

**Managing for Transboundary Freshwater Habitats and
Wildlife in the Northeast Region:
Opportunities, Challenges, and Strategies**

Edalin Michael
April 15, 2008

Intro

Water is not a static resource, instead flowing across national, state, and local boundaries. As such, it presents unique management challenges both as a resource itself, and a habitat for species. The agreed upon way of dealing with aquatic resources is to approach their management from a watershed level – at the scale of the habitat, not of the individual species. The state agencies behind the northeast wildlife action plans profess to relinquish their species-based management regime in order to embrace a holistic, habitat-based approach. Therefore the SWAPs, in identifying actions and providing a strategy for comprehensive conservation, should alleviate some of the challenges, or at the least, pave the way for new opportunities for regional/interstate action for freshwater species and habitats.

In this study I compare the SGCN species lists from the nine northeast study area plans to determine if and where there may be overlap – ie, where multiple states shared species of greatest conservation need. After these common species were discovered, I then identify existing interstate programs focusing on these species/habitats, and describe three of them in case studies. For those species and/or habitats that are not currently the focus of interstate actions, opportunities for transboundary collaboration are ripe.

Then I discuss the threats facing these species as identified in the SWAPs. Next, the methods for managing freshwater-dependent species and habitats as outlined in the SWAPs are identified. As watershed boundaries very infrequently follow political boundaries, and also taking into account the transient nature of migratory species, this section also includes an exploration of how states deal with interstate resources in the SWAPs. This information is included mainly to inform and foment discussion of the SWAPs' capabilities to effectively manage transboundary freshwater habitats and their dependent species.

Based on the experiences of other interstate groups, I then describe common challenges as well as strategies for success as a guide for such regional programs that may result from SWAP development and implementation. The obstacles and challenges as well as success strategies also inform recommendations for policy action at the local, state, regional, and national scales.

Overview

Methods of Freshwater Resource Management

Advances in the understanding of these linkages between the terrestrial and aquatic landscapes during the later part of the nineteenth century prompted the development of new management regimes based on watershed boundaries. Some of the earliest proposals came from forester George Perkins Marsh in the 1860's as part of an analysis of the effects of forests on water supplies in Vermont. The next proponent became John Wesley Powell who, after surveying the arid lands around the Colorado River, in 1878 suggested new states be created according to watershed boundaries in order to facilitate comprehensive management of the resources. Efforts behind the creation of New York's Adirondack Park beginning in the 1860's but primarily occurring in the 1880s and 1890s also proposed watershed-based management as a way to forestall desertification of the area and siltation of the Erie Canal and Hudson River as a result of poor forestry practices and unchecked logging.

Comprehensive, integrated basin policy continued to develop during Theodore Roosevelt's administration largely through series of commission reports.¹ Although the commissions promoted similar goals as current watershed-based initiatives and management structures such as coordinated agency objectives, planning, and resources across terrestrial and aquatic systems, their proposals were aimed at harnessing and developing the water resources for irrigation, hydropower, and flood control. During the later part of the Franklin D. Roosevelt administration, states began to look on centralized, federal water resource planning with disapproval and resentment. Since that time, support and implementation of watershed-based management has fluctuated both at the federal-level and among resource managers in general.

Unlike earlier proposals for watershed management that focused on the human consumptive uses of water resources, the new comprehensive basin planning programs of the 1960's and 1970's also included conservation, pollution, and quality issues as part of a general push for ecosystem protection and planning. Largely due to the results of decades-worth of unintentional experimentation, resource managers across the boards are gaining further understanding of the intricacies and interconnections between the various component parts of ecosystems. Despite previous species-targeted efforts, many aquatic and terrestrial populations are still in decline due to loss, modification, and destruction of habitat. Consequentially, the habitat level (and therefore, watersheds and ecosystems) is recognized as the scale at which conservation and management must take place as well as at which sources of impairment must be addressed.

However, watersheds are, necessarily large, and therefore the complexity involved in the management of such an immense area seems daunting: "When one considers the need to protect the entire upstream drainage network, the riparian zone and much of the surrounding landscape, and to avoid dams, pollution, or other activities that might prevent passage of migratory species, the challenges of whole-catchment conservation are apparent."² Therefore, even in an age in which the benefits and logic of watershed- and habitat- based approaches are understood, management of freshwater and other ecosystems is fragmented – rivers are broken into reaches which are managed separately, water quality and quantity are under the jurisdiction of different bodies, etc.

To compound the problem, rivers, streams, and aquifers often cross political boundaries. Robert Varady and Barbara Morehouse state "... borders often impede the rational application of scientific knowledge to the problems it is meant to solve."³ Although Varady and Morehouse were speaking about international boundaries, many of the difficulties related to management of freshwater resources and its associated species are especially evident when the resource lies within multiple states even if they are all under the regulations of a federal government, as they have different jurisdictions, priorities, regulations, and resources. However, ecosystems do not function along political boundaries, even if rivers were originally used as the dividing point, such as the Connecticut River was (see Figure 1). The hydrological cycle and other processes

¹ Inland Waterways Commission (1908), the National Conservation Commission (1909), the National Waterways Commission (1912), etc. For a more complete history of US Watershed programs and watershed-based management initiatives, see Robert W. Adler, "Addressing barriers to watershed protection," *Environmental Law* 25 no.4 (Fall 1995).

² J.D. Allan and M. Castillo, *Stream Ecology: Structure and Function of Running Waters, Second Edition* (The Netherlands: Springer, 2007), p. 354.

³ R. Varady and B. Morehouse, "Moving Borders from the Periphery to the Center: River Basins, Political Boundaries, and Water Management Policy," in *Water: Science, Policy, and Management*, ed. R. Lawford, D. Fort, H. Hartmann, and S. Eden, (Washington, DC: American Geophysical Institute, 2003), p.143.

influencing aquatic and terrestrial ecosystems occur over massive areas, where one particular cause can have an effect tens, hundreds, or thousands of miles away.

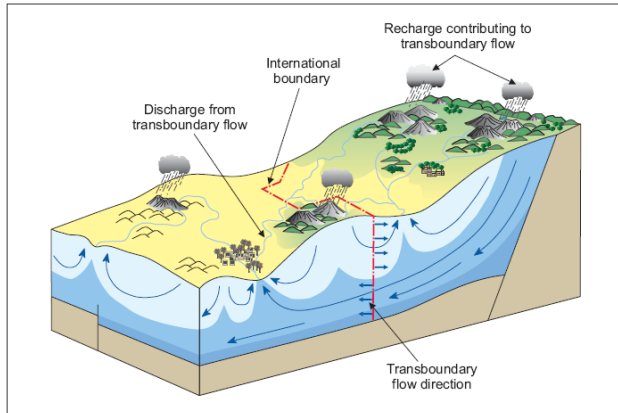


Figure 1

Freshwater Resource Management and the SWAPs

The goals of the State Wildlife Action Plans across the northeast region are, simply, to protect biodiversity. As part of the eight elements required in the SWAPs, the state agencies were asked to identify habitats and species in greatest conservation need, threats facing them, and management actions. In the

process of creating such comprehensive strategies, agencies throughout the northeast report that plan development encouraged them to look at species from the habitat level if they did not previously. Even states that were already managing at the habitat scale, recognize the need to continue doing so. For example, one of Maine's general conservation strategies outlined in their Plan is to "Implement landscape level habitat conservation initiatives."⁴

Aquatic resources and ecosystems often get overlooked in favor of focusing attention on terrestrial species and habitat, the thought being that if the land around a stream is protected, then the stream itself must benefit from its protection as well. However, in focusing conservation attention to the habitat level, many states such as New Hampshire, Massachusetts, and New York organized species by habitat classifications that included watersheds of major waterways. Indeed, this was a step forward, especially for states such as New Hampshire. Although classification systems existed for wetland and terrestrial habitats prior to Plan development, New Hampshire did not have a classification system for aquatic habitats. According to the New Hampshire plan, "The purpose of the watershed classification system was to help guide broad-scale conservation of aquatic ecosystems in New Hampshire. Conservation efforts that preserve the integrity of many types of watersheds provide greater opportunity to preserve unique, functional communities of organisms without having to identify each individual species and define its role in the community."⁵

Methodology

Primary research methods include personal interviews, in-depth analysis of the study-region SWAPs, and a review of pertinent literature. Interviews were conducted with state and federal agency representatives, as well as individuals involved in conservation and management of interstate aquatic resources at the local, state, and regional levels over the course of fifteen months. Background research was conducted on topics including current interstate aquatic management programs, species included in the plans, collaborative and joint management, and the history of watershed management in the United States. The information gleaned from the

⁴ Maine Department of Inland Fisheries and Wildlife (MDIFW), *Maine's Comprehensive Wildlife Conservation Strategy* (Augusta: ME: 2005), p. 6-4.

⁵ New Hampshire Fish and Game Department Nongame and Endangered Wildlife Program (NHFG), *New Hampshire Wildlife Action Plan* (Concord, NH: 2005), p. 2-4.

Plans centered around current management regimes employed by state agencies, information on species and habitats in the region, and insight into the threats and strategies for neutralizing or counteracting those threats. The information gleaned from these sources helped in addressing the following research questions:

1. How do SWAPs across the study region deal with freshwater-dependent species within the state? What are the threats facing freshwater species and habitats in the study region?
2. As watershed boundaries very infrequently follow politically boundaries, and also taking into account the transient nature of migratory species, how do SWAPs deal with interstate resources?
3. Based upon the SGCN species lists included in each of the plans from the study region, what are SGCN species common to all or a number of states? Are their currently programs or regimes in place to address joint management of these common species? If not, which species present good opportunities for collaborative interstate management?
4. What are the challenges facing stakeholders working to manage transboundary freshwater species and habitats? Are the SWAPs a challenge?
5. How do regional stakeholders surmount the obstacles? Are the SWAPs helping stakeholders overcome the challenges they face?
6. What DO swaps do for regional stakeholders, or what should they do and how could they do it?

A large part of the work undertaken for this study involved working with the Plans to find and compile information about freshwater-dependent SGCN species and freshwater habitats within the states. This included identifying the freshwater-dependent species in the lists of SGCN for each state and then comparing the lists of neighboring states to find areas of overlap. Important geographical species ranges for a number of species were also identified and compared across state boundaries to ascertain what, if any, programs were already in action to address the needs of the species and its habitat, as well as to pinpoint opportunities for future collaboration.

The procedure for identifying species and compiling the information necessary for later analysis varied across state and depended upon the organization and contents of the plans themselves. 'Freshwater-dependent species' were identified as SGCN using wetlands, bogs, swamps, lakes, ponds, streams, and vernal pools as their primary and secondary habitats. There were two primary reasons for this range of habitat types being included in the classification for this study. First, a summary of the aquatic SGCN (fish and mussels) in each of the plans as well as the listed associated threats, habitat types, and actions has already been completed by the US Fish & Wildlife Service.⁶ Second, in promoting habitat-based management and conservation it is necessary to include the other SGCN species that depend upon freshwater ecosystems for their survival. Although the majority of SGCN require access to freshwater, some are dependent upon it for breeding, hunting, and shelter while others are not. These freshwater ecosystems include rivers and streams, ponds and lakes, wetlands, and seasonal (vernal) pools. Diadromous fish

⁶ United States Fish & Wildlife, *Aquatic Summaries and Highlights, A Review of Wildlife Action Plans: Opportunities to Advance Fresh Water Aquatic Fish and Mollusk Species/Habitat Conservation* (Washington DC: United States Fish & Wildlife Service, 2007).

species are also included in the lists of freshwater SGCN, as they are dependent upon the freshwater environment for significant portions of their life cycles.⁷

In order to ensure the compiled lists from the different states as accurate as possible, I primarily relied on Latin/scientific species names when cross referencing the lists between states. As a number of species are known by different names in different parts of their ranges, relying only on their common names would skew the results of the analysis and return fewer instances of overlap. The state lists included in Appendix A identify species by their common names as indicated in the individual state plans. Latin and scientific names of species, however, also differ depending upon the state. Usually discrepancies in Latin names were limited to slight variations in spelling such as those of the Atlantic Sturgeon (*Acipenser oxyrinchus* or *Acipenser oxyrhynchus*). Other differences in Latin name were more significant, such as for the Wood Turtle, *Glyptemys insculpta*, which was *Clemmys insculpta* before the scientific name was changed in 2001. Some states used the new name while others used the older name. Instances where multiple spellings or names existed are indicated in the Appendix A lists, and include both spellings or names.

Although all the plans included a chart or list of all of the SGCN for its respective state, the information for Latin and common names as well as primary and secondary habitat needs were not always available in the same charts or in charts at all. Compiling species lists for those Plans without charts listing species by the latin and common names and/or species by habitats and or species by taxa necessitated a thorough review of the individual species and habitat profiles as included in the Plans. In the rare instance that I could not glean the necessary data from the plan, state and federal wildlife agency webpages would often yield the required information. This would then be cross-referenced with the other information available in the state plan in order to ensure its accuracy.

In plans that organize some or all habitats by watershed such Vermont, New Hampshire, New York, Massachusetts, and New Jersey, specific habitat-type information was found in the in-depth species information to determine whether or not a species could be classified as freshwater or not. Plans relying on habitat classification rather than watersheds necessitated finding species range information either in accompanying maps if provided, web-based tools created by the state for such purposes, or the in-depth species information.

After this information was compiled in state-by-state databases, all of the state lists were then combined to form one regional list where species were identified by Latin name and state. It was in this step where most discrepancies in Latin names were identified and modified. Additionally, redundancies in state lists were flagged so as to be discernable when the state lists were compared. These redundancies indicate species for which multiple populations of one species were of concern while the species as a whole was not. These species include:

1. *Salmo salar* (Atlantic Salmon);
2. *Salvelinus namaycush* (Lake Trout), *Petromyzon marinus* (Sea Lamprey), *Lota lota* (Burbot or Cusk), and *Alosa aestivalis* (Blueback herring); and
3. *Ambystoma jeffersonianum*, *Ambystoma laterale*, and *Ambystoma laterale x jeffersonianum* (Blue Spotted and Jefferson Salamanders).

⁷ Although anadromous (live in the sea, breed in fresh water such as Atlantic Salmon) and catadromous (live in fresh water, breed in the sea such as American Eels) species are included in the compiled lists of SGCN, I will refer to them both as 'diadromous' throughout this paper.

There are diadromous and landlocked Atlantic salmon populations in Vermont and Maine, and both are included as separate SGCN in each state's SWAP. This information is available in both Appendix B (where the state's box is orange instead of white to indicate an aberration in the population identified) and in Appendix A in the species lists for each state. Lake Trout, Sea Lamprey, Burbot (Cusk), and Blueback Herring were all identified by a number of different states as being SGCN. However, certain states identified only specific populations as being SGCN while others considered all populations of the species to be SGCN. This information is also available both in Appendix B (where the state's box is orange instead of white to indicate an aberration in the population identified) and in the state lists in Appendix A, where specific populations are identified.

The Blue Spotted and Jefferson salamanders are species that often interbreed – male Jeffersons will breed with Blue Spotted salamander females. The result is a hybrid (*Ambystoma laterale x jeffersonianum*) sometimes known as Tremblay's, Silvery, or triploid or complex Jefferson salamanders, depending on the number of chromosomes received from each of the parents. The hybrid salamanders are always female. When these hybrids reach adulthood, if they breed with male Jefferson salamanders, their offspring is exclusively female triploids or clones of itself.⁸ In Maine, it is believed that the majority of Blue Spotted Salamanders are really hybrids.⁹ This is evident in the Maine plan, which only lists the hybrid population as an SGCN. In Appendix B, I have marked Maine's box in orange for both the Blue Spotted and Jefferson salamander as well, as it seems unlikely that the hybrid population is supported solely through genetic cloning. As it would be dependent upon the gene pools of both or either the pure Blue Spotted or Jefferson Salamanders, I believed it important to take those two species into consideration for Maine despite the fact that the state SGCN list did not include them. It should be noted that in Appendix B and in the analysis of overlap across the states the Maine populations of the pure Jefferson and Blue Spotted Salamanders were not counted toward the tally of states with those common SGCNs.

Watershed Management in the SWAPs

In creating the Wildlife Action Plans, states chose to describe a more insular approach to dealing with aquatic resources, listing state-level implementation and management instead of working with neighbors to integrate the findings of their plans, despite the fact that joint jurisdictional management regimes and programs have been in effect in some areas since the 1960's. Although all of the state agencies discussed the plans and the plan development process with each other, only four of the agencies within the region report extending discussion to species lists and actions with other states' agencies, and discussions on these topics were limited and very informal.¹⁰ A couple agencies mentioned the use of regional species of concern lists as a surrogate for direct discussion. Indeed, all of the agencies used a number of regional lists to choose and prioritize SGCN. Primarily, this list was the Northeast Region Species of

⁸ For more information about hybridization of the two salamander species, see the "Jefferson Salamander" article on Wikipedia at http://en.wikipedia.org/wiki/Jefferson_Salamander; the "Blue Spotted Salamander" page from the Michigan DNR at http://www.michigan.gov/dnr/0,1607,7-153-10370_12145_12201-32988--,00.html; or "Wetland Connections" from the University of Maine at <http://www.umaine.edu/wetlands/VPbluespot.htm>.

⁹ University of Maine, "Wetland Connections," <http://www.umaine.edu/wetlands/VPbluespot.htm>.

¹⁰ The four states were CT, PA, NY, and MA.

Conservation Concern from the Northeast Wildlife Diversity Technical Committee.¹¹ Other widely used lists were focused on migratory bird species.¹² A number of states in the study area, such as Maine, considered transient species and populations differently than other non-migratory species.¹³ However, in some states such as Connecticut, migratory populations were not included in SGCN unless habitat within the state was “critical to its survival.”¹⁴

Despite the history of some of the joint interstate programs, states in the study region did not always include information about these interstate programs in process in the plans or address them as such. In the SWAPs, conservation actions for freshwater species are taken within the state. Therefore, the actions included in the plans do not always speak to the nature of the habitat or to the habitat itself.

Threats

In the Northeast study area, direct threats to freshwater-dependent species and freshwater habitats fall into four main categories: habitat loss and fragmentation, altered hydrology, water quality, and invasive species.

Habitat Loss and Fragmentation

Across the nine states, ‘habitat loss and fragmentation’ was listed as the most pressing threat.¹⁵ Development rates in the study area are some of the highest in the United States, with staggering numbers of acres being lost each year. Suburban expansion, as well as an increase in the size of housing units, has led to the conversion of large tracts of previously undeveloped land. As this land is often bought or sold incrementally or in parcels, the number of large intact tracts of land is dwindling rapidly.

These trends are especially noticeable in wetland areas and in riparian areas where buffer zones are disappearing as suburban development encroaches. The riparian zone, where the terrestrial and aquatic zones meet, is an incredibly rich area with high biodiversity. Riparian buffer zones are an important part of the freshwater ecosystem, as they stabilize channels and banks, and provide a wide variety of habitat to a number of species. Additionally, riparian buffer zones act as barriers to pollution, and can retain and reduce nutrient loadings to a channel by 65-¹⁶100%.¹⁷ Although protection of riparian areas is gaining more traction among state and local governments nationwide, a large proportion of these zones are not under any type of protection,

¹¹ G.D. Therres, “Wildlife species of conservation concern in the northeastern United States,” *Northeast Wildlife* 54 (1999).

¹² These included Partners in Flight, North American Landbird Conservation Plan, U.S. Shorebird Conservation Plan, Waterbird Conservation for the Americas, The North American Waterbird Conservation Plan, North American Waterfowl Management Plan, Northeast American Woodcock Management Plan, and U.S. Fish and Wildlife list of species of conservation concern.

¹³ Maine, for example, ranks migratory species lower than non-transient species, but ranks breeding and stopover populations differently based on the proportion of the population using Maine habitats or number of breeding pairs. Migratory populations that breed in Maine are ranked higher than migratory populations that use Maine habitats as stopovers. (MDIFW, Appendix 3C, p. 1.)

¹⁴ Connecticut Department of Environmental Protection (CTDEP), *Connecticut's Comprehensive Wildlife Conservation Strategy* (Hartford, CT: 2005), p. 1-25.

¹⁵ This is based on results presented in our Regional study.

¹⁶ The exact numbers are available in the individual state plans, online at each state’s Office of Dam Safety. (Brian Graber, American Rivers) Conservation NGO representative, telephone interview with Edalin Michael, February 29, 2008, Ann Arbor, MI.

¹⁷ R.G. Wetzel, *Limnology: Lake and River Ecosystems, Third Edition* (CA: Elsevier, 2001), p. 840.

despite their significant impact on threatened and endangered aquatic communities. According to the Massachusetts CWCS, in the state of Massachusetts only 23% of the riparian area surrounding the habitat of rare aquatic species is under permanent protection.¹⁸ Buffer bills offering varying types of protection to these important riparian zones are being developed in a number of northeast states. In Connecticut, for example, proposed buffer bills would modify zoning ordinances so that developers would not be able to build into or within so many feet of riparian habitat.¹⁹

The extent to which the connectivity and flow of rivers are compromised are also measures of habitat fragmentation. All the major rivers in the northeast have some type of impoundment or dam – there are over 1000 dams in the Connecticut River watershed alone.²⁰ On average, each state in the northeast study area has 3000 dams in its register. Of the states in the study region, Maine is home to more free-flowing and undeveloped rivers and streams than any other state in the northeast.²¹ As the definition for a ‘dam’ varies across state (usually by the height of the impoundment), the true number of impoundments, however, is much higher.

Dams, culverts, and other types of impoundments significantly affect fluvial ecosystems. The types and extent of impacts depend upon dam size, purpose, operational procedures, and discharge location (top/bottom). Population dynamics, development practices, and climate change increasingly influence the impact of dams on river ecosystems as well. Primary impacts include loss of natural flow variability, altered habitat, and severance of upstream/downstream linkages. These result in reduced species dispersal and migration; unstable habitat conditions; and changes in water quality, temperature, channel shape, and species composition and distribution.

Dams fragment habitat and are barriers to the migration of aquatic species. This has likely affected species ranges, such as those of the Atlantic salmon (*Salmo salar*) and Eastern Brook Trout (*Salvelinus fontinalis*), among many others. Additionally, dams disrupt upstream/downstream linkages for species that use different sections of the river at different points in their life cycles. This is especially the case for diadromous SGCN, which depend on migration in order to reach their spawning and nursery habitats.

Impoundments affect temperatures along the course of a river. The reservoir may stratify, increasing epilimnion temperatures and decreasing hypolimnion temperatures. Below the dam, a constant thermal regime is imposed. The temperature of the water varies depending on the location from which the water is released (tail waters are cold if released from the bottom of the reservoir, warmer if released at the top), but does not vary seasonally as in a free-flowing river. Regulated thermal regimes negatively impact species reliant on temperature cues to move between life cycle stages, as well as affecting species composition. In areas where low flows are a problem, dams, especially unused ones, could further exacerbate temperature increases.

Water quality also changes in a dammed river. In bottom-release dams, tail waters from the reservoir’s oxygen-poor hypolimnion do not have enough oxygen to support fish. Agricultural and industrial contaminants in sediment and water behind these dams concentrate in

¹⁸ Massachusetts Division of Fish & Wildlife Department of Fish and Game (MDFW), *Commonwealth of Massachusetts 2005 Comprehensive Wildlife Conservation Strategy* (Boston, MA: 2005), p. 14: excerpt *Losing Ground: At What Cost?*

¹⁹ Conservation NGO representative, telephone interview with Edalin Michael, February 28, 2008, Ann Arbor, MI.

²⁰ The Nature Conservancy, “The Connecticut River,” The Connecticut River Program, <http://www.nature.org/wherewework/northamerica/states/connecticut/preserves/art22544.html>.

²¹ MDIFW, p. 4-5.

the reservoir due to low release rates, thereby affecting water quality. Again, in areas where low flows are a problem, dams further exacerbate the effects and rates of pollution concentration.

According to one stakeholder, the majority of dams and impoundments that currently exist in the northeast are no longer used for the purpose for which they were designed, if they are even in use at all anymore.²² The benefits of dam removal generally include safety, re-establishment of natural flow and thermal regimes, and opening of migration corridors. The restoration of natural flow regime has a number of beneficial results including promotion of riparian growth through flooding of river banks, lower river temperatures, improved oxygenation, and increased habitat for insects and animals. It restores cycles of sediment release, transport, and deposition, allowing for channel and habitat creation. All of these elements result in the recovery of native species. Additionally, they have impacts on humans as well, through new recreational opportunities, reduction in hazards, and improved aesthetics.

Although a number of dam removal projects have been initiated or completed in the northeast region, in general, dam removal faces a number of challenges. One stakeholder claims that one of these challenges is sentimental attachment. This individual explains, “Basically, people have grown up around them and they’re used to seeing it, it’s almost like a waterfall. In other cases the pool of water that the dam creates is used for some type of recreation... but one of the main challenges we face is the sentimental attachment to these structures.”²³ Differing priorities across states in regard to dam removal also has a significant effect on the number of removal projects.²⁴ Another challenge is the increased understanding of climate change. “The climate change issue is actually taking us in both directions,” states one stakeholder, “It’s raising the importance of environmental issues, which is of course helping us with restoration projects, but it’s also raising more awareness of the need for renewable energy sources. And hydropower, despite its significant environmental impacts, is seen as one of those.”²⁵ Large dam owners are more reluctant than ever to consider taking down such lucrative sources of revenue, especially when commitments to lower greenhouse gas emissions standards make the future look so bright. Many small dam owners hope to benefit by retrofitting their dams with hydropower turbines despite high costs in order to do so.

Altered Hydrology

In addition to the impacts of impoundments on fluvial hydrology, freshwater ecosystems across the northeast are also suffering alterations to their hydrology due to withdrawals for competing uses. Rivers throughout the study area are more frequently running dry in the summer due to low flows. In 2004-2005, Connecticut had over 60 rivers and streams that suffered from “flow impairment,” Massachusetts listed over 160 rivers in its low-flow inventory, Vermont found more than 50 rivers to be altered by flow reduction, and Rhode Island named over 35.²⁶

Low flows are primarily linked to the combination of increased human consumption and natural flow cycles in rivers. Streams and rivers have lower flows during the summer after experiencing peak flows spring. For an example, please see the hydrograph for Connecticut River as measured at the gauge station at West Lebanon, NH for years 2001-2005 included as

²² Conservation NGO representative, telephone interview with Edalin Michael, February 29, 2008, Ann Arbor, MI.

²³ Conservation NGO representative, telephone interview with Edalin Michael, February 29, 2008, Ann Arbor, MI.

²⁴ Conservation NGO representative, telephone interview with Edalin Michael, February 29, 2008, Ann Arbor, MI.

²⁵ Conservation NGO representative, telephone interview with Edalin Michael, February 29, 2008, Ann Arbor, MI.

²⁶ Trout Unlimited, “Eastern Water: The Problem,”

http://www.tu.org/site/c.kkLRJ7MSKtH/b.3267717/k.7196/Eastern_Water_The_Problem.htm.

Figure 4. The Connecticut River begins up in northern New Hampshire, and at this gauge station drains an area of 4092 miles.²⁷ In the fall, higher precipitation rates cause flow rates to be pretty high. As colder weather sets in, flow drops as rivers become covered with snow and ice. During the spring, the rivers are receiving influxes of runoff from snowmelt and precipitation, and therefore have higher average flows. As the temperature increases and runoff from snowmelt is no longer an input, these influxes decrease. Higher evaporation rates tied to warmer temperatures combined with lower precipitation rates cause low flows during the summer. Increased human consumption of water and consequential increased pumping for agricultural, industrial, and municipal use coincide with the summer's seasonal lows of rivers and streams. This places added pressure on SGCN within the watershed, many of which require cold water temperatures to survive. As the vegetation in riparian areas and wetlands are composed of water-loving plants, it is highly dependent upon the water in the ecosystem. Additionally, when years of drought coincide with low flows, the impacts on the watershed are even more pronounced. In areas of higher point and no-point source pollution, low flows in general can lead to increased nutrient loading as lower water volumes can not dilute the pollutants as much.

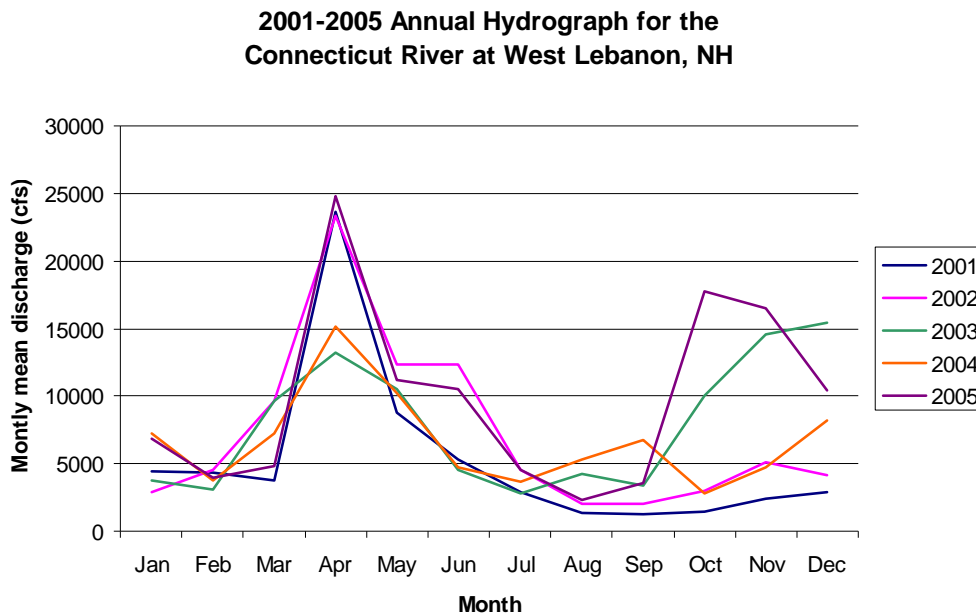


Figure 2²⁸

Water Use and Regulation

Consumption rates in the northeast are directly related to rules and policy regulating water use and pumping as well as population and development trends. The dominant freshwater management regime of the late nineteenth and early twentieth centuries directly influenced the legal structure in which water is governed. In large part, the states have historically had control over water within their boundaries, allocating water and making and enforcing regulations as

²⁷ US Geological Survey, "Water Resources Data for USGS station 01144500 CONNECTICUT RIVER AT WEST LEBANON, NH," USGS Water Data for the Nation, <http://waterdata.usgs.gov/nwis>.

²⁸ Information for this hydrograph was compiled using stream flow measurements collected at USGS station 01144500 CONNECTICUT RIVER AT WEST LEBANON, NH, and made available by the US Geological Survey, Water Resources Data at <http://waterdata.usgs.gov/nwis>.

they saw fit. Groundwater and surface water withdrawals in the study area states were governed under separate sets of regulations, mirroring the limited knowledge of the hydrological cycle available at the time.

The federal government over the last fifty years, however, has “quietly but profoundly displaced” state-created water law.²⁹ A number of federally-imposed pieces of legislation have worked to create baseline regulations and standards on state governance of water including federal reserved water rights, the Clean Water Act, the Wild and Scenic Rivers Act, the Safe Drinking Water Act, the National Environmental Policy Act, and the Endangered Species Act. Authority and implementation of these and other regulations are shared by the federal and state agencies.

Changing consumption trends compound the regulatory problems. Across the study area, water management systems were established during the mid-1800s. During this era, existing water supplies were plentiful enough to serve the municipal and industrial needs of the population. As industry and population were concentrated in cities, so too was water use. However, development trends and patterns since that time have changed. The landscape, especially in the northeast, is much more densely populated than when the water systems were first created, and the patterns of current population concentrations are much different as well.³⁰ Additionally, suburbanization and housing trends have created a higher demand for water for consumptive uses in areas where previous demand was not as high. According to some, “The region’s supply systems have not adapted to respond to this new, wide-ranging pattern of demand.”³¹

Water Quality

Six agencies in the study area listed pollution as one of the general threats facing the biodiversity of their state.³² Freshwater ecosystems in the region are at risk from point source pollution, non-point source pollution, and sedimentation. Sources of pollution are varied, but are directly related to agricultural and industrial processes, urban runoff, and erosion, and indirectly related to management practices and federal, state, and local regulations and policies. Timber production and destruction of riparian zones increases sedimentation and nutrient runoff in watersheds. Increased sedimentation from sand and silt due to poor road construction and management practices reduces the survival rates of insects and fish eggs. Acid mine drainage and precipitation is a problem in the southern portion of the study area, and is primarily concentrated in Pennsylvania. In some areas, the effects of acid mine drainage create pH levels so low as to make the habitat unsuitable for most living organisms.³³ Decreased water quality exacerbates the problems caused by other anthropogenic alterations to freshwater ecosystems.

²⁹ Robert Glennon, *Water Follies* (Washington, DC: Island Press, 2002), p. 222.

³⁰ Trout Unlimited, “Eastern Water FAQ’s,”

http://www.tu.org/site/c.kkLRJ7MSKtH/b.3303627/k.C035/Eastern_Water_FAQs.htm.

³¹ Trout Unlimited, “Eastern Water FAQ’s.”

³² These include agencies from the states of NY, ME, PA, VT, NH, MA.

³³ Eastern Brook Trout Joint Venture (EBTJV), *Eastern Brook Trout: Roadmap to Restoration*, http://www.easternbrooktrout.org/docs/EBTJV_RoadmapToRestoration_FINAL.pdf, p. 7.

Invasive Species

Other than habitat fragmentation, loss, and degradation, invasive species was the only other general threat listed by all of the study area SWAPs.³⁴ Alien species are introduced through a number of vectors, but have been able to out-compete native species. In some cases this is because the invasive species are better able to adapt to the alterations in ecosystems than the native species. For example, damming a river causes reduced water temperatures and flows. The native species living in the river were likely cold water loving species. However, with the changes in flow and temperature, new, warm-water species are able to move and out-compete the cold-water species, as they are more fit in the altered environment. Like some other SGCN, the largest threat to populations of Eastern Brook Trout (*Salvelinus fontinalis*) is non-native fish.³⁵ There are many aggressive programs already in existence on the local, state, and federal levels to slow the spread of already established invasive species and limit the introduction of new ones.

Freshwater SGCN Identified in the Northeast Study Area

An analysis of the SGCN lists included in the plans shows about a third to one-half of the SGCN represented in the plans to be using freshwater habitats as their primary or secondary habitats (Figure 2).³⁶ The notable exception is Pennsylvania, which did not directly include invertebrates in the lists in their plan. When these state lists are compared, 300 overlaps are found – about 39% of freshwater SGCN are found across multiple states.

Appendix B includes a list of all of the freshwater-dependent species represented in the lists of SGCN across the study area and the states in which they are SGCN. Of the 772 SGCN in the study area five species were listed by all nine states in the study area: American Bittern, Spotted Turtle, Wood Turtle, Bald Eagle, and Least Bittern. Another additional six species were listed by eight states in the study: Shortnose Sturgeon, Atlantic Sturgeon, Brook Floater, American Black Duck, Pied-billed Grebe, Brook Trout, Eastern Brook Trout. The number of species common to a number of states are further detailed in the box to the right as well.

Common SGCN listed by:

9 states	5
8 states	6
7 states	11
6 states	11
5 states	17
4 states	29
3 states	56
2 states	165
1 state	472

³⁴ This is based on results presented in our Regional study.

³⁵ Eastern Brook Trout Joint Venture (EBTJVb), *Eastern Brook Trout: Status and Threats* (Arlington, VA: Trout Unlimited, 2006), p. 2.

³⁶ Specific populations such as *Salmo Salar*, etc. discussed in the results section were counted twice if listed separately for the purposes of tallying species state-by-state and creating this chart. The reason for this is that if the state listed them separately, they also counted them separately in their total SGCN tally.

