The Nature Conservancy

Protecting nature. Preserving life.™

©U.S. Fish & Wildlife

© Stephanie Koch U.S. Fish & Wildlife

Conservation Status of Fish, Wildlife, and Natural Habitats in the Northeast Landscape

Implementation of the Northeast Monitoring Framework

The Nature Conservancy · Eastern Conservation Science

©Eric Aldrich/TNC

Mark G. Anderson and Arlene Olivero Sheldon
The Nature Conservancy
Eastern Conservation Science
Eastern Regional Office
99 Bedford Street
Boston, MA 02111

Please cite as:

Anderson, M.G. and A. Olivero Sheldon. 2011. Conservation Status of Fish, Wildlife, and Natural Habitats in the Northeast Landscape: Implementation of the Northeast Monitoring Framework. The Nature Conservancy, Eastern Conservation Science. 289 pp.

This project was supported by a grant from the Northeast Association of Fish and Wildlife Agencies (#2007-05, The Conservation Status of Key Habitats and Species of Greatest Conservation Need in the Eastern Region, and 2008-05, Regional Indicators and Measures: Beyond Conservation Land), through funding from the National Fish & Wildlife Foundation, Doris Duke Charitable Trust, and U.S. Fish and Wildlife Service. In-kind support was provided by individual state fish & wildlife agencies of the Northeast Association of Fish and Wildlife Agencies, the network of Natural Heritage Programs and The Nature Conservancy.

Acknowledgements

This project is the result of a web of collaborations across the northeastern U.S. and beyond. The authors were charged with assembling and analyzing the information, but it would not have been possible without the expertise contributed by individuals in state agencies, federal agencies, academia, conservation organizations, and elsewhere. We offer our thanks to everyone who contributed their time and talents.

Core team members participated in conference calls and reviewed materials throughout this project. They were critical in the initial six months of the project during which we reviewed potential conservation status and condition metrics for inclusion: Jenny Dickson and Rick Jacobson of CT DEP; Robert Coxe and Kevin Kalasz of DE DFW; John O'Leary and Thomas O'Shea of MA DFW; Glenn Therres, Lynn Davidson, Scott Stranko, and Dana L. Limpert of MD DNR; George Matula and Sandy Ritchie of ME DIFW; Jim Oehler, John Kanter, Matt Carpenter, Steve Fuller, and John Tash of NH DFG; Dave Jenkins, Kris Schantz, and Miriam Dunne of NJ DFW, Tracey Tomajer, Greg Edinger, Dan Rosenblatt, and Erin White of NY DEC; Dan Brauning and Lisa Williams of PA GC, Dave Day of PA FBC, Jeffrey Wagner of PA WPC/NHP; Jon Kart and Rod Wentworth of VT DFW; Gary Foster of WV CNR; Becky Gwynn of VA DGIF, Dave Tilton, Genevieve Pullis LaRouche, Ron Essig, and Ken Sprankle of USFWS; Don Faber-Langendoen of NatureServe, Dan Lambert of American Bird Conservancy, Dave Chadwick of the Association of Fish and Wildlife Agencies, Mary Anne Theising of USEPA, and James McKenna of USGS.

Federal agencies provided many of the underlying datasets used in this project, and we would like to particularly thank their staff for sharing their expertise; specifically Pam Fuller of the USGS/BRD Nonindigenous Aquatic Species Program, John R. Sauer of the USGS Patuxent Wildlife Research Center Breeding Bird Survey, Jon D. Klimstra of the USFWS Division of Migratory Bird Management, Richard Mitchell PhD. of the USEPA Office of Wetlands, Oceans, and Watersheds, Mark Hatfield of USFS's Northern Research Station for FIA data and explanations, and Daren M. Carlisle PhD of the USGS National Water-Quality Assessment Program. We would also like to thank Harry Vogel of the Northeast Loon Study Working Group, Patricia A. Soranno, PhD., Dana Infante PhD., and Peter Esselman PhD. at Michigan State University, and Matthew Baker PhD. at the University of Maryland for their assistance with the lake and stream measures.

