Monitoring, Performance Evaluation, and Adaptive Management

Abstract

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 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.

Overview

Evaluating the success of actions outlined in this Wildlife Action Plan requires a multi-process approach. Species and habitats must be monitored to document changes in populations or habitat condition. This monitoring can identify trends, geographic areas of concern, and new threats or changing threat levels. In addition, performance monitoring measures the efficacy of actions towards improving species and habitat conditions. For actions implemented by NHFG, this will be tracked using the USFWS Wildlife TRACS database. Tracking the progress of wildlife and habitat work by our many partners has proved challenging, and NHFG will work to improve the communication of successes between partners and incorporation into management evaluations. All this information will be used to adapt actions to address the changing needs of species and habitats, using the best available methods for conservation, recovery, restoration efforts, and collaboration with partners within and outside the state to protect the diversity of wildlife and habitats in New Hampshire.

This chapter addresses Element 5 of the NAAT Guidelines requiring state Wildlife Action Plans to propose plans for a) the provisions for periodic monitoring of SGCN and their habitats, b) for monitoring the effectiveness of conservation actions, and c) for adapting conservation actions as appropriate to respond to new information or changing conditions. Monitoring targets identified by the Northeast Association of Fish and Wildlife Agencies (NEAFWA) are also included: forests, freshwater streams and river systems, freshwater wetlands, highly migratory species, lakes and ponds, managed grasslands and shrublands, regionally significant SGCN and unique habitats in the Northeast.

Monitoring Species Population Status and Trends
In some cases, existing monitoring may be sufficient for particular species, habitats, risk assessments, or management responses. Some monitoring programs could be easily adapted or expanded to focus on

priorities. For example, the North American Amphibian Monitoring annually. These 'routes' do not adequately sample for several amphibians of conservation concern (e.g., Northern leopard frog, mink frog, Fowler's toad), but this program could be expanded to include several priority species or habitats. In other cases, an entirely new monitoring scheme may be necessary. Detailed monitoring for specific species is identified as an action under their individual profiles (Appendix A).

In some cases, monitoring only can be accomplished by expert observers operating under rigorous protocols. However, monitoring by highly qualified scientists may not be necessary in all cases nor is it possible. Trained citizens can provide important information on the distribution of species and assist with monitoring of the condition of habitats. In addition to being a cost-effective means of collecting useful data, citizen science is a valuable tool in educating the public. Several groups have been actively studying the feasibility of using citizen volunteers to assist with scientific studies or monitoring (e.g., Harris Center for Conservation Education, University of New Hampshire). Trained citizens are already used extensively to collect distribution information for some groups of species (e.g., Reptile and Amphibian Reporting Program, New Hampshire Bird Records, New Hampshire Dragonfly Survey).

The following is not intended to be a complete list of monitoring occurring for New Hampshire's wildlife, but provides a sampling of ongoing monitoring efforts and the relative level and scale of existing programs among taxonomic groups. Clearly some taxonomic groups and species have been monitored far more intensively than others.

Plants & Natural Communities
The New Hampshire Natural Heritage Bureau conducts ongoing inventories for natural communities and plants.

Invertebrates
The Marine Division of NHFG conducts ongoing monitoring programs for lobsters and breeding horseshoe crab surveys around Great Bay and coastal New Hampshire. The NHFG Nongame & Endangered Wildlife Program, NH Natural Heritage Bureau, The Nature Conservancy, USFWS, and the University of New Hampshire have conducted targeted presence/absence surveys for several threatened or endangered invertebrates including but not limited to: dwarf wedgemussel, brook floater mussel, ringed boghaunter, cobblestone tiger beetle, and rare butterflies and moths that occur in pine barrens of Concord and Ossipee.. The New Hampshire Dragonfly Survey was a five year effort (2007-2011) to document the distributions of all species of dragonflies and damselflies in the state. Trained volunteers continue to submit records annually documenting the distribution of species. Intense population and habitat management monitoring occurs for Karner blue butterfly at the one extant population. Long-term population monitoring has been ongoing for dwarf wedgemussels in the Ashuelot River and periodic distribution and condition surveys have been conducted in the Connecticut River.

Birds
Birds have traditionally been the most intensely monitored group of wildlife (other than perhaps game mammals). Major monitoring efforts have been initiated in New Hampshire by the NHFG, USFWS, New Hampshire Audubon, UNH, Dartmouth College, Plymouth State University, Vermont Center for Ecostudies, Biodiversity Research Institute, the Loon Preservation Committee, and others. New Hampshire participates in both national (Breeding Bird Surveys-BBS and Christmas Bird Counts-CBC) and state coordinated programs, as well as intense local surveys. New Hampshire Bird Records/NH

eBird (NHBR) is a state-reporting system and database that gathers bird sighting records from volunteer observers and is primarily used to collect distribution information. Long-term intensive monitoring of occupied locations and population conditions has been conducted for several threatened and endangered species, including common loon, piping plover, bald eagle, osprey, and peregrine falcon. Habitat-based bird surveys have been conducted at varying extents for grassland, salt marsh, freshwater wetland, high elevation spruce fir, and floodplain forest habitats. Several game birds of conservation concern have been monitored annually as well (e.g., American black duck, ruffed grouse, American woodcock).