Managing for Transboundary Freshwater Habitats and Wildlife in the Northeast Region

Total Numbers of Freshwater SGCN, SGCN, and Species in Study Area States									
	CT	MA	ME	NH	NJ	NY	PA	RI	VT
Invertebrates									
Insect	56	56	38	2	13	76	no inverts in the plan	50	57
Worms		2							
Sponges		2							
Crustacea		5				2			3
Mussels		7	3		9	54		8	13
Snails		5	7	3					14
Vertebrates									
Fish	39	28	17	24	20	47	53	20	33
Reptiles	19	6	4	6	7	13	10	3	7
Amphiban		7	1	6	11	14	9	9	6
Birds	74	19	34	23	116	40	17	19	10
Mammals	21	4	0	5	10	1	3	2	10
Total	209	141	104	69	186	247	92	111	153
Total SGCN Species	475	257	213	84	289	537	572	364	323
Total Species	>20636	7333-9333, estimated	17000+	10000+	>10992	>1385, estimated	>10854	870+	15464-36464, estimated

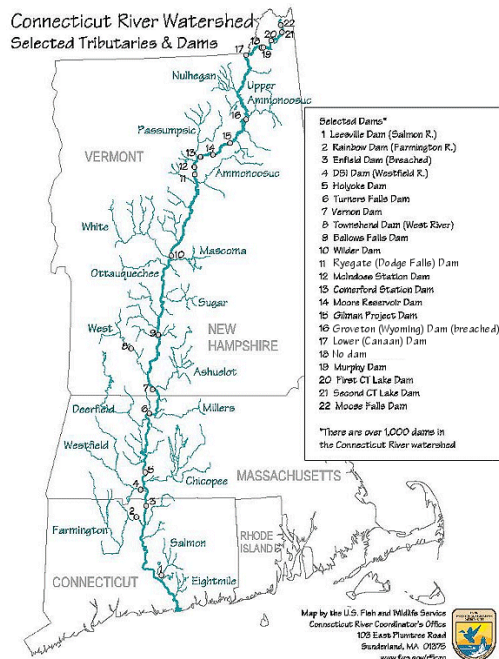
Figure 3

Current Interstate Efforts for Managing SGCN

Of the species that are SGCN in a high number of states, the vast majority are either federally threatened or endangered or of regional conservation concern.³⁷ Specific information about species listing status is also available in Appendix B, but only for species that were listed by a large number of states or that are of regional conservation concern. As all the states included federally threatened and endangered species as well as species of regional conservation concern in their lists, federally threatened or endangered SGCN or those of regional concern listed by fewer states suggests these species have ranges that do not cover the entire northeast study area or that the range beyond the states in which it is listed is not necessary to its survival. Other species that are listed by large numbers of states are protected under treaties or agreements, such as the Migratory Bird Treaty. A small number of species such as the Eastern Brook Trout (*Salvelinus fontinalis*) appear on the SGCN lists of a large number of states because they are being considered for listing as federally endangered or threatened species. Other species are included in the SGCN lists because they are economically important or game species in the region.

Of the SGCN species listed by four or more states, the vast majority are already under some sort of joint management regime either at the federal or state level. The Eastern Brook Trout Joint Venture and programs concerning the management of the Connecticut River and Lake Champlain offer a look into the breadth of species, habitats, and management regimes currently underway in the region.

The Connecticut River



At 407 miles, the Connecticut River is the longest river in the Northeast (see map to the right).³⁸ It flows through four states, and has a watershed that extends more than 11,000 square miles.³⁹ The Connecticut is an American Heritage River, Conte National Fish & Wildlife Refuge, Wetland of International Importance, a “Last Great Place,” and part of the Northern Forest. The Connecticut River watershed is home to ten federally listed endangered or threatened species, as well as a number of regionally important diadromous fish species, such as the Atlantic salmon.

As a watershed that covers multiple states and land uses, the species within it often must face anthropogenic threats. Within the region there are a number of groups that work together to protect the resources of the watershed. The groups run the gamut from local communities to NGOs and state and federal agencies.

³⁷ A list of species of regional conservation concern was compiled by the Northeast Wildlife Diversity Technical Committee: Therres 1999.

³⁸ Map and information from Wikipedia, “The Connecticut River,” http://en.wikipedia.org/wiki/Connecticut_River.

³⁹ *ibid.*

Lake Champlain

The Lake Champlain Basin

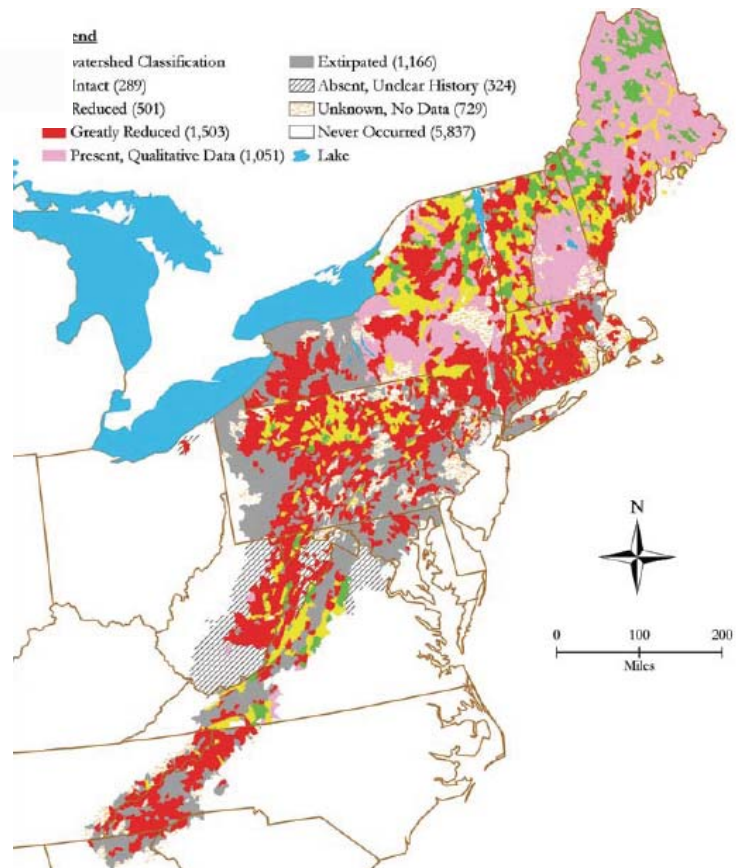


As an international basin, Lake Champlain offers an especially interesting example of interstate management. Over the course of its 120-mile length, Lake Champlain flows from Whitehall, New York north to the Canadian border, where it drains into the Richelieu River in Quebec (see map at left).⁴⁰

At a max depth of 400 feet and average depth of 64 feet, the lake has a wide range of species that inhabit it.⁴¹ There are over 40 species in the Lake that are protected in Vermont and/or New York, 3 of which enjoy federal protection.⁴² Because the Richelieu joins the St. Lawrence River which then flows to the Atlantic Ocean, the Lake sees a number of diadromous species, such as the Sea Lamprey.

Eastern Brook Trout Joint Venture

The Eastern Brook Trout (*Salvelinus fontinalis*) appears on the SGCN lists of eight different states in the Northeast study region. The species occupies a range covering all nine states at its northern reach (Figure 6). However, the Brookie, as the Eastern Brook Trout is often called, is losing numbers throughout the study region due mostly to increased sedimentation and water temperatures due to changes in land use practices, fragmented habitat, and competition from exotic species. The situation of the Brookie has become so dire that it is being considered for listing as an endangered species.



⁴⁰ Map and info from The Lake Champlain Basin Program, “The Lake Champlain Basin Program,” <http://www.lcbp.org/>.

⁴¹ *ibid.*

⁴² See Appendix A, New York and New Hampshire.

The timing was right for a region-wide, multi-scale push to restore Brook Trout populations and keep the species off the Endangered Species List. Stakeholders from NGOs, state and federal agencies, and local communities and landowners came together to pool their resources and expertise. The result was the Eastern Brook Trout Joint Venture (EBJTV), an interstate program extending from Maine to the Carolinas – the first project under the National Fish Habitat Program.

Partners in the EBJTV consider the Northeastern region (the study region minus Pennsylvania and New Jersey) to be “the last, best stronghold for brook trout in the eastern United States.”⁴³ The region has more intact populations than any other two regions the Project works in combined, and additionally, it is the only region that houses the four distinct adaptations of the Brookie.⁴⁴

Opportunity for New Programs Based on State Overlap

In looking for SGCN for which interstate management is necessary, particular attention was paid to the following types of species and habitats:

- same species in a region that overlaps multiple states
 - migrant species
 - regionally dispersed species
- different species that share same habitat requirements or face a common threat in a region that overlaps multiple states
- Identify areas that, if protected or restored, would help more than one species
- Coastal regions that share migrant resources
 - Great Lakes (NY, PA, VT)
 - Atlantic (ME, NH, MA, RI, CT, NY, NJ)

The interstate conservation programs described above cover a wide variety of species, habitats, and management regimes. However, as the situations of some of the more-widely shared species has worsened or as resources become scarcer, the need for new partners on current joint management projects is needed. Additionally, as connectivity and water quality improve, new areas will be repopulated, thereby creating a need for expansion in current programs.

Because many programs have been created to restore and manage populations with large ranges, most of the new opportunities for transboundary management include species and habitats shared exclusively between two states. More detail can be found on these species in Appendix C, where neighboring states are paired and shared species near borderlands are highlighted.

Some SGCN are not good targets for interstate action even though multiple states recognize them as SGCN because their habitats are not always next to each other, or at least discernibly next to each other based on descriptions or visuals provided with plans. On a larger scale, it is inappropriate to say that SGCN appearing on more states’ lists offer better opportunities for joint management – only that joint management is needed across a larger area and will necessarily include more partners.

⁴³ EBTJVa, p. 6.

⁴⁴ *ibid.*

Challenges to Joint Management of Freshwater Species and Habitats

The SWAPs suffer from the typical problems facing protection of freshwater resources: “Priority-setting and design strategies for the freshwater component [of land, freshwater, and coastal oceans protection] currently lag well behind terrestrial and marine conservation work, and are hampered both by inadequate knowledge of the biota, especially those other than vertebrate animals, and insufficient understanding of ecological relationships.”⁴⁵ Additionally, the plans themselves can be a challenge to regional collaboration and implementation of interstate conservation action. In other words, although species of regional concern are included in the plans as SGCNs, this study finds that SWAPs are generally a challenge to regional collaboration, especially on issues relating to freshwater resources.

Limitations and Challenges of SWAP Use on the Ground

As the plans have now been available for about two years, a number of regional organizations have attempted to make use of the plans on the ground. Interviewees from these organizations generally found that the plans, although useful as a guide for individual states, were not useful in identifying opportunities for collaboration across multiple states, nor for finding information relating to habitats and species. Difficulties were generally linked to a lack of standardization across the states in the final SWAPs, as well as unevenness in quality and usefulness.⁴⁶ One interviewee stated, “The State Wildlife Plans, if you look at them, don’t immediately make it clear that you can dovetail these things together and get funding or implement strategies in a cross-basin way.”⁴⁷

There were a number of challenges in using the information of the SWAPs that I experienced during the course of compiling the information to undertake this research. These include standardization, completeness, and organization of content. In doing this study, I have concentrated on the organisms that rely on freshwater resources as their primary habitat – bogs, fens, swamp, ponds, lakes, streams, rivers, vernal pools. Habitats, while associated with aquatic freshwater species of concern, are not similarly classified across state boundaries. Often different states classify habitats based on similar, but slightly different traits. Likewise, species are not identified using the same systems across states in the region. In the tables I have created, this inconsistency was a problem in a number of ways. Different habitat types were sometimes lumped together to form groups of organisms in different ways. In some, wetland and swamp areas were lumped in with ponds and lakes. In others, they were separated. In New Jersey for example, forests and wetlands were a category, therefore it was difficult to determine which species within that group were actually species relying on freshwater habitats versus forested habitats. The result is that some SGCN species are not listed in Appendix A, B, or C as being in a state when in fact they are. At the same time, however, the inclusion of these species in some states’ lists of freshwater-dependant SGCN in the first place is suspect. For example, the short-eared owl (*Asio flammeus*), a species of regional conservation concern, is listed as one of

⁴⁵ J.D. Allan and M. Castillo, *Stream Ecology: Structure and Function of Running Waters, Second Edition* (The Netherlands: Springer, 2007), p. 354.

⁴⁶ Conservation NGO representative, telephone interview with Edalin Michael, March 3a, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, March 7a, 2008, Ann Arbor, MI.; and Conservation NGO representative, telephone interview with Edalin Michael, March 3b, 2008, Ann Arbor, MI.

⁴⁷ Conservation NGO representative, telephone interview with Edalin Michael, March 7a, 2008, Ann Arbor, MI.

Massachusetts, Connecticut, Rhode Island, and New York's SGCN species. However, it does not show up in the tables in Appendices A, B, or C here because it was not classified as using a freshwater habitat as its primary or secondary habitat in Massachusetts, Connecticut, Rhode Island, and New York whereas in other states (Maine, New Jersey, Pennsylvania, and Vermont) it was. In Massachusetts, Connecticut, Rhode Island, and New York the short-eared owl was classified as requiring a grassland-type habitat whereas in Maine, New Jersey, Pennsylvania, and Vermont it was described as primarily or secondarily also using wetland- or marsh-type habitat. **Therefore the results from this study will understate or overstate the number of SGCN species for which opportunities for collaboration exist depending upon whether the classification as a freshwater-dependant species was appropriate or not. This is, of course, based on the state's classification systems as applied to the individual species and listed in the plans.**

The species lists are not necessarily inclusive. First, the species included on the lists of SGCN tend to be focused on E&T and globally rare species. In some states a species could be listed, and yet in neighboring states the same species would not be listed. A good example is the Eastern Brook Trout, which was listed in all states in the study region except Pennsylvania, which is part of its range.⁴⁸ While for some species this would not constitute a problem as some species' ranges do not cover interstate ranges, for others (especially aquatic species) this is indeed a problem. The choice of the state agency to include a species on their list of SGCN or not therefore has an effect on the outcome of this study. Just because a species is not on one state's list of SGCN does not mean that the opportunity for joint management is not available. Another problem is that the plans did not all include a complete list of invertebrates, specifically insects, most (if not all) of which are reliant upon freshwater ecosystems for at least one stage of their life.⁴⁹ Plants are not included in the plan at all except for Vermont. To compound these omissions, strategies and proposed actions included in the plans for the bulk of listed freshwater species focus more on information gathering, as current understanding of these species is limited. **Therefore the results from this study will understate the number of SGCN species for which opportunities for collaboration exist, as some states chose not to list species that other states did, despite having populations in the state.**

The organization of the plans themselves was a barrier to making useful conclusions about the SGCN or habitats. Some plans included tables that delineated habitat types of SGCN while others only used the "habitats" used by the plan, while still others included no quick reference for species by habitat. In this sense, the plans for states such as New York, New Hampshire, and New Jersey were difficult to analyze as they relied on geographic regions instead of habitat types within those geographic regions. In the New Hampshire plan, I had to go through all of the species specific information to find habitat information, as the detailed habitat pages only provided an incomplete list of species. Some of the plans also had no tables providing the Latin (scientific) names of the SGCN – only the common names. As some of the species are known by different common names across the region, for the purpose of interstate collaboration it is important to be able to find out whether you, as a manager, and your counterpart across the state border are really talking about the same fish (Common name: Burbot or Cusk, Latin Name: *Lota lota*) or two completely different fish (Common names: Atlantic sturgeon & Lake Sturgeon,

⁴⁸ The state of Pennsylvania is working to correct this, and is currently involved in processes to update its State Wildlife Action Plan so that it does include the Eastern Brook Trout on its SGCN list.

⁴⁹ Pennsylvania is the most extreme, including no invertebrates in the plan whatsoever due to information gaps. For similar reasons, other states were forced to limit their inclusion of certain families and species of insects.

Latin names: *Acipenser oxyrinchus* & *Acipenser fulvescens*). Some plans did not even include one single list of all of the SGCN for their state. **Trying to create and then cross-reference species lists between two states based on taxa or habitat type was time consuming and not straight forward.**

In some states, the development process itself inhibited involvement of partners, thereby making it difficult for these groups to find objectives and goals that were in concert with those of the plans.⁵⁰ For already established regional groups, this significantly hampers their ability to become involved in conservation actions on ‘their’ project across the border. Additionally, the absence of meaningful coverage of current joint management efforts in actions, species, and habitat information from most of the plans makes joining these partnerships difficult. As a result, organizations are making use of the SWAPs as part of their grant-writing process or in order to qualify for grants.⁵¹ However, even this has been difficult when working on grant proposals for border-regions for the same reasons mentioned above.⁵²

Challenges Facing Joint Management Programs for Freshwater Habitats and Species

“When working across states, there are all kinds of things that don’t work easily.”⁵³

As the quote above suggests, working across multiple boundaries is fraught with difficulties, and made worse by the limitations of our understanding about species and habitats, especially those in freshwater ecosystems. “The politics and consensus building required for integrated resource management of the [freshwater] resource,” Robert Adler points out, “are often as complex as the ecosystem itself.”⁵⁴ These challenges include aligning different priorities, creating and maintaining relationships, finding and efficiently using resources, and interpreting and working within multiple sets of regulations and policies.

Different priorities

Differing state conservation mandates, goals, and priorities was the most frequently cited challenge among interviewees.⁵⁵ As is evidenced in the SWAPs, state agencies have different

⁵⁰ Conservation NGO representative, telephone interview with Edalin Michael, March 7a, 2008, Ann Arbor, MI.

⁵¹ Conservation NGO representative, telephone interview with Edalin Michael, February 29, 2008, Ann Arbor, MI.;

Conservation NGO representative, telephone interview with Edalin Michael, March 14, 2008, Ann Arbor, MI.;

Conservation NGO representative, telephone interview with Edalin Michael, March 3a, 2008, Ann Arbor, MI.;

Conservation NGO representative, telephone interview with Edalin Michael, March 7a, 2008, Ann Arbor, MI.;

Conservation NGO representative, telephone interview with Edalin Michael, February 28, 2008, Ann Arbor, MI.;

Conservation NGO representative, telephone interview with Edalin Michael, March 4, 2008, Ann Arbor, MI.;

Conservation NGO representative, telephone interview with Edalin Michael, March 7b, 2008, Ann Arbor, MI.;

Conservation NGO representative, telephone interview with Edalin Michael, March 3b, 2008, Ann Arbor, MI.; and

Conservation NGO representative, email interview with Edalin Michael, March 2, 2008, Ann Arbor, MI.

⁵² Conservation NGO representative, telephone interview with Edalin Michael, March 3a, 2008, Ann Arbor, MI.

⁵³ Conservation NGO representative, telephone interview with Edalin Michael, March 3a, 2008, Ann Arbor, MI.

⁵⁴ Robert W. Adler, “Addressing barriers to watershed protection,” *Environmental Law* 25 no.4 (Fall 1995): p. 4.

⁵⁵ Conservation NGO representative, telephone interview with Edalin Michael, February 29, 2008, Ann Arbor, MI.;

Conservation NGO representative, telephone interview with Edalin Michael, March 14, 2008, Ann Arbor, MI.;

Conservation NGO representative, telephone interview with Edalin Michael, March 3a, 2008, Ann Arbor, MI.;

Conservation NGO representative, telephone interview with Edalin Michael, March 7a, 2008, Ann Arbor, MI.;

Conservation NGO representative, telephone interview with Edalin Michael, February 28, 2008, Ann Arbor, MI.;

priorities based upon their interests, knowledge, and capabilities. To add another layer of complexity, there are competing and contradictory priorities between different state-level agencies within states as well as across state boundaries. A tier 1, top-priority SGCN in one state might not even show up on the SGCN list of another state even though there are populations there, making the processes of finding partners and funding much easier or difficult depending upon which state the organization is dealing with.

Despite the recognition of the need for more of a habitat-based approach to management and conservation, a number of interviewees feel that there is still a disconnect among partners when it comes to setting project goals at the habitat level.⁵⁶ “There’s a conflict between focusing on target species and focusing on ecosystems here and I think everywhere,” states one stakeholder, “We have to identify target species for the funding sources, but in practice an organization like [ours] is trying to do ecosystem based, holistic projects and any dam removal that you do is benefiting native riverine species – all types of species, macroinvertebrates, mussels, fish. But we often work with funders that are looking at specific target species.” According to the Connecticut Plan, “Lack of landscape-level conservation efforts” is a threat to all SGCN species in the state.⁵⁷ It will be interesting to see if, during the implementation, the SWAPs are able to influence this debate and move conservation and management initiatives to the habitat level while using species more as indicators and less as primary targets of conservation efforts.

Multiple Sets of Regulations and Policies

Interpreting and working within multiple sets of regulations and policies is a challenge for interstate management of freshwater resources primarily regarding dams and impoundments and water withdrawals – it is the second most frequently mentioned challenge of interviewees. The states in the study area have differing state regulations and management regimes relating to water quality, withdrawals for ground- and surface- water, and dam safety.

As Robert Glennon, a professor of law in Arizona states, “Rivers, springs, lakes, wetlands, and estuaries around the country face an uncertain future because most states have separate legal rules for regulating surface water and ground water.”⁵⁸ Surface water in the northeast is governed by riparian law, while in other places in the country the prior appropriation doctrine outlines water rights. Groundwater, on the other hand, is generally governed by the doctrines of capture or reasonable use, although in some states, prior appropriation is also used.⁵⁹ In the Northeast, however, absolute ownership is the rule in Connecticut, Maine, Massachusetts, Rhode Island. However, in Connecticut all water is held as a public trust resource and all

Conservation NGO representative, telephone interview with Edalin Michael, March 4, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, March 7b, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, March 3b, 2008, Ann Arbor, MI.; and Conservation NGO representative, email interview with Edalin Michael, March 2, 2008, Ann Arbor, MI.

⁵⁶ Conservation NGO representative, telephone interview with Edalin Michael, February 29, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, March 7a, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, March 4, 2008, Ann Arbor, MI.

⁵⁷ CTDEP, p. 3-2.

⁵⁸ Glennon 2002, p. 210.

⁵⁹ More on the differences between various groundwater rights regimes can be found in Water Systems Council, *Who Owns the Water: A Summary of Existing Water Rights Laws* (Washington DC: Water Systems Council, 2003), http://www.watersystemscouncil.org/VAiWebDocs/WSCDocs/4504256WSC_RIGHTS_03.pdf.

surface- and ground-water withdrawals must be permitted by the state, the legislature still has not overturned the doctrine of absolute rule.⁶⁰

Separate rules governing different types of water withdrawals exhibit a disregard for scientific understanding of the hydrologic cycle. Although the hydrologic cycle was not well understood when most state water law was made in the 1800's as mentioned earlier, significant increases in scientific knowledge of the hydrologic cycle over the past century should have led to the modification of regulations and rules in individual states. However, generally it has not. In the Northeast, most state-driven water law has not changed over the past century, with severe repercussions for local ecosystems. For example, in Connecticut, the state Department of Environmental Protection has publicly acknowledged "that the state's existing legal, planning and institutional mechanisms are incapable of addressing long-term water allocation problems or protecting the state's streams. Approximately 87% of all water use in Connecticut is exempt from any kind of environmental review."⁶¹ A quick overview of existing legal and regulatory structures and their effectiveness relating to water withdrawals is available in Figure 5. Due to increasing concerns about water quality and allocation as well as environmental awareness, some states in the region have been working to update existing regulations. For example, although previously many states in the region did not have adequate regulations in place to address issues of instream flow, a number of agencies and legislatures have begun to view 'water for the ecosystem' as a merit-worthy use.

Regulations for monitoring withdrawals are also currently undergoing changes in the northeast study region. Massachusetts and Connecticut have historically monitored withdrawals, but New Hampshire and Vermont do not have state-imposed restrictions on water use, and therefore do not monitor withdrawals. However, as a correlative rights doctrine state, the government has the right to limit water withdrawals. Currently, a proposed permitting system is in front of the legislature, and will hopefully be passed this year.⁶² (These more recent developments are not represented in Figure 5).

Changes and updates to laws, however, are limited in their effect unless applied equally to all users. In the northeast states, changes in water laws, regulations, and monitoring policies essentially exempt big municipal and private water companies from new rates by grandfathering them in under their old capacity rates. This is especially evident in Massachusetts and Connecticut. Both have shown some intent to change this and hold all users to new standards either through changes in existing permits or through new laws. However, from previous experience in both states, it seems likely that any changes to regulations and permitting will end up in court.

⁶⁰ Conservation NGO representative, telephone interview with Edalin Michael, February 28, 2008, Ann Arbor, MI.

⁶¹ Trout Unlimited, "Water Policy," http://www.tu.org/site/c.kkLRJ7MSKtH/b.3267719/k.854E/Water_Policy.htm.

⁶² (Kirt Mayland, Trout Unlimited) Conservation NGO representative, telephone interview with Edalin Michael, February 28, 2008, Ann Arbor, MI.

Overview of Water Withdrawal Policies in the New England States

	Permitting Statute for Surface Water Withdrawals	Permitting Statute for Groundwater Withdrawals	Streamflow Standards	Interbasin Transfer Review	Water Quality Standards Contain Explicit Reference to Flows	Water Conservation Standards
CT						
MA						
ME						
NH						
RI						
VT						

Key:

- Adequate legal instruments currently exist in the state.
- Policy or legal instruments are under development.
- The state exempts a large number of water users from a statute or addresses the issue only indirectly or via an unenforceable policy.
- No statewide policy or legal instrument exists.

As the table above demonstrates, the New England states vary significantly in their respective policy responses to the growing challenge of water withdrawals.

Figure 4 ⁶³

⁶³ Trout Unlimited, *A Glass Half Full: The Future of Water in New England* (Arlington, VA: Trout Unlimited), p. 15.

Creating and Maintaining Relationships

Finding partners and then forging relationships are initially a difficult part of working in teams. In order to have a successful regional partnership, it's necessary to have stakeholders from all involved states, from both the state and local levels, as well as representatives from the associated federal-level agencies.

State-level agency support is absolutely critical to any regional conservation effort. In fact, a couple of interviewees stated that finding or creating state support was *the* most important step in working regionally.⁶⁴ Primarily this is because the state agencies drive most conservation and management efforts. Having them as a partner can make a huge difference for regional groups, in terms of resources and political backing.

Local level partnerships and support are also incredibly important, and sometimes the most difficult to secure. Although local towns and municipalities are generally in agreement that improving the health of their ecosystems and therefore communities is a good thing, private property owners are often not persuaded so easily. "Their initial response to anything that smacks of natural resource management is to question it and make sure it's not going to any further impact their private property rights," says one stakeholder.⁶⁵ Another interviewee agrees saying, "We have to work so opportunistically, in that in order for us to complete a large scale project we have to have property owners on board, and in most cases it's just not viable."⁶⁶

In addition to having local support from the effected community, a regional project must also have political support from state legislators. An interviewee explained, "One of the challenges we have at the federal level is capturing the imagination of Congressmen and Senators who really are used to being very parochial – 'what am I bringing back to my state' – and we're asking them to think about something that's much bigger than their state."⁶⁷

Within all of the different groups, distrust, a lack of respect, and conflicting philosophies and priorities can make creating and maintaining partnerships difficult. However, as one stakeholder points out, "...Every project makes the next project easier or more difficult. The partnerships you forge make the next project easier."⁶⁸ No matter what their rank, agency, group, or party affiliation, taking the time and energy to form and maintain individual relationships makes future dealings with the same partners easier.

Finding Resources

In an age of ever-shrinking environmental funding from the federal government, state agencies and environmental groups find funding to be a significant challenge. In a survey of regional agency representatives, all claimed funding, and resources in general, to be one of their top challenges.⁶⁹ Similarly, non-agency groups working for conservation and restoration consistently mention a need to find funding, time, equipment, and information.⁷⁰

⁶⁴ Conservation NGO representative, telephone interview with Edalin Michael, March 4, 2008, Ann Arbor, MI.;

Conservation NGO representative, telephone interview with Edalin Michael, February 29, 2008, Ann Arbor, MI.

⁶⁵ Conservation NGO representative, telephone interview with Edalin Michael, March 3b, 2008, Ann Arbor, MI.

⁶⁶ Conservation NGO representative, telephone interview with Edalin Michael, February 29, 2008, Ann Arbor, MI.

⁶⁷ Conservation NGO representative, telephone interview with Edalin Michael, March 3a, 2008, Ann Arbor, MI.

⁶⁸ Conservation NGO representative, telephone interview with Edalin Michael, February 29, 2008, Ann Arbor, MI.

⁶⁹ This information comes from results described in our Regional Study.

⁷⁰ Conservation NGO representative, telephone interview with Edalin Michael, February 29, 2008, Ann Arbor, MI.;

Conservation NGO representative, telephone interview with Edalin Michael, March 14, 2008, Ann Arbor, MI.;

Conservation NGO representative, telephone interview with Edalin Michael, March 3a, 2008, Ann Arbor, MI.;

Challenges not only make working regionally difficult, but can exacerbate the effects of some of the threats as well. Some of the challenges are state-specific and some are regional, and because the region is on a national border, potentially international. Therefore, it is imperative to develop strategies to effectively deal with the obstacles facing joint partnerships.

Strategies for Success

In order to create successful transboundary management regimes for freshwater habitat and species it's necessary to overcome the many challenges discussed in the previous section. Interviewees shared the strategies they have identified to ameliorate these problems.

Education

A primary component of many northeast states's strategy for action was education. Similarly, educating and informing potential partners about freshwater ecosystems helps them understand the importance of looking at state or local freshwater resources from a larger perspective. One interviewee explained:

“We try to educate them [congressional delegations] about the fact that this is one watershed that crosses multiple states, and so they really need to care about what's happening upstream and downstream. You just need to have an understanding of the whole watershed, and given that a lot of people that I deal with don't even know what a watershed is, it's a challenge to get that concept across.”⁷¹

A couple interviewees specifically mentioned the importance of learning through doing – inviting potential partners to experience the continuity of the watershed through a paddle across the lake or down a river.⁷²

The power of knowledge cannot be underestimated. Another stakeholder, when asked why the time is ripe for regional management of freshwater resources stated:

“All of the conservation community thinking about ecosystems, thinking about ecological function... it's probably the educational efforts from all of these other groups doing it, saying ‘think about ecosystems, think about how these things fit together, you can't just focus on one species’. The exchange of ideas. We've learned a lot, everybody.”⁷³

Conservation NGO representative, telephone interview with Edalin Michael, March 7a, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, February 28, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, March 4, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, March 7b, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, March 3b, 2008, Ann Arbor, MI.; and Conservation NGO representative, email interview with Edalin Michael, March 2, 2008, Ann Arbor, MI.

⁷¹ Conservation NGO representative, telephone interview with Edalin Michael, March 3a, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, March 14, 2008, Ann Arbor, MI.

⁷² Conservation NGO representative, telephone interview with Edalin Michael, March 14, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, March 3a, 2008, Ann Arbor, MI.

⁷³ Conservation NGO representative, telephone interview with Edalin Michael, March 4, 2008, Ann Arbor, MI.

Over time, seeing the outcomes of past policies and regulations has forced management and conservation organizations to recognize the need to think and act on a landscape scale in order to preserve the biodiversity of the region. Nowhere is that more evident than on rivers, lakes, and streams. One interviewee said that, when thinking about regional conservation, “Rivers and watersheds are a good place to start, as they connect communities across political boundaries.”⁷⁴

Flexibility

Flexibility both in dealing with partners will allow partnerships to survive and flourish, as well as efficiently allocate scarce resources. All interviewees stated that management responsibilities are set up on project-by-project basis.⁷⁵ This allows each partner the opportunity to contribute where, when, and how they feel they are best suited. Sharing resources allows all of the groups involved to make more happen with fewer resources.

Interviewees also pointed out the need to be flexible with partners. Instead of trying to force them into doing something, by understanding where they were coming from and working with them from there, support can be gained for a project when initially prospects may look bleak. This is especially important when working with partners from multiple states. For example, although land owners in Vermont may feel one way about the management of Lake Champlain, those in New York may feel completely differently. In order to gain the trust and support of both, it’s necessary to find out where they are coming from and address common interests.

Finding Common Interests

Many interviewees claimed, “It’s all about perspective...”⁷⁶ Finding common interests across disparate groups of people can sometimes be as simple as putting the issue in a different perspective. Instead of only promoting the ecological benefits of water quality, think in terms of people AND fish: “Drinking water – time and time again, that’s the number one issue, but if you ask people if they care about water for the species that live in it, not really.”⁷⁷ However, projects that accomplish one goal also necessarily accomplish the other.

Similarly, the issue of connectivity can be seen from multiple perspectives. Culverts are barriers to fish migration, and many ecologists have been talking about the need to remove culverts and replace them with more stable structures that allow unimpeded flow. To a local politician, construction costs associated with digging up culverts and replacing them with bridges sounds expensive and therefore connectivity projects sound like wasted taxpayer dollars. However, culverts also pose a threat to human safety, a point tragically brought home to the

⁷⁴ Conservation NGO representative, email interview with Edalin Michael, March 2, 2008, Ann Arbor, MI.

⁷⁵ Conservation NGO representative, telephone interview with Edalin Michael, February 29, 2008, Ann Arbor, MI.

⁷⁶ Conservation NGO representative, telephone interview with Edalin Michael, February 29, 2008, Ann Arbor, MI.;

Conservation NGO representative, telephone interview with Edalin Michael, March 14, 2008, Ann Arbor, MI.;

Conservation NGO representative, telephone interview with Edalin Michael, March 3a, 2008, Ann Arbor, MI.;

Conservation NGO representative, telephone interview with Edalin Michael, March 7a, 2008, Ann Arbor, MI.;

Conservation NGO representative, telephone interview with Edalin Michael, February 28, 2008, Ann Arbor, MI.;

Conservation NGO representative, telephone interview with Edalin Michael, March 4, 2008, Ann Arbor, MI.;

Conservation NGO representative, telephone interview with Edalin Michael, March 7b, 2008, Ann Arbor, MI.;

Conservation NGO representative, telephone interview with Edalin Michael, March 3b, 2008, Ann Arbor, MI.; and

Conservation NGO representative, email interview with Edalin Michael, March 2, 2008, Ann Arbor, MI.

⁷⁷ Conservation NGO representative, telephone interview with Edalin Michael, March 3a, 2008, Ann Arbor, MI.

residents of Alstead, New Hampshire in 2005. After heavy rains, a small culvert and a couple bridges became jammed with woody debris causing the Cold River and its tributaries to overflow their banks, where they swept away cars and flooded part of town. In all, ten people died.⁷⁸ Since the Alstead flood, state agencies have partnered on a number of connectivity projects where culverts have been replaced.⁷⁹

Work Together

According to some estimates there are currently over 100,000 public entities somehow involved in work related to water resources in the United States.⁸⁰ In working across state boundaries and over large regions, in order to mass the resources necessary to have an impact, it is imperative to combine forces and work together with other groups. “Everyone collectively is realizing you’ve got to work together in these big partnerships – it’s the only way to get anything done on the scale that matters,” stated one stakeholder. All interviewees mentioned that they worked with partners on practically every project.⁸¹

Being able to get involved with organizations that already have support and funding for a joint program and being able to build on the experiences of a successful joint project put groups ahead. “That’s been the opportunity. If we had to [create partnerships] piecemeal, come from isolation and then force the states to come together to have a conversation, you’d have to build your own mechanism, and that would take awhile,” pointed out one interviewee.⁸²

Another interviewee pointed out that strength lies in numbers, especially when approaching politicians for funding and support: “All the NGO’s were on the same page, we all had the same request... [the politicians are] hearing this repetition from group after group saying ‘we want so many dollars... and these are the things that we think are important.’ When different groups all come in with the same message, we’ve found that’s really powerful.”⁸³ In the regional context, when partners might be split across multiple states, a combined front is important. With limited resources available, a number of groups focusing on one issue shows politicians that there is common support for an issue.

Interviewees also highlight the importance of building a strong foundation in the local community. “Every project that we do needs to have a local champion in order for it to happen. That means we’re working with local towns, smaller non-profits, sometimes regional staff from

⁷⁸ More info is available on the Alstead flood online at: Scott A. Olson, “Flood of October 8 and 9, 2005, on Cold River in Walpole, Langdon, and Alstead and on Warren Brook in Alstead, New Hampshire,” US Geological Survey, <http://pubs.usgs.gov/of/2006/1221/> and “10 Dead In East Coast Floods,” CBS Broadcasting Inc., <http://www.cbsnews.com/stories/2005/10/10/national/main927945.shtml>.

⁷⁹ Conservation NGO representative, telephone interview with Edalin Michael, March 3a, 2008, Ann Arbor, MI.

⁸⁰ Adler, 1995, p. 2.

⁸¹ Conservation NGO representative, telephone interview with Edalin Michael, February 29, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, March 14, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, March 3a, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, March 7a, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, February 28, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, March 4, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, March 7b, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, March 3b, 2008, Ann Arbor, MI.; and Conservation NGO representative, email interview with Edalin Michael, March 2, 2008, Ann Arbor, MI.