Without the countless hours of field work and information management conducted by Natural Heritage Programs and NatureServe this report would also not be possible. We would like to particularly thank the following individuals for the assistance with obtaining this critical data: NatureServe: Lynn Kutner, Kat Maybury, Margaret Ormes, and Adele Tomaino; CT NHP: Nancy Murray and Karen Zyko, DE NHP: Karen Bennett, NH NHP: Don Kent, NY NHP: D.J. Evans, NJ DEP Jason McNees, C. David Jenkins, Jr. , Bob Cartica, Gretchen Fowles, Elena Williams, Peter Winkler, and Kathleen Walz, PA NHP Susan Klugman and Jeff Wagner, ME NHP: Molly Docherty, MD NHP : Lynn Davidson, MA NHP: Henry Woolsey and Sarah Haggerty, RI NHP: Rick Enser and David Gregg, VT NHP: Bob Popp and Steve Parren, VA NHP: Tom Smith, and WV NHP: Barbara Sargent.

Without a spatial dataset of public and private lands secured from conversion this report would also not have been possible. We want to thank all the federal, state, local, and other NGO agencies who contributed spatial data and review to our secured lands regional dataset. We especially thank Melissa Clark who coordinated the effort, Kathy Smith for compiling the regional database and TNC state field office staff who were responsible for compiling the source datasets and quality controlling the information: Daniel Coker, Craig Cheeseman, Brad Stratton, Peter Steckler, Dan Farrell, Jessica Dyson, Kevin Ruddock, Michelle Canick, Tamara Gagnolet, Rachel Ralls, Mike Shanahan, Ellen Creveling, Chris Bruce, and Ruth Thornton.

Finally, we would like to thank members of the Conservancy team that provided assistance with data gathering, analysis, editing, and review during this project; specifically Melissa Clark, John Prince, and Charles Ferree of Eastern Conservation Science, and Colin Apse and Erik Martin of the Eastern Freshwater Program.

Conservation Status of
Fish, Wildlife, and Natural Habitats
In the Northeast Landscape

Executive Summary

April 2011

M. Anderson and A. Olivero Sheldon

The Northeast and Mid-Atlantic states have a long history of conservation and collaboration. Because the forests, rivers, and coastline of this region are extensive, but many of the individual states are small, the states have a tradition of working together to understand the broad ecological patterns that cross state lines. Toward this end, in 2008, the Northeast Association of Fish and Wildlife Agencies (NEAFWA) and its partners developed a multi-state monitoring framework to take stock of the condition and conservation of the species and habitats that characterize the region. The report, Monitoring the Conservation of Fish and Wildlife in the Northeast (Tomajer et al. 2008) was intended to inform decision makers and managers on how the natural world is faring in individual states, and in the region as a whole.

This report, also funded by NEAFWA, is the first attempt to implement the recommendations of the monitoring framework. Through compiling region-wide data, analyzing the underlying patterns, and assessing the many indicators suggested by the framework, it presents a comprehensive and three-dimensional picture of the state of the natural world in the northeast landscape. Full report at: http://conserveonline.org/workspaces/ecs/documents/northeast-conservation-status-report-april-2011/

The region studied includes: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, Washington D.C., and West Virginia. In these states, Fish and Wildlife agency members are responsible for managing species and habitats in a diverse range of ecosystems that include terrestrial, freshwater, coastal, and marine systems, all set amongst one of the most densely populated regions of the country. All 13 states and D.C. have developed State Wildlife Action Plans (SWAPs) that together represent a vision for the future of conservation. These plans form the underlying basis of the monitoring framework and this report.

The monitoring framework intentionally focused on the use of existing data to keep its recommendations simple and manageable. Nevertheless, implementing the recommendations required the compilation and management of over 50 data sets. Inevitably, some needed thorough revision, or had to be created anew from state sources for this report. Several federal agencies also provided datasets critical to this project, and we would like to thank their staff for sharing their expertise in using these.

The concept of a key indicator is important to an understanding of this report. The framework did not try to provide all-encompassing lists of every possible characteristic to monitor; rather, it recommended a few indicators for each target that were illustrative of overall progress and were meant to serve as a dashboard of information to guide decision makers. For our part, we focused strongly on compiling the information and displaying the patterns in as clear and transparent a way as possible. Usually, this meant keeping the analysis simple and direct. Still, there are many indicators, and as straightforward as any one

The Nature Conservancy • Eastern Conservation Science • Eastern Division • 99 Bedford St • Boston, MA 02111

indicator might be, together they interlink to form a complex, multi-dimensional picture of the target, and more than once revealed a striking and unexpected pattern.

