New Hampshire conservationists helped pass the 1911 Weeks Act, which in 1912 led to the purchase of 72,000 acres of land by the federal government and the creation of the White Mountain National Forest. Since then, people have flocked to New Hampshire each year to enjoy our forests, water, and wildlife.

In the early decades of the 20th century, concerned hunters and anglers demanded an end to the over-exploitation of the nation’s fish and wildlife resources. In response, the reorganized and renamed New Hampshire Fish and Game Department (NHFG) took steps to conserve them by setting and enforcing bag limits; creating wildlife refuges and sanctuaries; paying for game damage; operating a game farm; and issuing hunting and fishing licenses. The revenue generated from fishing and hunting license sales enabled the agency to expand its restoration, education, and law enforcement programs.

Additional funding for wildlife restoration started coming to NHFG from the Federal government after the passage of the Pittman-Robertson Act in 1937. In 1950, the Dingell-Johnson Act was established to support the states’ restoration of sport fish. With this infusion of funds and support and the efforts of the Department, the health and population of dozens of fish and wildlife species like moose, black bears, beaver, white-tailed deer, and wood ducks has rebounded.

Beyond Sport Fish and Game Restoration

In 1979, during an era of public outcry over polluted air and water, New Hampshire formally recognized the need to conserve endangered wildlife and passed the state Endangered Species Conservation Act. In partnership with the U.S. Fish & Wildlife Service (USFWS), U.S. Forest Service (USFS), and New Hampshire Audubon (NHA), NHFG staff initiated activities that would ultimately lead to the recovery of some of the high-profile species that were hit hardest by environmental contaminants—bald eagles, peregrine falcons, ospreys, and loons. The success of these efforts proved that management could benefit a broad range of wildlife.

In 1988, the NH Legislature passed the Nongame Species Management Act, and expanded the mission of NHFG to manage and protect the full array of wildlife and the varied habitats they need to thrive. Through the 1990s, new partnerships formed between NHFG and the Society for the Protection of New

Introduction

Hampshire Forests (SPNHF), NH Audubon (NHA), The Nature Conservancy (TNC), local and regional land trusts, individual towns, and many others to protect hundreds of thousands of acres throughout the state. Just since the 2005 WAP, over 245,000 acres of wildlife habitat have been protected.

The state's ability to conserve non-game wildlife and habitat greatly expanded in 2002 when the US Congress passed a law appropriating \$80 million in State Wildlife Grants, directed to state wildlife agencies to develop programs to help "species in greatest need of conservation", including those species not hunted or fished.

State Wildlife Grants and the 2005 Wildlife Action Plan

To be eligible for State Wildlife Grants from the US Fish & Wildlife Service, states were required to develop a comprehensive wildlife conservation plan to be submitted to Congress by October 1, 2005. Congress mandated that the Plan address eight elements, as revised in 2007:

1. The distribution and abundance of species of wildlife, including low and declining populations as each State fish and wildlife agency deemed appropriate, that are indicative of the diversity and health of wildlife of the State. In subsequent discussions, these species were referred to as Species of Greatest Conservation Need or SGCN.
2. The location and relative condition of key habitats and community types essential to the conservation of each State's SGCN;
3. The problems which may adversely affect SGCN or their habitats, and priority research and surveys needed to identify factors which may assist in restoration and improved conservation of SGCN and their habitats;
4. The actions necessary to conserve SGCN and their habitats and establishes priorities for implementing such conservation actions;
5. The provisions for periodic monitoring of SGCN and their habitats, for monitoring the effectiveness of conservation actions, and for adapting conservation actions as appropriate to respond to new information or changing conditions;
6. Each State's provisions to review its Strategy at intervals not to exceed ten years;
7. Each State's provisions for coordination during the development, implementation, review, and revision of its Strategy with Federal, State, and local agencies and Indian Tribes that manage significant areas of land or water within the State, or administer programs that significantly affect the conservation of species or their habitats; and
8. Each State's provisions to provide the necessary public participation in the development, revision, and implementation of its Strategy.