⁸² Conservation NGO representative, telephone interview with Edalin Michael, March 7a, 2008, Ann Arbor, MI.

⁸³ Conservation NGO representative, telephone interview with Edalin Michael, March 3a, 2008, Ann Arbor, MI.

larger non-profits. If you don't have that support on the local level it makes the project MUCH more difficult for it to come to fruition."⁸⁴

Recognize the Equality of Partners

A number of interviewees discussed the importance of maintaining good relationships with partners. A prime element in doing so is treating partners with respect. One interviewee kept repeating "it's a bi-state thing" in describing a partnership – to drive home the point that one was not more important than the other because without the support of one partner, there was no partnership.⁸⁵ Another interviewee mentioned that treating partners equally was important to keeping them involved in the process, that "...Sometimes you have to divvy funding up equitably even though the science may tell you to do something differently."⁸⁶ Recognizing partners as equals in the joint processes maintains good relationships.

Put Your Money Where Your Mouth Is

Putting a solid proposal for joint projects in front of potential partners is helpful in gaining support. Two interviewees claimed that it is important to do your research ahead of time so that no one's time and resources are wasted. "If you don't know the sources of your stress, you may apply your strategy to the wrong pressure point."⁸⁷ For one interviewee, this included a full-scale field study, then a test run of the proposed project on a small scale. Taking the results of the study and the derived policy recommendations to multiple agencies in different states allowed the project to be implemented in both states, where it is now part of a standard permitting process.⁸⁸

Build on Success

The interviewee mentioned just above then shared the news of the success of the program with colleagues in another state, where they are now working to implement a similar program. Build on success, share success stories so that other groups in other states can find out what worked and how it was accomplished. This was a common theme throughout interviews as most regional groups in existence now were created following the model of another group or are the model for new spinoff groups.⁸⁹

Use the SWAPS: What DO SWAPS Do For Regional Groups?

In a number of ways, these strategies are currently being implemented across the northeast states to address the challenges listed above. While the SWAPS were created to address certain challenges, others have no easy fix and must be dealt with on a case-by-case basis. All respondents found that the SWAPS were most useful in helping to overcome the challenge of finding resources. Non-agency organizations claim that SWAPS make it much easier to get individual-state grant requests approved by conservation and philanthropic groups as well as a

⁸⁴ Conservation NGO representative, telephone interview with Edalin Michael, February 29, 2008, Ann Arbor, MI.

⁸⁵ Conservation NGO representative, telephone interview with Edalin Michael, March 3b, 2008, Ann Arbor, MI.

⁸⁶ Conservation NGO representative, telephone interview with Edalin Michael, March 4, 2008, Ann Arbor, MI.

⁸⁷ Conservation NGO representative, telephone interview with Edalin Michael, March 3a, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, March 7b, 2008, Ann Arbor, MI.

⁸⁸ Conservation NGO representative, telephone interview with Edalin Michael, March 3a, 2008, Ann Arbor, MI.

⁸⁹ Conservation NGO representative, email interview with Edalin Michael, March 2, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, March 4, 2008, Ann Arbor, MI.

multitude of state and federal agencies.⁹⁰ From the agency perspective, the SWAPs are a tool to leverage funding, both from state and private sources.⁹¹ The SWAPs also house a wealth of information, provided one understands how to find it. This gives users a base set of knowledge concerning species, habitats, and actions from which to begin working. In sharing information, no group has to spend time, money, or man-hours to find information the agency already has.

The plans also can be seen as an early step in overcoming some of the challenges related to different regulations and policies across the states, particularly in the northeast. As the region is home to many states that have devolved government to the municipal level, there are limited state-level regulations, and few, if any, county-level. For these states, the SWAP offers a type of state-level plan for conservation and resource management. An interviewee stated, "...what we're missing in our government is leadership and state-level planning... No one wanted to be told what to do, and that is the bottom line problem... But the wildlife action plan will be really neat to watch, because it IS a state-level plan."⁹² For a group working at the regional level, some kind of state-level priority- and goal- setting in a state such as these is incredibly helpful. Strategies and goals set forth in the plan are beginning to be adopted at the local level among municipal zoning and planning boards.⁹³ As the different municipalities work to incorporate the goals of the plans in their regulations, conservation at the regional level will be able to occur more efficiently.

Although not formally part of the SWAPs, the Regional Conservation Needs Grant Program for Northeast Fish & Wildlife Region 5 and the creation of new regional targets and indicators of ecosystem health from the Northeast Wildlife Diversity Technical Committee show that regional collaboration is the next step. Although joint development of classifications, species lists, and actions were only informally discussed during the draft stages of the original plans, as one agency representative said, "The formal stuff has come since the plans were developed."⁹⁴

Conclusion & Recommendations

"In the East, we have a lot of land that's in conservation ownership – I think we're very, very fortunate. Is there a lot more that can be done? Absolutely..."⁹⁵

There are many areas of opportunity for interstate cooperation on aquatic resource management in the northeast study region. While large waterways, lakes, and reservoirs are already the subject of joint management projects and planning processes, there are still many opportunities

⁹⁰ Conservation NGO representative, telephone interview with Edalin Michael, February 29, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, March 14, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, March 3a, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, March 7a, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, February 28, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, March 4, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, March 7b, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, March 3b, 2008, Ann Arbor, MI.; and Conservation NGO representative, email interview with Edalin Michael, March 2, 2008, Ann Arbor, MI.

⁹¹ This is information from our regional piece.

⁹² Conservation NGO representative, telephone interview with Edalin Michael, March 7b, 2008, Ann Arbor, MI.

⁹³ Conservation NGO representative, telephone interview with Edalin Michael, October 26, 2007, Ann Arbor, MI.

⁹⁴ New Hampshire Fish and Game representative, telephone interview with Michelle Aldridge, October 1, 2007, Ann Arbor, MI.

⁹⁵ Conservation NGO representative, telephone interview with Edalin Michael, March 3a, 2008, Ann Arbor, MI.

on the local-level for making significant contributions to these larger programs. “They all need more attention than they’re getting right now,” says one stakeholder of the freshwater ecosystems in the northeast, a sentiment echoed by a number of other interviewees.⁹⁶ Smaller freshwater systems that cover multiple states are also, in many instances, the subject of non-profit and state agency attention. Similarly, however, there are a number that could benefit from organized management. With the new focus on dam removal in the region, this number is growing. Another area identified as needing attention is near-boundary freshwater ecosystems. Often, species and habitats are affected by events or practices occurring in neighboring areas. Although these species and habitats are not specifically inter-state, their management should likely be handled through some sort of partnership between the neighboring states.

Through implementation and modifications in the drafting and contents of subsequent iterations, agencies should work to make SWAPs address many more of the challenges encountered by users generally, as well as groups trying to work regionally. This is partially a function of the intended audience of the plans – SWAPs that were designed to be used by other groups outside of the agency were easier to navigate. Additionally, the SWAPs that shared similar structures, organizations, habitat classifications, and habitat types were easier to cross-reference than those that did not. In linking species to habitats, maps help to keep people thinking at the habitat level. One interviewee mentioned, “the use of GIS as a tool has certainly enhanced our capability to think at the landscape level hugely...”⁹⁷ Therefore, in order to facilitate regional collaboration, SWAPs should use more standardized classifications and organizational structures and make available as many detailed maps as possible, either in the plan or through GIS data.

Many of the states in the northeast region did not fully develop descriptions of current partnerships and interstate projects that they were already involved in. However, it is important to include these types of implementation and monitoring plans in the state’s individual wildlife action plans in order to facilitate the formation of new partnerships and efficient uses of resources. SWAPs are great places for regional groups to look for potential agency partnerships, as conservation action is driven by the states agencies.⁹⁸

One of the things that the SWAPs do well is show how the management focus is shifting from the species level to habitat level. “The thing that I think is different is the recognition by the agencies and the states and us that one, we need to think on a broader scale. You can’t think about the one stream reach, the one pool that everyone fishes, or the one section that everyone loves, you have to think on a watershed basis to make any difference in terms of habitat and water quality and fish populations and fish species...” says one stakeholder.⁹⁹ It will be important in the drafting of subsequent iterations of the plan to keep this focus, and to incorporate it more into the structure of the plan as well as the strategies within it.

⁹⁶ Conservation NGO representative, telephone interview with Edalin Michael, February 29, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, March 3a, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, March 4, 2008, Ann Arbor, MI.

⁹⁷ Conservation NGO representative, telephone interview with Edalin Michael, March 3a, 2008, Ann Arbor, MI.

⁹⁸ Conservation NGO representative, telephone interview with Edalin Michael, March 4, 2008, Ann Arbor, MI.; Conservation NGO representative, telephone interview with Edalin Michael, February 29, 2008, Ann Arbor, MI.

⁹⁹ Conservation NGO representative, telephone interview with Edalin Michael, March 4, 2008, Ann Arbor, MI.

Resources

Connecticut Department of Environmental Protection (CTDEP). *Connecticut's Comprehensive Wildlife Conservation Strategy* (Hartford, CT: 2005).

Maine Department of Inland Fisheries and Wildlife (MDIFW). *Maine's Comprehensive Wildlife Conservation Strategy* (Augusta: ME: 2005).

Massachusetts Division of Fish & Wildlife Department of Fish and Game (MDFW). *Commonwealth of Massachusetts 2005 Comprehensive Wildlife Conservation Strategy* (Boston, MA: 2005).

New Jersey Division of Fish & Wildlife Endangered and Nongame Species Program (NJDFW). *New Jersey Wildlife Action Plan* (Trenton, NJ: 2005).

New Hampshire Fish and Game Department Nongame and Endangered Wildlife Program (NHFG). *New Hampshire Wildlife Action Plan* (Concord, NH: 2005).

New York Department of Environmental Conservation (NYDEC). *New York Comprehensive Wildlife Conservation Strategy* (Albany, NY: 2005).

Rhode Island Department of Environmental Management Division of Fish and Wildlife (RIDEM). *Rhode Island's Comprehensive Wildlife Conservation Strategy*, (Wakefield, RI: 2005).

Pennsylvania Game Commission (PGC) and Pennsylvania Game and Boat Commission (PGBC). *Pennsylvania Comprehensive Wildlife Conservation Strategy* (Harrisburg, PA: 2005).

Vermont Fish and Wildlife Department (VFW). *Vermont's Wildlife Action Plan* (Waterbury, VT: 2005).

Adler, Robert W. "Addressing barriers to watershed protection." *Environmental Law* 25 no.4 (Fall 1995).

Allan, J.D. and M. Castillo. *Stream Ecology: Structure and Function of Running Waters, Second Edition* (The Netherlands: Springer, 2007).

Glennon, Robert. *Water Follies* (Washington, DC: Island Press, 2002).

Varady, R. and B. Morehouse. "Moving Borders from the Periphery to the Center: River Basins, Political Boundaries, and Water Management Policy," in *Water: Science, Policy, and Management*, ed. R. Lawford, D. Fort, H. Hartmann, and S. Eden, (Washington, DC: American Geophysical Institute, 2003).

Wetzel, R.G. *Limnology: Lake and River Ecosystems, Third Edition* (CA: Elsevier, 2001).

United States Fish & Wildlife. *Aquatic Summaries and Highlights, A Review of Wildlife Action Plans: Opportunities to Advance Fresh Water Aquatic Fish and Mollusk Species/Habitat Conservation* (Washington DC: United States Fish & Wildlife Service, 2007).

University of Maine. "Wetland Connections," <http://www.umaine.edu/wetlands/VPbluespot.htm>.

G.D. Therres. "Wildlife species of conservation concern in the northeastern United States," *Northeast Wildlife* 54 (1999).

The Nature Conservancy. "The Connecticut River," The Connecticut River Program, <http://www.nature.org/wherewework/northamerica/states/connecticut/preserves/art22544.html>.

Trout Unlimited. "Eastern Water: The Problem," http://www.tu.org/site/c.kkLRJ7MSKtH/b.3267717/k.7196/Eastern_Water_The_Problem.htm.

Trout Unlimited. "Eastern Water FAQ's," http://www.tu.org/site/c.kkLRJ7MSKtH/b.3303627/k.C035/Eastern_Water_FAQs.htm.

Trout Unlimited. "Water Policy," http://www.tu.org/site/c.kkLRJ7MSKtH/b.3267719/k.854E/Water_Policy.htm.

US Geological Survey. "Water Resources Data for USGS station 01144500 CONNECTICUT RIVER AT WEST LEBANON, NH," USGS Water Data for the Nation, <http://waterdata.usgs.gov/nwis>.

Water Systems Council. *Who Owns the Water: A Summary of Existing Water Rights Laws* (Washington DC: Water Systems Council, 2003), http://www.watersystemscouncil.org/VAiWebDocs/WSCDocs/4504256WSC_RIGHTS_03.pdf.

Olson, Scott A. "Flood of October 8 and 9, 2005, on Cold River in Walpole, Langdon, and Alstead and on Warren Brook in Alstead, New Hampshire," US Geological Survey, <http://pubs.usgs.gov/of/2006/1221/>.

"10 Dead In East Coast Floods." CBS Broadcasting Inc., <http://www.cbsnews.com/stories/2005/10/10/national/main927945.shtml>.

Eastern Brook Trout Joint Venture (EBTJV_a). *Eastern Brook Trout: Roadmap to Restoration*, http://www.easternbrooktrout.org/docs/EBTJV_RoadmapToRestoration_FINAL.pdf.

Eastern Brook Trout Joint Venture (EBTJV_b). *Eastern Brook Trout: Status and Threats* (Arlington, VA: Trout Unlimited, 2006).

Trout Unlimited. *A Glass Half Full: The Future of Water in New England* (Arlington, VA: Trout Unlimited).

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, State by State

Connecticut
Maine
Massachusetts
New Hampshire
New Jersey
New York
Pennsylvania
Rhode Island
Vermont

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, Connecticut

	Most Important		
	Very Important		
	Important		
Taxa			Habitat
Mammal	Black Bear	<i>Ursus americanus</i>	Forested Inland Wetland, Shrub Inland Wetland, Herbaceous Inland Wetland, Large Rivers and their Riparian Zones
21	Bobcat	<i>Felis rufus</i>	Forested Inland Wetland, Shrub Inland Wetland
	Eastern Pipistrelle	<i>Pipistrellus subflavus</i>	Forested Inland Wetland, Herbaceous Inland Wetland, Sparsely Vegetated Inland Wetland, Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Cold Water Streams, Lakes and their Shorelines
	Eastern Small-footed Bat	<i>Myotis leibii</i>	Forested Inland Wetland, Shrub Inland Wetland, Herbaceous Inland Wetland, Sparsely Vegetated Inland Wetland, Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Cold Water Streams, Lakes and their Shorelines
	Hairy-tailed Mole	<i>Parascalops breweri</i>	Forested Inland Wetland
	Hoary Bat	<i>Lasiurus cinereus</i>	Forested Inland Wetland, Shrub Inland Wetland, Herbaceous Inland Wetland, Sparsely Vegetated Inland Wetland, Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Cold Water Streams, Lakes and their Shorelines
	Indiana Bat	<i>Myotis sodalis</i>	Forested Inland Wetland, Shrub Inland Wetland, Herbaceous Inland Wetland, Sparsely Vegetated Inland Wetland, Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Cold Water Streams, Lakes and their Shorelines
	Little Brown Bat	<i>Myotis lucifugus</i>	Forested Inland Wetland, Herbaceous Inland Wetland, Sparsely Vegetated Inland Wetland, Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Cold Water Streams, Lakes and their Shorelines
	Long-tailed Weasel	<i>Mustela frenata</i>	Large Rivers and their Riparian Zones
	Meadow Jumping Mouse	<i>Zapus hudsonius</i>	Large Rivers and their Riparian Zones
	Mink	<i>Mustela vison</i>	Forested Inland Wetland, Shrub Inland Wetland, Herbaceous Inland Wetland, Sparsely Vegetated Inland Wetland, Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Cold Water Streams
	Muskrat	<i>Ondatra zibethicus</i>	Herbaceous Inland Wetland, Large Rivers and their Riparian Zones, Coastal Plain Ponds
	New England Cottontail	<i>Sylvilagus transitionalis</i>	Shrub Inland Wetland
	Northern Long-eared Bat	<i>Myotis septentrionalis</i>	Forested Inland Wetland, Herbaceous Inland Wetland, Sparsely Vegetated Inland Wetland, Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Cold Water Streams, Lakes and their Shorelines
	Northern Water Shrew	<i>Sorex palustris</i>	Forested Inland Wetland, Shrub Inland Wetland, Herbaceous Inland Wetland, Sparsely Vegetated Inland Wetland, Unrestricted, Free-flowing Streams, Cold Water Streams
	Red Bat	<i>Lasiurus borealis</i>	Forested Inland Wetland, Shrub Inland Wetland, Herbaceous Inland Wetland, Sparsely Vegetated Inland Wetland, Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Cold Water Streams, Lakes and their Shorelines
	Short-tailed Weasel	<i>Mustela erminea</i>	Large Rivers and their Riparian Zones
	Silver-haired Bat	<i>Lasionycteris noctivagans</i>	Forested Inland Wetland, Shrub Inland Wetland, Herbaceous Inland Wetland, Sparsely Vegetated Inland Wetland, Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Cold Water Streams, Lakes and their Shorelines
	Southern Bog Lemming	<i>Synaptomys cooperi</i>	Forested Inland Wetland, Shrub Inland Wetland
	Woodland Jumping Mouse	<i>Napaeozapus insignis</i>	Sparsely Vegetated Inland Wetland, Unrestricted, Free-flowing Streams, Cold Water Streams
	Woodland Vole	<i>Microtus pinetorum</i>	Herbaceous Inland Wetland
Bird	Alder Flycatcher	<i>Empidonax alorum</i>	Shrub Inland Wetland, Herbaceous Inland Wetland, Large Rivers and their Riparian Zones
74	American Bittern	<i>Botaurus lentiginosus</i> (Botaurus)	Herbaceous Inland Wetland, Sparsely Vegetated Inland Wetland
	American Black Duck	<i>Anas rubripes</i>	Forested Inland Wetland, Herbaceous Inland Wetland, Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Lakes and their Shorelines, Coastal Plain Ponds
	American Redstart	<i>Setophaga ruticilla</i>	Forested Inland Wetland, Large Rivers and their Riparian Zones
	American Woodcock	<i>Scolopax minor</i>	Forested Inland Wetland, Shrub Inland Wetland, Sparsely Vegetated Inland Wetland, Large Rivers and their Riparian Zones, Cold Water Streams
	Bald Eagle	<i>Haliaeetus leucocephalus</i> (Haliaeetus)	Large Rivers and their Riparian Zones, Lakes and their Shorelines
	Baltimore Oriole	<i>Icterus galbula</i>	Forested Inland Wetland
	Bank Swallow	<i>Riparia riparia</i>	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Lakes and their Shorelines
	Barred Owl	<i>Strix varia</i>	Forested Inland Wetland, Sparsely Vegetated Inland Wetland, Large Rivers and their Riparian Zones
	Belted Kingfisher	<i>Ceryle alcyon</i>	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Lakes and their Shorelines

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, Connecticut

Taxa		Habitat
Black Rail	<i>Laterallus jamaicensis</i>	Coastal Plain Ponds
Black-and-white Warbler	<i>Mniotilta varia</i>	Large Rivers and their Riparian Zones
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	Forested Inland Wetland
Black-crowned Night-heron	<i>Nycticorax nycticorax</i>	Herbaceous Inland Wetland, Coastal Plain Ponds
Black-throated Blue Warbler	<i>Dendroica caerulescens</i>	Forested Inland Wetland
Black-throated Green Warbler	<i>Dendroica virens</i>	Forested Inland Wetland
Blue-gray Gnatcatcher	<i>Poliophtila caerulea</i>	Large Rivers and their Riparian Zones
Blue-winged Teal	<i>Anas discors</i>	Herbaceous Inland Wetland, Large Rivers and their Riparian Zones, Lakes and their Shorelines, Coastal Plain Ponds, Unrestricted
Blue-winged Warbler	<i>Vermivora pinus</i>	Free-flowing Streams
Broad-winged Hawk	<i>Buteo platypterus</i>	Forested Inland Wetland
Canada Warbler	<i>Wilsonia canadensis</i>	Forested Inland Wetland, Herbaceous Inland Wetland, Large Rivers and their Riparian Zones
Canvasback	<i>Aythya valisineria</i>	Large Rivers and their Riparian Zones, Lakes and their Shorelines, Coastal Plain Ponds
Cerulean Warbler	<i>Dendroica cerulea</i>	Forested Inland Wetland, Large Rivers and their Riparian Zones
Chestnut-sided Warbler	<i>Dendroica pensylvanica</i>	Forested Inland Wetland
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	Large Rivers and their Riparian Zones, Lakes and their Shorelines
Common Loon	<i>Gavia immer</i>	Lakes and their Shorelines
Common Merganser	<i>Mergus merganser</i>	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Lakes and their Shorelines
Common Moorhen	<i>Gallinula chloropus</i>	Herbaceous Inland Wetland
Eastern Kingbird	<i>Tyrannus tyrannus</i>	Forested Inland Wetland, Herbaceous Inland Wetland, Sparsely Vegetated Inland Wetland, Large Rivers and their Riparian Zones
Eastern Screech-owl	<i>Otus asio</i>	Forested Inland Wetland, Large Rivers and their Riparian Zones
Gray Catbird	<i>Dumetella carolinensis</i>	Shrub Inland Wetland, Herbaceous Inland Wetland
Gray-cheeked Thrush	<i>Catharus minimus</i>	Forested Inland Wetland
Great Blue Heron	<i>Ardea herodias</i>	Forested Inland Wetland, Sparsely Vegetated Inland Wetland
Great Cormorant	<i>Phalacrocorax carbo</i>	Large Rivers and their Riparian Zones
Great Egret	<i>Ardea alba</i>	Coastal Plain Ponds
Greater Scaup	<i>Aythya marila</i>	Large Rivers and their Riparian Zones, Coastal Plain Ponds
Green Heron	<i>Butorides virescens</i>	Forested Inland Wetland, Herbaceous Inland Wetland
Hermit Thrush	<i>Catharus guttatus</i>	Forested Inland Wetland
Hooded Merganser	<i>Lophodytes cucullatus</i>	Forested Inland Wetland, Herbaceous Inland Wetland, Unrestricted, Free-flowing Streams, Lakes and their Shorelines
Hooded Warbler	<i>Wilsonia citrina</i>	Large Rivers and their Riparian Zones
King Rail	<i>Rallus elegans</i>	Herbaceous Inland Wetland, Sparsely Vegetated Inland Wetland
Least Bittern	<i>Ixobrychus exilis</i>	Herbaceous Inland Wetland
Least Flycatcher	<i>Empidonax minimus</i>	Forested Inland Wetland, Large Rivers and their Riparian Zones
Lesser Scaup	<i>Aythya affinis</i>	Large Rivers and their Riparian Zones, Lakes and their Shorelines, Coastal Plain Ponds
Little Blue Heron	<i>Egretta caerulea</i>	Coastal Plain Ponds
Louisiana Waterthrush	<i>Seiurus motacilla</i>	Forested Inland Wetland, Shrub Inland Wetland, Sparsely Vegetated Inland Wetland, Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Cold Water Streams
Marsh Wren	<i>Cistothorus palustris</i>	Herbaceous Inland Wetland
Northern Flicker	<i>Colaptes auratus</i>	Forested Inland Wetland
Northern Parula	<i>Parula americana</i>	Forested Inland Wetland
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams
Northern Saw-whet Owl	<i>Aegolius acadicus</i>	Forested Inland Wetland, Herbaceous Inland Wetland
Northern Waterthrush	<i>Seiurus noveboracensis</i>	Forested Inland Wetland, Shrub Inland Wetland, Sparsely Vegetated Inland Wetland, Large Rivers and their Riparian Zones, Cold Water Streams
Olive-sided Flycatcher	<i>Contopus borealis</i>	Unrestricted, Free-flowing Streams, Cold Water Streams, Lakes and their Shorelines
Orchard Oriole	<i>Icterus spurius</i>	Large Rivers and their Riparian Zones
Osprey	<i>Pandion haliaetus</i>	Large Rivers and their Riparian Zones, Lakes and their Shorelines
Pied-billed Grebe	<i>Podilymbus podiceps</i>	Herbaceous Inland Wetland, Large Rivers and their Riparian Zones, Coastal Plain Ponds
Purple Martin	<i>Progne subis</i>	Forested Inland Wetland

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, Connecticut

Taxa			Habitat
	Red-necked Grebe	Podiceps grisegena	Large Rivers and their Riparian Zones
	Red-shouldered Hawk	Buteo lineatus	Forested Inland Wetland
	Rose-breasted Grosbeak	Pheucticus ludovicianus	Forested Inland Wetland
	Rough-legged Hawk	Buteo lagopus	Herbaceous Inland Wetland
	Sedge Wren	Cistothorus platensis (Cistothorus)	Herbaceous Inland Wetland
	Semipalmated Sandpiper	Charadrius semipalmatus	Sparsely Vegetated Inland Wetland
	Snowy Egret	Egretta thula	Coastal Plain Ponds
	Sora	Porzana carolina	Herbaceous Inland Wetland, Sparsely Vegetated Inland Wetland
	Spotted Sandpiper	Actitis macularia	Unrestricted, Free-flowing Streams, Lakes and their Shorelines
	Veery	Catharus fuscescens	Forested Inland Wetland
	Virginia Rail	Rallus limicola	Herbaceous Inland Wetland
	Warbling Vireo	Vireo gilvus	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams
	Willow Flycatcher	Empidonax traillii	Shrub Inland Wetland, Herbaceous Inland Wetland, Large Rivers and their Riparian Zones
	Winter Wren	Troglodytes troglodytes	Forested Inland Wetland
	Yellow-billed Cuckoo	Coccyzus americanus	Forested Inland Wetland
	Yellow-crowned Night-heron	Nyctanassa violacea (Nyctanassa)	Coastal Plain Ponds
	Yellow-throated Vireo	Vireo flavifrons	Forested Inland Wetland, Large Rivers and their Riparian Zones
Reptile/Amphibian	Blue-spotted Salamander (complex)	Ambystoma laterale	Forested Inland Wetland, Herbaceous Inland Wetland, Large Rivers and their Riparian Zones, Shrub Inland Wetland, Sparsely Vegetated Inland Wetland, Unrestricted, Free-flowing Streams
19	Blue-spotted salamander (diploid)	Ambystoma laterale	Forested Inland Wetland, Herbaceous Inland Wetland, Large Rivers and their Riparian Zones, Shrub Inland Wetland, Sparsely Vegetated Inland Wetland, Unrestricted, Free-flowing Streams
	Bog Turtle	Glyptemys muhlenbergii	Herbaceous Inland Wetland
	Copperhead	Agkistrodon contortrix	Lakes and their Shorelines
	Eastern Box Turtle	Terrapene carolina (Terrapene carolina)	Coastal Plain Ponds, Forested Inland Wetland, Herbaceous Inland Wetland, Lakes and their Shorelines, Large Rivers and their Riparian Zones, Shrub Inland Wetland, Sparsely Vegetated Inland Wetland
	Eastern Newt	Notophthalmus viridescens	Forested Inland Wetland, Shrub Inland Wetland, Sparsely Vegetated Inland Wetland
	Ribbon Snake (Eastern Ribbonsnake)	Thamnophis sauritus (Thamnophis sauritus)	Coastal Plain Ponds, Cold Water Streams, Forested Inland Wetland, Herbaceous Inland Wetland, Lakes and their Shorelines, Large Rivers and their Riparian Zones, Shrub Inland Wetland, Sparsely Vegetated Inland Wetland, Unrestricted, Free-flowing Streams
	Eastern Spadefoot	Scaphiopus holbrookii	Forested Inland Wetland, Large Rivers and their Riparian Zones, Sparsely Vegetated Inland Wetland
	Fowler's Toad	Bufo fowleri (Bufo woodhousii fowleri)	Coastal Plain Ponds, Forested Inland Wetland, Lakes and their Shorelines, Large Rivers and their Riparian Zones, Sparsely Vegetated Inland Wetland
	Gray Treefrog	Hyla versicolor	Sparsely Vegetated Inland Wetland
	Jefferson Salamander	Ambystoma jeffersonianum	Sparsely Vegetated Inland Wetland
	Marbled Salamander	Ambystoma opacum	Forested Inland Wetland, Shrub Inland Wetland, Sparsely Vegetated Inland Wetland
	Northern Dusky Salamander (Dusky Salamander)	Desmognathus fuscus	Cold Water Streams, Herbaceous Inland Wetland, Shrub Inland Wetland, Sparsely Vegetated Inland Wetland, Unrestricted, Free-flowing Streams
	Northern Spring Salamander	Gyrinophilus porphyriticus (Gyrinophilus porphyriticus)	Cold Water Streams, Herbaceous Inland Wetland, Shrub Inland Wetland, Sparsely Vegetated Inland Wetland, Unrestricted, Free-flowing Streams
	Smooth Greensnake	Opheodrys vernalis	Lakes and their Shorelines, Shrub Inland Wetland
	Spotted Salamander	Ambystoma maculatum	Forested Inland Wetland, Shrub Inland Wetland, Sparsely Vegetated Inland Wetland
	Spotted Turtle	Clemmys guttata	Forested Inland Wetland, Herbaceous Inland Wetland, Lakes and their Shorelines, Large Rivers and their Riparian Zones, Shrub Inland Wetland, Sparsely Vegetated Inland Wetland, Unrestricted, Free-flowing Streams
	Wood Frog	Rana sylvatica	Forested Inland Wetland, Shrub Inland Wetland, Sparsely Vegetated Inland Wetland
	Wood Turtle	Glyptemys insculpta (previously)	Forested Inland Wetland, Herbaceous Inland Wetland, Lakes and their Shorelines, Large Rivers and their Riparian Zones, Shrub Inland Wetland, Sparsely Vegetated Inland Wetland, Unrestricted, Free-flowing Streams
Invertebrate		Agonum darlingtoni	Shrub Inland Wetland
56		Agonum mutatum	Shrub Inland Wetland
	American Rubyspot	Hetaerina americana	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Cold Water Streams
	Annointed Sallow Moth	Pyreferra ceromatica	Forested Inland Wetland
		Atylotus ohioensis	Shrub Inland Wetland
		Baetisca lacustris	Large Rivers and their Riparian Zones

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, Connecticut

Taxa		Habitat
	<i>Baetisca obesa</i>	Large Rivers and their Riparian Zones
Banded Bog Skimmer	<i>Williamsonia lintneri</i>	Shrub Inland Wetland
	<i>Bembidion carinula</i>	Large Rivers and their Riparian Zones, Lakes and their Shorelines
	<i>Bembidion lacunarium</i>	Large Rivers and their Riparian Zones
	<i>Bembidion pseudocautum</i>	Herbaceous Inland Wetland
	<i>Bembidion quadratum</i>	Shrub Inland Wetland
	<i>Bembidion semicinctum</i>	Forested Inland Wetland
	<i>Bembidion simplex</i>	Unrestricted, Free-flowing Streams, Cold Water Streams
Blue Crab	<i>Callinectes sapidus</i>	Large Rivers and their Riparian Zones
Bog Copper	<i>Lycaena epixanthe</i>	Shrub Inland Wetland
Bog Tiger Moth (an arctiid moth)	<i>Grammia speciosa</i>	Shrub Inland Wetland
	<i>Boreal Fossaria</i>	Lakes and their Shorelines
	<i>Brachinus cyanipennis</i>	Forested Inland Wetland, Herbaceous Inland Wetland
	<i>Brachinus fumans</i>	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Cold Water Streams, Lakes and their Shorelines
	<i>Brachinus medius</i>	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Cold Water Streams, Lakes and their Shorelines
	<i>Brachinus ovipennis</i>	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Cold Water Streams, Lakes and their Shorelines
Brook Floater	<i>Alasmidonta varicosa</i>	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams
	<i>Carabus vinctus</i>	Forested Inland Wetland
	<i>Cicindela marginata</i>	Large Rivers and their Riparian Zones
	<i>Cinygmula subaequalis</i>	Unrestricted, Free-flowing Streams, Cold Water Streams
Clam Shrimp	<i>Eulimnadia agassizii</i>	Sparsely Vegetated Inland Wetland
Coastal Pond Amphipod	<i>Synurella chamberlaini</i>	Forested Inland Wetland
Cobra Clubtail	<i>Gomphus vastus</i>	Large Rivers and their Riparian Zones
Crimson-ringed Whiteface	<i>Leucorrhinia glacialis</i>	Shrub Inland Wetland
Dark-bellied Tiger Beetle	<i>Cicindela tranquebarica</i>	Large Rivers and their Riparian Zones, Lakes and their Shorelines
Disc Gyro	<i>Gyraulus circumstriatus</i>	Lakes and their Shorelines
Dwarf Wedge Mussel	<i>Alasmidonta heterodon</i>	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams
Eastern Pearlshell	<i>Margaritifera margaritifera</i>	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams
Eastern Pond Mussel	<i>Ligumia nasuta</i>	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Lakes and their Shorelines
Eyed Brown	<i>Satyrodes eurydice</i>	Herbaceous Inland Wetland
Fiddler Crabs	<i>Uca</i> spp.	Large Rivers and their Riparian Zones
	<i>Goniops chrysocoma</i>	Forested Inland Wetland
Grass Shrimp	<i>Hippolyte</i> spp.	Large Rivers and their Riparian Zones
Gray Comma	<i>Polygonia progne</i>	Forested Inland Wetland
Hairy-necked Tiger Beetle	<i>Cicindela hirticollis</i>	Large Rivers and their Riparian Zones, Lakes and their Shorelines
Harpoon Clubtail	<i>Gomphus descriptus</i>	Cold Water Streams
Henry's Elfin	<i>Callophrys henrici</i>	Shrub Inland Wetland
Hessel's Hairstreak	<i>Mitoura hesseli</i>	Forested Inland Wetland
	<i>Hybomitra frosti</i>	Shrub Inland Wetland
	<i>Hybomitra longiglossa</i>	Shrub Inland Wetland
	<i>Hybomitra lurida</i>	Shrub Inland Wetland
	<i>Hybomitra trepida</i>	Forested Inland Wetland
	<i>Hybomitra typhus</i>	Forested Inland Wetland
Labrador Tea Tentiform Leafminer	<i>Phyllonorycter ledella</i>	Shrub Inland Wetland
Lemmer's Noctuid Moth	<i>Lithophane lemmeri</i>	Forested Inland Wetland
	<i>Loxandrus vitiosus</i>	Forested Inland Wetland
Lymnaeid Snail	<i>Fossaria rustica</i>	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Lakes and their Shorelines
	<i>Merycomyia whitneyi</i>	Shrub Inland Wetland, Herbaceous Inland Wetland
Midland Clubtail	<i>Gomphus fraternus</i>	Large Rivers and their Riparian Zones