Organization of the Report This report describes all secured lands in the region, and summarizes the status measures for seven thematic targets:

- Forests
- Wetlands
- Freshwater stream and river systems
- Lakes and ponds
- Unique habitats of the Northeast
- Species of greatest conservation need
- Grassland and shrubland (appendix only)

The chapters and sections are organized around the seven groups with a set of sub-targets, stressors, and indicators developed for each one. Each chapter begins by describing the target and its variations (for instance, forest types), and then discusses each key indicator, the method used to assess it, and the results of the analysis. The results include charts, tables, full page maps, and an appendix with detailed state-by-state information. Maps are also posted individually for anyone who may want to view or print them in high resolution. Additionally, there is an appendix of data sources that identifies the major sources used, and provides links to the original data. Lastly, there is an appendix with more specific explanations of our methods for those who may want to recreate the analyses.

Summary of Findings

Secured Lands

The eastern secured lands system represents a commitment to nature and to future generations, and an indication of what can be achieved through collective effort. These lands provide the core of efforts to protect the region's outstanding habitats and threatened species, and are increasingly understood as essential providers of ecosystem services and storehouses of the land's biological resources. Even as the region's ecology adjusts in response to a changing climate, the secured lands play a critical role in maintaining arenas for evolution and provide people with the opportunities and rewards stemming from direct contact with the land. Throughout this report, we use the term "**secured**" to refer to land that is permanently secured against conversion to development, and "**secured primarily for nature**" for the subset of those lands where the intent of the managing entity is the conservation of nature and biodiversity. The remaining subset of secured lands are "**secured for multiple uses,**" meaning that they are managed for many purposes, often including forest products and recreation. Although not explicitly managed for natural diversity, the multiple-use lands provide and sustain many important functions and are an integral piece of the conservation picture.

The secured lands are held by over 6,000 fee owners and 2,000 easement holders. Private conservation easements account for 3 million acres and fee-owned conservation land for another 1.4 million acres, reflecting a huge increase in the reach and effectiveness of non-profit land trusts. State (12 million acres),

federal (6 million acres) and municipal (900,000 acres) ownerships accounts for the rest of the conservation land.

In total, 16 percent of the region is secured against conversion and is intended to remain permanently in natural cover, while 28 percent of the region has been converted to development or agriculture. Thus, conversion outweighs total securement 2 to1. Moreover, 5 percent of the land is secured primarily for nature, and 11 percent for multiple uses, so, on an acre-by-acre basis, five acres have been converted for every one secured for nature.

In spite of great successes, the pattern of protection reveals widespread and fundamental biases in the network, with severe implications for biodiversity. Rocky granite habitats are secured for nature in equal proportion to conversion, but diverse, productive, limestone habitats have 51 times more conversion than securement for nature. Any way that it is measured, securement for nature is largely limited to slopes, high elevations, and granite or sedimentary bedrocks. Flats, floodplains, low elevations, limestone, sand and shale - the centers of diversity in the region - are largely converted and mostly unsecured.

Eastern Forests

Distribution, Loss, and Protection: The region was originally 91 percent forest supporting thousands of species; almost one-third of that, 39 million acres, has been converted. Converted forest land exceeds forest land secured for nature 6 to 1, and securement is not spread evenly across forest types. Upland boreal forests are 30 percent secured with 12 percent secured for nature. Northern hardwoods are 23 percent secured with 8 percent primarily for nature. Oak-pine forests are only 17 percent secured with 5 percent primarily for nature.

Fragmentation: Forests in the region are highly fragmented by 732,000 miles of permanent roads, enough to loop the equator 29 times. On average, 43 percent of the forest occurs in blocks less than 5,000 acres in size that are completely encircled by major roads, resulting in an almost 60 percent loss of local connectivity. Judging from current patterns, securement has been an effective strategy for preventing fragmentation, as there is a high proportion of secured land within most of the remaining big contiguous forest blocks.