NHFG undertook an extensive, two-year initiative involving dozens of scientists and hundreds of people throughout the state to create New Hampshire's first Wildlife Action Plan. The plan was approved in 2005 and has been guiding wildlife and habitat management programs since then. With the infusion of funds from the State Wildlife Grants and the 2005 WAP, NHFG's Nongame and Endangered Wildlife Program has expanded over the last thirteen years to cover more species and habitats in a broader context than ever before. Even with additional funding and staff, NHFG continues to work closely with partners, recognizing that responsibility of protecting all wildlife and habitats is bigger than what one agency can accomplish on its own.

2015 Revision of the Wildlife Action Plan

To assist in the 10-year update of the 2005 WAP, NHFG again called upon broad expertise in the state to work as collaborators. We reaffirmed the outcomes that are needed to guide the development and future implementation of the Plan:

1. Citizens that are aware of New Hampshire's wildlife diversity and its contribution to the environmental, economic, and social fabric of the State, and that actively support wildlife conservation;
2. An informed network of partners actively prepared to engage in implementing key conservation strategies and actions that protect the State's wildlife diversity;
3. A dynamic and adaptable GIS-based blueprint of New Hampshire's significant wildlife habitats that support species in greatest need for conservation and the full array of wildlife diversity;
4. A suite of conservation strategies that considers biological, social, and economic factors and opportunities to conserve wildlife species in greatest need of conservation and all wildlife;
5. A dynamic and adaptable GIS-based wildlife data management system that contains all known wildlife occurrences and habitat polygons and that can be augmented continually with new data and queried by ecoregion, conservation land, habitat type, and species to monitor our progress in conserving wildlife.

NHFG had a functioning Wildlife Action Plan Implementation Team, including NHFG biologists and others from NH Audubon, NH Natural Heritage Bureau and The Nature Conservancy, that had been formed in 2006 to ensure that the actions outlined in the WAP were being prioritized and implemented by NHFG and its many partners. This team developed the approach to revising the WAP and did most of the writing. For the stakeholder and outreach work, a separate Outreach and Engagement Steering Committee was created, comprised of several NHFG biologists plus communications and outreach experts from a number of partner organizations. This team worked on generating public input and releasing public information about the WAP. The teams communicated frequently, and most partner organizations were represented on more than one team to keep technical, scientific and communications activities in sync.

In developing strategies to address challenging issues facing New Hampshire wildlife, the Wildlife Action Plan Implementation Team:

1. Identified wildlife at risk
2. Assessed wildlife habitat conditions
3. Evaluated risk factors
4. Developed actions
5. Integrated monitoring, performance and adaptive management
6. Planned for implementation and future revisions

Throughout the process, we concentrated on developing a more systematic and transparent approach to wildlife planning. In partnership with a team from UNH Cooperative Extension and CrossCurrent Communications, NHFG again implemented an extensive public awareness and participation process during plan development. Efforts included key informant interviews, stakeholder and community input sessions throughout the state, an online survey, press coverage and public review of the entire draft plan.

Information Gathering

One of the early and integral steps in the creation of the 2005 Wildlife Action Plan was the development of an accurate, up-to-date, geographically referenced database system containing information on wildlife species. In cooperation with the New Hampshire Natural Heritage Bureau (NHNHB), we solicited data from experts on the highest priority wildlife and improved the quality of existing records, tripling the initial amount of information. In 2009, this Wildlife Sightings Database was updated and opened to the public to allow for input of sightings of rare species and citizen science project data, which is later assessed for quality by NHFG biologists. This database provides us with an efficient, web-based mechanism for accurately reporting known fish and wildlife occurrences, and has been instrumental in determining distribution and abundance of species and habitats as required in the first and second of the Eight Required Elements.

Chapters 2-6 form the core of the WAP, with specific information about wildlife in New Hampshire, the problems they face, the solutions we propose, and how we will monitor them. To ensure that our work was comprehensive and based on the best available information, we gathered technical information and data from experts. The format and analysis of data follows the recommendations in *The Northeast Lexicon: Terminology Conventions and Data Framework for State Wildlife Action Plans in the Northeast Region*, a document conceived of and compiled by the northeastern states (Crisfield 2013) to facilitate the collaboration of states in implementing the WAPs.