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, Connecticut

Taxa			Habitat
	Mustached Clubtail	Gomphus adelphus	Cold Water Streams
	Mystic Valley Amphipod	Crangonyx aberrans	Forested Inland Wetland
		Nebria lacustris lacustris	Large Rivers and their Riparian Zones
	Newman's Brocade	Meropleon ambifusca	Herbaceous Inland Wetland
		Omopron tessellatum	Lakes and their Shorelines
	Piedmont Groundwater Amphipod	Stygobromus tenuis tenuis (Styg)	Sparsely Vegetated Inland Wetland
	Pink Streak	Faronta rubripennis	Forested Inland Wetland
	Pitcher Plant Borer Moth	Papaipema appassionata	Shrub Inland Wetland
	Pitcher Plant Moth	Exyra rolandiana	Shrub Inland Wetland
	Puritan Tiger Beetle	Cicindela puritana	Large Rivers and their Riparian Zones
	Rapids Clubtail	Gomphus quadricolor	Cold Water Streams
	Riverine Clubtail	Stylurus amnicola	Large Rivers and their Riparian Zones
	Sand Shrimp	Crangon septemspinosa	Large Rivers and their Riparian Zones
		Sargus fasciatus	Shrub Inland Wetland, Herbaceous Inland Wetland
	Scarlet Bluet	Enallagma pictum	Lakes and their Shorelines
			Shrub Inland Wetland, Herbaceous Inland Wetland, Sparsely Vegetated Inland Wetland, Large Rivers and their Riparian Zones
	Sedge Skipper	Euphyes dion	
	Shore Shrimp	Palaemonetes spp.	Large Rivers and their Riparian Zones
	Skillet Clubtail	Gomphus ventricosus	Large Rivers and their Riparian Zones
	Ski-tailed Emerald	Somatochlora elongata	Shrub Inland Wetland, Cold Water Streams
	Slender Clearwing	Hemaris gracilis	Shrub Inland Wetland
	Slender Walker	Pomatiopsis lapidaria	Large Rivers and their Riparian Zones
	Sparkling Jewelwing	Calopteryx dimidiata	Unrestricted, Free-flowing Streams
		Tabanus fulvicallus	Shrub Inland Wetland
	Tidewater Mucket	Leptodea ochracea	Large Rivers and their Riparian Zones, Lakes and their Shorelines
	Tiger Spiketail	Cordulegaster erronea	Cold Water Streams
	Turret Snail	Valvata tricarinata	Lakes and their Shorelines
	Two-spotted Skipper	Euphyes bimaculata (Euphys bima)	Forested Inland Wetland, Shrub Inland Wetland, Herbaceous Inland Wetland, Large Rivers and their Riparian Zones
	Virginia River Snail	Elimia virginica	Large Rivers and their Riparian Zones
	Walker's Tusked Sprawler	Anthopotamus verticis	Large Rivers and their Riparian Zones
	Woodland Pondsnail	Stagnicola catascopium	Large Rivers and their Riparian Zones
	Yellow Bog Anarta	Anarta luteola	Shrub Inland Wetland
	Yellow Lampmussel	Lampsilis cariosa	Large Rivers and their Riparian Zones
Fish	Alewife	Alosa pseudoharengus	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Coastal Plain Ponds
39	American Brook Lamprey	Lampetra appendix	Unrestricted, Free-flowing Streams, Cold Water Streams
	American Eel	Anguilla rostrata	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Cold Water Streams, Lakes and their Shorelines, Coastal Plain Ponds
	American Shad	Alosa sapidissima	Large Rivers and their Riparian Zones
	Atlantic Salmon	Salmo salar	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams
	Atlantic Sturgeon	Acipenser oxyrinchus (Acipenser)	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams
	Atlantic Tomcod (Tomcod)	Microgadus tomcod	Large Rivers and their Riparian Zones
	Banded Sunfish	Enneacanthus obesus	Lakes and their Shorelines, Coastal Plain Ponds
	Black Crappie	Pomoxis nigromaculatus	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Lakes and their Shorelines, Coastal Plain Ponds
	Blacknose Dace	Rhinichthys atratulus	Unrestricted, Free-flowing Streams, Cold Water Streams
	Blueback Herring	Alosa aestivalis	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams
	Bridle Shiner	Notropis bifrenatus	Unrestricted, Free-flowing Streams, Lakes and their Shorelines
	Brook Trout (wild)	Salvelinus fontinalis	Unrestricted, Free-flowing Streams, Cold Water Streams, Unrestricted, Free-flowing Streams, Cold Water Streams
	Burbot	Lota lota	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Cold Water Streams
	Chain Pickerel	Esox niger	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Lakes and their Shorelines, Coastal Plain Ponds
	Common Shiner	Luxilus cornutus (Luxilus comutu)	Unrestricted, Free-flowing Streams, Cold Water Streams

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, Connecticut

Taxa		Habitat
Creek Chubsucker	<i>Erimyzon oblongus</i>	Unrestricted, Free-flowing Streams, Lakes and their Shorelines
Cutlips Minnow	<i>Exoglossum maxillingua</i> (Exoglossum)	Unrestricted, Free-flowing Streams, Cold Water Streams
Fallfish	<i>Semotilus corporalis</i>	Unrestricted, Free-flowing Streams, Cold Water Streams
Fourspine Stickleback	<i>Apeltes quadracus</i>	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Cold Water Streams, Lakes and their Shorelines, Coastal Plain Ponds
Golden Shiner	<i>Notemigonus crysoleucas</i>	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Lakes and their Shorelines, Coastal Plain Ponds
Hickory Shad	<i>Alosa mediocris</i>	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams
Hogchoker	<i>Trinectes maculatus</i>	Large Rivers and their Riparian Zones
Largemouth Bass	<i>Micropterus salmoides</i>	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Lakes and their Shorelines, Coastal Plain Ponds
Longnose Dace	<i>Rhinichthys cataractae</i>	Unrestricted, Free-flowing Streams, Cold Water Streams
Longnose Sucker	<i>Catostomus catostomus</i>	Cold Water Streams
Menhaden	<i>Brevoortia tyrannus</i>	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams
Pumpkinseed	<i>Lepomis gibbosus</i>	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Lakes and their Shorelines, Coastal Plain Ponds
Rainbow Smelt	<i>Osmerus mordax</i>	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams
Redbreast Sunfish	<i>Lepomis auritus</i>	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Lakes and their Shorelines, Coastal Plain Ponds
Redfin Pickerel	<i>Esox americanus</i> (<i>Esox americana</i>)	Unrestricted, Free-flowing Streams
Sea Lamprey	<i>Petromyzon marinus</i>	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams
Shortnose Sturgeon	<i>Acipenser brevirostrum</i> (<i>Acipenser</i>)	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams
Slimy Sculpin	<i>Cottus cognatus</i>	Cold Water Streams
Smallmouth Bass	<i>Micropterus dolomieu</i>	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Lakes and their Shorelines, Coastal Plain Ponds
Striped Bass	<i>Morone saxatilis</i> (<i>Morone saxatilis</i>)	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams
Swamp Darter	<i>Etheostoma fusiforme</i>	Unrestricted, Free-flowing Streams, Lakes and their Shorelines, Coastal Plain Ponds
White Sucker	<i>Catostomus commersoni</i>	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Cold Water Streams, Lakes and their Shorelines, Coastal Plain Ponds
Yellow Perch	<i>Perca flavescens</i>	Large Rivers and their Riparian Zones, Unrestricted, Free-flowing Streams, Lakes and their Shorelines, Coastal Plain Ponds

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, Maine

Taxa	SGCN Species		Habitat	
Bird	American Bittern	<i>Botaurus lentiginosus (Botaurus lentiginosus)</i>	WM, WS	
	American Black Duck	<i>Anas rubripes</i>	WL, WF, WM	
	American Coot	<i>Fulica americana</i>	WM	
	American Woodcock	<i>Scolopax minor</i>	WS	
	Bald Eagle	<i>Haliaeetus leucocephalus</i>	WL, WR	
	Barn Swallow	<i>Hirundo rustica</i>	WL, WM	
	Barrow's Goldeneye	<i>Bucephala islandica</i>	WR	
	Black Tern	<i>Chlidonias niger</i>	WL, WM	
	Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	WM	
	Blue-winged Warbler	<i>Vermivora pinus</i>	WS	
	Bobolink	<i>Dolichonyx oryzivorus</i>	WM	
	Bonaparte's Gull (breeding)	<i>Larus philadelphia</i>	WL	
	Canada Warbler	<i>Wilsonia canadensis</i>	WF	
	Common Loon (breeding)	<i>Gavia immer</i>	WL	
	Common Moorhen	<i>Gallinula chloropus</i>	WM	
	Common Tern	<i>Sterna hirundo</i>	WL	
	Golden Eagle	<i>Aquila chrysaetos</i>	WR	
	Great Blue Heron	<i>Ardea herodias</i>	WL, WM	
	Greater Scaup (non-breeding)	<i>Aythya marila</i>	WL, WR	
	Least Bittern	<i>Ixobrychus exilis</i>	WM	
	Louisiana Waterthrush	<i>Seiurus motacilla</i>	WR	
	Marsh Wren	<i>Cistothorus palustris</i>	WM	
	Nelson's Sharp-tailed Sparrow	<i>Ammodramus nelsoni</i>	WM	
	Olive-sided Flycatcher	<i>Contopus borealis</i>	WS, WP	
	Pied-billed Grebe	<i>Podilymbus podiceps</i>	WL, WM	
	Purple Martin	<i>Progne subis</i>	WL, WM	
	Ruddy Duck	<i>Oxyura jamaicensis</i>	WL	
	Rusty Blackbird	<i>Euphagus carolinus</i>	WF, WS, WP	
	Sandhill Crane	<i>Grus canadensis</i>	WM	
	Sedge Wren	<i>Cistothorus platensis (Cistothorus plantensis)</i>	WM	
	Short-eared Owl	<i>Asio flammeus</i>	WM	
	Willow Flycatcher	<i>Empidonax traillii</i>	WS	
	Yellow Rail	<i>Coturnicops noveboracensis</i>	WM	
	Yellow-throated Vireo	<i>Vireo flavifrons</i>	WF, WR	34
Fish (Inland, Marine)	American Eel	<i>Anguilla rostrata</i>	WL, WR	
Fish (Marine, Diadromous)	American Shad	<i>Alosa sapidissima</i>	WR	

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, Maine

Taxa	SGCN Species		Habitat	
Fish (Inland)	Arctic Charr	<i>Salvelinus alpinus oquassa</i>	WL	
Fish (Marine, Diadromous)	Atlantic Salmon	<i>Salmo salar</i>	WR	
Fish (Marine, Diadromous)	Atlantic Sturgeon	<i>Acipenser oxyrinchus (Acipenser oxyrinchus)</i>	WR	
Fish (Inland)	Brook Trout	<i>Salvelinus fontinalis</i>	WR, WL	
Fish (Inland)	Burbot (Cusk)	<i>Lota lota</i>	WL, WR	
Fish (Inland)	Lake Trout (Togue)	<i>Salvelinus namaycush</i>	WL	
Fish (Inland)	Lake Whitefish	<i>Coregonus clupeaformis (Coregonus clupeaformis)</i>	WL, WR	
Fish (Inland)	Landlocked Salmon	<i>Salmo salar</i>	WL, WR	
Fish (Inland)	Longnose Sucker	<i>Catostomus catostomus</i>	WL, WR	
Fish (Inland, Marine)	Rainbow Smelt	<i>Osmerus mordax</i>	WL, WR	
Fish (Inland)	Redfin Pickerel	<i>Esox americanus (Esox americanus americanus)</i>	WR	
Fish (Inland)	Round Whitefish	<i>Prosopium cylindraceum (Prosopium cylindraceus)</i>	WL, WR	
Fish (Marine, Diadromous)	Shortnose Sturgeon	<i>Acipenser brevirostrum (Acipenser brevirostrum)</i>	WR	
Fish (Marine, Diadromous)	Striped Bass	<i>Morone saxatilis (Morone saxatilis)</i>	WR	
Fish (Inland)	Swamp Darter	<i>Etheostoma fusiforme</i>	WL	17
Herpetofauna, Amphibian	Blue-spotted Salamander (complex)	<i>Ambystoma laterale x jeffersonianum</i>	WF, WS	1
Herpetofauna, Reptile	Blanding's Turtle	<i>Emydoidea blandingii (Emys blandingii)</i>	WL, WM, WF, WS, WR	
	Eastern Box Turtle	<i>Terrapene carolina (Terrapene c. carolina)</i>	WM, WF, WR	
	Spotted Turtle	<i>Clemmys guttata</i>	WL, WM, WF, WS, WR	
	Wood Turtle	<i>Glyptemys insculpta (previously called Clemmys insculpta)</i>	WF, WR, WS	4
Invertebrate, Caddisflies	A Caddisfly	<i>Hydroptila tomah</i>	WM, WR	
Invertebrate, Mayflies	A Mayfly	<i>Siphonurus demaryi</i>	WL	
Invertebrate, Mayflies	A Mayfly	<i>Siphonurus securifer</i>	WL	
Invertebrate, Mayflies	A Mayfly	<i>Baetisca rubescens</i>	WR	
Invertebrate, Mayflies	A Mayfly	<i>Nixe horrida</i>	WR	
Invertebrate, Mayflies	A Mayfly	<i>Nixe rusticalis</i>	WR	
Invertebrate, Mayflies	A Mayfly	<i>Plauditus veteris</i>	WR	
Invertebrate, Mayflies	A Mayfly	<i>Procloeon mendax</i>	WR	
Invertebrate, Mayflies	A Mayfly	<i>Procloeon ozburni</i>	WR	
Invertebrate, Mayflies	A Mayfly	<i>Procloeon simplex</i>	WR	
Invertebrate, Stoneflies	A Stonefly	<i>Neoperla mainensis</i>	WR	
Invertebrate, Damselflies & Dragonflies	Arrow Clubtail	<i>Stylurus spiniceps</i>	WR	
Invertebrate, Damselflies & Dragonflies	Arrowhead Spiketail	<i>Cordulegaster obliqua</i>	WR	
Invertebrate, Damselflies & Dragonflies	Big Bluet	<i>Enallagma durum</i>	WL, WR	
Invertebrate, Damselflies & Dragonflies	Boreal Snaketail	<i>Ophiogomphus colubrinus</i>	WR	
Invertebrate, Damselflies & Dragonflies	Canada Whiteface	<i>Leucorrhinia patricia</i>	WP	

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, Maine

Taxa	SGCN Species		Habitat	
Invertebrate, Damselflies & Dragonflies	Citrine Forktail	<i>Ischnura hastata</i>	WL, WM	
Invertebrate, Butterflies	Clayton's Copper	<i>Lycaena dorcas claytoni</i>	WS, WP	
Invertebrate, Damselflies & Dragonflies	Cobra Clubtail	<i>Gomphus vastus</i>	WR	
Invertebrate, Butterflies	Crowberry Blue	<i>Plebejus idas empetri</i>	WP	
Invertebrate, Damselflies & Dragonflies	Dusky Dancer	<i>Argia translata</i>	WR	
Invertebrate, Butterflies	Frigga Fritillary	<i>Boloria frigga</i>	WP	
Invertebrate, Moths	Graceful Clearwing	<i>Hemaris gracilis</i>	WP	
Invertebrate, Butterflies	Hessel's Hairstreak	<i>Callophrys hesseli</i>	WF, WP	
Invertebrate, Moths	Precious Underwing	<i>Catocala pretiosa pretiosa (Catocala p. pretiosa)</i>	WF	
Invertebrate, Damselflies & Dragonflies	Pygmy Snaketail	<i>Ophiogomphus howei</i>	WR	
Invertebrate, Damselflies & Dragonflies	Quebec Emerald	<i>Somatochlora brevicincta</i>	WP	
Invertebrate, Damselflies & Dragonflies	Rambur's Forktail	<i>Ischnura ramburii</i>	WL, WM	
Invertebrate, Damselflies & Dragonflies	Rapids Clubtail	<i>Gomphus quadricolor</i>	WR	
Invertebrate, Damselflies & Dragonflies	Ringed Boghaunter	<i>Williamsonia lintneri</i>	WF, WS	
Invertebrate, Mayflies	Roaring Brook Mayfly	<i>Epeorus frisoni</i>	WR	
Invertebrate, Damselflies & Dragonflies	Scarlet Blue	<i>Enallagma pictum</i>	WL	
Invertebrate, Damselflies & Dragonflies	Sedge Darner	<i>Aeshna juncea</i>	WM, WP	
Invertebrate, Damselflies & Dragonflies	Southern Pygmy Clubtail	<i>Lanthus vernalis</i>	WR	
Invertebrate, Damselflies & Dragonflies	Spatterdock Darner	<i>Rhionaeschna mutata</i>	WL, WM	
Invertebrate, Damselflies & Dragonflies	Swamp Darner	<i>Epiaeschna heros</i>	WF, WS	
Invertebrate, Mayflies	Tomah Mayfly	<i>Siphonisca aerodromia</i>	WM, WR	
Invertebrate, Damselflies & Dragonflies	Tule Blue	<i>Enallagma carunculatum</i>	WL, WR	38
Invertebrate, Snails	A Spire Snail	<i>Amnicola decisis</i>	WL, WR	
	Bigmouth Pondsnaail	<i>Stagnicola mighelsi</i>	WL, WM, WP	
	Deep-throat Vertigo	<i>Vertigo nylanderi</i>	WF, WS, WP	
	Great Lakes Physa	<i>Physella magnalacustris</i>	WL	
	Mystery Vertigo	<i>Vertigo paradoxa</i>	WF	
	Pleistocene Catinella	<i>Catinella exile</i>	WF, WP	
	Six-whorl Vertigo	<i>Vertigo morsei</i>	WP	7
Invertebrate, Freshwater Mussels	Brook Floater	<i>Alasmidonta varicosa</i>	WR	
	Tidewater Mucket	<i>Leptodea ochracea</i>	WL, WR	
	Yellow Lampmussel	<i>Lampsilis cariosa</i>	WL, WR	3
				104

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, Massachusetts

Total	Taxa	Common Name (Latin Name)
28	Fish	American Brook Lamprey (<i>Lampetra appendix</i>)
		Shortnose Sturgeon (<i>Acipenser brevirostrum</i> (<i>Acipenser brevirostrum</i>))
		Atlantic Sturgeon (<i>Acipenser oxyrinchus</i> (<i>Acipenser oxyrinchus</i>))
		Lake Chub (<i>Couesius plumbeus</i>)
		Eastern Silvery Minnow (<i>Hybognathus regius</i>)
		Bridle Shiner (<i>Notropis bifrenatus</i>)
		Northern Redbelly Dace (<i>Phoxinus eos</i>)
		Longnose Sucker (<i>Catostomus catostomus</i>)
		Burbot (<i>Lota lota</i>)
		Threespine Stickleback (<i>Gasterosteus aculeatus</i>)
		Blueback Herring (<i>Alosa aestivalis</i>)
		Alewife (<i>Alosa pseudoharengus</i>)
		American Shad (<i>Alosa sapidissima</i>)
		American Eel (<i>Anguilla rostrata</i>)
		White Sucker (<i>Catostomus commersoni</i>)
		Slimy Sculpin (<i>Cottus cognatus</i>)
		Banded Sunfish (<i>Enneacanthus obesus</i>)
		Creek Chubsucker (<i>Erimyzon oblongus</i>)
		Swamp Darter (<i>Etheostoma fusiforme</i>)
		Tessellated Darter (<i>Etheostoma olmstedii</i>)
		Common Shiner (<i>Luxilus cornutus</i> (<i>Luxilus comutus</i>))
		Sea Lamprey (<i>Petromyzon marinus</i>)
		Blacknose Dace (<i>Rhinichthys atratulus</i>)
		Longnose Dace (<i>Rhinichthys cataractae</i>)
		Atlantic Salmon (<i>Salmo salar</i>)
		Brook Trout (<i>Salvelinus fontinalis</i>)
		Creek Chub (<i>Semotilus atromaculatus</i>)
		Fallfish (<i>Semotilus corporalis</i>)
7	Amphibians	Northern Leopard Frog (<i>Rana pipiens</i>)
		Jefferson Salamander (<i>Ambystoma jeffersonianum</i>)
		Blue-Spotted Salamander (<i>Ambystoma laterale</i>)
		Marbled Salamander (<i>Ambystoma opacum</i>)
		Spring Salamander (<i>Gyrinophilus porphyriticus</i>)
		Four-Toed Salamander (<i>Hemidactylium scutatum</i>)
		Eastern Spadefoot (<i>Scaphiopus holbrookii</i>)
6	Reptiles	Spotted Turtle (<i>Clemmys guttata</i>)
		Wood Turtle (<i>Glyptemys insculpta</i> (previously called <i>Clemmys insculpta</i>))
		Bog Turtle (<i>Clemmys muhlenbergii</i>)
		Blanding's Turtle (<i>Emydoidea blandingii</i> (<i>Emys blandingii</i>))
		Northern Red-Bellied Cooter (<i>Pseudemys rubriventris pop. 1</i>)
		Eastern Ribbon Snake (<i>Thamnophis sauritus</i> (<i>Thamnophis sauritus sauritus</i>))
2	sponges	Smooth Branched Sponge (<i>Spongilla aspinosa</i>)
		Mount Everett Pond Sponge (<i>Corvomeyenia everetti</i>)
1	flatworms	Sunderland Spring Planarian (<i>Polycelis remota</i>)
1	segmented worm	New England Medicinal Leech (<i>Macrobdella sestertia</i>)
3	Insect	A Stonefly (<i>Alloperla voinae</i>)
		Hanson's Appalachian Stonefly (<i>Hansonoperla appalachia</i>)
		A Stonefly (<i>Perlesta nitida</i>)
5	Snail	Walker's Limpet (<i>Ferrissia walkeri</i>)
		Pilsbry's Spire Snail (<i>Pyrgulopsis lustrica</i>)
		Boreal Turret Snail (<i>Valvata sincera</i>)
		Olive Vertigo (<i>Vertigo perryi</i>)
		Vernal Physa (<i>Physa vernalis</i>)
7	Freshwater mussels	Dwarf Wedgemussel (<i>Alasmidonta heterodon</i>)
		Triangle Floater (<i>Alasmidonta undulata</i>)
		Brook Floater (<i>Alasmidonta varicosa</i>)
		Yellow Lampmussel (<i>Lampsilis cariosa</i>)
		Tidewater Mucket (<i>Leptodea ochracea</i>)
		Eastern Pondmussel (<i>Ligumia nasuta</i>)
		Creeper (<i>Strophitus undulatus</i> (<i>Strophitus undulates</i>))
Crustaceans	Appalachian Brook Crayfish (<i>Cambarus bartonii</i> (<i>Camburus bartonii</i>))	
	Northern Spring Amphipod (<i>Gammarus pseudolimnaeus</i>)	

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, Massachusetts

Total	Taxa	Common Name (Latin Name)
5	Invertebrates	Taconic Cave Amphipod (<i>Stygobromus borealis</i>) Piedmont Groundwater Amphipod (<i>Stygobromus tenuis tenuis</i> (<i>Stygobromus tenuis</i>)) Coastal Swamp Amphipod (<i>Synurella chamberlaini</i>)
		Dragonflies Spatterdock Darner (<i>Aeshna mutata</i> (<i>Aeshna mutata</i>)) Subarctic Darner (<i>Aeshna subarctica</i>) Comet Darner (<i>Anax longipes</i>) Ocellated Darner (<i>Boyeria grafiana</i>) Spine-Crowned Clubtail (<i>Gomphus abbreviatus</i>) Harpoon Clubtail (<i>Gomphus descriptus</i>) Midland Clubtail (<i>Gomphus fraternus</i>) Rapids Clubtail (<i>Gomphus quadricolor</i>) Cobra Clubtail (<i>Gomphus vastus</i>) Skillet Clubtail (<i>Gomphus ventricosus</i>) Umbur Shadowdragon (<i>Neurocordulia obsoleta</i>) Stygian Shadowdragon (<i>Neurocordulia yamaskanensis</i>) Brook Snaketail (<i>Ophiogomphus aspersus</i>) Riffle Snaketail (<i>Ophiogomphus carolus</i>) Ski-Tailed Emerald (<i>Somatochlora elongata</i>) Forcipate Emerald (<i>Somatochlora forcipata</i>) Coppery Emerald (<i>Somatochlora georgiana</i>) Incurvate Emerald (<i>Somatochlora incurvata</i>) Kennedy's Emerald (<i>Somatochlora kennedyi</i> (<i>Somatochlora kennedyis</i>)) Mocha Emerald (<i>Somatochlora linearis</i>) Riverine Clubtail (<i>Stylurus amnicola</i>) Zebra Clubtail (<i>Stylurus scudderi</i>) Arrow Clubtail (<i>Stylurus spiniceps</i>) Ebony Boghaunter (<i>Williamsonia fletcheri</i>) Ringed Boghaunter (<i>Williamsonia lintneri</i>)
		Damselflies Tule Bluet (<i>Enallagma carunculatum</i>) Attenuated Bluet (<i>Enallagma daeckii</i>) New England Bluet (<i>Enallagma laterale</i>) Scarlet Bluet (<i>Enallagma pictum</i>) Pine Barrens Bluet (<i>Enallagma recurvatum</i>) Little Bluet (<i>Enallagma minusculum</i>)
		Beetles Twelve-Spotted Tiger Beetle (<i>Cicindela duodecimguttata</i>) Cobblestone Tiger Beetle (<i>Cicindela marginipennis</i>) Puritan Tiger Beetle (<i>Cicindela puritana</i>) Sylvan Hygrotus Diving Beetle (<i>Hygrotus sylvanus</i>)
		Butterflies and Moths Drunk Apamea Moth (<i>Apamea inebriata</i>) Coastal Plain Apamea Moth (<i>Apamea mixta</i>) Straight Lined Mallow Moth (<i>Bagisara rectifascia</i>) Hessel's Hairstreak (<i>Callophrys hesseli</i>) Bog Elfin (<i>Callophrys lanoraieensis</i>) Precious Underwing Moth (<i>Catocala pretiosa pretiosa</i> (<i>Catocala p. pretiosa</i>)) Chain Dot Geometer (<i>Cingilia catenaria</i>) Dion Skipper (<i>Euphyes dion</i>) Slender Clearwing Sphinx Moth (<i>Hemaris gracilis</i>) Pale Green Pinion Moth (<i>Lithophane viridipallens</i>) Coastal Swamp Metarranthis (<i>Metarranthis pilosaria</i>) Northern Brocade Moth (<i>Neoligia semicana</i>) Pitcher Plant Borer (<i>Papaipema appassionata</i>) Chain Fern Borer (<i>Papaipema stenocelis</i>) Water-Willow Stem Borer (<i>Papaipema sulphurata</i>) Eastern Veined White (<i>Pieris oleracea</i>) Spartina Borer (<i>Spartiniphaga inops</i>) Two-striped Cord Grass Moth (<i>Macrochilo bivittata</i>)
18		Common Loon (<i>Gavia immer</i>) Pied-Billed Grebe (<i>Podilymbus podiceps</i>) American Bittern (<i>Botaurus lentiginosus</i> (<i>Botaurus lentiginosus</i>)) Least Bittern (<i>Ixobrychus exilis</i>) Bald Eagle (<i>Haliaeetus leucocephalus</i> (<i>Haliaeetus leucocephalus</i>)) Northern Harrier (<i>Circus cyaneus</i>)

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, Massachusetts

Total	Taxa	Common Name (Latin Name)
19	Birds	King Rail (<i>Rallus elegans</i>)
		Common Moorhen (<i>Gallinula chloropus</i>)
		Sedge Wren (<i>Cistothorus platensis</i> (<i>Cistothorus plantensis</i>))
		Northern Parula (<i>Parula americana</i>)
		Henslow's Sparrow (<i>Ammodramus henslowii</i>)
		American Black Duck (<i>Anas rubripes</i>)
		Broad-Winged Hawk (<i>Buteo platypterus</i>)
		Green Heron (<i>Butorides virescens</i>)
		Sora (<i>Porzana carolina</i>)
		American Woodcock (<i>Scolopax minor</i>)
		Louisiana Waterthrush (<i>Seiurus motacilla</i>)
		Canada Warbler (<i>Wilsonia canadensis</i>)
		White-throated Sparrow (<i>Zonotrichia albicollis</i>)
4	Mammals	Water Shrew (<i>Sorex palustris</i>)
		Indiana Myotis (Historic in MA) (<i>Myotis sodalis</i>)
		Eastern Small-footed Bat (<i>Myotis leibii</i>)
141	Total	Southern Bog Lemming (<i>Synaptomys cooperi</i>)

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, New Hampshire

		Habitat Key			
		Watershed Groupings	Medium and Small-Scale Habitats		
		1. Connecticut River Mainstem Watersheds	20. Floodplain Forests		
		2. Southern Upland Watersheds	21. Marsh and Shrub Wetlands		
		3. Northern Upland Watersheds	22. Peatlands		
		4. Montane Watersheds			
		5. Coastal Transitional Watersheds			
		6. Non-Tidal Coastal Watersheds			
		7. Tidal Coastal Watersheds			
	Taxa	Common Name	(Latin Name)	State Rank	Habitat
Invertebrates	Freshwater molluscs	Brook floater	<i>Alasmidonta varicosa</i>	E, RC	2,5,6,7
		3 Dwarf wedgemussel	<i>Alasmidonta heterodon</i>	E, FE	1,2,3
		Eastern pondmussel	<i>Ligumia nasuta</i>	RC	1,2,6,7
	Insects	Cobblestone tiger beetle	<i>Cicindela marginipennis</i>	T	1
		2 Ringed boghaunter	<i>Williamsonia lintneri</i>	E	21,22
Vertebrates	Fish	Alewife	<i>Alosa pseudoharengus</i>		6,7
		24 American brook lamprey	<i>Lampetra appendix</i>	RC	6,7
		American eel	<i>Anguilla rostrata</i>		1,3,5,6,7
		American shad	<i>Alosa sapidissima</i>		1,6,7
		Atlantic salmon	<i>Salmo salar</i>		1,2,3,4,5,6,7
		Atlantic sturgeon	<i>Acipenser oxyrinchus (Acipenser oxyrhynchus)</i>	RC	6,7
		Banded sunfish	<i>Enneacanthus obesus</i>	RC	2,5,6,7
		Blueback herring	<i>Pomolobus aestivalis</i>		1,6,7
		Bridle shiner	<i>Notropis bifrenatus</i>	RC	5,6,7
		Burbot	<i>Lota lota</i>		1,2,3,4,5,6,7
		Eastern brook trout	<i>Salvelinus fontinalis</i>		1,2,3,4,5,6,7
		Finescale dace	<i>Phoxinus neogaeus</i>		3
		Lake trout	<i>Salvelinus namaycush</i>		2,3,5
		Lake whitefish	<i>Coregonus clupeaformis (Coregonus clupeaforms)</i>		3,5
		Northern redbelly dace	<i>Phoxinus eos</i>		2,3
		Rainbow smelt	<i>Osmerus mordax</i>		2,3,4,5,6,7
		Redfin pickerel	<i>Esox americanus (Esox americanus americanus)</i>		6,7
		Round whitefish	<i>Prosopium cylindraceum (Prosopium cylindraceus)</i>	RC	2,3,5
		Sea lamprey	<i>Petromyzon marinus</i>		1,5,6,7
		Shortnose sturgeon	<i>Acipenser brevirostrum (Acipenser brevirostrum)</i>	E, FE	6,7
		Slimy sculpin	<i>Cottus cognatus</i>		1,2,3,4,5,6
		Sunapee trout	<i>Salvelinus aureolus</i>	E	2,5
		Swamp darter	<i>Etheostoma fusiforme</i>		5,6,7
Tessellated darter	<i>Etheostoma olmstedii</i>		1,2,3,5,6		
	Amphibians	Blue-spotted salamander	<i>Ambystoma laterale</i>	RC	21,26
		6 Fowler's toad	<i>Bufo fowleri (Bufo woodhousii fowleri) formerly Bufo woodhousii fowleri</i>	SC	21,23
		Jefferson salamander	<i>Ambystoma jeffersonianum</i>	SC, RC	20,21,26
		Marbled salamander	<i>Ambystoma opacum</i>	E	26
		Mink frog	<i>Rana septentrionalis</i>		3,4,20,21,22
		Northern leopard frog	<i>Rana pipiens</i>	SC, RC	1,3,4,5,7,14,20,21
	Reptiles	Black racer	<i>Coluber constrictor constrictor</i>		8,12,14,15,23,24
		6 Blanding's turtle	<i>Emydoidea blandingii (Emys blandingii)</i>	SC, RC	5,6,7,8,12,14,20,21,22,26
		Ribbon snake	<i>Thamnophis sauritus (Thamnophis sauritus sauritus)</i>	RC	8,11,12,20,21,22,26
		Spotted turtle	<i>Clemmys guttata</i>	SC, RC	2,5,6,7,8,11,12,20,21,22,26
		Smooth green snake	<i>Opheodrys vernalis</i>	SC	8,11,12,14,15,21,23

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, New Hampshire

	Taxa	Common Name	(Latin Name)	State Rank	Habitat
		Wood turtle	<i>Glyptemys insculpta</i> (previously called <i>Clemmys insculpta</i>)	SC, RC	1,2,3,4,5,6,7,8,10,11,12,14,15,20
	Birds	American bittern	<i>Botaurus lentiginosus</i> (<i>Botaurus lentiginosus</i>)	RC	14,15,21
	23	American black duck	<i>Anas rubripes</i>		21,15
		American woodcock	<i>Scolopax minor</i>		8,11,12,14,15,20,21
		Bald eagle	<i>Haliaeetus leucocephalus</i> (<i>Haliaeetus leucophalus</i>)	E, FT	1,2,3,5,6,7,8,10,11,12
		Canada warbler	<i>Wilsonia canadensis</i>	RC	8,11,12,20
		Cerulean warbler	<i>Dendroica cerulea</i>	RC	8,12,20
		Common loon	<i>Gavia immer</i>	T	1,2,3,5,6,7
		Cooper's hawk	<i>Accipiter cooperii</i>	T	8,10,11,12,20
		Common moorhen	<i>Gallinula chloropus</i>		21
		Eastern towhee	<i>Pipilo erythrophthalmus</i> (<i>Pipilo erythrophthalmus</i>)		8,12,15,22,23
		Golden-winged warbler	<i>Vermivora chrysoptera</i>	SC, RC	15,21
		Great blue heron	<i>Ardea herodias</i>		21,25
		Least bittern	<i>Ixobrychus exilis</i>	SC	21
		Northern harrier	<i>Circus cyaneus</i>	E, RC	14,15,21,25
		Osprey	<i>Pandion haliaetus</i>	T	1,2,3,5,6,7,21
		Palm warbler	<i>Dendroica palmarum</i>		10,22
		Pied-billed grebe	<i>Podilymbus podiceps</i>	E, RC	21
		Red shouldered hawk	<i>Buteo lineatus</i>	SC	12,20,21
		Rusty blackbird	<i>Euphagus carolinus</i>	SC	10,21,22
		Sedge wren	<i>Cistothorus platensis</i> (<i>Cistothorus plantensis</i>)	E, RC	21
		Spruce grouse	<i>Falcipecten canadensis</i>		9,10,22
		Veery	<i>Catharus fuscescens</i>		8,11,12,20
		Wood thrush	<i>Hylocichla mustelina</i>		8,11,12,20
	Mammals	Eastern red bat	<i>Lasiurus borealis</i>	SC, RC	8,11,12,20,21
	5	New England cottontail	<i>Sylvilagus transitionalis</i>	SC, RC	8,12,15,21,23
		Northern bog lemming	<i>Synaptomys borealis sphagnicola</i> (<i>Synaptomys borealis</i>)	SC, RC	10,22
		Northern myotis (long-eared bat)	<i>Myotis septentrionalis</i>		8,11,12,16
		Silver-haired bat	<i>Lasionycteris noctivagans</i>	SC, RC	8,11,12,20,21
	Total		69		