Fish

Anadromous fish species are monitored annually by NHFG and USFWS biologists at fishways during spring spawning runs. Atlantic salmon populations are additionally monitored in cooperation with the USFWS and the USFS at designated salmon index sites. The Marine Division of NHFG has a number of ongoing monitoring programs as part of the multi-state management of marine fisheries administered by the Atlantic States Marine Fisheries Commission. Programs include a juvenile American eel survey and a juvenile finfish seine survey. The Marine Division also cooperates with the Maine Department of Marine Resources in the Inshore Trawl Survey, which has been monitoring marine fish populations in the Gulf of Maine since 2000. Surveys are conducted semi-annually by the NHFG Division of Inland Fisheries to monitor the populations of recreationally fished species such as brook trout. The Inland Fisheries biologists also conduct surveys under the Fish Habitat Program to assess the condition of fish in the state's streams, rivers, ponds and lakes.. Following the development of the first Wildlife Action Plan in 2005, the Fish Habitat Program initiated surveys to investigate the status of certain fish species of concern, including the bridle shiner, banded sunfish, redfin pickerel, swamp darter, and American brook lamprey.

Reptiles and Amphibians

New Hampshire participates in the nationally coordinated North America Amphibian Monitoring Program designed to examine long-term trends of breeding frog populations. The Amphibian Research and Monitoring Initiative has conducted some inventory work in New Hampshire including at the Lake Umbagog National Wildlife Refuge. The Reptile and Amphibian Reporting Program (RAARP) and the Vernal Pool Identification and Documentation program are coordinated by the NHFG Nongame & Endangered Wildlife Program, and are designed to gather statewide distribution information based on volunteer observations. Data is incorporated into an online NH Wildlife Sightings reporting website database. Malformed frog surveys have been conducted by the NHDES and the University of New Hampshire. Local targeted presence/absence and condition surveys have been conducted for some rare, threatened, and endangered species, but have been rather limited overall.

Mammals

NHFG intensely monitors population trends of big game mammals (e.g., white-tailed deer, black bear, moose) and furbearer populations. Traditionally, small mammals (e.g., bog lemmings, shrews) have had minimal monitoring, if any, although the USFS has conducted some small mammal inventories on the WMNF. Since the outbreak of White Nose Syndrome in bats, known bat hibernacula are inventoried every one to three years. Roadside bat acoustic surveys are conducted across 46 towns as part of a long-term national study. The program is coordinated by NH Audubon and completed with volunteers. Acoustic data is also collected by DFL on state lands prior to harvest and by WMNF and FWS on their lands. Volunteer landowners also monitor summer roosts through emergence counts. Multiple years of research has been conducted by UNH since 2008 to determine the health of bobcat populations in NH.

NHFG staff completed winter surveys for Canada lynx in predicted high quality habitat from 2011 – 2014. Surveys for lagomorph species in southern NH are conducted by NHFG staff with an emphasis on New England cottontail.

NH Wildlife Sightings Reporting Website
A data collection tool, New Hampshire Wildlife Sightings (NHWS), was developed in cooperation with a number of government and nongovernment entities (Figure 2-2). NHWS is a web site for collection of species occurrence data (http://nhwildlifesightings.unh.edu/). Reptiles and amphibians have been a primary focus of reporting but all taxonomic groups are potentially reportable through the website. Web hosting for NHWS is provided by the UNH Complex Systems Research Center. Staff within the Wildlife Division at NHFG perform quality control of all data. After quality control is complete, data are forwarded to NHNHB within NHDRED to be incorporated into the rare wildlife, plant, and natural community database.

Monitoring Habitat Quality

Habitat monitoring is used to understand species' population trends (a research action), design conservation actions in support of single or multiple species, and/or measure achievement of objectives of conservation actions. Habitat quality will be measured through extent (overall acres), condition (size of blocks, connectivity), and change in threats (invasive species, water quality).

Conservation Lands
A conservation lands layer in GIS for NH is updated twice a year.

Condition of the Northeast Terrestrial and Aquatic Habitats
The goal of this project was to assess the condition of 116 terrestrial and aquatic habitats in the Northeast to provide tools for the state agencies and conservation organizations to evaluate condition of specific habitats within their states. This work provides 14 ecological condition metrics and comparative results of the metrics as applied to the terrestrial and aquatic habitats. A database for the region is also available to evaluate specific areas. This is a cooperative project between the Northeast states and the North Atlantic Landscape Conservation Cooperative.

USFS Forest Condition Data
The Forest Inventory and Analysis (FIA) Program provides the information needed to assess America's forests. FIA reports status and trends in forest area and location; size and health of trees; total tree growth, mortality, and removal by harvest; wood production and utilization rates of various products; and forest land ownership. Data is collected annually and includes information on soils, under story vegetation, tree crown condition, coarse woody debris, and lichen community composition in a subsample of their plots.