Age and Size Structure: No matter what the forest type, forests in the region average only 60 years old and are overwhelmingly composed of small trees 2” to 6” in diameter. Upland boreal forests are the most heavily logged, and they differ from the other types in having fewer trees in the larger diameter size classes. Out of almost 7,000 forest samples collected in this region by the US Forest Inventory and Analysis program, no forest stands were dominated by old trees or had the majority of their canopy composed of trees over 20” in diameter.

Trends in Forest Birds: There have been substantial changes, both increases and declines, in forest bird abundances over the last 40 years. Species abundance changes were correlated with degree of fragmentation, with the road-riddled oak-pine forests showing declines in 11 species and increases in 10 species. Changes in boreal birds appeared less extensive suggesting that logging has not had as obvious an effect on bird abundance as fragmentation, but due to data limitations this pattern needs more research to confirm.

Wetlands

Distribution, Loss, and Protection: Wetlands once covered 7 percent of the region, and swamps, peatlands, and marshes are some of the most diverse wildlife habitat in the region. At least 2.8 million acres of wetlands, one-quarter of the original extent, has been converted to development or drained for agriculture. Conservation efforts have secured 25 percent of the remaining acres including one-third of the largest tidal marshes. River-related wetlands, such as floodplain forests, have lost 27 percent of their historic extent and are only 6 percent secured for nature, the greatest discrepancy of any wetland type.

Ecological Condition: The majority of individual wetlands have expanded slightly over the last 20 years, but 67 percent of them have paved roads so close to them, and in such high densities, that they have probably experienced a loss of species. Moreover, 66 percent have development or agriculture directly in their 100 meter buffer zones which can result in notable impacts on biodiversity.

Trends in Wetland Birds: There have been substantial changes, both increases and declines, in wetland bird populations over the last 40 years. Species change is correlated with the degree of conversion in the buffer zone and with the density of nearby roads. River-related wetlands have seen the most declines and tidal marshes the least. Some changes appear to be species specific and may not be tightly related to local wetland characteristics

Lakes and Ponds

Distribution, Loss, and Protection: Of the regions 34,000 waterbodies, 13 percent are fully secured against conversion to development. Very large lakes, over 10,000 acres in size, have the least securement (4 percent).

Shoreline Conversion: Forty percent of the region's waterbodies have severe disturbance impacts in their shoreline buffer zones, reflecting high levels of development, agriculture, and roads in this ecologically sensitive area. On the other hand, shoreline zones also have a high level of securement and in most lake types the amount of securement exceeds the amount of conversion.

Roads, Impervious Surfaces, and Dams: Lakes and ponds in this region are highly accessible; only seven percent are over one mile from a road and 69 percent are less than one tenth of a mile from a road, suggesting that most are likely to have non-native species. Dams are fairly ubiquitous; 70 percent of the very large lakes, 52 percent of the large lakes, and 35 percent of the medium size lakes, have dams associated with them and are likely to be somewhat altered in terms of temperature and water levels.

Biological Integrity: Over half of our small to large waterbodies have lost over 20 percent of their expected plankton and diatom taxa, and a third have lost over 40 percent. In small lakes this correlates roughly, but not significantly, with the amount of shoreline conversion. Recently, common loons, indicators of high quality lake habitats, have been producing slightly less chicks per breeding pair than the estimated 0.48 needed to maintain a stable population.

Rivers and Streams

Biotic Integrity: The region contains over 200,000 miles of streams and rivers supporting over 1,000 aquatic species, including 300 types of fish. The majority of the region's watersheds still retain 95-100 of their native fish species, but are also home to up to 37 non-indigenous species. The range of native brook trout, a species that prefers cold high-quality streams, has been reduced by 60 percent. Direct indicators of biological integrity suggest that while 44 percent of the wadeable streams are undisturbed, another 30 percent are severely disturbed, and this correlates with impervious surfaces in the watershed.

Conversion and Securement in the Riparian Zone: Riparian areas, the narrow 100 m zone flanking all streams and rivers, are important for stream function and habitat. Currently, conversion of this natural habitat exceeds securement 2 to 1, with 27 percent of riparian areas converted and 14 percent secured.