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, New Jersey

All NJ SGCN species		Habitat Key:																														
		Atlantic Coastal Landscape					Piedmont Landscape					Skylands Landscape																				
		Atlantic Coastal Cape May (CM)					Northern Piedmont Plains (NP)					Upper Delaware River Valley and Kittatinny Ridge (UD)																				
		Atlantic City Area (AC)					Raritan Bay and North Atlantic Coast (RB)					Kittatinny Valley (or Great Valley) (KV)																				
		Barnegat Bay-Little Egg Harbor (BL)					Central Piedmont Plains (CP)					Northern Highlands (NH)																				
		Northern Atlantic Coastal (NA)					Southern Piedmont Plains (SP)					Delaware and Musconetcong River Valleys (DM)																				
		The Atlantic Ocean (AO)										Central Highlands (CH)																				
												Urban Highlands (UH)																				
		Delaware Bay Landscape					Pinelands Landscape					Southern Highlands (SH)																				
		Cohansey River (CR)					Southern Pinelands (SP)																									
		Maurice River Watershed (MR)					Western Pinelands (WP)																									
		Tuckahoe River Watershed (TR)					Mullica River Watershed (MR)																									
		Delaware Bay Shoreline (DB)					Northern Pinelands (MP)																									
		Cape May Peninsula (CM)																														
		Habitat Landscape																														
							Atlantic Coastal					Delaware Bay					Piedmont Plains					Pinelands					Skylands					
		EW	FW	F	G	B	CM	AC	BL	NA	AO	CR	MR	TR	DB	CM	NP	RB	CP	SP	WP	MR	MP	UD	KV	NH	DM	CH	UH	SH	Freshwater aquatic (including wetland)?	
Mammals	Indiana bat (<i>Myotis sodalis</i>)						F																								yes	
16	Bobcat (<i>Lynx rufus</i>)																														yes	
	Eastern red bat (<i>Lasiurus borealis</i>)											F																			yes	
	Eastern smallfooted myotis (<i>Myotis leibii</i>)																														yes	
	Hoary bat (<i>Lasiurus cinereus</i>)																														yes	
	Long-tailed (Rock) shrew (<i>Sorex dispar</i>)																														yes	
	Marsh rice rat (<i>Oryzomys palustris</i>)																														yes	
	River otter (<i>Lutra canadensis</i>)																														yes	
	Silver-haired bat (<i>Lasionycteris noctivagans</i>)																														yes	
	Southern bog lemming (<i>Synaptomys cooperi</i>)																														yes	
	Allegheny woodrat (<i>Neotoma floridana magister</i>)																														no	
	Blue whale (<i>Balaneoptera musculus</i>)																														no	
	Fin whale (<i>Balaneoptera physalus</i>)																														no	
	Humpback whale (<i>Megaptera novaeangliae</i>)																														no	
	North Atlantic Right whale (<i>Balaena glacialis</i>)																														no	
	Sei whale (<i>Balaneoptera borealis</i>)																														no	
	Sperm whale (<i>Physeter macrocephalus</i>)																														no	
																															10	
Birds	Nelson's sharp-tailed sparrow						W	W	W																						not on SGCN list	
142	Acadian flycatcher (<i>Empidonax vireescens</i>)																														yes	
	American bittern (<i>Botaurus lentiginosus</i> (<i>Botaurus lentiginosus</i>))						W																								yes	
	American black duck (<i>Anas rubripes</i>)																														yes	
	American goldenplover (<i>Pluvialis dominica</i>)																														yes	
	American oystercatcher (<i>Haematopus palliatus</i>)																														yes	
	American woodcock (<i>Scolopax minor</i>)																														yes	
	Atlantic brant (<i>Branta bernicla</i>)																														yes	
	Bald eagle (<i>Haliaeetus leucocephalus</i> (<i>Haliaeetus leucophalus</i>))																														yes	
	Barred owl (<i>Strix varia</i>)																														yes	
	Black rail (<i>Laterallus jamaicensis</i>)																														yes	
	Black scoter (<i>Melanitta nigra</i>)																														yes	
	Black skimmer (<i>Rynchops niger</i>)																														yes	
	Black-and-white warbler (<i>Mniotilta varia</i>)																														yes	
	Black-billed cuckoo (<i>Coccyzus erythrophthalmus</i>)																														yes	
	Blackburnian warbler (<i>Dendroica fusca</i>)																														yes	
	Black-crowned night-heron (<i>Nycticorax nycticorax</i>)																														yes	
	Black-throated blue warbler (<i>Dendroica caerulescens</i>)																														yes	
	Black-throated green warbler (<i>Dendroica virens</i>)																														yes	
	Blue-headed vireo (solitary vireo) (<i>Vireo solitarius</i>)																														yes	
	Blue-winged warbler (<i>Vermivora pinus</i>)																														yes	

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, New Jersey

Taxa	Common Name (Latin Name)	EW	FW	F	G	B	Atlantic Coastal						Delaware Bay				Piedmont Plains				Pinelands			Skylands					Freshwater aquatic (including wetland)?							
							CM	CO	BC	BL	NA	AO	OK	MR	TR	DB	CM	NP	RB	CP	SP	SP	WP	MR	MP	UD	KV	NH		DM	CH	UH	SH			
	Brown thrasher (<i>Toxostoma rufum</i>)																																			yes
	Bufflehead (<i>Bucephala albeola</i>)																																			yes
	Canada geese (Atlantic population, migrants) (<i>Branta Canadensis interior</i>)																																			yes
	Canada warbler (<i>Wilsonia canadensis</i>)																																			yes
	Canvasback (<i>Aythya valisineria</i>)																																			yes
	Caspian Tern (<i>Sterna caspia</i>)																																			yes
	Cattle egret (<i>Bubulcus ibis</i>)																																			yes
	Cerulean warbler (<i>Dendroica cerulea</i>)																																			yes
	Chimney swift (<i>Chaetura pelagica</i>)																																			yes
	Chuck-will'swidow (<i>Caprimulgus carolinensis</i>)																																			yes
	Clapper rail (<i>Rallus longirostris</i>)																																			yes
	Cliff swallow (<i>Petrochelidon pyrrhonota</i>)																																			yes
	Common Eider (<i>Somateria mollissima</i>)																																			yes
	Common tern (<i>Sterna hirundo</i>)																																			yes
	Cooper's hawk (<i>Accipiter cooperii</i>)																																			yes
	Eastern screech-owl (<i>Otus asio</i>)																																			yes
	Eastern towhee (<i>Pipilo erythrophthalmus</i> (<i>Pipilo erythrophthalmus</i>))																																			yes
	Forster's tern (<i>Sterna forsteri</i>)																																			yes
	Glossy ibis (<i>Plegadis falcinellus</i>)																																			yes
	Gray catbird (<i>Dumetella carolinensis</i>)																																			yes
	Gray-cheeked thrush (<i>Catharus minimus</i>)																																			yes
	Great blue heron (<i>Ardea herodias</i>)																																			yes
	Great crested flycatcher (<i>Myiarchus crinitus</i>)																																			yes
	Great egret (<i>Ardea alba</i>)																																			yes
	Greater scaup (<i>Aythya marila</i>)																																			yes
	Greater yellowlegs (<i>Tringa melanoleuca</i>)																																			yes
	Green heron (<i>Butorides virescens</i>)																																			yes
	Gull-billed tern (<i>Sterna nilotica</i>)																																			yes
	Harlequin Duck (<i>Histrionicus histrionicus</i>)																																			yes
	Henslow's sparrow (<i>Ammodramus henslowii</i>)																																			yes
	Hooded warbler (<i>Wilsonia citrina</i>)																																			yes
	Horned grebe (<i>Podiceps auritus</i>)																																			yes
	Hudsonian Godwit (<i>Limosa haemastica</i>)																																			yes
	Indigo bunting (<i>Passerina cyanea</i>)																																			yes
	Kentucky warbler (<i>Oporornis formosus</i>)																																			yes
	King rail (<i>Rallus elegans</i>)																																			yes
	Least bittern (<i>Ixobrychus exilis</i>)																																			yes
	Least flycatcher (<i>Empidonax minimus</i>)																																			yes
	Least tern (<i>Sterna antillarum</i>)																																			yes
	Lesser scaup (<i>Aythya affinis</i>)																																			yes
	Little blue heron (<i>Egretta caerulea</i>)																																			yes
	Long-tailed duck (<i>Clangula hyemalis</i>)																																			yes
	Louisiana waterthrush (<i>Seiurus motacilla</i>)																																			yes
	Marbled Godwit (<i>Limosa fedoa</i>)																																			yes
	Marsh wren (<i>Cistothorus palustris</i>)																																			yes
	Northern flicker (<i>Colaptes auratus</i>)																																			yes
	Northern gannet (<i>Morus bassanus</i>)																																			yes
	Northern goshawk (<i>Accipiter gentilis</i>)																																			yes
	Northern harrier (<i>Circus cyaneus</i>)																																			yes
	Northern parula (<i>Parula Americana</i>)																																			yes
	Northern pintail (<i>Anas acuta</i>)																																			yes
	Osprey (<i>Pandion haliaetus</i>)																																			yes
	Peregrine falcon (<i>Falco peregrinus</i>)																																			yes
	Pied-billed grebe (<i>Podilymbus podiceps</i>)																																			yes
	Pine warbler (<i>Dendroica pinus</i>)																																			yes

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, New Jersey

Taxa	Common Name (Latin Name)	EW	FW	F	G	B	Atlantic Coastal						Delaware Bay				Piedmont Plains				Pinelands			Skylands					Freshwater aquatic (including wetland)?						
							CM	AC	BG	BL	NA	AO	OK	MR	TR	DB	CM	NP	RB	CP	SP	SP	WP	MR	MP	UD	KV	NH		DM	CH	UH	SH		
	Prairie warbler (<i>Dendroica discolor</i>)																																	yes	
	Prothonotary warbler (<i>Protonotaria citrea</i>)																																	yes	
	Purple finch (<i>Carpodacus purpureus</i>)																																	yes	
	Red knot (<i>Calidris canutus</i>)																																	yes	
	Red-shouldered hawk (<i>Buteo lineatus</i>)																																	yes	
	Red-throated loon (<i>Gavia stellata</i>)																																	yes	
	Roseate Tern (<i>Sterna dougallii</i>)																																	yes	
	Rose-breasted grosbeak (<i>Pheucticus ludovicianus</i>)																																	yes	
	Ruddy turnstone (<i>Arenaria interpres</i>)																																	yes	
	Ruffed grouse (<i>Bonasa umbellus</i>)																																		yes
	Saltmarsh sharp-tailed sparrow (<i>Ammodramus caudacutus</i>)																																	yes	
	Scarlet tanager (<i>Piranga olivacea</i>)																																	yes	
	Seaside sparrow (<i>Ammodramus maritimus</i>)																																	yes	
	Sedge wren (<i>Cistothorus platensis</i> (<i>Cistothorus plantensis</i>))																																	yes	
	Semipalmated sandpiper (<i>Calidris pusilla</i>)																																	yes	
	Sharp-shinned hawk (<i>Accipiter striatus</i>)																																	yes	
	Short-eared owl (<i>Asio flammeus</i>)																																	yes	
	Snowy egret (<i>Egretta thula</i>)																																	yes	
	Sora rail (<i>Porzana carolina</i>)																																	yes	
	Spotted sandpiper (<i>Actitis macularia</i>)																																	yes	
	Summer tanager (<i>Piranga rubra</i>)																																	yes	
	Surf scoter (<i>Melanitta perspicillata</i>)																																	yes	
	Tricolored heron (<i>Egretta tricolor</i>)																																	yes	
	Veery (<i>Catharus fuscescens</i>)																																	yes	
	Virginia rail (<i>Rallus limicola</i>)																																	yes	
	Whimbrel (<i>Numenius phaeopus</i>)																																	yes	
	Whip-poor-will (<i>Caprimulgus vociferus</i>)																																	yes	
	White-winged scoter (<i>Melanitta fusca</i>)																																	yes	
	Willet (<i>Catoptrophorus semipalmatus</i>)																																	yes	
	Willow flycatcher (<i>Empidonax traillii</i>)																																	yes	
	Winter wren (<i>Troglodytes troglodytes</i>)																																	yes	
	Wood duck (<i>Aix sponsa</i>)																																	yes	
	Wood thrush (<i>Hylocichla mustelina</i>)																																	yes	
	Worm-eating warbler (<i>Helmitheros vermivorus</i>)																																	yes	
	Yellow-bellied sapsucker (<i>Sphyrapicus varius</i>)																																	yes	
	Yellow-billed cuckoo (<i>Coccyzus americanus</i>)																																	yes	
	Yellow-breasted chat (<i>Icteria virens</i>)																																	yes	
	Yellow-crowned night-heron (<i>Nyctanassa violacea</i> (<i>Nyctanassa violaceus</i>))																																	yes	
	Yellow-throated vireo (<i>Vireo flavifrons</i>)																																	yes	
	Yellow-throated warbler (<i>Dendroica dominica</i>)																																	yes	
	Arctic Tern																																	not on SGCN list	
	Carolina Chickadee																																	not on SGCN list	
	Common moorhen																																	not on SGCN list	
	Eastern Bluebird																																	not on SGCN list	
	Hairy Woodpecker																																	not on SGCN list	
	Hermit Thrush																																	not on SGCN list	
	Ipswich Sparrow																																	not on SGCN list	
	Northern Saw-whet owl																																	not on SGCN list	
	Red crossbill																																	not on SGCN list	
	Red-breasted nuthatch																																	not on SGCN list	
	Red-eyed vireo																																	not on SGCN list	
	White-eyed vireo																																	not on SGCN list	
	Wilson's Phalarope																																	not on SGCN list	
	Swainson's warbler (<i>Limnithlypis swainsonii</i>)																																	none listed	
	American kestrel (<i>Falco sparverius</i>)																																	no	

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, New Jersey

Taxa	Common Name (Latin Name)	EW	FW	F	G	B	Atlantic Coastal					Delaware Bay				Piedmont Plains			Pinelands			Skylands					Freshwater aquatic (including wetland)?										
							CM	AC	BG	BL	NA	AO	OK	MR	TR	DB	CM	NP	RB	CP	SP	SP	WP	MR	MP	UD			KV	NH	DM	CH	UH	SH			
	Baltimore oriole (<i>Icterus galbula</i>)																																			no	
	Black tern (<i>Chlidonias niger</i>)																																			no	
	Bobolink (<i>Dolichonyx oryzivorus</i>)																																			no	
	Broad-winged hawk (<i>Buteo platypterus</i>)																																			no	
	Common barn owl (<i>Tyto alba</i>)																																			no	
	Common nighthawk (<i>Chordeiles minor</i>)																																			no	
	Dickcissel (<i>Spiza americana</i>)																																			no	
	Eastern kingbird (<i>Tyrannus tyrannus</i>)																																			no	
	Eastern meadowlark (<i>Sturnella magna</i>)																																			no	
	Eastern woodpecker (<i>Contopus virens</i>)																																			no	
	Field sparrow (<i>Spizella pusilla</i>)																																			no	
	Golden-winged warbler (<i>Vermivora chrysoptera</i>)																																			no	
	Grasshopper sparrow (<i>Ammodramus savannarum</i>)																																			no	
	Greater shearwater (<i>Puffinus gravis</i>)																																			no	
	Horned lark (<i>Eremophila alpestris</i>)																																			no	
	Loggerhead shrike (<i>Lanius ludovicianus</i>)																																			no	
	Long-eared owl (<i>Asio otus</i>)																																			no	
	Northern bobwhite (<i>Colinus virginianus</i>)																																			no	
	Razorbill (<i>Alca torda</i>)																																			no	
	Red-headed woodpecker (<i>Melanerpes erythrocephalus</i>)																																			no	
	Sanderling (<i>Calidris alba</i>)																																			no	
	Savannah sparrow (<i>Passerculus sandwichensis</i>)																																			no	
	Upland sandpiper (<i>Batramia longicauda</i>)																																			no	
	Vesper sparrow (<i>Poocetes gramineus</i>)																																			no	116
Reptiles	Bog turtle (<i>Glyptemys mhlenbergii</i>)																																			yes	
17	Eastern kingsnake (<i>Lampropeltis getula getula</i>)																																			yes	
	Northern diamondback terrapin (<i>Malaclemys terrapin terrapin</i>)																																			yes	
	Queen snake* (<i>Regina septemvittata</i>)																																			yes	
	Spotted turtle (<i>Clemmys guttata</i>)																																			yes	
	Timber rattlesnake (<i>Crotalus h. horridus</i>)																																			yes	
	Wood turtle (<i>Glyptemys insculpta</i> (previously called <i>Clemmys insculpta</i>))																																			yes	
	Coastal plain milk snake (<i>Lampropeltis triangulum triangulum</i> x <i>L. t. elapsoides</i>)																																			no	
	Corn snake (<i>Elaphe g. guttata</i>)																																			no	
	Eastern box turtle (<i>Terrapene carolina carolina</i>)																																			no	
	Green sea turtle (<i>Chelonia mydas</i>)																																			no	
	Hawksbill sea turtle (<i>Eretmochelys imbricata</i>)																																			no	
	Kemp's ridley sea turtle (<i>Lepidochelys kempi</i>)																																			no	
	Leatherback sea turtle (<i>Dermochelys coriacea</i>)																																			no	
	Loggerhead sea turtle (<i>Caretta caretta</i>)																																			no	
	Northern copperhead (<i>Agkistrodon contortrix mokasen</i>)																																			no	
	Northern pine snake (<i>Pituophis m. melanoleucus</i>)																																			no	7
Amphibian	Blue-spotted salamander (<i>Ambystoma laterale</i>)																																			yes	
11	Carpenter frog (<i>Rana virgatipes</i>)																																			yes	
	Cope's gray treefrog (<i>Hyla chrysocelis</i>)																																			yes	
	Eastern mud salamander (<i>Pseudotriton montanus</i>)																																			yes	
	Tiger Salamander (Eastern tiger salamander) (<i>Ambystoma tigrinum</i>)																																			yes	
	Fowler's toad (<i>Bufo fowleri</i> (<i>Bufo woodhousii fowleri</i>))																																			yes	
	Jefferson salamander (<i>Ambystoma jeffersonianum</i>)																																			yes	
	Longtail Salamander (Long-tailed salamander) (<i>Eurycea longicauda</i>)																																			yes	
	Marbled salamander (<i>Ambystoma opacum</i>)																																			yes	
	Northern spring salamander (<i>Gyrinophilus porphyriticus porphyriticus</i>)																																			yes	
	Pine Barrens treefrog (<i>Hyla andersonii</i>)																																			yes	11
Mollusks	Brook floater (<i>Alasmidonta varicosa</i>)																																			yes	
9	Creeper (<i>Strophitus undulatus</i> (<i>Strophitus undulatus</i>))																																			yes	
	Dwarf wedgemussel (<i>Alasmidonta heterodon</i>)																																			yes	

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, New Jersey

Taxa	Common Name (Latin Name)	EW	FW	F	G	B	Atlantic Coastal					Delaware Bay				Piedmont Plains			Pinelands			Skylands					Freshwater aquatic (including wetland)?									
							CM	AC	BG	BL	NA	AO	OK	MR	TR	DB	CM	NP	RB	CP	SP	SP	WP	MR	MP	UD		KV	NH	DM	CH	UH	SH			
	Eastern lampmussel (<i>Lampsilis radiata</i>)																																			yes
	Eastern pondmussel (<i>Ligumia nasuta</i>)																																			yes
	Green floater (<i>Lasmigona subviridis</i>)																																			yes
	Tidewater mucket (<i>Leptodea ochracea</i>)																																			yes
	Triangle floater (<i>Alasmidonta undulata</i>)																																			yes
	Yellow lampmussel (<i>Lampsilis cariosa</i>)																																			yes
Insects	Hoary elfin																																			9
67	Appalachian grizzled skipper* (<i>Pyrgus wyandot</i>)																																			yes ???
	Arogos skipper (<i>Atrytone arogos arogos</i>)																																			yes
	Bronze copper (<i>Lycaena hyllus</i>)																																			yes
	Checkered white (<i>Pontia protodice</i>)																																			yes
	Dotted skipper (<i>Hesperia attalus</i>)																																			yes
	Frosted elfin (<i>Callophrys irus</i>)																																			yes
	Harris's checkerspot (<i>Chlosyne harrisii</i>)																																			yes
	Hessel's hairstreak (<i>Callophrys hesseli</i>)																																			yes
	Mitchell's satyr** (<i>Neonympha m. mitchellii</i>)																																			yes
	Northern metalmark (<i>Calephelis borealis</i>)																																			yes
	Silver-bordered fritillary (<i>Bolaria selene myrina</i>)																																			yes
	Two-spotted skipper (Euphyes bimacula (Euphys bimacula))																																			yes
	Georgia Satyr																																			not on SGCN list
	American burying beetle** (<i>Nicrophorus mericanus</i>)																																			no
	Northeastern beach tiger beetle																																			no
	A geometrid moth (<i>Idaea violacearia</i>)																																			
	A geometrid moth (<i>Metarranthis lateritaria</i>)																																			
	A geometrid moth (<i>Metarranthis sp 1</i>)																																			
	A noctuid moth (<i>Apamea inebriata</i>)																																			
	A noctuid moth (<i>Apamea mixta</i>)																																			
	A noctuid moth (<i>Apharetra dentata</i>)																																			
	A noctuid moth (<i>Chytonix sensilis</i>)																																			
	A noctuid moth (<i>Cucullia alfarata</i>)																																			
	A noctuid moth (<i>Macrochilo louisiana</i>)																																			
	A noctuid moth (<i>Macrochilo santerivalis</i>)																																			
	A noctuid moth (<i>Macrochilo sp 1</i>)																																			
	A noctuid moth (<i>Meropleon cosmion</i>)																																			
	A noctuid moth (<i>Meropleon titan</i>)																																			
	A notodontid moth (<i>Heterocampa varia</i>)																																			
	A slugmoth (<i>Monoleuca semifascia</i>)																																			
	A spanworm (<i>Itame sp 1</i>)																																			
	Buchholz's gray (<i>Hypomecis buchholzaria</i>)																																			
	Carter's noctuid moth (<i>Spartiniphaga carterae</i>)																																			
	Catocala jair ssp 2																																			
	Chain fern borer moth (<i>Papaipema stenocelis</i>)																																			
	Clubtail dragonfly (<i>Gomphus septima</i>)																																			
	Daecke's pyralid moth (<i>Crambus daeckellus</i>)																																			
	Doll's merolonche (<i>Merolonche dollii</i>)																																			
	Eusarca fundaria																																			
	Extra-striped snaketail (<i>Ophiogomphus anomalus</i>)																																			
	Granitosa fern moth (<i>Callopietria granitosa</i>)																																			
	Green-faced clubtail (<i>Gomphus viridifrons</i>)																																			
	Half yellow moth (<i>Tarachidia semiflava</i>)																																			
	Herodias or Gerhard's underwing (<i>Catocala herodias gerhardi</i>)																																			
	Lemmer's pinion moth (<i>Lithophane lemmeri</i>)																																			
	Lytrosis sinuosa																																			
	Maritime sunflower borer (<i>Papaipema maritima</i>)																																			
	Nemoria saturiba																																			

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, New Jersey

Taxa	Common Name (Latin Name)	EW	FW	F	G	B	Atlantic Coastal					Delaware Bay				Piedmont Plains			Pinelands			Skylands					Freshwater aquatic (including wetland)?													
							CM	AC	BG	BL	NA	AO	OK	MR	TR	DB	CM	NP	RB	CP	SP	SP	WP	MR	MP	UD			KV	NH	DM	CH	UH	SH						
	New England bluet (<i>Enallagma laterale</i>)																																							
	Pero zalissaria																																							
	Pine Barrens bluet (<i>Enallagma recurvatum</i>)																																							
	Pine Barrens zale (<i>Zale sp 1</i>)																																							
	Pink streak (<i>Faronta rubripennis</i>)																																							
	Pitcher plant borer moth (<i>Papaipema appassionata</i>)																																							
	Placenticia tiger moth (<i>Grammia placenticia</i>)																																							
	Precious underwing (<i>Catocala pretiosa pretiosa</i>)																																							
	Rare skipper (<i>Problema bulenta</i>)																																							
	Regal moth (<i>Citheronia regalis</i>)																																							
	Richia sp 2																																							
	Ringed boghaunter (<i>Williamsonia lintreri</i>)																																							
	Rippled wave (<i>Idaea obfusaria</i>)																																							
	Scarlet bluet (<i>Enallagma pictum</i>)																																							
	Schweitzer's buckmoth (<i>Hemileuca sp 2</i>)																																							
	Simyra sp 1																																							
	Southern ptichodis (<i>Ptichodis bistrigata</i>)																																							
	The consort, or consors underwing (<i>Catocala consors sorsconi</i>)																																							
	Zanclognatha sp 1																																							13
Fish	American brook lamprey* (<i>Lampetra appendix</i>)																																						yes	
20	Atlantic sturgeon (<i>Acipenser oxyrinchus</i> (<i>Acipenser oxyrhynchus</i>))																																					yes		
	Banded sunfish* (<i>Enneacanthus obesus</i>)																																					yes		
	Black-banded sunfish (<i>Enneacanthus chatedon</i>)																																					yes		
	Bridle shiner (<i>Notropis bifrenatus</i>)																																					yes		
	Brook trout* (<i>Salvelinus fontinalis</i>)																																					yes		
	Brown trout* (<i>Salmo trutta</i>)																																					yes		
	Comely shiner (<i>Notropis amoenus</i>)																																					yes		
	Cutlips minnow (<i>Exoglossum maxillingua</i> (<i>Exoglossum magillingua</i>))																																					yes		
	Hickory shad (<i>Alosa mediocris</i>)																																					yes		
	Ironcolor shiner (<i>Notropis chalybaeus</i> (<i>Notropis chaleybaeus</i>))																																					yes		
	Longnose gar (<i>Lepisosteus osseus</i>)																																					yes		
	Margined madtom (<i>Noturus insignis</i>)																																					yes		
	Northern hogsucker (<i>Hypentelium nigricans</i>)																																					yes		
	Pirate perch (<i>Aphroderus sayanus</i>)																																					yes		
	Rainbow smelt (<i>Osmerus mordax</i>)																																					yes		
	Rainbow trout* (<i>Salmo gairdneri</i>)																																					yes		
	Shield darter (<i>Perca peltata</i>)																																					yes		
	Shortnose sturgeon (<i>Acipenser brevirostrum</i> (<i>Acipenser brevirostrum</i>))																																					yes		
	Slimy sculpin** (<i>Cottus cognatus</i>)																																					yes		
Total		297																																				186		

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, New York

	Common Name (Latin Name):	Species Group:
Bird	American bittern (<i>Botaurus lentiginosus</i> (<i>Botaurus lentiginosus</i>))	Freshwater marsh nesting birds
40	American black duck (<i>Anas rubripes</i>)	Breeding waterfowl
	Atlantic brant (<i>Branta bernicla</i>)	Wintering waterbirds
	Bald eagle (<i>Haliaeetus leucocephalus</i> (<i>Haliaeetus leucophalus</i>))	Bald Eagle
	Black scoter (<i>Melanitta nigra</i>)	Wintering waterbirds
	Black tern (<i>Chlidonias niger</i>)	Freshwater marsh nesting birds
	Black-crowned night-heron (<i>Nycticorax nycticorax</i>)	Colonial-nesting herons
	Blue-winged teal (<i>Anas discors</i>)	Breeding waterfowl
	Bonaparte's gull (<i>Larus philadelphia</i>)	Wintering waterbirds
	Cattle egret (<i>Bubulcus ibis</i>)	Colonial-nesting herons
	Common eider (<i>Somateria mollissima</i>)	Wintering waterbirds
	Common goldeneye (<i>Bucephala clangula</i>)	Breeding waterfowl
	Common loon (<i>Gavia immer</i>)	Common loon
	Cory's shearwater (<i>Calonectris diomedea</i>)	Wintering waterbirds
	Glossy ibis (<i>Plegadis falcinellus</i>)	Colonial-nesting herons
	Great egret (<i>Ardea alba</i>)	Colonial-nesting herons
	Greater scaup (<i>Aythya marila</i>)	Wintering waterbirds
	Greater shearwater (<i>Puffinus gravis</i>)	Wintering waterbirds
	Harlequin duck (<i>Histrionicus histrionicus</i>)	Wintering waterbirds
	Horned grebe (<i>Podiceps auritus</i>)	Wintering waterbirds
	King rail (<i>Rallus elegans</i>)	Freshwater marsh nesting birds
	Least bittern (<i>Ixobrychus exilis</i>)	Freshwater marsh nesting birds
	Lesser scaup (<i>Aythya affinis</i>)	Wintering waterbirds
	Little blue heron (<i>Egretta caerulea</i>)	Colonial-nesting herons
	Little gull (<i>Larus minutus</i>)	Wintering waterbirds
	Long-tailed duck (<i>Clangula hyemalis</i>)	Wintering waterbirds
	Northern pintail (<i>Anas acuta</i>)	Wintering waterbirds
	Osprey (<i>Pandion haliaetus</i>)	Osprey
	Pied-billed grebe (<i>Podilymbus podiceps</i>)	Freshwater marsh nesting birds
	Razorbill (<i>Alca torda</i>)	Wintering waterbirds
	Red-necked phalarope (<i>Phalaropus lobatus</i>)	Wintering waterbirds
	Red-throated loon (<i>Gavia stellata</i>)	Wintering waterbirds
	Ruddy duck (<i>Oxyura jamaicensis</i>)	Breeding waterfowl
	Snowy egret (<i>Egretta thula</i>)	Colonial-nesting herons
	Surf scoter (<i>Melanitta perspicillata</i>)	Wintering waterbirds
	Thayer's gull (<i>Larus thayeri</i>)	Wintering waterbirds
	Tricolored heron (<i>Egretta tricolor</i>)	Colonial-nesting herons
	White-winged scoter (<i>Melanitta fusca</i>)	Wintering waterbirds
	Yellow rail (<i>Coturnicops noveboracensis</i>)	Freshwater marsh nesting birds
	Yellow-crowned night-heron (<i>Nyctanassa violacea</i> (<i>Nyctanassa violacea</i>))	Colonial-nesting herons
Crustacea	Devil crawfish (<i>Cambarus diogenes</i>)	Freshwater crustacea
2	Piedmont groundwater amphipod (<i>Stygobromus tenuis tenuis</i> (<i>Stygobromus tenuis</i>))	Freshwater crustacea
Freshwater Fish	Atlantic salmon (<i>Salmo salar</i>)	Extirpated Fishes
40	Banded sunfish (<i>Enneacanthus obesus</i>)	Banded sunfish
	Bigeye chub (<i>Hybopsis amblops</i>)	Bigeye chub
	Black redbreast (<i>Moxostoma duquesnei</i>)	Black redbreast
	Blackchin shiner (<i>Notropis heterodon</i>)	Blackchin shiner
	Bloater (<i>Coregonus hoyi</i>)	Extirpated Fishes
	Bluebreast darter (<i>Etheostoma camurum</i>)	Bluebreast darter
	Brook trout, Heritage strains (<i>Salvelinus fontinalis</i>)	Brook trout, Heritage strains
	Comely shiner (<i>Notropis amoenus</i>)	Comely shiner
	Deepwater sculpin (<i>Myoxocephalus thompsoni</i>)	Deepwater sculpin
	Eastern sand darter (<i>Ammocrypta pellucida</i> (<i>Ammocrypta pellucidum</i>))	Eastern sand darter
	Gilt darter (<i>Percina evides</i>)	Extirpated Fishes
	Gravel chub (<i>Erimystax x-punctatus</i>)	Gravel chub
	Iowa darter (<i>Etheostoma exile</i>)	Iowa darter
	Ironcolor shiner (<i>Notropis chalybaeus</i> (<i>Notropis chalybaeus</i>))	Ironcolor shiner
	Kiyi (<i>Coregonus kiyi</i>)	Extirpated Fishes
	Lake chubsucker (<i>Erimyzon sucetta</i>)	Extirpated Fishes
	Lake sturgeon (<i>Acipenser fulvescens</i>)	Lake Sturgeon
	Longear sunfish (<i>Lepomis megalotis</i>)	Longear sunfish
	Longhead darter (<i>Percina macrocephala</i>)	Longhead darter
	Mooneye (<i>Hiodon tergisus</i>)	Mooneye
	Mountain brook lamprey (<i>Ichthyomyzon greeleyi</i>)	Mountain brook lamprey
	Mud sunfish (<i>Acantharchus pomotis</i>)	Extirpated Fishes
	N. American ninespine stickleback (<i>Pungitius pungitius occidentalis</i>)	Ninespine stickleback - inland
	Ohio lamprey (<i>Ichthyomyzon bdellium</i>)	Ohio lamprey
	Paddlefish (<i>Polyodon spathula</i>)	Extirpated Fishes

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, New York

	Common Name (Latin Name):	Species Group:
	Pugnose shiner (<i>Notropis anogenus</i>)	Pugnose shiner
	Redfin shiner (<i>Lythrurus umbratilis</i>)	Redfin shiner
	River redhorse (<i>Moxostoma carinatum</i>)	River redhorse
	Round whitefish (<i>Prosopium cylindraceum</i> (<i>Prosopium cylindraceus</i>))	Round whitefish
	Sauger (<i>Stizostedion canadense</i>)	Sauger
	Shortjaw cisco (<i>Coregonus zenithicus</i>)	Extirpated Fishes
	Shortnose cisco (<i>Coregonus reighardi</i>)	Extirpated Fishes
	Silver chub (<i>Macrhybopsis storeriana</i>)	Extirpated Fishes
	Spoonhead sculpin (<i>Cottus ricei</i>)	Extirpated Fishes
	Spotted darter (<i>Etheostoma maculatum</i>)	Spotted darter
	Streamline chub (<i>Erimystax dissimilis</i>)	Streamline chub
	Swallowtail shiner (<i>Notropis procne</i>)	Swallowtail shiner
	Swamp darter (<i>Etheostoma fusiforme</i>)	Swamp darter
	Western pirate perch (<i>Aphredoderus sayanus gibbosus</i>)	Western pirate perch
Herpetofauna	Blanding's turtle (<i>Emydoidea blandingii</i> (<i>Emys blandingii</i>))	Uncommon turtles of wetlands
27	Blue-spotted salamander (<i>Ambystoma laterale</i>)	Vernal pool salamanders
	Bog turtle (<i>Clemmys mühlenbergii</i>)	Uncommon turtles of wetlands
Reptiles	Coal skink (<i>Eumeces anthracinus</i>)	Lizards (shrub swamp, mineral soil wetland)
13	Common mudpuppy (<i>Necturus maculosus</i>)	Mudpuppy
Amphibians	Eastern massasauga (<i>Sistrurus c. catenatus</i> (<i>Sistrurus catenatus catenatus</i>))	Massasauga (shrub swamp, mineral soil wetland)
14	Eastern mud turtle (<i>Kinosternon subrubrum</i>)	Uncommon turtles of wetlands
	Ribbon Snake (Eastern Ribbonsnake) (<i>Thamnophis sauritus</i> (<i>Thamnophis</i>))	Lake/river reptiles
	Eastern spadefoot (<i>Scaphiopus holbrookii</i>)	Eastern Spadefoot Toad (vernal pool, mineral soil wetland)
	Four-toed salamander (<i>Hemidactylium scutatum</i>)	Freshwater wetland amphibians
	Fowler's toad (<i>Bufo fowleri</i> (<i>Bufo woodhousii fowleri</i>))	Freshwater wetland amphibians
	Hellbender (<i>Cryptobranchus alleganiensis</i>)	Hellbender
	Jefferson salamander (<i>Ambystoma jeffersonianum</i>)	Vernal pool salamanders
	Longtail Salamander (Long-tailed salamander) (<i>Eurycea longicauda</i> (<i>Eurycea</i>))	Stream salamanders
	Marbled salamander (<i>Ambystoma opacum</i>)	Vernal pool salamanders
	Northern cricket frog (<i>Acris crepitans</i>)	Freshwater wetland amphibians
	Northern map turtle (<i>Graptemys geographica</i>)	Lake/river reptiles
	Northern red salamander (<i>Pseudotriton ruber</i>)	Stream salamanders
	Queen snake (<i>Regina septemvittata</i>)	Lake/river reptiles
	Snapping turtle (<i>Chelydra serpentina</i>)	Snapping Turtle
	Southern leopard frog (Coastal Plain Leopard Frog) (<i>Rana sphenoccephala</i>)	Freshwater wetland amphibians
	Spiny softshell (<i>Trionyx spiniferus</i>)	Lake/river reptiles
	Spotted turtle (<i>Clemmys guttata</i>)	Uncommon turtles of wetlands
	Stinkpot (Common Musk Turtle) (<i>Sternotherus odoratus</i>)	Uncommon turtles of wetlands
	Tiger Salamander (Eastern tiger salamander) (<i>Ambystoma tigrinum</i>)	Vernal pool salamanders
	Western chorus frog (<i>Pseudacris triseriata</i>)	Freshwater wetland amphibians
	Wood turtle (<i>Glyptemys insculpta</i> (previously called <i>Clemmys insculpta</i>))	Lake/river reptiles
Insect	A mayfly (<i>Procladius mendax</i>)	Stoneflies/Mayflies of lotic waters
76	A mayfly (<i>Epeorus frisoni</i>)	Stoneflies/Mayflies of lotic waters
	A mayfly (<i>Rhithrogena uhari</i>)	Stoneflies/Mayflies of lotic waters
	A mayfly (<i>Epeorus suffusus</i>)	Stoneflies/Mayflies of lotic waters
	A mayfly (<i>Epeorus punctatus</i>)	Stoneflies/Mayflies of lotic waters
	A mayfly (<i>Ameletus tarteri</i>)	Stoneflies/Mayflies of lotic waters
	A mayfly (<i>Siphonurus barbarus</i>)	Stoneflies/Mayflies of lotic waters
	A mayfly (<i>Rhithrogena anomala</i>)	Stoneflies/Mayflies of lotic waters
	A mayfly (<i>Brachycercus maculatus</i>)	Stoneflies/Mayflies of lotic waters
	A mayfly (<i>Siphonurus barbaroides</i>)	Stoneflies/Mayflies of lotic waters
	A mayfly (<i>Procladius ozburni</i>)	Stoneflies/Mayflies of lotic waters
	A mayfly (<i>Heptagenia julia</i>)	Stoneflies/Mayflies of lotic waters
	A mayfly (<i>Baetis rusticans</i>)	Stoneflies/Mayflies of lotic waters
	A mayfly (<i>Eurylophella bicoloroides</i>)	Stoneflies/Mayflies of lotic waters
	A mayfly (<i>Nixe rusticalis</i>)	Stoneflies/Mayflies of lotic waters
	A mayfly (<i>Heptagenia culacantha</i>)	Stoneflies/Mayflies of lotic waters
	A mayfly (<i>Ameletus tertius</i>)	Stoneflies/Mayflies of lotic waters
	A stonefly (<i>Pteronarcys comstocki</i>)	Stoneflies/Mayflies of lotic waters
	A stonefly (<i>Utaperla gaspesiana</i>)	Stoneflies/Mayflies of lotic waters
	A stonefly (<i>Alloperla vostoeki</i>)	Stoneflies/Mayflies of lotic waters
	A stonefly (<i>Alloperla illinoensis</i>)	Stoneflies/Mayflies of lotic waters
	A tiger beetle (<i>Cicindela ancocisconensis</i>)	Riparian tiger beetles
	American burying beetle (<i>Nicrophorus americanus</i>)	American burying beetle
	American rubyspot (<i>Hetaerina americana</i>)	Odonates of rivers/streams
	Appalachian jewelwing (<i>Calopteryx angustipennis</i>)	Odonates of rivers/streams
	Arrow clubtail (<i>Stylurus spiniceps</i>)	Odonates of rivers/streams
	Arrowhead spiketail (<i>Cordulegaster obliqua</i>)	Odonates of seeps/rivulets