Identifying Wildlife at Risk

In Chapter 2, we identify New Hampshire's low and declining wildlife populations, and wildlife that are indicative of the diversity and health of the State's wildlife. This chapter corresponds primarily with the first of the Eight Required Elements, and builds on the many conservation initiatives that both preceded and have occurred since the 2005 WAP in New Hampshire. This chapter is supplemented by four appendices: Species Profiles, B: Habitat Profiles, C: Habitats and Natural Communities Crosswalk, and D: Rare Plant Species and Wildlife Habitats which provide details on SGCN and their habitats. These also lay a foundation for Required Element 2 by describing the use of natural communities as surrogates for the diversity of poorly understood wildlife, the relationship between natural communities and wildlife habitats. Chapter 2 and these appendices serve to organize both species and natural communities within the over-arching habitat types that occur in New Hampshire. These habitat types are the basis for our analyses and planning work described in later chapters.

Assessing Wildlife Habitat Condition

The location and relative condition of key wildlife habitats, the second of the Eight Required Elements, is the topic of Chapter 3. Maps of wildlife habitat types and an analysis of habitat condition were created and revised during and after the development of the 2005 Wildlife Action Plan, and were revised in 2010. These maps and the underlying data have been used for species recovery efforts, land conservation, and habitat restoration. Completion of revised habitat maps and application of regional geospatial condition assessment data was a major undertaking that will benefit conservation, planning, and resource management organizations. For the 2015 WAP, we used the northeast regional habitat land cover GIS data as the basis for the locations of habitat types in New Hampshire. These were

Introduction

grouped into habitat types similar to the 2005 WAP. An updated habitat condition analysis was run, and the results will be used for a variety of conservation purposes.

The goal of our investment in sophisticated mapping technology and conservation science is to provide tools for local and regional planners that can help them make informed decisions about habitat and wildlife protection. Developing a complete map of wildlife habitats in New Hampshire and compiling information about them for the WAP was a major scientific undertaking that will provide an invaluable technical basis for land management, wildlife, and conservation activities for the coming decade.

Evaluating Threats to Species and Habitats

Chapter 4 addresses problems that may adversely affect wildlife and their habitats based on the expert opinions of wildlife professionals and the published literature. We used a structured process based on the IUCN threat classification system, as suggested by the NE Lexicon, to organize and focus the attention of our science team on the most challenging issues.

In keeping with New Hampshire's tradition of teamwork, NHFG invited species and habitat experts from across the state to participate in an interactive threat-ranking session. The sessions began by updating the individual threat ranks established in the 2005 WAP for each species or habitat, and was followed by a discussion of new or emerging threats. This process is described in detail in Appendix E. Scores were later compiled to give each threat an overall score using a ranking process described in Chapter 4 and Appendix E.

To the extent that expertise and information was available, the values given for each threat factor (spatial extent, severity, immediacy, certainty, likelihood, and reversibility) were peer-reviewed and cross-referenced to scientific literature. The highest ranking threats to species and habitats are discussed in the profiles (Appendix A and B).

In the comparative phase of the process, scores from all of the threat rank sessions were compiled in an Excel database. This allowed us to analyze and compare the levels of risk among species/habitats and also among the broader threat categories. This process also allowed us to compare changes in threats over the past ten years (summarized in Appendix G). This approach enabled us to summarize challenging issues in a consistent, standardized format that will be used to help prioritize actions for implementation.

Developing an Action Plan

In response to the fourth of the Eight Required Elements, Chapter 5 describes actions necessary to conserve wildlife and provides information about prioritizing and implementing such actions. As part of the preceding chapters, we completed in-depth analyses to obtain a “diagnosis” of the issues that most threaten New Hampshire's wildlife. We compiled actions to address the individual needs of species and habitat, which led to an understanding of actions that were common across multiple species and/or habitats. We also compiled action from the 2005 WAP, the Ecosystems and Wildlife Climate Change Adaptation Plan (a plan developed in 2012 to address climate change issues), gathered ideas for actions from stakeholders and the public through the Stakeholder and Community Input Sessions, and spoke

Introduction

with partners and other experts. These actions were then combined, refined and sorted into categories based on a combination of the type of action and what entities might implement them.

Integrating Monitoring, Performance, and Adaptive Management

To meet the fifth of the Eight Required Elements, Chapter 6 describes New Hampshire’s plan for monitoring species identified in Element 1 and their habitats, for monitoring the effectiveness of the conservation actions proposed in Element 4, and for adapting these conservation actions to respond appropriately to new information or changing conditions. Our monitoring priorities include species population trends and habitat quality. The three categories of variables we need to monitor are changes in threats, management effects, and ecological responses. Finding the right combination of measurements and variables within a reasonable budget—and still having the ability to respond to changes on the ground—is a critical challenge.