Dams and Connected Networks: Historically, 41 percent of the region's streams were linked into huge interconnected networks, each over 5,000 miles long. Today none of those large networks remain, and even the smaller ones over 1,000 miles long have been reduced by half. There has been a corresponding increase in short networks, less than 25 miles long, that now account for 23 percent of all stream miles - up from 3 percent historically. This highly fragmented pattern reflects the density of barriers, which currently averages 7 dams and 106 road-stream crossings per 100 miles of stream.

Flow: Water flow defines a stream; currently 61 percent of the region's streams have flow regimes that are altered enough to result in biotic impacts. One-third of all headwater streams have diminished minimum flows (they are subject to drying up) resulting in a reduction of habitat. Seventy percent of the large rivers have reduced maximum flows (smaller floods) that decreases the amount of nutrient laden water delivered to their floodplains.

Unique Habitats of the Northeast

Unique Habitats and Rare Species: Eleven unique habitats, from sandy pine barren to limestone glade, support over 2,700 restricted rare species. Three geologic habitats have very high densities of rare species: coarse-grained sands, limestone bedrock, and fine-grained silts. These three settings are also the most converted, the most fragmented, and in two cases, the least protected.

Distribution, Loss, and Protection: Remarkably, securement for nature was equal to, or greater than, conversion on granite settings, on summits and cliffs, and at high elevations. In stark contrast, habitat conversion exceeds securement for nature 51:1 on calcareous settings, 29:1 on shale settings, 23:1 on dry flat settings, 19:1 on moderately calcareous settings and 18:1 on low elevations. These habitats need concerted conservation attention if we are to maintain the full range of biodiversity in the region.

Fragmentation and Connectivity: Fragmentation and loss of connectivity is pervasive at lower elevations across all geology classes. Even the least fragmented setting in the region, granite, retains only 43 percent of its local connectivity. The highest level of fragmentation, with over an 80 percent loss of local connectivity, was found in calcareous settings, coarse-grained sands, fine-grained silts, and low elevations under 800 feet.

Species of Greatest Conservation Need

Species of High Regional Responsibility: Out of all species-of-concern listed in the State Wildlife Action Plans, 112 have their distributions centered in this region, and occur across four or more states. This region bears the responsibility for their conservation, and examples include: Bicknell's thrush, blue spotted salamander, Atlantic sturgeon, dwarf wedgemussel, eastern small-footed bat, and wood turtle. Currently 25 percent of their known locations are on secured land, including 9 percent on land secured primarily for nature. Surprisingly, high responsibility species are secured at levels below those of low responsibility species: 25 percent versus 32 percent.

Species of Widespread or High Concern: For species of widespread or high concern, 32 percent of their known locations are on secured land, including 16 percent on land secured primarily for nature. Species of concern include animals which are declining in many geographic regions, so actions in this region are only one part of a larger solution. Examples include: bald eagle, eastern spadefoot toad, American brook lamprey, cherrystone drop snail, Indiana bat, and Blanding's turtle.

Conservation across Taxonomic Groups: Among all species-of-concern, mammals had the highest percent of highest percentage of secured locations (46 percent), followed by amphibians (40 percent) birds (36 percent) and reptiles (26 percent). Fish had the lowest level of inventory and securement (14 percent out of 575 locations)

Grassland and Shrubland

Trends in Grasslands Birds: Out of 22 species that preferentially breed in grasslands and fields, there have been persistent widespread declines in 17 of them: eastern meadowlark, field sparrow, northern bobwhite, ring-necked pheasant, brown thrasher, song sparrow, common yellowthroat, grasshopper sparrow, red-winged blackbird, killdeer, savannah sparrow, golden-winged warbler, vesper sparrow, yellow-breasted chat, blue-winged warbler, prairie warbler, and bobolink. This trend probably reflects the expansion of their habitat during the period of widespread farming and pasturing, followed by agricultural abandonment and a return of the land to forest.

For more information please see the full report at:

http://conserveonline.org/workspaces/ecs/documents/northeast-conservation-status-report-april-2011/

Reference

Tomajer, T, Kart, J, Salafsky, N. Stem, C and V. Swaminathan. 2008. Monitoring the Conservation of Fish and Wildlife in the Northeast: A Report on the Monitoring and Performance Reporting Framework for the Northeast Association of Fish and Wildlife Agencies. 50 pp. http://rcngrants.org/regional_monitoring.shtml.