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, New York

	Common Name (Latin Name):	Species Group:
	Barrens buck moth (<i>Hemileuca maia maia</i>)	Barrens buck moth
	Black meadowhawk (<i>Sympetrum danae</i>)	Odonates of bogs/fens/ponds
	Blue-tipped dancer (<i>Argia tibialis</i>)	Odonates of rivers/streams
	Bog buckmoth (<i>Hemileuca sp.</i>)	Bog buck moth
	Boreal snaketail (<i>Ophiogomphus colubrinus</i>)	Odonates of rivers/streams
	Brook snaketail (<i>Ophiogomphus aspersus</i>)	Odonates of rivers/streams
	Cobblestone tiger beetle (<i>Cicindela marginipennis</i>)	Riparian tiger beetles
	Cobra clubtail (<i>Gomphus vastus</i>)	Odonates of rivers/streams
	Comet darner (<i>Anax longipes</i>)	Odonates of lakes/ponds
	Common sanddragon (<i>Progomphus obscurus</i>)	Odonates of rivers/streams
	Ebony boghaunter (<i>Williamsonia fletcheri</i>)	Odonates of bogs/fens/ponds
	Elusive clubtail (<i>Stylurus notatus</i>)	Odonates of rivers/streams
	Extra-striped snaketail (<i>Ophiogomphus anomalus</i>)	Odonates of rivers/streams
	Forcipate emerald (<i>Somatochlora forcipata</i>)	Odonates of bogs/fens/ponds
	Gray petaltail (<i>Tachopteryx thoreyi</i>)	Odonates of seeps/rivulets
	Green-faced clubtail (<i>Gomphus viridifrons</i>)	Odonates of rivers/streams
	Incurvate emerald (<i>Somatochlora incurvata</i>)	Odonates of bogs/fens/ponds
	Karner blue (<i>Lycaeides melissa samuelis</i>)	Karner blue butterfly
	Lake emerald (<i>Somatochlora cingulata</i>)	Odonates of lakes/ponds
	Little bluet (<i>Enallagma minusculum</i>)	Odonates of coastal plain lakes/ponds
	Mantled baskettail (<i>Tetragoneuria semiaquea</i>)	Odonates of lakes/ponds
	Midland clubtail (<i>Gomphus fraternus</i>)	Odonates of rivers/streams
	Mocha emerald (<i>Somatochlora linearis</i>)	Odonates of small forest streams
	Needham's skimmer (<i>Libellula needhami</i>)	Odonates of brackish marshes/lakes/ponds
	New England bluet (<i>Enallagma laterale</i>)	Odonates of lakes/ponds
	Ocellated emerald (<i>Somatochlora minor</i>)	Odonates of small forest streams
	Pine barrens bluet (<i>Enallagma recurvatum</i>)	Odonates of coastal plain lakes/ponds
	Pygmy snaketail (<i>Ophiogomphus howei</i>)	Odonates of rivers/streams
	Rambur's forktail (<i>Ischnura ramburii</i>)	Odonates of brackish marshes/lakes/ponds
	Rapids clubtail (<i>Gomphus quadricolor</i>)	Odonates of rivers/streams
	Ringed boghaunter (<i>Williamsonia lintheri</i>)	Odonates of bogs/fens/ponds
	Ringed emerald (<i>Somatochlora albicincta</i>)	Odonates of high elevation lakes
	Riverine clubtail (<i>Stylurus amnicola</i>)	Odonates of rivers/streams
	Russet-tipped clubtail (<i>Stylurus plagiatus</i>)	Odonates of rivers/streams
	Sable clubtail (<i>Gomphus rogersi</i>)	Odonates of small forest streams
	Scarlet bluet (<i>Enallagma pictum</i>)	Odonates of coastal plain lakes/ponds
	Seepage dancer (<i>Argia bipunctulata</i>)	Odonates of seeps/rivulets
	Septima's clubtail (<i>Gomphus septima</i>)	Odonates of rivers/streams
	Skillet clubtail (<i>Gomphus ventricosus</i>)	Odonates of rivers/streams
	Southern sprite (<i>Nehalennia integricollis</i>)	Odonates of bogs/fens/ponds
	Sparkling jewelwing (<i>Calopteryx dimidiata</i>)	Odonates of rivers/streams
	Spatterdock darner (<i>Aeshna mutata</i> (Aeshna mutata))	Odonates of lakes/ponds
	Spine-crowned clubtail (<i>Gomphus abbreviatus</i>)	Odonates of rivers/streams
	Subarctic bluet (<i>Coenagrion interrogatum</i>)	Odonates of bogs/fens/ponds
	Subarctic darner (<i>Aeshna subarctica</i>)	Odonates of bogs/fens/ponds
	Sylvan hygrotus diving beetle (<i>Hygrotus sylvanus</i>)	Sylvan hygrotus diving beetle
	Taper-tailed darner (<i>Gomphaeschna antilope</i>)	Odonates of bogs/fens/ponds
	Tiger spiketail (<i>Cordulegaster erronea</i>)	Odonates of seeps/rivulets
	Yellow-sided skimmer (<i>Libellula flavida</i>)	Odonates of bogs/fens/ponds
Mammals	River otter (<i>Lontra canadensis</i>)	Furbearers
Mollusk	Alewite floater (<i>Anodonta implicata</i>)	Freshwater bivalves
54	Banded physa (<i>Physella vinosa</i>)	Freshwater gastropods
	Black sandshell (<i>Ligumia recta</i>)	Freshwater bivalves
	Brook floater (<i>Alasmidonta varicosa</i>)	Freshwater bivalves
	Buffalo pebblesnail (<i>Gillia altilis</i>)	Freshwater gastropods
	Campeloma spire snail (<i>Cincinnatia cincinnatiensis</i>)	Freshwater gastropods
	Canadian duskysnail (<i>Lyogyrus walkeri</i>)	Freshwater gastropods
	Chittenango ovate amber snail (<i>Novisuccinea chittenangoensis</i>)	Terrestrial gastropods
	Clubshell (<i>Pleurobema clava</i>)	Freshwater bivalves
	Coldwater pondsnail (<i>Stagnicola woodruffi</i>)	Freshwater gastropods
	Deertoe (<i>Truncilla truncata</i>)	Freshwater bivalves
	Dwarf wedgemussel (<i>Alasmidonta heterodon</i>)	Freshwater bivalves
	Eastern pearlshell (<i>Margaritifera margaritifera</i>)	Freshwater bivalves
	Eastern pondmussel (<i>Ligumia nasuta</i>)	Freshwater bivalves
	Elktoe (<i>Alasmidonta marginata</i>)	Freshwater bivalves
	Fat pocketbook (<i>Potamilus capax</i>)	Freshwater bivalves
	Fawnsfoot (<i>Truncilla donaciformis</i>)	Freshwater bivalves
	File rams-horn (<i>Planorbella pilsbryi</i>)	Freshwater gastropods

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, New York

	Common Name (Latin Name):	Species Group:
	Fingered valvata (Fringed valvata) (<i>Valvata lewisi</i>)	Freshwater gastropods
	Globe siltsnail (<i>Birgella subglobosus</i>)	Freshwater gastropods
	Gravel pyrg (<i>Pyrgulopsis letsoni</i>)	Freshwater gastropods
	Green floater (<i>Lasmigona subviridis</i>)	Freshwater bivalves
	Hickorynut (<i>Obovaria olivaria</i>)	Freshwater bivalves
	Kidneyshell (<i>Ptychobranchnus fasciolaris</i>)	Freshwater bivalves
	Lance aplexa (<i>Aplexa elongata</i>)	Freshwater gastropods
	Lilliput (<i>Toxolasma parvum</i>)	Freshwater bivalves
	Mapleleaf (<i>Quadrula quadrula</i>)	Freshwater bivalves
	Mossy valvata (<i>Valvata sincera</i>)	Freshwater gastropods
	Mucket (<i>Actinonaias ligamentina</i>)	Freshwater bivalves
	Northern riffleshell (<i>Epioblasma torulosa rangiana</i>)	Freshwater bivalves
	Paper pondshell (<i>Utterbackia imbecillis</i>)	Freshwater bivalves
	Pimpleback (<i>Quadrula pustulosa</i>)	Freshwater bivalves
	Pink heelsplitter (<i>Potamilus alatus</i>)	Freshwater bivalves
	Pink mucket (<i>Lampsilis abrupta</i>)	Freshwater bivalves
	Pocketbook (<i>Lampsilis ovata</i>)	Freshwater bivalves
	Purplecap valvata (<i>Valvata perdepressa</i>)	Freshwater gastropods
	Rainbow (<i>Villosa iris</i>)	Freshwater bivalves
	Rayed bean (<i>Villosa fabalis</i>)	Freshwater bivalves
	Round hickorynut (<i>Obovaria subrotunda</i>)	Freshwater bivalves
	Round pigtoe (<i>Pleurobema sintoxia</i>)	Freshwater bivalves
	Salamander mussel (<i>Simpsonaias ambigua</i>)	Freshwater bivalves
	Sheepnose (<i>Plethobasus cyphus</i>)	Freshwater bivalves
	Slippershell mussel (<i>Alasmidonta viridis</i>)	Freshwater bivalves
	Snuffbox (<i>Epioblasma triquetra</i>)	Freshwater bivalves
	Spindle lymnaea (<i>Acella haldemani</i>)	Freshwater gastropods
	Threeridge (<i>Amblema plicata</i>)	Freshwater bivalves
	Tidewater mucket (<i>Leptodea ochracea</i>)	Freshwater bivalves
	Tubercled blossom (<i>Epioblasma torulosa</i>)	Freshwater bivalves
	Wabash pigtoe (<i>Fusconaia flava</i>)	Freshwater bivalves
	Watercress snail (<i>Fontigens nickliniana</i>)	Freshwater gastropods
	Wavyrayed lampmussel (<i>Lampsilis fasciola</i>)	Freshwater bivalves
	White heelsplitter (<i>Lasmigona complanata</i>)	Freshwater bivalves
	Yellow lamp mussel (<i>Lampsilis cariosa</i>)	Freshwater bivalves
	Yellow sandshell (<i>Lampsilis teres</i>)	Freshwater bivalves
Marine Fish	Alewife (<i>Alosa pseudoharengus</i>)	Alewife - marine district population
They claim 8 diad	American eel (<i>Anguilla rostrata</i>)	American eel
	American shad (<i>Alosa sapidissima</i>)	American shad
	Atlantic sturgeon (Acipenser oxyrinchus (Acipenser oxyrinchus))	Atlantic sturgeon
	Blueback herring (<i>Alosa aestivalis</i>)	Blueback herring
	Rainbow smelt (<i>Osmerus mordax</i>)	Rainbow smelt
	Shortnose sturgeon (Acipenser brevirostrum (Acipenser brevirostrum))	Shortnose sturgeon
Total		247

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, Pennsylvania

		Immediate	
		High Level	
		Responsible	
		PA VULNERABLE	
		MAINTENANCE CONCERN	
Taxa	Common Name	Habitat	
Amphibian	Southern leopard frog (Coastal Plain Leopard Frog) (<i>Rana sphenocephala</i>)	emergent wetlands/marshes	
	Eastern Spadefoot (<i>Scaphiopus holbrookii</i>)	Seasonal Wetlands, Sandy Beach Habitat	
	HELLBENDER (<i>Cryptobranchus alleganiensis</i>)	Streams and Rivers	
	Jefferson Salamander (<i>Ambystoma jeffersonianum</i>)	Seasonal Wetlands	
	Mountain Chorus Frog (<i>Pseudacris brachyphona</i>)	Sandy Beach Habitat, Seasonal Wetlands	
	New Jersey Chorus Frog (<i>Pseudacris triseriata kalmi</i>)	Seasonal Wetlands, Streams and Rivers, emergent wetlands/marshes	
	Northern Cricket Frog (<i>Acris crepitans</i>)	Seasonal Wetlands, emergent wetlands/marshes	
	Upland Chorus Frog (<i>Pseudacris feriarum</i>)	Seasonal Wetlands, emergent wetlands/marshes	
Western Chorus Frog (<i>Pseudacris triseriata</i>)	Seasonal Wetlands, emergent wetlands/marshes	9	
Bird	American Bittern (<i>Botaurus lentiginosus</i> (<i>Botaurus lentiginosus</i>))	emergent wetlands/marshes	
	Bald Eagle (<i>Haliaeetus leucocephalus</i> (<i>Haliaeetus leucocephalus</i>))	Streams and Rivers, emergent wetlands/marshes	
	Black Tern (<i>Chlidonias niger</i>)	emergent wetlands/marshes	
	Black-crowned Night Heron (<i>Nycticorax nycticorax</i>)	emergent wetlands/marshes	
	Great Egret (<i>Ardea alba</i>)	emergent wetlands/marshes	
	Green-winged Teal (<i>Anas discolor</i>)	emergent wetlands/marshes	
	King Rail (<i>Rallus elegans</i>)	emergent wetlands/marshes	
	Least Bittern (<i>Ixobrychus exilis</i>)	emergent wetlands/marshes	
	Long-eared Owl (<i>Asio otus</i>)	Sandy Beach Habitat	
	Marsh Wren (<i>Cistothorus palustris</i>)	emergent wetlands/marshes	
	Northern Bobwhite Quail (native) (<i>Colinus virginianus</i>)	Sandy Beach Habitat	
	Northern Harrier (<i>Circus cyaneus</i>)	emergent wetlands/marshes	
	Osprey (<i>Pandion haliaetus</i>)	Streams and Rivers, emergent wetlands/marshes	
	Sedge Wren (<i>Cistothorus platensis</i> (<i>Cistothorus plantensis</i>))	emergent wetlands/marshes	
	Short-eared Owl (<i>Asio flammeus</i>)	emergent wetlands/marshes	
	Virginia Rail (<i>Rallus limicola</i>)	emergent wetlands/marshes	
	Yellow-crowned Night Heron (<i>Nyctanassa violacea</i> (<i>Nyctanassa violaceus</i>))	emergent wetlands/marshes	17
Fish	ATLANTIC STURGEON (<i>Acipenser oxyrinchus</i> (<i>Acipenser oxyrinchus</i>))	Streams and Rivers	
	BANDED SUNFISH (<i>Enneacanthus obesus</i>)	Streams and Rivers	
	BIGMOUTH BUFFALO (<i>Ictiobus cyprinellus</i>)	Streams and Rivers	
	BIGMOUTH SHINER (<i>Notropis dorsalis</i>)	Streams and Rivers	
	BLACK BUFFALO (<i>Ictiobus niger</i>)	Streams and Rivers	
	BLACK BULLHEAD (<i>Ameiurus melas</i>)	Streams and Rivers	
	BLACKCHIN SHINER (<i>Notropis heterodon</i>)	Streams and Rivers	
	BLUEBREAST DARTER (<i>Etheostoma camurum</i>)	Streams and Rivers	
	BRIDLE SHINER (<i>Notropis bifrenatus</i>)	Streams and Rivers	
	BRINDLED MADTOM (<i>Noturus miurus</i>)	Streams and Rivers	
	BURBOT (Allegh R popn) (<i>Lota lota</i>)	Streams and Rivers	
	CHANNEL DARTER (<i>Percina copelandi</i>)	Streams and Rivers	
	CHEAT MINNOW (<i>Parachanna boweri</i>)	Streams and Rivers	
	CHECKERED SCULPIN (<i>Cottus</i> sp. 7 – not described)	Streams and Rivers	
	CHESAPEAKE LOGPERCH (<i>Percina caprodes</i>)	Streams and Rivers	
	CISCO (<i>Coregonus artedii</i>)	Streams and Rivers	
	EASTERN SAND DARTER (<i>Ammocrypta pellucida</i> (<i>Ammocrypta pellucidum</i>))	Streams and Rivers	
	GHOST SHINER (<i>Notropis buchanani</i>)	Streams and Rivers	
	GILT DARTER (<i>Percina evides</i>)	Streams and Rivers	
	GOLDEYE (<i>Hiodon alosoides</i>)	Streams and Rivers	
	GRAVEL CHUB (<i>Erimystax x-punctatus</i>)	Streams and Rivers	
	HICKORY SHAD (<i>Alosa mediocris</i>)	Streams and Rivers	
	HIGHFIN CARPSUCKER (<i>Carpiodes velifer</i>)	Streams and Rivers	
	HORNHEAD CHUB (<i>Nocomis biguttatus</i>)	Streams and Rivers	
	IOWA DARTER (<i>Etheostoma exile</i>)	Streams and Rivers	
	IRONCOLOR SHINER (<i>Notropis chalybaeus</i> (<i>Notropis chaleybaeus</i>))	Streams and Rivers	
	LAKE STURGEON (<i>Acipenser fulvescens</i>)	Streams and Rivers	
	LONGEAR SUNFISH (<i>Lepomis megalotis</i>)	Streams and Rivers	
	LONGHEAD DARTER (<i>Percina macrocephala</i>)	Streams and Rivers	
	LONGNOSE SUCKER (<i>Catostomus catostomus</i>)	Streams and Rivers	
	MOONEYE (<i>Hiodon tergisus</i>)	Streams and Rivers	
	MOUNTAIN BROOK LAMPREY R (<i>Ichthyomyzon greeleyi</i>)	Streams and Rivers	
	MOUNTAIN MADTOM (<i>Noturus eleutherus</i>)	Streams and Rivers	
	NORTHERN BROOK LAMPREY (<i>Ichthyomyzon fossor</i>)	Streams and Rivers	
	NORTHERN MADTOM (<i>Noturus stigmosus</i>)	Streams and Rivers	
	OHIO LAMPREY (<i>Ichthyomyzon bdellium</i>)	Streams and Rivers	
	PADDLEFISH (<i>Polydon spathula</i>)	Streams and Rivers	
	RAINBOW SMELT (<i>Osmerus mordax</i>)	Streams and Rivers	
	REDFIN SHINER (<i>Lythrurus umbratilis</i>)	Streams and Rivers	
	RIVER CARPSUCKER (<i>Carpiodes carpio</i>)	Streams and Rivers	
	RIVER SHINER (<i>Notropis biennis</i>)	Streams and Rivers	
	SHORTNOSE STURGEON (<i>Acipenser brevirostrum</i> (<i>Acipenser brevirostrum</i>))	Streams and Rivers	
	SILVER CHUB (<i>Macrhybopsis storeriana</i>)	Streams and Rivers	
	SOUTHERN REDBELLY DACE (<i>Phoxinus erythrogaster</i>)	Streams and Rivers	
	SPOTTED DARTER (<i>Etheostoma maculatum</i>)	Streams and Rivers	
	SPOTTED GAR (<i>Lepisosteus oculatus</i>)	Streams and Rivers	
	SPOTTED SUCKER (<i>Minytrema melanops</i>)	Streams and Rivers	

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, Pennsylvania

Taxa	Common Name	Habitat	
	STREAMLINE CHUB (<i>Erimystax dissimilis</i>)	Streams and Rivers	
	TADPOLE MADTOM (<i>Noturus gyrinus</i>)	Streams and Rivers	
	THREESPINE STICKLEBACK (<i>Gasterosteus aculeatus</i>)	Streams and Rivers	
	TIPPECANOE DARTER (<i>Etheostoma tippecanoe</i>)	Streams and Rivers	
	TONGUE-TIED MINNOW (<i>Exoglossum laurae</i>)	Streams and Rivers	
	WARMOUTH (<i>Lepomis gulosus</i>)	Streams and Rivers	53
Mammal	Eastern Spotted Skunk (<i>Spilogale putorius</i>)	Sandy Beach Habitat	
	Rock Vole (<i>Microtus chrotorrhinus</i>)	Streams and Rivers	
	West Virginia Water Shrew (<i>Sorex palustris punctulatus</i>)	Streams and Rivers	3
Reptile	Blanding's Turtle (<i>Emydoidea blandingii</i> (<i>Emys blandingii</i>))	Streams and Rivers, emergent wetlands/marshes	
	Bog Turtle (<i>Clemmys muhlenbergii</i>)	emergent wetlands/marshes	
	Eastern Massasauga (<i>Sistrurus c. catenatus</i> (<i>Sistrurus catenatus catenatus</i>))	emergent wetlands/marshes	
	Eastern Ribbon Snake (<i>Thamnophis sauritus</i> (<i>Thamnophis sauritus sauritus</i>))	Streams and Rivers, emergent wetlands/marshes	
	Kirtland's Snake (<i>Clonophis kirtlandii</i>)	Streams and Rivers, emergent wetlands/marshes, Sandy Beach Habitat	
	Mountain Earth Snake-R (<i>Virginia valeriae pulchra</i>)	Sandy Beach Habitat	
	Queen Snake (<i>Regina septemvittata</i>)	Streams and Rivers, emergent wetlands/marshes	
	Redbelly Turtle (<i>Pseudemys rubriventris</i>)	Streams and Rivers, emergent wetlands/marshes	
	Shorthead Garter Snake (<i>Thamnophis brachystoma</i>)	Streams and Rivers, emergent wetlands/marshes	
	Spotted Turtle (<i>Clemmys guttata</i>)	Seasonal Wetlands, emergent wetlands/marshes	
	Wood Turtle (<i>Glyptemys insculpta</i> (previously called <i>Clemmys insculpta</i>))	Streams and Rivers, Sandy Beach Habitat, emergent wetlands/marshes	10
Total		93	

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, Rhode Island

Taxa	Name	Habitat	
Bird	American bittern (<i>Botaurus lentiginosus</i> (<i>Botaurus lentiginosus</i>))	Emergent Marsh Deep	
	American black duck (<i>Anas rubripes</i>)	Emergent Marsh Deep	
	bald eagle (<i>Haliaeetus leucocephalus</i> (<i>Haliaeetus leucophaea</i>))	Lacustrine Oligotrophic Lake/Pond	
	blue-winged teal (<i>Anas discors</i>)	Emergent Marsh Deep	
	Canada warbler (<i>Wilsonia canadensis</i>)	Forested Coniferous Wetland Unspecified	
	common moorhen (<i>Gallinula chloropus</i>)	Emergent Marsh Deep	
	eastern kingbird (<i>Tyrannus tyrannus</i>)	River Lower Perennial	
	green-winged teal (<i>Anas crecca</i>)	Emergent Marsh Deep	
	least bittern (<i>Ixobrychus exilis</i>)	Emergent Marsh Deep	
	marsh wren (<i>Cistothorus palustris</i>)	Emergent Marsh Deep	
	northern waterthrush (<i>Seiurus noveboracensis</i>)	Forested Coniferous Wetland Unspecified	
	orchard oriole (<i>Icterus spurius</i>)	River Lower Perennial	
	osprey (<i>Pandion haliaetus</i>)	Lacustrine Oligotrophic Lake/Pond	
	pie-billed grebe (<i>Podilymbus podiceps</i>)	Emergent Marsh Deep	
	prothonotary warbler (<i>Protonotaria citrea</i>)	Forested Deciduous Red Maple Swamp	
	solitary sandpiper (<i>Tringa solitaria</i>)	Freshwater Beaches	
	sora (<i>Porzana carolina</i>)	Emergent Marsh Deep	
	willow flycatcher (<i>Empidonax traillii</i>)	Shrub Swamp Alder	
	Wilson's snipe (<i>Gallinago delicata</i>)	Emergent Marsh Shallow	19
	Butterfly/Moths	(<i>Aeshna mutata</i> (<i>Aeshna mutata</i>))	Coastal Plain Pondshores and Quagmires
crimson-ringed whiteface (<i>Leucorrhinia glacialis</i>)		Coastal Plain Pondshores and Quagmires	
southern sprite (<i>Nehalennia integrivittata</i>)		Coastal Plain Pondshores and Quagmires	
(<i>Exyra fax</i>)		Emergent Fen, Bog	
(<i>Fagitana littera</i>)		Emergent Fen, Bog	
Bog Tiger Moth (an arctiid moth) (<i>Grammia speciosa</i>)		Emergent Fen, Bog	
(<i>Homophoberia cristata</i>)		Emergent Fen, Bog	
(<i>Iodopepla u-album</i>)		Emergent Fen, Bog	
bog copper (<i>Lycaena epixanthe</i>)		Emergent Fen, Bog	
coastal swamp metarranthid (<i>Metarranthis pilosaria</i>)		Emergent Fen, Bog	
(<i>Oligia minuscula</i>)		Emergent Fen, Bog	
pitcher plant borer (<i>Papaipema appassionate</i>)		Emergent Fen, Bog	
(<i>Scopula purata</i>)		Emergent Fen, Bog	
ringed boghaunter (<i>Williamsonia lintneri</i>)		Emergent Fen, Bog	
meadow fritillary (<i>Boloria bellona</i>)		Emergent Marsh Shallow	
bronze copper (<i>Lycaena hyllus</i>)		Emergent Marsh Shallow	
(<i>Macrochilo louisiana</i>)		Emergent Marsh Shallow	
(<i>Meropleon diversicolor</i>)		Emergent Marsh Shallow	
mulberry wing (<i>Poanes massasoit</i>)		Emergent Marsh Shallow	
Acadian hairstreak (<i>Satyrium acadicum</i>)		Emergent Marsh Shallow	
northern pearly eye (<i>Enodia anthedon</i>)		Forested Deciduous Wetland Unspecified	
(<i>Plagodis kuetzingi</i>)		Forested Deciduous Wetland Unspecified	
Hessel's hairstreak (<i>Callophrys hesseli</i>)		Forested Wetland	
noctuid moth (<i>Lithophane baileyi</i>)		Forested Wetland	
thaxter's pinon moth (<i>Lithophane thaxteri</i>)		Forested Wetland	
pale green pinon moth (<i>Lithophane viridipallens</i>)		Forested Wetland	
(<i>Capis curvata</i>)		Freshwater Wetland Unspecified	
(<i>Cepphis decoloraria</i>)		Freshwater Wetland Unspecified	
(<i>Conservula anodonta</i>)		Freshwater Wetland Unspecified	
harvester (<i>Feniseca tarquinius</i>)		Shrub Swamp Alder	
(<i>Darapsa versicolor</i>)		Shrub Swamp Water Willow	31
Dragon/Damselflies	American rubyspot (<i>Hetaerina americana</i>)	River Upper Perennial	
	arrowhead spiketail (<i>Cordulegaster obliqua</i>)	Springs	
	backwater bluet (<i>Enallagma weewa</i>)	River Blackwater Creek	
	brook snaketail (<i>Ophiogomphus aspersus</i>)	River Upper Perennial	
	comet darner (<i>Anax longipes</i>)	Permanent Fishless Pond	
	common sanddragon (<i>Progomphus obscurus</i>)	Lacustrine Oligotrophic Lake/Pond	
	coppery emerald (<i>Somatochlora georgiana</i>)	River Blackwater Creek	
	delta-spotted spiketail (<i>Cordulegaster diastatops</i>)	River Upper Perennial	
	lyre-tipped spreadwing (<i>Lestes unguiculatus</i>)	Semi-permanently Flooded Pond	
	Maine snaketail (<i>Ophiogomphus mainensis</i>)	River Upper Perennial	
	mustached clubtail (<i>Gomphus adelphus</i>)	River Upper Perennial	
	pine barrens bluet (<i>Enallagma recurvatum</i>)	Permanent Fishless Pond	

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, Rhode Island

Taxa	Name	Habitat	
	scarlet bluet (<i>Enallagma pictum</i>)	Permanent Fishless Pond	
	southern pygmy clubtail (<i>Lanthis vernalis</i>)	River Upper Perennial	
	spine-crowned clubtail (<i>Gomphus abbreviatus</i>)	River Upper Perennial	
	taper-tailed damer (<i>Gomphaeschna antilope</i>)	Emergent Fen, Bog	
	twin-spotted spiketail (<i>Cordulegaster maculata</i>)	River Upper Perennial	
	zebra clubtail (<i>Stylurus scudleri</i>)	River Upper Perennial	18
Beetles	(<i>Agonum darlingtoni</i>)	Shrub Bog Unspecified	1
Reptiles	eastern ribbon snake (<i>Thamnophis sauritus</i> (<i>Thamnophis</i>)	Emergent Fen, Bog	
	spotted turtle (<i>Clemmys guttata</i>)	Emergent Fen, Bog	
	wood turtle (<i>Glyptemys insculpta</i> (previously called <i>Clemmys</i>)	River Upper Perennial	3
Amphibians	Northern Dusky Salamander (Dusky Salamander) (<i>Desmognathus fuscescens</i>)	Springs	
	eastern newt (<i>Notophthalmus viridescens</i>)	Semi-permanently Flooded Pond	
	eastern spadefoot (<i>Scaphiopus holbrookii</i>)	Seasonally Flooded Pond	
	four-toed salamander (<i>Hemidactylium scutatum</i>)	Forested Deciduous Wetland Unspecified	
	fowler's toad (<i>Bufo fowleri</i> (<i>Bufo woodhousii fowleri</i>))	Semi-permanently Flooded Pond	
	marbled salamander (<i>Ambystoma opacum</i>)	Seasonally Flooded Pond	
	northern leopard frog (<i>Rana pipiens</i>)	Seasonally Flooded Pond	
	spring salamander (<i>Gyrinophilus porphyriticus</i> (<i>Gyrinophilus</i>)	Springs	
	wood frog (<i>Rana sylvatica</i>)	Seasonally Flooded Pond	9
Mammals	common water shrew (<i>Sorex palustris</i>)	River Upper Perennial	
	southern bog lemming (<i>Synaptomys cooperi</i>)	Emergent Marsh Shallow	2
Mollusks	alewife floater (<i>Anodonta implicata</i>)	River Lower Perennial	
	brook floater (<i>Alasmidonta varicosa</i>)	River Lower Perennial	
	eastern pearlshell (<i>Margaritifera margaritifera</i>)	River Upper Perennial	
	eastern pond mussel (<i>Ligumia nasuta</i>)	Lacustrine Oligotrophic Lake/Pond	
	lampmussel (<i>Lampsilis radiata</i>)	Lacustrine Oligotrophic Lake/Pond	
	squaawfoot (<i>Strophitus undulatus</i> (<i>Strophitus undulates</i>))	River Lower Perennial	
	tidewater mucket (<i>Leptodea ochracea</i>)	Lacustrine Oligotrophic Lake/Pond	
	triangle floater (<i>Alasmidonta undulata</i>)	River Lower Perennial	8
Fish	alewife (<i>Alosa pseudoharengus</i>)	River Lower Perennial	
	American brook lamprey (<i>Lampetra appendix</i>)	River Upper Perennial	
	American eel (<i>Anguilla rostrata</i>)	River Lower Perennial	
	American shad (<i>Alosa sapidissima</i>)	River Lower Perennial	
	Atlantic menhaden (<i>Brevoortia tyrannus</i>)	anadromous	
	Atlantic salmon (<i>Salmo salar</i>)	River Upper Perennial	
	Atlantic sturgeon (<i>Acipenser oxyrinchus</i> (<i>Acipenser oxyrinchus</i>))	anadromous	
	Atlantic Tomcod (Tomcod) (<i>MICROGADUS TOMCOD</i>)	anadromous	
	banded sunfish (<i>Enneacanthus obesus</i>)	Lacustrine Eutrophic Lake/Pond	
	blacknose dace (<i>Rhinichthys atratulus</i>)	River Upper Perennial	
	blueback herring (<i>Alosa aestivalis</i>)	River Lower Perennial	
	bridle shiner (<i>Notropis bifrenatus</i>)	Lacustrine Eutrophic Lake/Pond	
	brook trout (<i>Salvelinus fontinalis</i>)	River Upper Perennial	
	common shiner (<i>Luxilus cornutus</i> (<i>Luxilus cornutus</i>))	River Upper Perennial	
	creek chubsucker (<i>Erimyzon oblongus</i>)	River Lower Perennial	
	longnose dace (<i>Rhinichthys cataractae</i>)	River Upper Perennial	
	rainbow smelt (<i>Osmerus mordax</i>)	River Lower Perennial	
	redbreast sunfish (<i>Lepomis auritus</i>)	River Lower Perennial	
	Shortnose sturgeon (<i>Acipenser brevirostrum</i> (<i>Acipenser brevirostrum</i>))	anadromous	
	spottail shiner (<i>Notropis hudsonius</i>)	River Lower Perennial	20
			111