Our approach is to find the most efficient variables. By “efficient” we mean variables that fit into more than one of the categories described above and also represent many fish and wildlife species. Efficient also means that we can measure a variable and detect changes with minimal effort. When a variable meets these criteria, we consider it a useful “indicator” because it indicates changes that are happening for many variables. Our goal is to select useful indicators for each priority habitat and high priority species, and to monitor them rigorously.

The success of conservation actions will be measured using terminology used in Wildlife TRACS. To facilitate this process, the actions we’ve identified have been coordinated with TRACS categories. We have built in adaptive management strategies to enable the best use of our resources through planning, implementation, and evaluation. This ongoing cycle of work flow was incorporated into the development of this document and will continue through the next 10 years, until the document is revised again.

Guiding Implementation

In accordance with elements 6-8 of the Eight Required Elements, Chapter 7 describes our plans for coordinating, reviewing, and revising the WAP during the implementation phase in concert with our partners, stakeholders, and public. Several of the objectives described in Chapter 5 require immediate implementation and will serve as a transition between plan development and implementation. For example, information that we gathered about risks to wildlife and the feasibility of our objectives will be used to prioritize implementation of the WAP. We recognize that our priorities may differ from those of our partners, stakeholders, and the public, and therefore will provide guidance to match action items with the best organization for implementation.

Planning for the Future

Once the 2015 WAP is approved, the process of funding and implementation begins. The benefits of investing in the WAP’s strategies—or any wildlife conservation activities—go well beyond “saving” rare species. The economic benefits are clear - wildlife-associated recreation is a significant economic engine for New Hampshire. The U.S. Fish and Wildlife Service’s 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation determined expenditures for these activities to be nearly

Introduction

\$551 million in New Hampshire. Fishing brought in an estimated \$209 million in 2011; hunting, \$61 million; and wildlife watching, \$281 million. Outdoor recreation brings in \$4.2 billion annually from New Hampshire residents and tourists (TPL 2014). Any downturn in participation in these activities will have a negative impact on the state's economy, whereas efforts to improve wildlife and habitat in New Hampshire will likely bring more revenue into the system from hunters, anglers, and wildlife watchers.

The economic issue goes well beyond wildlife-associated recreation. New Hampshire's ecological framework is itself a hidden economy, untranslatable into dollars and cents. People live in and visit New Hampshire, and spend money in the state, in large part because it is a place of great natural beauty. The downside is this: New Hampshire's structures and services have boomed. When people move to New Hampshire from out of state, the amount of space developed per person has risen to more than two acres. This conversion of forest and other wildlife habitat into roads, houses, and businesses degrades the land's value to New Hampshire's wildlife. New Hampshire can support new people, and it can offer them places to live and drive, work and recreate. The Wildlife Action Plan helps accomplish this by pointing to where the most vulnerable species and habitats are in relationship to the rapidly transforming landscape.

It starts with smart planning, which is at the heart of this Plan's strategies. When people are able to clearly see the connections between good wildlife management, clean air and water, sustainable economic growth, and our quality of life, wildlife habitat conservation actions will naturally be brought to the forefront of planning decisions.

Through existing and new partnerships, NHFG is moving forward with implementing the Wildlife Action Plan. Prompt action is crucial—not only for the health and diversity of wildlife and habitats in the state, but also to ensure that future generations will have the opportunity to experience and enjoy the Wild New Hampshire we love and appreciate today.

Literature Cited

- Crisfield, E and the Northeast Fish and Wildlife Diversity Technical Committee. 2013. The Northeast Lexicon: Terminology Conventions and Data Framework for State Wildlife Action Plans in the Northeast Region. A report submitted to the Northeast Fish and Wildlife Diversity Technical Committee. Terwilliger Consulting, Inc., Locustville, VA.
- The Trust for Public Land. 2014. New Hampshire's Return on Investment in Land Conservation. The Trust for Public Land. Boston, MA. 48 pp.
- U.S. Department of the Interior, U.S. Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau. 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.