Wildlife Management Institute Tracker Database
The Tracker Database compiles information on management of early successional habitat. It is an online spatial reporting tool for Wildlife Management Institute contractors and partners to highlight habitat restoration accomplishments. Data is entered for all state and other public lands and summarized at the HUC 12 watershed level for NRCS projects.

Water Quality Tracking

The NHDES coordinates several water quality monitoring programs. Lakes and ponds are monitored via the Volunteer Lake Assessment Program (VLAP). Initiated in 1985, VLAP establishes a volunteer-driven lake sampling program to assist NHDES in evaluating lake water quality, and provides volunteer monitors and lake residents with reports on lake health. This cooperative effort allows biologists and lake associations to make educated decisions regarding the future of New Hampshire's lakes and ponds.

The NHDES Surface Water Quality Assessment Program produces an integrated surface water quality document every two years. The Integrated Report describes the quality of New Hampshire's surface waters and an analysis of the extent to which all such waters provide for the protection and propagation of a balanced population of shellfish, fish, and wildlife, and allow recreational activities in and on the water.

The NHDES Wetlands Bureau tracks acreage of wetland fill, wetland creation/restoration, and wetland protection. The NHDES Wetlands Bureau is developing wetlands specific water quality standards and a methodology for monitoring condition. NHNHB has developed a wetland condition assessment protocol based on plant communities and ecological integrity (Ecological Integrity Assessment).

IPANE/EDDMapS
The Invasive Plant Atlas of New England's (IPANE) mission is to create a comprehensive web-accessible database of invasive and potentially invasive plants in New England that will be continually updated by a network of professionals and trained volunteers.

Performance Evaluation

In addition to monitoring species and habitats, NHFG will assess project results following the guidance provided by Associate of Fish and Wildlife Agencies in "Measuring Effectiveness of State Wildlife Grants" (AWFA 2011). The success of conservation actions will be measured using terminology used in Wildlife TRACS. The actions have been identified in TRACS categories to facilitate this process. By using this predefined system the outcomes will be:

- Linked – tied to key factors in the theory of change laid out in the results chain
- Measureable – in either quantitative or qualitative terms
- Precise – defined the same way by all agencies
- Consistent – unlikely to change over time
- Sensitive – changing proportionately in response to actual changes in the condition or item being measured
- Overarching – available to be measured at various points through the life of a project
- Achievable – not onerous for states or their partners to support.

NH evaluated threats for habitats and species in both 2005 and 2015 using a systematic and repeatable approach. Threat ranking methodology was similar between years; deviations were mostly due to an adoption of a new regional approach during 2015. As such, we were able to compare how risk assessments changed in New Hampshire within the last 10 years. This change in risk assessment serves as a measure of performance and a reassessment of the condition of habitat and species, and will be repeated again in 2025. (*See Chapter 4 Risk Assessment for details*).

Adaptive Management

Adaptive management incorporates conservation planning, implementation, monitoring, performance evaluation, and most importantly, the ability to learn and adapt between each phase. 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. The following is an outline of actions that will be taken by NHFG to formally complete the adaptive management cycle while implementing the Wildlife Action Plan.

Planning
- Research and comparatively analyze threats to the condition of wildlife populations and habitats
- Prioritize all proposed conservation actions before implementation to ensure that resources are targeted effectively
- Select performance measure for each action

Implementation
- Implement strategies and actions to affect change on threat.
- Monitor population status and trend
- Monitor the ecological response to conservation actions to understand links between species, habitats and threats

Evaluate and Adapt
- Report results through TRACS
- Refine and adapt all management activities to reflect new science
- Manage information and develop media to disseminate to all levels in conservation
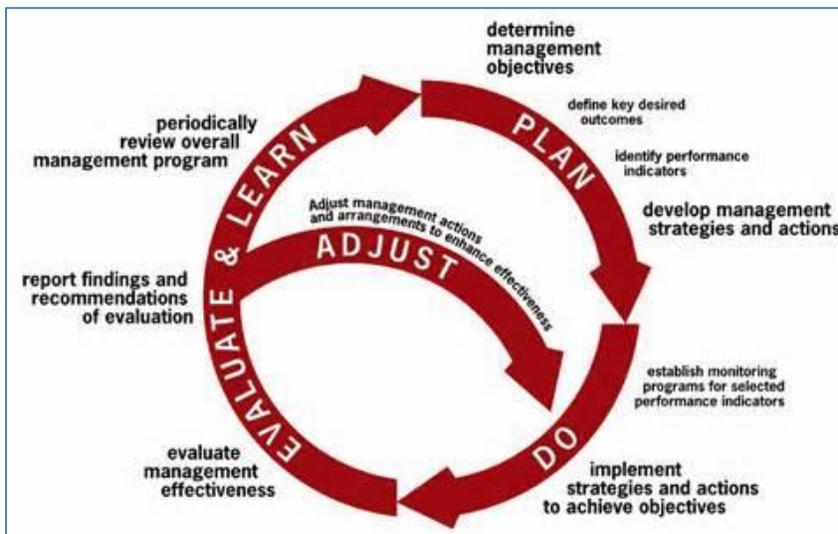- Revise the SWAP in 2025

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

Literature Cited

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