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, Vermont

Taxa	Common (Latin) Name	Habitat		
Vertebrates	Birds	American Black Duck (<i>Anas rubripes</i>)	2, 3 Aquatic: Fluvial, Aquatic: Lacustrine, Aquatic: Large Lake Champlain Tribs Below Falls, Aquatic: Lower CT River, Floodplain Forests, Hardwood Swamps, Marshes and Sedge Meadows, Open Peatlands, Shrub Swamps	
		Bald Eagle (<i>Haliaeetus leucocephalus</i> (<i>Haliaeetus leucocephalus</i>))	2, 3 Aquatic: Lake Champlain, Aquatic: Large Lake Champlain Tribs Below Falls, Aquatic: Lower CT River, Aquatic: Man-Made Water Bodies, Floodplain Forests, Hardwood Swamps, Marshes and Sedge Meadows	
		Black Tern (<i>Chlidonias niger</i>)	1, 3 Marshes and Sedge Meadows, Shrub Swamps	
		Blue-winged Teal (<i>Anas discors</i>)	Aquatic: Fluvial, Aquatic: Lake Champlain, Aquatic: Large Lake Champlain Tribs Below Falls, Aquatic: Lower CT River, Aquatic: Man-Made Water Bodies, Floodplain Forests, Grasslands and Hedgerows, Hardwood Swamps, Marshes and Sedge Meadows, Shrub Swamps, Wet Shores	
		Common Loon (<i>Gavia immer</i>)	2, 3 Aquatic: Lacustrine, Aquatic: Lake Champlain, Aquatic: Man-Made Water Bodies	
		Common Tern (<i>Sterna hirundo</i>)	1, 2 Aquatic: Lake Champlain	
		Lesser yellowlegs (<i>Tringa flavipes</i>)	Aquatic: Fluvial, Aquatic: Large Lake Champlain Tribs Below Falls, Aquatic: Lower CT River, Aquatic: Man-Made Water Bodies, Grasslands and Hedgerows, Marshes and , Sedge Meadows, Open Peatlands, Shrub Swamps, Wet Shores	
		Osprey (<i>Pandion haliaetus</i>)	2, 3 Aquatic: Fluvial, Aquatic: Lacustrine, Aquatic: Lake Champlain, Aquatic: Large Lake Champlain Tribs Below Falls, Aquatic: Lower CT River, Building or Structure, Cliffs and Talus, Floodplain Forests, Hardwood Swamps, Marshes and Sedge Meadows, Open Peatlands, Outcrops and Alpine, Seeps and Pools, Shrub Swamps, Softwood Swamps, Upland Shores, Wet Shores	
		Peregrine Falcon (<i>Falco peregrinus</i>)	2, 3 Aquatic: Fluvial, Aquatic: Lacustrine, Aquatic: Lake Champlain, Aquatic: Large Lake Champlain Tribs Below Falls, Aquatic: Lower CT River, Building or Structure, Cliffs and Talus, Grasslands and Hedgerows, Lawns, Gardens, and Row Crops, Mine, Upland Shores	
		Pied-billed Grebe (<i>Podilymbus podiceps</i>)	1, 2, 3 Aquatic: Fluvial, Aquatic: Large Lake Champlain Tribs Below Falls, Aquatic: Lower CT River, Floodplain Forests, Hardwood Swamps, Marshes and Sedge Meadows, Open Peatlands, Seeps and Pools, Shrub Swamps, Softwood Swamps, Wet Shores	
		Fish	American brook lamprey (<i>Lampetra appendix</i>)	1, 2, 3 *
			American eel (<i>Anguilla rostrata</i>)	3
			American shad (<i>Alosa sapidissima</i>)	
			Arctic Char (Sunapee Trout) (<i>Salvelinus alpinus oquassa</i>)	3
			Atlantic salmon-anadromous (<i>Salmo salar (anadromous)</i>)	2
	Atlantic salmon-landlocked (<i>Salmo salar (landlocked)</i>)		3	
	Blackchin shiner (<i>Notropis heterodon</i>)			
	Blacknose shiner (<i>Notropis heterolepis</i>)		2	
	Blueback herring (CT River only) (<i>Alosa aestivalis</i>)		3	
	Brassy minnow (<i>Hybognathus hankinsoni</i>)			
	Bridle shiner (<i>Notropis bifrenatus</i>)		1, 2, 3	
	Brook trout (naturally reproducing populations only) (<i>Salvelinus fontinalis (naturally reproducing pops)</i>)		3	
	Channel darter (<i>Percina capelandi</i>)		1	
	Cisco (Lake Herring) (<i>Coregonus artedii</i>)			
	Eastern sand darter (<i>Ammocrypta pellucida (Ammocrypta pellucida)</i>)		1	
	Greater redborse (<i>Moxostoma valenciennesi</i>)		3	
	Lake sturgeon (<i>Acipenser fulvescens</i>)		1, 3	
	Lake trout (naturally reproducing populations only) (<i>Salvelinus namaycush (naturally reproducing pop)</i>)			
	Lake whitefish (<i>Coregonus clupeaformis (Coregonus clupeaformis)</i>)			
	Mooneye (<i>Hiodon tergisus</i>)		1, 3	
	Mottled sculpin (<i>Cottus bairdi</i>)			
	Muskellunge (<i>Esox masquinongy</i>)			
	Northern brook lamprey (<i>Ichthyomyzon fossor</i>)		1, 3 *	
	Quillback (<i>Carpilodes cyprinus</i>)		3	
	Redbreast sunfish (<i>Lepomis auritus</i>)			
	Redfin pickerel (<i>Esox americanus (Esox americanus americanus)</i>)		2	
	Round whitefish (<i>Prosopium cylindraceum (Prosopium cylindraceum)</i>)		1, 2, 3	
	Sauger (<i>Sander canadense</i>)		3	
	Sea lamprey (CT River only) (<i>Petromyzon marinus (CT river only)</i>)		*	
	Shorthead redborse (<i>Moxostoma macrolepidotum</i>)			
	Silver lamprey (<i>Ichthyomyzon unicuspis</i>)		1, 3 *	
	Silver redborse (<i>Moxostoma anisurum</i>)			
	Stonecat (<i>Naturus flavus</i>)			
	Mammals	Eastern pipistrelle (<i>Pipistrellus subflavus</i>)	2 River, Building or Structure, Floodplain Forests, Hardwood Swamps, Mine, Subterranean, Wet Shores Aquatic: Fluvial, Aquatic: Lacustrine, Aquatic: Lake Champlain, Aquatic: Large Lake Champlain Tribs Below Falls, Aquatic: Lower CT River, Aquatic: Man-Made Water Bodies, Grasslands and Hedgerows, Marshes and Sedge Meadows, Northern Hardwood, Oak-Pine Northern Hardwood, Open Peatlands, Shrub Swamps, Spruce Fir Northern Hardwood, Wet Shores	
		Hoary bat (<i>Lasiurus cinereus</i>)	1, 3 Aquatic: Lacustrine, Building or Structure, Marshes and Sedge Meadows, Mine, Northern Hardwood, Oak-Pine Northern Hardwood, Open Peatlands, Shrub Swamps, Spruce Fir Northern Hardwood, Subterranean, Wet Shores	
		Little brown bat (<i>Myotis lucifugus</i>)	Aquatic: Man-Made Water Bodies, Early Succession Boreal Hardwoods, Early Succession Northern Hardwoods, Early Succession Upland Oak, Grasslands and Hedgerows, Marshes and Sedge Meadows, Northern Hardwood, Oak-Pine Northern Hardwood, Spruce Fir Northern Hardwood, Wet Shores	
		Long-tailed weasel (<i>Mustela frenata</i>)		

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, Vermont

Taxa		Common (Latin) Name	Habitat
		Masked shrew (<i>Cinereus</i>) (<i>Sorex cinereus</i>)	Aquatic: Fluvial, Aquatic: Large Lake Champlain Tribs Below Falls, Aquatic: Lower CT River, Cliffs and Talus, Early Succession Boreal Conifers, Early Succession Boreal Hardwoods, Early Succession Northern Hardwoods, Early Succession Other Types, Early Succession Pine and Hemlock, Early Succession Spruce-Fir, Early Succession Upland Oak, Floodplain Forests, Grasslands and Hedgerows, Hardwood Swamps, Northern Hardwood, Oak-Pine Northern Hardwood, Open Peatlands, Outcrops and Alpine, Seeps and Pools, Shrub Swamps, Softwood Swamps, Spruce Fir Northern Hardwood, Upland Shores, Wet Shores
		Mink (<i>Mustela vison</i>)	Aquatic: Fluvial, Aquatic: Lacustrine, Aquatic: Lake Champlain, Aquatic: Large Lake Champlain Tribs Below Falls, Aquatic: Lower CT River, Floodplain Forests, Hardwood Swamps, Marshes and Sedge Meadows, Open Peatlands, Seeps and Pools, Shrub Swamps, Softwood Swamps, Wet Shores
		Muskrat (<i>Ondatra zibethicus</i>)	Aquatic: Fluvial, Aquatic: Lacustrine, Aquatic: Lake Champlain, Aquatic: Large Lake Champlain Tribs Below Falls, Aquatic: Lower CT River, Aquatic: Man-Made Water Bodies, Marshes and Sedge Meadows
		Northern river otter (<i>Lutra canadensis</i>)	Aquatic: Fluvial, Aquatic: Lake Champlain, Aquatic: Large Lake Champlain Tribs Below Falls, Aquatic: Lower CT River
		Eastern Red bat (<i>Lasiurus borealis</i>)	1, 2, 3 Aquatic: Fluvial, Aquatic: Lacustrine, Aquatic: Lake Champlain, Aquatic: Large Lake Champlain Tribs Below Falls, Aquatic: Lower CT River, Aquatic: Man-Made Water Bodies, Grasslands and Hedgerows, Northern Hardwood, Oak-Pine Northern Hardwood, Spruce Fir Northern Hardwood
		Water shrew (<i>Sorex palustris</i>)	Aquatic: Fluvial, Floodplain Forests, Marshes and Sedge Meadows, Open Peatlands, Shrub Swamps, Spruce Fir, Northern Hardwood, Wet Shores
	Reptile & Amphibians	Blue-spotted Salamander (<i>Ambystoma laterale</i>)	1, 3 Hardwood, Open Peatlands, Seeps and Pools, Shrub Swamps, Softwood Swamps, Spruce Fir Northern Hardwood
		Brown Snake (<i>Storeria dekayi</i>)	Aquatic: Man-Made Water Bodies, Early Succession Northern Hardwoods, Floodplain Forests, Grasslands and Hedgerows, Hardwood Swamps, Lawns, Gardens, and Row Crops, Marshes and Sedge Meadows, Northern Hardwood, Oak-Pine Northern Hardwood, Open Peatlands, Seeps and Pools, Shrub Swamps
		Common Mudpuppy (<i>Necturus maculosus</i>)	3 Aquatic: Fluvial, Aquatic: Lacustrine, Aquatic: Large Lake Champlain Tribs Below Falls, Aquatic: Lower CT River, Aquatic: Man-Made Water Bodies
		Stinkpot (Common Musk Turtle) (<i>Sternotherus odoratus</i>)	Aquatic: Lacustrine, Aquatic: Large Lake Champlain Tribs Below Falls, Aquatic: Man-Made Water Bodies, Marshes and Sedge Meadows, Shrub Swamps
		Eastern Ribbon Snake (<i>Thamnophis sauritus</i>) (<i>Thamnophis sauritus sauritus</i>)	1, 2, 3 Aquatic: Man-Made Water Bodies, Cliffs and Talus, Grasslands and Hedgerows, Marshes and Sedge Meadows, Oak-Pine Northern Hardwood, Seeps and Pools, Shrub Swamps
		Fowler's Toad (<i>Bufo fowleri</i>) (<i>Bufo woodhousii fowleri</i>)	2, 3 Aquatic: Lacustrine, Aquatic: Man-Made Water Bodies, Early Succession Northern Hardwoods, Early Succession Pine and Hemlock, Early Succession Upland Oak, Floodplain Forests, Grasslands and Hedgerows, Hardwood Swamps, Lawns, Gardens, and Row Crops, Marshes and Sedge Meadows, Northern Hardwood, Oak-Pine Northern Hardwood, Seeps and Pools, Shrub Swamps, Upland Shores, Wet Shores
		Jefferson Salamander (<i>Ambystoma jeffersonianum</i>)	1, 2, 3 Aquatic: Man-Made Water Bodies, Northern Hardwood, Oak-Pine Northern Hardwood, Seeps and Pools, Spruce Fir Northern Hardwood
		Northern Water Snake (<i>Nerodia sipedon</i>)	Aquatic: Lacustrine, Aquatic: Large Lake Champlain Tribs Below Falls, Aquatic: Man-Made Water Bodies, Marshes and Sedge Meadows, Shrub Swamps
		Spiny Softshell (Turtle) (<i>Apalone spinifera</i>)	3 Aquatic: Lacustrine, Aquatic: Lake Champlain, Aquatic: Large Lake Champlain Tribs Below Falls, Marshes and Sedge Meadows, Shrub Swamps, Upland Shores, Wet Shores
		Spotted Salamander (<i>Ambystoma maculatum</i>)	Aquatic: Man-Made Water Bodies, Floodplain Forests, Hardwood Swamps, Marshes and Sedge Meadows, Northern Hardwood, Oak-Pine Northern Hardwood, Open Peatlands, Seeps and Pools, Shrub Swamps, Softwood Swamps, Spruce Fir Northern Hardwood
		Spotted Turtle (<i>Clemmys guttata</i>)	1, 2, 3 Aquatic: Lacustrine, Aquatic: Man-Made Water Bodies, Hardwood Swamps, Marshes and Sedge Meadows, Northern Hardwood, Oak-Pine Northern Hardwood, Open Peatlands, Seeps and Pools, Shrub Swamps, Softwood Swamps, Wet Shores
		Western (Striped) Chorus Frog (<i>Pseudacris triseriata</i>)	3 Aquatic: Man-Made Water Bodies, Marshes and Sedge Meadows, Shrub Swamps
		Wood Turtle (<i>Glyptemys insculpta</i> (previously called <i>Clemmys insculpta</i>))	1, 2 Aquatic: Fluvial, Aquatic: Large Lake Champlain Tribs Below Falls, Aquatic: Man-Made Water Bodies, Early Succession Northern Hardwoods, Early Succession Other Types, Early Succession Pine and Hemlock, Early Succession Upland Oak, Floodplain Forests, Grasslands and Hedgerows, Hardwood Swamps, Marshes and Sedge Meadows, Northern Hardwood, Oak-Pine Northern Hardwood, Open Peatlands, Seeps and Pools, Shrub Swamps, Softwood Swamps, Spruce Fir Northern Hardwood
Invertebrates	Odonata (Dragonflies & Damselflies)	Bog/Fen/Swamp/Marshy Pond Odonata Group	
		Black Meadowhawk (<i>Sympetrum danae</i>)	
		Citrine Forktail (<i>Ischnura hastata</i>)	
		Comet damer (<i>Anax longipes</i>)	
		Cyrano Damer (<i>Nasiaeschna pentacantha</i>)	
		Delicate Emerald (<i>Somatochlora franklini</i>)	
		Ebony Boghaunter (<i>Williamsonia fletcheri</i>)	
		Forcipate Emerald (<i>Somatochlora forcipata</i>)	
		Green-striped Damer (<i>Aeshna verticalis</i>)	
		Harlequin Damer (<i>Gomphaeschna furcillata</i>)	
		Kennedy's Emerald (<i>Somatochlora kennedyi</i>) (<i>Somatochlora kennedyi</i>)	
		Mottled Damer (<i>Aeshna clepsydra</i>)	
		Painted skimmer (<i>Libellula semifasciata</i>)	
		Petite Emerald (<i>Dorocordulia lepida</i>)	
		Ski-tailed Emerald (<i>Somatochlora elongata</i>)	
		Southern Spreadwing (<i>Lestes disjunctus australis</i>)	
		Spatterdock Damer (<i>Aeshna mulata</i> (<i>Aeshna mutata</i>))	
		Subarctic Bluet (<i>Coenagrion interrogatum</i>)	
		Subarctic Damer (<i>Aeshna subarctica</i>)	
		Swamp Damer (<i>Epiaeschna heros</i>)	
		Zigzag Damer (<i>Aeshna stichensis</i>)	
		Seep/Rivulet Odonata Group	
		Gray petaltail (<i>Ischnura elegans</i>)	
		Lakes/Ponds Odonata Group	
		Lake Emerald (<i>Somatochlora cingulata</i>)	
		Lilypad Forktail (<i>Ischnura kellicotti</i>)	
		New England bluet (<i>Enallagma laterale</i>)	
		Ringed Emerald (<i>Somatochlora albicincta</i>)	
		Slender Bluet (<i>Enallagma trivittatum</i>)	

Appendix A: Freshwater Species of Greatest Conservation Need in the Northeast Study Area, Vermont

Taxa		Common (Latin) Name	Habitat		
		Vernal Bluet (<i>Enallagma vemale</i>)			
		White Corporal (<i>Libellula exusta</i>)			
		River/Stream Odonata Group	American rubspot (<i>Hetaerina americana</i>)		
		Blue-fronted dancer (<i>Argia apicalis</i>)			
		Brook snaketail (<i>Ophiogomphus aspersus</i>)			
		Cobra clubtail (<i>Gomphus vastus</i>)			
		Maine snaketail (<i>Ophiogomphus mainensis</i>)			
		Rainbow bluet (<i>Enallagma antennatum</i>)			
		Rapids clubtail (<i>Gomphus quadricolor</i>)			
		Riffle snaketail (<i>Ophiogomphus carolus</i>)			
		Rusty snaketail (<i>Ophiogomphus rupinulensis</i>)			
		Skillet clubtail (<i>Gomphus ventricosus</i>)			
		Spine-crowned clubtail (<i>Gomphus abbreviatus</i>)			
		Stygian shadowdragon (<i>Neurocordulia yamaskanensis</i>)			
		Stylurus amnicola (<i>Riverine Clubtail</i>)			
Zebra Clubtail (<i>Stylurus scudderii</i>)					
Lepidoptera (Butterflies & Moths)	Wetland Butterflies Group	Black dash (<i>Euphyes conspiciua</i>)			
		Bog copper (<i>Lycaena epixanthe</i>)			
		Broad-winged skipper (<i>Poanes viator</i>)			
		Dion skipper (<i>Euphyes dion</i>)			
		Jutta arctic (<i>Oeneis jutta</i>)			
		Mulberry wing (<i>Poanes massasoit</i>)			
		Two-spotted skipper (<i>Euphyes bimaculata</i>)			
		Mayflies/Stonflies/Caddisflies Group	A Caddisfly (<i>Rhyacophila brunnea</i>)	A Mayfly (<i>Ameletus browni</i>)	
				A Mayfly (<i>Ameletus tertius</i>)	
				A Mayfly (<i>Baetisca rubescens</i>)	
				A Mayfly (<i>Euryophella bicoloroides</i>)	
				A Stonefly (<i>Alloperla voinae</i>)	
				Roaring Brook Mayfly (<i>Epeorus frisoni</i>)	
				Tomah Mayfly (<i>Siphonisca aerodromia</i>)	
				Mollusca	Freshwater Mussels Group
Black sandshell (<i>Ligumia recta</i>)					
Brook floater (<i>Alasmidonta varicosa</i>)					
Creek heelsplitter (<i>Lasmigona compressa</i>)					
Cylindrical papershell (<i>Anodontoides ferussacianus</i>)					
Dwarf wedgemussel (<i>Alasmidonta heterodon</i>)					
Eastern pearlshell (<i>Margaritifera margaritifera</i>)					
Elktoe (<i>Alasmidonta marginata</i>)					
Fluted-shell (<i>Lasmigona costata</i>)					
Fragile papershell (<i>Leptodea fragilis</i>)					
Giant floater (<i>Pyganodon grandis</i>)					
Pink heelsplitter (<i>Potamilus alatus</i>)					
Pocketbook (<i>Lampsilis ovata</i>)					
Freshwater Snails Group	Boreal marstonia (<i>Marstonia (Fyrgulopsis) decepta</i>)	Buffalo pebblesnail (<i>Gillia altilis</i>)			
		Canadian dusksnail (<i>Amnicola (Lyogyrus) walkeri</i>)			
		Country fossaria (<i>Fossaria rustica</i>)			
		Disco gyro (<i>Gyraulus circumstriatus</i>)			
		Fingered valvata (<i>Fingered valvata</i>) (<i>Valvata lewisii</i>)			
		Liver elmia (<i>Goniobasis livescens</i>)			
		Mammoth lymnaea (<i>Bulimnea megastoma</i>)			
		Mossy valvata (<i>Valvata sincera</i>)			
		Pupa dusksnail (<i>Lyogyrus (Amnicola) pupoidea</i>)			
		Sharp hornsnailed (<i>Pleurocera acuta</i>)			
		Spindle lymnaea (<i>Acella haldemanni</i>)			
		Squat dusksnail (<i>Amnicola (Lyogyrus) grana</i>)			
		Star gyro (<i>Gyraulus crista</i>)			
		Crustaceans Group	An Amphipod (<i>Diporeia hoyi</i>)	Appalachian brook crayfish (<i>Cambarus bartonii</i>)	
				(<i>Cambarus bartonii</i>)	
Taconic Cave Amphipod (<i>Stygobromus borealis</i>)					

Appendix B: SGCN Overlap in the Study Area, All States

Appendix B: SGCN Overlap in the Study Area, All States

Taxa	Common Name	Latin Name	State								SGCN in # of States	Reason	
			CT	MA	ME	NH	NJ	NY	PA	RI			VT
Bird	American Bittern	Botaurus lentiginosus (Botaurus lentiginosus)	X	X	X	X	X	X	X	X	X	9	Regional conservation concern (Therres 1999)
Reptile	Spotted Turtle	Clemmys guttata	X	X	X	X	X	X	X	X	X	9	Regional conservation concern (Therres 1999)
Reptile	Wood Turtle	Glyptemys insculpta (previously called Clemmys insculpta)	X	X	X	X	X	X	X	X	X	9	Regional conservation concern (Therres 1999)
Bird	Bald Eagle	Haliaeetus leucocephalus (Haliaeetus leucophalus)	X	X	X	X	X	X	X	X	X	9	Federally threatened (current 2005)
Bird	Least Bittern	Ixobrychus exilis	X	X	X	X	X	X	X	X	X	9	protected under Migratory Bird Treaty Act of 1918
Fish	Shortnose Sturgeon	Acipenser brevirostrum (Acipenser brevirostrum)	X	X	X	X	X	X	X	X	X	8	Federally endangered (current 2005)
Fish	Atlantic Sturgeon	Acipenser oxyrinchus (Acipenser oxyrinchus)	X	X	X	X	X	X	X	X	X	8	Regional conservation concern (Therres 1999)
Mussel	Brook Floater	Alasmidonta varicosa	X	X	X	X	X	X	X	X	X	8	Regional conservation concern (Therres 1999)
Bird	American Black Duck	Anas rubripes	X	X	X	X	X	X	X	X	X	8	
Bird	Pied-billed Grebe	Podilymbus podiceps	X	X	X	X	X	X	X	X	X	8	Regional conservation concern (Therres 1999)
Fish	Brook Trout, Eastern Brook Trout	Salvelinus fontinalis	X	X	X	X	X	X	X	X	X	8	
Fish	American Shad	Alosa sapidissima	X	X	X	X	X	X	X	X	X	7	
Amphibian	Jefferson Salamander	Ambystoma jeffersonianum	X	X	X	X	X	X	X	X	X	7	Regional conservation concern (Therres 1999)
Fish	American Eel	Anguilla rostrata	X	X	X	X	X	X	X	X	X	7	
Bird	Sedge Wren	Cistothorus platensis (Cistothorus plantensis)	X	X	X	X	X	X	X	X	X	7	Regional conservation concern (Therres 1999)
Fish	Banded Sunfish	Enneacanthus obesus	X	X	X	X	X	X	X	X	X	7	Regional conservation concern (Therres 1999)
Fish	Bridle Shiner	Notropis bifrenatus	X	X	X	X	X	X	X	X	X	7	Regional conservation concern (Therres 1999)
Fish	Rainbow Smelt	Osmerus mordax	X	X	X	X	X	X	X	X	X	7	
Bird	Osprey	Pandion haliaetus	X	X	X	X	X	X	X	X	X	7	
Reptile	Ribbon Snake (Eastern Ribbonsnake)	Thamnophis sauritus (Thamnophis sauritus sauritus)	X	X	X	X	X	X	X	X	X	7	Regional conservation concern (Therres 1999)
Bird	Canada Warbler	Wilsonia canadensis	X	X	X	X	X	X	X	X	X	7	Regional conservation concern (Therres 1999)
Fish	Atlantic Salmon	Salmo salar	X	X	X	X	X	X	X	X	X	7	
Mussel	Dwarf Wedge Mussel	Alasmidonta heterodon	X	X	X	X	X	X	X	X	X	6	Federally endangered (current 2005)
Amphibian	Blue-spotted Salamander	Ambystoma laterale	X	X	X	X	X	X	X	X	X	6	Regional conservation concern (Therres 1999)
Amphibian	Marbled Salamander	Ambystoma opacum	X	X	X	X	X	X	X	X	X	6	
Amphibian	Fowler's Toad	Bufo fowleri (Bufo woodhousii fowleri)	X	X	X	X	X	X	X	X	X	6	
Bird	Common Loon	Gavia immer	X	X	X	X	X	X	X	X	X	6	
Fish	American Brook Lamprey	Lampetra appendix	X	X	X	X	X	X	X	X	X	6	Regional conservation concern (Therres 1999)
Mussel	Tidewater Mucket	Leptodea ochracea	X	X	X	X	X	X	X	X	X	6	Regional conservation concern (Therres 1999)
Mussel	Eastern Pond Mussel	Ligumia nasuta	X	X	X	X	X	X	X	X	X	6	Regional conservation concern (Therres 1999)
Bird	Black-crowned Night-heron	Nycticorax nycticorax	X	X	X	X	X	X	X	X	X	6	
Bird	American Woodcock	Scolopax minor	X	X	X	X	X	X	X	X	X	6	
Insect	Banded Bog Skimmer, Ringed Boghaunter	Williamsonia lintneri	X	X	X	X	X	X	X	X	X	6	
Fish	Blueback Herring	Alosa aestivalis	X	X	X	X	X	X	X	X	X	5	
Fish	Alewife	Alosa pseudoharengus	X	X	X	X	X	X	X	X	X	5	
Bird	Great Blue Heron	Ardea herodias	X	X	X	X	X	X	X	X	X	5	
Bird	Northern Harrier	Circus cyaneus	X	X	X	X	X	X	X	X	X	5	Regional conservation concern (Therres 1999)
Bird	Marsh Wren	Cistothorus palustris	X	X	X	X	X	X	X	X	X	5	
Reptile	Blanding's Turtle	Emydoidea blandingii (Emys blandingii)	X	X	X	X	X	X	X	X	X	5	Regional conservation concern (Therres 1999)
Insect	Scarlet Bluet	Enallagma pictum	X	X	X	X	X	X	X	X	X	5	
Fish	Swamp Darter	Etheostoma fusiforme	X	X	X	X	X	X	X	X	X	5	
Bird	Common Moorhen	Gallinula chloropus	X	X	X	X	X	X	X	X	X	5	
Insect	Rapids Clubtail	Gomphus quadricolor	X	X	X	X	X	X	X	X	X	5	
Insect	Cobra clubtail	Gomphus vastus	X	X	X	X	X	X	X	X	X	5	
Mussel	Yellow lampmussel	Lampsilis cariosa	X	X	X	X	X	X	X	X	X	5	Regional conservation concern (Therres 1999)
Fish	Burbot (Cusk)	Lota lota	X	X	X	X	X	X	X	X	X	5	
Bird	Sora	Porzana carolina	X	X	X	X	X	X	X	X	X	5	
Bird	King Rail	Rallus elegans	X	X	X	X	X	X	X	X	X	5	
Amphibian	Eastern Spadefoot, Eastern Spadefoot Toad	Scaphiopus holbrookii	X	X	X	X	X	X	X	X	X	5	Regional conservation concern (Therres 1999)
Mammal	Southern Bog Lemming	Synaptomys cooperi	X	X	X	X	X	X	X	X	X	5	
Insect	Spatterdock Darner	Aeshna mutata (Aeshna mutata)	X	X	X	X	X	X	X	X	X	4	
Bird	Blue-winged Teal	Anas discors	X	X	X	X	X	X	X	X	X	4	
Insect	Comet Darner	Anax longipes	X	X	X	X	X	X	X	X	X	4	
Bird	Great Egret	Ardea alba	X	X	X	X	X	X	X	X	X	4	

Appendix B: SGCN Overlap in the Study Area, All States

Taxa	Common Name	Latin Name	State									SGCN in # of States	Reason	
			CT	MA	ME	NH	NJ	NY	PA	RI	VT			
Bird	Short-eared Owl	Asio flammeus	X										4	Regional conservation concern (Therres 1999)
Bird	Greater Scaup	Aythya marila	X	X	X	X	X	X	X	X	X	X	4	
Bird	Red-shouldered Hawk, Red Shouldered Hawk	Buteo lineatus	X	X	X	X	X	X	X	X	X	X	4	
Insect	Hessel's Hairstreak	Callophrys hesseli	X	X	X	X	X	X	X	X	X	X	4	
Bird	Veery	Catharus fuscescens	X	X	X	X	X	X	X	X	X	X	4	
Fish	Longnose Sucker	Catostomus catostomus	X	X	X	X	X	X	X	X	X	X	4	
Bird	Black Tern	Chlidonias niger	X	X	X	X	X	X	X	X	X	X	4	Regional conservation concern (Therres 1999)
Insect	Cobblestone Tiger Beetle	Cicindela marginipennis	X	X	X	X	X	X	X	X	X	X	4	
Fish	Slimy Sculpin	Cottus cognatus	X	X	X	X	X	X	X	X	X	X	4	
Bird	Cerulean Warbler	Dendroica cerulea	X	X	X	X	X	X	X	X	X	X	4	Regional conservation concern (Therres 1999)
Bird	Willow Flycatcher	Empidonax traillii	X	X	X	X	X	X	X	X	X	X	4	
Fish	Redfin Pickerel	Esox americanus (Esox americanus americanus)	X	X	X	X	X	X	X	X	X	X	4	
Insect	Spine-Crowned Clubtail	Gomphus abbreviatus	X	X	X	X	X	X	X	X	X	X	4	
Insect	Skilllet Clubtail	Gomphus ventricosus	X	X	X	X	X	X	X	X	X	X	4	
Amphibian	Northern Spring Salamander, Spring Salamander	Gyrinophilus porphyriticus (Gyrinophilus porphyriticus porphyriticus)	X	X	X	X	X	X	X	X	X	X	4	
Amphibian	Four-toed salamander	Hemidactylium scutatum	X	X	X	X	X	X	X	X	X	X	4	
Insect	American Rubyspot, American Rubspot (VT)	Hetaerina americana	X	X	X	X	X	X	X	X	X	X	4	
Mammal	Red Bat, Eastern Red Bat	Lasiurus borealis	X	X	X	X	X	X	X	X	X	X	4	Regional conservation concern (Therres 1999)
Mussel	Eastern Pearlshell	Margaritifera margaritifera	X	X	X	X	X	X	X	X	X	X	4	
Bird	Yellow-crowned Night-heron, Yellow-crowned Nightheron, Yellow-crowned Night heron	Nyctanassa violacea (Nyctanassa violaceus)	X	X	X	X	X	X	X	X	X	X	4	
Insect	Brook Snaketail	Ophiogomphus aspersus	X	X	X	X	X	X	X	X	X	X	4	
Fish	Sea Lamprey	Petromyzon marinus	X	X	X	X	X	X	X	X	X	X	4	
Fish	Round Whitefish	Prosopium cylindraceum (Prosopium cylindraceus)	X	X	X	X	X	X	X	X	X	X	4	Regional conservation concern (Therres 1999)
Bird	Louisiana Waterthrush	Seiurus motacilla	X	X	X	X	X	X	X	X	X	X	4	Regional conservation concern (Therres 1999)
Mammal	Northern Water Shrew	Sorex palustris	X	X	X	X	X	X	X	X	X	X	4	
Fish	Common Shiner	Luxilus cornutus (Luxilus comutus)	X	X	X	X	X	X	X	X	X	X	4	
Fish	Lake sturgeon	Acipenser fulvescens	X	X	X	X	X	X	X	X	X	X	3	Regional conservation concern (Therres 1999)
Insect	Subarctic Darner	Aeshna subarctica	X	X	X	X	X	X	X	X	X	X	3	
Mussel	Triangle Floater	Alasmidonta undulata	X	X	X	X	X	X	X	X	X	X	3	
Fish	Hickory Shad	Alosa mediocris	X	X	X	X	X	X	X	X	X	X	3	
Fish	Eastern sand darter	Ammocrypta pellucida (Ammocrypta pellucidum)	X	X	X	X	X	X	X	X	X	X	3	Regional conservation concern (Therres 1999)
Mussel	Alewife floater	Anodonta implicata	X	X	X	X	X	X	X	X	X	X	3	
Bird	Lesser Scaup	Aythya affinis	X	X	X	X	X	X	X	X	X	X	3	
Bird	Green Heron	Butorides virescens	X	X	X	X	X	X	X	X	X	X	3	
Insect	Puritan Tiger Beetle	Cicindela puritana	X	X	X	X	X	X	X	X	X	X	3	federally threatened (current 2005)
Reptile	Bog Turtle	Clemmys muhlenbergii	X	X	X	X	X	X	X	X	X	X	3	federally threatened (current 2005)
Bird	Black-billed Cuckoo	Coccyzus erythrophthalmus	X	X	X	X	X	X	X	X	X	X	3	
Insect	Arrowhead Spiketail	Cordulegaster obliqua	X	X	X	X	X	X	X	X	X	X	3	
Fish	Lake Whitefish	Coregonus clupeaformis (Coregonus clupeaformis)	X	X	X	X	X	X	X	X	X	X	3	
Bird	Little Blue Heron	Egretta caerulea	X	X	X	X	X	X	X	X	X	X	3	
Bird	Snowy Egret	Egretta thula	X	X	X	X	X	X	X	X	X	X	3	
Insect	New England Bluet	Enallagma laterale	X	X	X	X	X	X	X	X	X	X	3	
Insect	Pine Barrens Bluet	Enallagma recurvatum	X	X	X	X	X	X	X	X	X	X	3	
Insect	Roaring Brook Mayfly, A Mayfly	Epeorus frisoni	X	X	X	X	X	X	X	X	X	X	3	
Fish	Creek Chubsucker	Erimyzon oblongus	X	X	X	X	X	X	X	X	X	X	3	
Bird	Rusty Blackbird	Euphagus carolinus	X	X	X	X	X	X	X	X	X	X	3	
Insect	Two-spotted Skipper	Euphyes bimacula (Euphys bimacula)	X	X	X	X	X	X	X	X	X	X	3	
Insect	Sedge Skipper, Dion Skipper	Euphyes dion	X	X	X	X	X	X	X	X	X	X	3	
Insect	Midland Clubtail	Gomphus fraternus	X	X	X	X	X	X	X	X	X	X	3	
Insect	Slender Clearwing, Slender Clearwing Sphinx Moth, Graceful Clearwing	Hemaris gracilis	X	X	X	X	X	X	X	X	X	X	3	
Fish	Mooneye	Hiodon tergisus	X	X	X	X	X	X	X	X	X	X	3	Regional conservation concern (Therres 1999)
Mammal	Silver-haired Bat	Lasionycteris noctivagans	X	X	X	X	X	X	X	X	X	X	3	Regional conservation concern (Therres 1999)

Appendix B: SGCN Overlap in the Study Area, All States

Taxa	Common Name	Latin Name	State								SGCN in # of States	Reason		
			CT	MA	ME	NH	NJ	NY	PA	RI			VT	
Mammal	Hoary Bat	Lasiurus cinereus	X	X									3	Regional conservation concern (Therres 1999)
Fish	Redbreast Sunfish	Lepomis auritus	X	X									3	
Insect	Bog Copper	Lycaena epixanthe	X	X							X	X	3	
Mammal	Eastern Small-footed Bat, Eastern smallfooted myotis, Small-footed bat	Myotis leibii	X	X					X				3	Regional conservation concern (Therres 1999)
Mammal	Indiana Bat, Indiana Myotis	Myotis sodalis	X	X					X				3	Federally endangered (current 2005)
Fish	Ironcolor shiner	Notropis chalybaeus (Notropis chaleybaeus)						X	X	X	X		3	
Fish	Blackchin shiner	Notropis heterodon						X	X	X	X	X	3	
Insect	Pitcher Plant Borer Moth, Pitcher Plant Borer	Papaipema appassionata	X	X								X	3	
Bird	Northern Parula	Parula americana	X	X				X	X	X	X		3	
Bird	Eastern towhee, Rufous-sided Towhee	Pipilo erythrophthalmus (Pipilo erythrophthalmus)					X	X	X	X	X	X	3	
Amphibian	Western chorus frog, Western striped chorus frog	Pseudacris triseriata					X	X	X	X	X	X	3	
Bird	Virginia Rail	Rallus limicola	X	X				X	X	X	X		3	
Amphibian	Northern Leopard Frog	Rana pipiens		X				X	X	X	X	X	3	Regional conservation concern (Therres 1999)
Reptile	Queen snake	Regina septemvittata		X				X	X	X	X	X	3	Regional conservation concern (Therres 1999)
Fish	Blacknose Dace	Rhinichthys atratulus	X	X								X	3	
Fish	Longnose Dace	Rhinichthys cataractae	X	X								X	3	
Fish	Lake Trout	Salvelinus namaycush			X	X						X	3	ME Togue pop only
Insect	Ski-tailed Emerald	Somatochlora elongata	X	X								X	3	
Insect	Forcinate Emerald	Somatochlora forcipata	X	X								X	3	
Bird	Common Tern	Sterna hirundo		X				X	X	X	X	X	3	Regional conservation concern (Therres 1999)
Mussel	Creeper, Squawfoot	Strophitus undulatus (Strophitus undulates)										X	3	
Crustacean	Piedmont Groundwater Amphipod	Stygobromus tenuis tenuis (Stygobromus tenuis)	X	X									3	
Insect	Riverine Clubtail	Stylurus amnicola	X	X									3	
Insect	Zebra Clubtail	Stylurus scudderi	X	X								X	3	
Insect	Arrow Clubtail	Stylurus spiniceps	X	X								X	3	
Snail	Boreal Turret Snail, Mossy valvata	Valvata sincera		X								X	3	
Bird	Blue-winged Warbler	Vermivora pinus	X	X					X				3	
Bird	Yellow-throated Vireo	Vireo flavifrons	X	X					X				3	
Insect	Ebony Boghaunter	Williamsonia fletcheri	X	X					X			X	3	

**Appendix C: SGCN Overlap in Borderlands of Neighboring States,
Species with Opportunity for Transboundary Management**

	CT	MA	ME	NH	NJ	NY	PA	RI	VT
CT		1				2		3	
MA	1			4		5		6	7
ME				8					
NH		4	8						9
NJ						10	11		
NY	2	5			10		12		13
PA					11	12			
RI	3	6							
VT		7		9		13			

- Table 1: Connecticut and Massachusetts
- Table 2: Connecticut and New York
- Table 3: Connecticut and Rhode Island
- Table 4: Massachusetts and New Hampshire
- Table 5: Massachusetts and New York
- Table 6: Massachusetts and Rhode Island
- Table 7: Massachusetts and Vermont
- Table 8: Maine and New Hampshire
- Table 9: New Hampshire and Vermont
- Table 10: New Jersey and New York
- Table 11: New Jersey and Pennsylvania
- Table 12: New York and Pennsylvania
- Table 13: New York and Vermont

Table 1: Connecticut and Massachusetts

Taxa	Common Name	Latin Name	Habitat on Borderland (according to MA)?	If no habitat on borderland, habitat in/on shared resource?	Notes
Amphibian	Blue-spotted Salamander	Ambystoma laterale	y		CT contains maps but not on a species by species basis, nor on a useful scale - taxa density maps per state. CT also only relates species to general habitat types, not geographically specific habitats.
Amphibian	Eastern Spadefoot, Eastern Spadefoot Toad	Scaphiopus holbrookii	y		
Amphibian	Jefferson Salamander	Ambystoma jeffersonianum	y		
Amphibian	Marbled Salamander	Ambystoma opacum	y		
Bird	American Bittern	Botaurus lentiginosus (Botaurus lentiginosus)	y		
Bird	American Black Duck	Anas rubripes	n		
Bird	American Woodcock	Scolopax minor		All counties in MA	
Bird	Bald Eagle	Haliaeetus leucocephalus (Haliaeetus leucophalus)	y		
Bird	Broad-winged Hawk	Buteo platypterus		Common throughout MA except on Cape and Islands	
Bird	Canada Warbler	Wilsonia canadensis		Connecticut River Valley and west	
Bird	Common Loon	Gavia immer	n		
Bird	Common Moorhen	Gallinula chloropus	y		
Bird	Green Heron	Butorides virescens		found throughout MA	
Bird	King Rail	Rallus elegans	n		
Bird	Least Bittern	Ixobrychus exilis	n	Connecticut River Valley	
Bird	Louisiana Waterthrush	Seiurus motacilla			
Bird	Northern Parula	Parula americana	n		
Bird	Pied-billed Grebe	Podilymbus podiceps	n		
Bird	Sedge Wren	Cistothorus platensis (Cistothorus platensis)	n	Connecticut River Valley	
Bird	Sora	Porzana carolina			
Crustacean	Coastal Swamp Amphipod	Synurella chamberlaini	n		
Crustacean	Piedmont Groundwater Amphipod	Stygobromus tenuis tenuis (Stygobromus tenuis)	y		
Fish	Alewife	Alosa pseudoharengus			
Fish	American Brook Lamprey	Lampetra appendix	y		
Fish	American Eel	Anguilla rostrata	y		
Fish	American Shad	Alosa sapidissima		Connecticut & Merrimack Mainstems	
Fish	Atlantic Salmon	Salmo salar	y		
Fish	Atlantic Sturgeon	Acipenser oxyrinchus (Acipenser oxyrinchus)	n	Connecticut & Merrimack Mainstems	
Fish	Banded Sunfish	Enneacanthus obesus	y		
Fish	Blacknose Dace	Rhinichthys atratulus	y		
Fish	Blueback Herring	Alosa aestivalis		Connecticut & Merrimack Mainstems	
Fish	Bridle Shiner	Notropis bifrenatus	y		
Fish	Brook Trout, Eastern Brook Trout	Salvelinus fontinalis	y		
Fish	Burbot (Cusk)	Lota lota	y		
Fish	Common Shiner	Luxilus cornutus (Luxilus cornutus)	y		
Fish	Creek Chubsucker	Erimyzon oblongus	y		
Fish	Fallfish	Semotilus corporalis	y		
Fish	Longnose Dace	Rhinichthys cataractae	y		
Fish	Longnose Sucker	Catostomus catostomus	y		
Fish	Sea Lamprey	Petromyzon marinus		Connecticut & Merrimack Mainstems	
Fish	Shortnose Sturgeon	Acipenser brevirostrum (Acipenser brevirostrum)	y		
Fish	Slimy Sculpin	Cottus cognatus	y		
Fish	Swamp Darter	Etheostoma fusiforme	n		
Fish	White Sucker	Catostomus commersoni	y		
Insect	Banded Bog Skimmer, Ringed Boghaunter	Williamsonia lintneri	n		
Insect	Cobra clubtail	Gomphus vastus	n	Connecticut & Merrimack Mainstems	
Insect	Harpoon Clubtail	Gomphus desertus	y		
Insect	Midland Clubtail	Gomphus fraternus	n	Connecticut & Merrimack Mainstems	
Insect	Pitcher Plant Borer Moth, Pitcher Plant Borer	Papaipema appassinata	n		
Insect	Puritan Tiger Beetle	Cicindela puritana	n	Connecticut & Merrimack Mainstems	
Insect	Rapids Clubtail	Gomphus quadricolor	n	Connecticut & Merrimack Mainstems	
Insect	Riverine Clubtail	Stylurus amnicola	y		
Insect	Scarlet Bluet	Enallagma pictum	y		
Insect	Sedge Skipper, Dion Skipper	Euphyes dion	y		
Insect	Skillet Clubtail	Gomphus ventricosus	n	Connecticut & Merrimack Mainstems	
Insect	Ski-tailed Emerald	Somatochlora elongata	n		
Insect	Slender Clearwing, Slender Clearwing Sphinx Moth, Graceful Clearwing	Hemaris gracilis	n	Connecticut River Watershed	
Mammal	Eastern Small-footed Bat, Eastern smallfooted myotis, Small-footed bat	Myotis leibii	n		
Mammal	Indiana Bat, Indiana Myotis	Myotis sodalis			
Mammal	Northern Water Shrew	Sorex palustris	y		
Mammal	Southern Bog Lemming	Synaptomys cooperi	n		
Mussel	Brook Floater	Alasmidonta varicosa	y		
Mussel	Dwarf Wedge Mussel	Alasmidonta heterodon	n	Connecticut & Merrimack Mainstems	
Mussel	Eastern Pond Mussel	Ligumia nasuta	n	Connecticut & Merrimack Mainstems	
Mussel	Tidewater Mucket	Leptodea ochracea	n	Connecticut & Merrimack Mainstems	
Mussel	Yellow lampmussel	Lampsilis cariosa	n	Connecticut & Merrimack Mainstems	
Reptile	Ribbon Snake (Eastern Ribbonsnake)	Thamnophis sauritus (Thamnophis sauritus sauritus)			
Reptile	Spotted Turtle	Clemmys guttata	y		

Table 2: Connecticut and New York

Taxa	Common Name	Latin Name	Habitat on Borderland (according to NY)?	Notes
Amphibian	Blue-spotted Salamander	Ambystoma laterale	y	CT contains maps but not on a species by species basis, nor on a useful scale - taxa density maps per state. CT also only relates species to general habitat types, not geographically specific habitats. NY distribution information only available by watershed (in Species Group Reports) NY Watersheds bordering CT are the Atlantic Ocean Basin, Lower Hudson, and Upper Hudson.
Amphibian	Eastern Spadefoot, Eastern Spadefoot Toad	Scaphiopus holbrookii	y	
Amphibian	Fowler's Toad	Bufo fowleri (Bufo woodhousii fowleri)	y	
Amphibian	Jefferson Salamander	Ambystoma jeffersonianum	y	
Amphibian	Marbled Salamander	Ambystoma opacum	y	
Bird	American Bittern	Botaurus lentiginosus (Botaurus lentiginosus)	y	
Bird	American Black Duck	Anas rubripes	y	
Bird	Bald Eagle	Haliaeetus leucocephalus (Haliaeetus leucophalus)	y	
Bird	Black-crowned Night-heron	Nycticorax nycticorax	y	
Bird	Blue-winged Teal	Anas discors	n	
Bird	Common Loon	Gavia immer	y	
Bird	Great Egret	Ardea alba	y	
Bird	Greater Scaup	Aythya marila	y	
Bird	King Rail	Rallus elegans	y	
Bird	Least Bittern	Ixobrychus exilis	y	
Bird	Lesser Scaup	Aythya affinis	y	
Bird	Little Blue Heron	Egretta caerulea	y	
Bird	Osprey	Pandion haliaetus	y	
Bird	Pied-billed Grebe	Podilymbus podiceps	y	
Bird	Snowy Egret	Egretta thula	y	
Bird	Yellow-crowned Night-heron, Yellow-crowned Nightheron, Yellow-crowned Night heron	Nyctanassa violacea (Nyctanassa violaceus)	y	
Crustacean	Piedmont Groundwater Amphipod	Stygobromus tenuis tenuis (Stygobromus tenuis)		
Fish	Alewife	Alosa pseudoharengus	y	
Fish	American Eel	Anguilla rostrata	y	
Fish	American Shad	Alosa sapidissima	y	
Fish	Atlantic Salmon	Salmo salar		
Fish	Atlantic Sturgeon	Acipenser oxyrinchus (Acipenser oxyrhynchus)	y	
Fish	Banded Sunfish	Enneacanthus obesus	y	
Fish	Blueback Herring	Alosa aestivalis	y	
Fish	Brook Trout, Eastern Brook Trout	Salvelinus fontinalis	y	
Fish	Rainbow Smelt	Osmerus mordax	y	
Fish	Shortnose Sturgeon	Acipenser brevirostrum (Acipenser brevirostrum)	y	
Fish	Swamp Darter	Etheostoma fusiforme	y	
Insect	American Rubyspot, American Rubspot (VT)	Hetaerina americana	y	
Insect	Banded Bog Skimmer, Ringed Boghaunter	Williamsonia lintneri		
Insect	Cobra clubtail	Gomphus vastus	n	
Insect	Midland Clubtail	Gomphus fraternus	y	
Insect	Rapids Clubtail	Gomphus quadricolor	y	
Insect	Riverine Clubtail	Stylurus amnicola		
Insect	Scarlet Bluet	Enallagma pictum	y	
Insect	Skillet Clubtail	Gomphus ventricosus		

Table 2: Connecticut and New York

Taxa	Common Name	Latin Name	Habitat on Borderland (according to NY)?	Notes
Insect	Sparkling Jewelwing	Calopteryx dimidiata		
Insect	Tiger spiketail	Cordulegaster erronea	y	
Mussel	Brook Floater	Alasmidonta varicosa	n	
Mussel	Dwarf Wedge Mussel	Alasmidonta heterodon	n	
Mussel	Eastern Pearlshell	Margaritifera margaritifera	y	
Mussel	Eastern Pond Mussel	Ligumia nasuta	y	
Mussel	Tidewater Mucket	Leptodea ochracea		
Mussel	Yellow lampmussel	Lampsilis cariosa	y	
Reptile	Ribbon Snake (Eastern Ribbonsnake)	Thamnophis sauritus (Thamnophis sauritus sauritus)	y	
Reptile	Spotted Turtle	Clemmys guttata	y	

Table 3: Connecticut and Rhode Island

Taxa	Common Name	Latin Name	Notes	
Amphibian	Blue-spotted Salamander	Ambystoma laterale	CT contains maps but not on a species by species basis, nor on a useful scale - taxa density maps per state. CT also only relates species to general habitat types, not geographically specific habitats.	
Amphibian	Eastern Newt	Notophthalmus viridescens		
Amphibian	Eastern Spadefoot, Eastern Spadefoot Toad	Scaphiopus holbrookii		
Amphibian	Fowler's Toad	Bufo fowleri (Bufo woodhousii fowleri)		
Amphibian	Marbled Salamander	Ambystoma opacum		
Amphibian	Northern Dusky Salamander (Dusky Salamander)	Desmognathus fuscus		
Amphibian	Northern Spring Salamander, Spring Salamander	Gyrinophilus porphyriticus (Gyrinophilus porphyriticus porphyriticus)		
Amphibian	Wood Frog	Rana sylvatica		
Bird	American Bittern	Botaurus lentiginosus (Botaurus lentiginosus)		RI contains maps but not on a species by species basis, nor on a useful scale - taxa density maps per state. RI also only relates species to general habitat types, not geographically specific habitats.
Bird	American Black Duck	Anas rubripes		
Bird	Bald Eagle	Haliaeetus leucocephalus (Haliaeetus leucocephalus)		
Bird	Blue-winged Teal	Anas discors		
Bird	Canada Warbler	Wilsonia canadensis		
Bird	Common Moorhen	Gallinula chloropus		
Bird	Eastern Kingbird	Tyrannus tyrannus		
Bird	Least Bittern	Ixobrychus exilis		
Bird	Marsh Wren	Cistothorus palustris		
Bird	Northern Waterthrush	Seiurus noveboracensis		
Bird	Orchard Oriole	Icterus spurius		
Bird	Osprey	Pandion haliaetus		
Bird	Pied-billed Grebe	Podilymbus podiceps		
Bird	Sora	Porzana carolina		
Bird	Willow Flycatcher	Empidonax traillii		
Fish	Alewife	Alosa pseudoharengus		
Fish	American Brook Lamprey	Lampetra appendix		
Fish	American Eel	Anguilla rostrata		
Fish	American Shad	Alosa sapidissima		
Fish	Atlantic Salmon	Salmo salar		
Fish	Atlantic Sturgeon	Acipenser oxyrinchus (Acipenser oxyrhynchus)		
Fish	Atlantic Tomcod (Tomcod)	Microgadus tomcod		
Fish	Banded Sunfish	Enneacanthus obesus		
Fish	Blacknose Dace	Rhinichthys atratulus		
Fish	Blueback Herring	Alosa aestivalis		
Fish	Bridle Shiner	Notropis bifrenatus		
Fish	Brook Trout, Eastern Brook Trout	Salvelinus fontinalis		
Fish	Common Shiner	Luxilus cornutus (Luxilus comutus)		
Fish	Creek Chubsucker	Erimyzon oblongus		
Fish	Longnose Dace	Rhinichthys cataractae		
Fish	Menhaden	Brevoortia tyrannus		
Fish	Rainbow Smelt	Osmerus mordax		
Fish	Redbreast Sunfish	Lepomis auritus		
Fish	Shortnose Sturgeon	Acipenser brevirostrum (Acipenser brevirostrum)		
Insect	American Rubyspot, American Rubspot (VT)	Hetaerina americana		
Insect	Banded Bog Skimmer, Ringed Boghaunter	Williamsonia lintneri		
Insect	bog copper	Lycena epixanthe		

Table 3: Connecticut and Rhode Island

Taxa	Common Name	Latin Name	Notes
Insect	Bog Tiger Moth (an arctiid moth)	<i>Grammia speciosa</i>	
Insect	Crimson-ringed Whiteface	<i>Leucorrhinia glacialis</i>	
Insect	Mustached Clubtail	<i>Gomphus adelphus</i>	
Insect	Pitcher Plant Borer Moth	<i>Papaipema appassionata</i>	
Insect	Scarlet Bluet	<i>Enallagma pictum</i>	
Insect		<i>Agonum darlingtoni</i>	
Mammal	Northern Water Shrew	<i>Sorex palustris</i>	
Mammal	Southern Bog Lemming	<i>Synaptomys cooperi</i>	
Mussel	Brook Floater	<i>Alasmidonta varicosa</i>	
Mussel	Eastern Pearlshell	<i>Margaritifera margaritifera</i>	
Mussel	Eastern Pond Mussel	<i>Ligumia nasuta</i>	
Mussel	Tidewater Mucket	<i>Leptodea ochracea</i>	
Reptile	Ribbon Snake (Eastern Ribbonsnake)	<i>Thamnophis sauritus (Thamnophis sauritus sauritus)</i>	
Reptile	Spotted Turtle	<i>Clemmys guttata</i>	

Table 4: Massachusetts and New Hampshire

Taxa	Common Name	Latin Name	Habitat on Borderland (according to MA)?	Habitat on Borderland (according to NH)?	If no habitat on borderland, habitat in/on shared resource?	Notes
Amphibian	Blue-spotted Salamander	Ambystoma laterale	y			MA has town maps (301 towns) and hydrological maps
Amphibian	Jefferson Salamander	Ambystoma jeffersonianum	y			
Amphibian	Marbled Salamander	Ambystoma opacum	y			NH has town maps
Amphibian	Northern Leopard Frog	Rana pipiens	y			
Bird	American Bittern	Botaurus lentiginosus (Botaurus lentiginosus)	y			Process: MA maps checked for borderlands MA plan checked for common resource Then for blanks and 'n's', NH plan checked for borderland or common resource
Bird	American Black Duck	Anas rubripes	y			
Bird	American Woodcock	Scolopax minor	y			
Bird	Bald Eagle	Haliaeetus leucocephalus (Haliaeetus leucophalus)	y			
Bird	Canada Warbler	Wilsonia canadensis			Connecticut River Valley and west	
Bird	Common Loon	Gavia immer	y			
Bird	Common Moorhen	Gallinula chloropus	n			
Bird	Least Bittern	Ixobrychus exilis	y			
Bird	Northern Harrier	Circus cyaneus	n			
Bird	Pied-billed Grebe	Podilymbus podiceps	n	y		
Bird	Sedge Wren	Cistothorus platensis (Cistothorus plantensis)	n			
Fish	Alewife	Alosa pseudoharengus			Lower section of the Merrimack River, Connecticut River Mainstem Watershed	
Fish	American Brook Lamprey	Lampetra appendix	n		Merrimack River watershed	
Fish	American Eel	Anguilla rostrata	y			
Fish	American Shad	Alosa sapidissima			Connecticut & Merrimack Mainstems	
Fish	Atlantic Salmon	Salmo salar			Connecticut & Merrimack Mainstems	
Fish	Atlantic Sturgeon	Acipenser oxyrinchus (Acipenser oxyrinchus)	y			
Fish	Banded Sunfish	Enneacanthus obesus	y			
Fish	Bridle Shiner	Notropis bifrenatus	y			
Fish	Brook Trout, Eastern Brook Trout	Salvelinus fontinalis	y			
Fish	Burbot (Cusk)	Lota lota	n		Connecticut River Watershed	
Fish	Northern Redbelly Dace	Phoxinus eos	n			
Fish	Sea Lamprey	Petromyzon marinus			Merrimack Mainstem	
Fish	Shortnose Sturgeon	Acipenser brevirostrum (Acipenser brevirostrum)	y			
Fish	Slimy Sculpin	Cottus cognatus	y			
Fish	Swamp Darter	Etheostoma fusiforme	y			
Fish	Tessellated Darter	Etheostoma olmstedii			Connecticut and Merrimack River Watersheds	
Insect	Banded Bog Skimmer, Ringed Boghaunter	Williamsonia lintneri	y			
Insect	Cobblestone Tiger Beetle	Cicindela marginipennis	n		Connecticut and Merrimack River Mainstreams	
Mussel	Brook Floater	Alasmidonta varicosa	y			
Mussel	Dwarf Wedge Mussel	Alasmidonta heterodon	n		Connecticut River Watershed	
Mussel	Eastern Pond Mussel	Ligumia nasuta	y			
Reptile	Blanding's Turtle	Emydoidea blandingii (Emys blandingii)	y			
Reptile	Ribbon Snake (Eastern Ribbonsnake)	Thamnophis sauritus (Thamnophis sauritus sauritus)		y		
Reptile	Spotted Turtle	Clemmys guttata	y			

Table 5: Massachusetts and New York

Taxa	Common Name	Latin Name	Habitat on Borderland (according to MA)?	Habitat on Borderland (according to NY)?	Notes
Amphibian	Blue-spotted Salamander	Ambystoma laterale	n	y	NY distribution information only available by watershed (in Species Group Reports)
Amphibian	Eastern Spadefoot, Eastern Spadefoot Toad	Scaphiopus holbrookii	n	y	
Amphibian	Four-toed salamander	Hemidactylium scutatum	n	y	NY Watershed bordering MA is the Upper Hudson
Amphibian	Jefferson Salamander	Ambystoma jeffersonianum	y		
Amphibian	Marbled Salamander	Ambystoma opacum	n	y	MA town maps (301 towns)
Bird	American Bittern	Botaurus lentiginosus (Botaurus lentiginosus)	y		
Bird	American Black Duck	Anas rubripes	n	y	Process: MA maps checked for borderlands
Bird	Bald Eagle	Haliaeetus leucocephalus (Haliaeetus leucophalus)	n	y	
Bird	Common Loon	Gavia immer	n	y	MA plan checked for common resource
Bird	King Rail	Rallus elegans	n	y	
Bird	Least Bittern	Ixobrychus exilis	y		Then for blanks and 'n's', NY plan checked for borderland or common resource
Bird	Pied-billed Grebe	Podilymbus podiceps	y		
Crustacean	Piedmont Groundwater Amphipod	Stygobromus tenuis tenuis (Stygobromus tenuis)	n		resource
Fish	Alewife	Alosa pseudoharengus	n		
Fish	American Eel	Anguilla rostrata	n	y	
Fish	American Shad	Alosa sapidissima	n	y	
Fish	Atlantic Salmon	Salmo salar	n		
Fish	Atlantic Sturgeon	Acipenser oxyrinchus (Acipenser oxyrinchus)	n	y	
Fish	Banded Sunfish	Enneacanthus obesus	n		
Fish	Blueback Herring	Alosa aestivalis	n	y	
Fish	Brook Trout, Eastern Brook Trout	Salvelinus fontinalis	y		
Fish	Shortnose Sturgeon	Acipenser brevirostrum (Acipenser brevirostrum)	n	y	
Fish	Swamp Darter	Etheostoma fusiforme	n		
Insect	Arrow Clubtail	Stylurus spiniceps	n		
Insect	Banded Bog Skimmer, Ringed Boghaunter	Williamsonia lintneri	n		
Insect	Brook Snaketail	Ophiogomphus aspersus	n	y	
Insect	Cobblestone Tiger Beetle	Cicindela marginipennis	n		
Insect	Cobra clubtail	Gomphus vastus	n		
Insect	Comet Darner	Anax longipes	n	y	
Insect	Ebony Boghaunter	Williamsonia fletcheri	n	y	
Insect	Forcinate Emerald	Somatochlora forcipata	n	y	
Insect	Incurvate Emerald	Somatochlora incurvata	n	y	
Insect	Little Bluet	Enallagma minusculum	n		
Insect	Midland clubtail	Gomphus fraternus	n	y	
Insect	Mocha Emerald	Somatochlora linearis	n	y	
Insect	New England Bluet	Enallagma laterale	n	y	
Insect	Pine Barrens Bluet	Enallagma recurvatum	n		
Insect	Rapids Clubtail	Gomphus quadricolor	n	y	
Insect	Riverine Clubtail	Stylurus amnicola	n		
Insect	Scarlet Bluet	Enallagma pictum	n		
Insect	Skilllet Clubtail	Gomphus ventricosus	n		
Insect	Spatterdock Darner	Aeshna mutata (Aeshna mutata)	n	y	
Insect	Spine-Crowned Clubtail	Gomphus abbreviatus	n		
Insect	Subarctic Darner	Aeshna subarctica	n		
Insect	Sylvan Hygrotus Diving Beetle	Hygrotus sylvanus			
Mussel	Brook Floater	Alasmidonta varicosa	n		
Mussel	Dwarf Wedge Mussel	Alasmidonta heterodon	n		
Mussel	Eastern Pond Mussel	Ligumia nasuta	n	y	
Mussel	Tidewater Mucket	Leptodea ochracea	n		
Mussel	Yellow lampmussel	Lampsilis cariosa	n	y	

Table 5: Massachusetts and New York

Taxa	Common Name	Latin Name	Habitat on Borderland (according to MA)?	Habitat on Borderland (according to NY)?	Notes
Reptile	Blanding's Turtle	<i>Emydoidea blandingii</i> (<i>Emys blandingii</i>)	n	y	
Reptile	Bog Turtle	<i>Clemmys muhlenbergii</i>		y	
Reptile	Ribbon Snake (Eastern Ribbonsnake)	<i>Thamnophis sauritus</i> (<i>Thamnophis sauritus sauritus</i>)		y	
Reptile	Spotted Turtle	<i>Clemmys guttata</i>	y		
Reptile	Wood Turtle	<i>Glyptemys insculpta</i> (previously called <i>Clemmys insculpta</i>)	y		
Snail	Mossy Valvata (Boreal Turret Snail)	<i>Valvata sincera</i>	n		

Table 6: Massachusetts and Rhode Island

Taxa	Common Name	Latin Name	Habitat on Borderland (according to MA)?	If no habitat on borderland, habitat in/on shared resource?	Notes
Amphibian	Eastern Spadefoot, Eastern Spadefoot Toad	Scaphiopus holbrookii	n		MA town maps (301 towns)
Amphibian	Four-toed salamander	Hemidactylium scutatum	y		
Amphibian	Marbled Salamander	Ambystoma opacum	y		
Amphibian	Northern Leopard Frog	Rana pipiens	n		RI contains maps but not on a species by species basis, nor on a useful scale - taxa density maps per state. RI also only relates species to general habitat types, not geographically specific habitats.
Bird	American Bittern	Botaurus lentiginosus (Botaurus lentiginosus)	n		
Bird	American Black Duck	Anas rubripes	y		
Bird	Bald Eagle	Haliaeetus leucocephalus (Haliaeetus leucophalus)	n		
Bird	Canada Warbler	Wilsonia canadensis	n		
Bird	Common Moorhen	Gallinula chloropus	n		
Bird	Least Bittern	Ixobrychus exilis	y		
Bird	Pied-billed Grebe	Podilymbus podiceps	n		
Bird	Sora	Porzana carolina			
Fish	Alewife	Alosa pseudoharengus			
Fish	American Brook Lamprey	Lampetra appendix	y		
Fish	American Eel	Anguilla rostrata	y		
Fish	American Shad	Alosa sapidissima			
Fish	Atlantic Salmon	Salmo salar			
Fish	Atlantic Sturgeon	Acipenser oxyrinchus (Acipenser oxyrinchus)	n		
Fish	Banded Sunfish	Enneacanthus obesus	y		
Fish	Blacknose Dace	Rhinichthys atratulus	y		
Fish	Blueback Herring	Alosa aestivalis			
Fish	Bridle Shiner	Notropis bifrenatus	y		
Fish	Brook Trout, Eastern Brook Trout	Salvelinus fontinalis	y		
Fish	Common Shiner	Luxilus cornutus (Luxilus cornutus)	y		
Fish	Creek Chubsucker	Erimyzon oblongus	y		
Fish	Longnose Dace	Rhinichthys cataractae	y		
Fish	Shortnose Sturgeon	Acipenser brevirostrum (Acipenser brevirostrum)	n		
Insect	Banded Bog Skimmer, Ringed Boghaunter	Williamsonia lintneri	y		
Insect	Brook Snaketail	Ophiogomphus aspersus	n		
Insect	Coastal Swamp Metarranthis	Metarranthis pilosaria	n		
Insect	Comet Darner	Anax longipes	y		
Insect	Coppery emerald	Somatochlora georgiana	n		
Insect	Hessel's Hairstreak	Callophrys hesseli	y		
Insect	Pale Green Pinion Moth	Lithophane viridipallens	n		
Insect	Pine Barrens Bluet	Enallagma recurvatum	y		
Insect	Pitcher Plant Borer Moth, Pitcher Plant Borer	Papaipema appassionata	n		
Insect	Scarlet Bluet	Enallagma pictum	y		
Insect	Spatterdock Darner	Aeshna mutata (Aeshna mutata)	n		
Insect	Spine-crowned Clubtail	Gomphus abbreviatus	n		
Insect	Zebra Clubtail	Stylurus scudderi	n		
Mammal	Northern Water Shrew	Sorex palustris	n		
Mammal	Southern Bog Lemming	Synaptomys cooperi	n		
Mussel	Brook Floater	Alasmidonta varicosa	n		
Mussel	Creeper, Squawfoot	Strophitus undulatus (Strophitus undulates)	y		
Mussel	Eastern Pond Mussel	Ligumia nasuta	y		
Mussel	Tidewater Mucket	Leptodea ochracea	n	Taunton River Watershed	
Mussel	Triangle Floater	Alasmidonta undulata	y		
Reptile	Ribbon Snake (Eastern Ribbonsnake)	Thamnophis sauritus (Thamnophis sauritus sauritus)			
Reptile	Spotted Turtle	Clemmys guttata	y		
Reptile	Wood turtle	Glyptemys insculpta (previously called Clemmys insculpta)	y		

Table 7: Massachusetts and Vermont

Taxa	Common Name	Latin Name	Habitat on Borderland (according to MA)?	Habitat on Borderland (according to VT)?	If no habitat on borderland, habitat in/on shared resource?	Notes
Amphibian	Blue-spotted Salamander	Ambystoma laterale	n	y		VT relates species to general habitat types, and geographically to one of seven biophysical regions except for insect groups, which are given species-by-species by town.
Amphibian	Four-toed salamander	Hemidactylium scutatum	n	y		
Amphibian	Jefferson Salamander	Ambystoma jeffersonianum	y			
Bird	American Bittern	Botaurus lentiginosus (Botaurus lentiginosus)	n	y		VT biophysical regions neighboring MA are Southern Green Mountains, Taconic Mountains, and Southern Vermont Piedmont
Bird	American Black Duck	Anas rubripes		y		
Bird	American Woodcock	Scolopax minor	y			
Bird	Bald Eagle	Haliaeetus leucocephalus (Haliaeetus leucophalus)	y			
Bird	Canada Warbler	Wilsonia canadensis			Connecticut River Valley and West	
Bird	Common Loon	Gavia immer	n	y		
Bird	Least Bittern	Ixobrychus exilis				
Bird	Northern Harrier	Circus cyaneus	n	y		
Bird	Pied-billed Grebe	Podilymbus podiceps	y			
Bird	Sedge Wren	Cistothorus platensis (Cistothorus plantensis)	n			
Bird	Sora	Porzana carolina				
Crustacean	Appalachian Brook Crayfish	Cambarus bartonii (Camburus bartonii)	y			MA has town maps (301 towns) and hydrological maps
Crustacean	Taconic Cave Amphipod	Stygobromus borealis	n	y		
Fish	American Brook Lamprey	Lampetra appendix	n			Process: MA maps checked for borderlands MA plan checked for common resource Then for blanks and 'n's', VT plan checked for borderland or common resource
Fish	American Eel	Anguilla rostrata	y			
Fish	American Shad	Alosa sapidissima			Connecticut River Mainstem	
Fish	Atlantic Salmon	Salmo salar			Connecticut River Mainstem	
Fish	Blueback Herring	Alosa aestivalis			Connecticut River Mainstem	
Fish	Bridle Shiner	Notropis bifrenatus	y			
Fish	Brook Trout, Eastern Brook Trout	Salvelinus fontinalis	y			
Fish	Sea Lamprey	Petromyzon marinus			Connecticut River Mainstem	
Insect	A Stonefly (Lawrence Sallfly)	Alloperla voinae				
Insect	Brook Snaketail	Ophiogomphus aspersus	n			
Insect	Cobblestone Tiger Beetle	Cicindela marginipennis	n		Connecticut River Mainstem	
Insect	Cobra clubtail	Gomphus vastus	n		Connecticut River Mainstem	
Insect	Comet Darner	Anax longipes	n			
Insect	Ebony Boghaunter	Williamsonia fletcheri	n			
Insect	Forcipate Emerald	Somatochlora forcipata	n			
Insect	Kennedy's Emerald	Somatochlora kennedyi (Somatochlora kennedyis)	n			
Insect	New England Bluet	Enallagma laterale	y			
Insect	Puritan Tiger Beetle	Cicindela puritana	n		Connecticut River Mainstem	
Insect	Rapids Clubtail	Gomphus quadricolor	n		Connecticut River Mainstem	
Insect	Riffle Snaketail	Ophiogomphus carolus	n			
Insect	Sedge Skipper, Dion Skipper	Euphyes dion	n	y		
Insect	Skillet Clubtail	Gomphus ventricosus	n		Connecticut River Mainstem	
Insect	Ski-tailed Emerald	Somatochlora elongata	n	y		
Insect	Spatterdock Darner	Aeshna mutata (Aeshna mutata)	n	y		
Insect	Spine-Crowned Clubtail	Gomphus abbreviatus	n	y		
Insect	Stygian Shadowdragon	Neurocordulia yamaskanensis	n		Connecticut River Mainstem	
Insect	Subarctic Darner	Aeshna subarctica	n			
Insect	Zebra Clubtail	Stylurus scudderi	n			
Mammal	Northern Water Shrew	Sorex palustris	n	y		
Mammal	Southern Bog Lemming	Synaptomys cooperi	n	y		
Mussel	Brook Floater	Alasmidonta varicosa	n		Connecticut River Basin	
Mussel	Dwarf Wedge Mussel	Alasmidonta heterodon	n		Connecticut River Mainstem	
Reptile	Ribbon Snake (Eastern Ribbonsnake)	Thamnophis sauritus (Thamnophis sauritus sauritus)		y		
Reptile	Spotted Turtle	Clemmys guttata	n	y		
Reptile	Wood Turtle	Glyptemys insculpta (previously called Clemmys insculpta)	y			
Snail	Boreal Turret Snail, Mossy valvata	Valvata sincera	n			

Table 8: Maine and New Hampshire

Taxa	Common Name	Latin Name	Habitat on Borderland (according to NH)?	Habitat on Borderland (according to ME)?	Notes
Amphibian	Blue-spotted Salamander	Ambystoma laterale	y		Distribution of species in ME is described by one of six geographical regions. Regions bordering on New Hampshire are Coastal, West, and South.
Amphibian	Blue-spotted Salamander (complex)	Ambystoma laterale x jeffersonianum		y	
Amphibian	Jefferson Salamander	Ambystoma jeffersonianum	y		
Bird	American Bittern	Botaurus lentiginosus (Botaurus lentiginosus)	y		NH has town maps
Bird	American Black Duck	Anas rubripes	y		
Bird	American Woodcock	Scolopax minor	y		Process: NH maps checked for borderlands or common resource
Bird	Bald Eagle	Haliaeetus leucocephalus (Haliaeetus leucocephalus)	y		
Bird	Canada Warbler	Wilsonia canadensis		y	Then for blanks and 'n's', ME plan checked for borderland or common resource
Bird	Common Loon	Gavia immer	y		
Bird	Common Moorhen	Gallinula chloropus	y		In New Hampshire, Ambystoma jeffersonianum and Ambystoma laterale are believed to exist as pure breeds, however, in the NH SWAP the two species are listed together and it is mentioned that the hybrid species (Ambystoma laterale x jeffersonianum) is prevalent, however the hybrid was not listed separately as it was in Maine.
Bird	Great Blue Heron	Ardea herodias	y		
Bird	Least Bittern	Ixobrychus exilis	y		
Bird	Pied-billed Grebe	Podilymbus podiceps	y		
Bird	Rusty Blackbird	Euphagus carolinus	y		
Bird	Sedge Wren	Cistothorus platensis (Cistothorus plantensis)	n	y	
Fish	American Eel	Anguilla rostrata		y	
Fish	American Shad	Alosa sapidissima			
Fish	Atlantic Salmon	Salmo salar		y	
Fish	Atlantic Sturgeon	Acipenser oxyrinchus (Acipenser oxyrhynchus)			
Fish	Brook Trout, Eastern Brook Trout	Salvelinus fontinalis	y		
Fish	Burbot (Cusk)	Lota lota	y		
Fish	Redfin Pickerel	Esox americanus (Esox americanus americanus)	y		
Fish	Lake Trout	Salvelinus namaycush	y		
Fish	Lake Whitefish	Coregonus clupeaformis (Coregonus clupeaforms)	y		
			n, native y, self-sust. stocked		
Fish	Rainbow Smelt	Osmerus mordax		y	
Fish	Round Whitefish	Prosopium cylindraceum (Prosopium cylindraceus)	n		
Fish	Shortnose Sturgeon	Acipenser brevirostrum (Acipenser brevirostrum)			
Fish	Swamp Darter	Etheostoma fusiforme	n	y	
Insect	Banded Bog Skimmer, Ringed Boghaunter	Williamsonia lintneri	y		
Mussel	Brook Floater	Alasmidonta varicosa	n	y	
Reptile	Blanding's Turtle	Emydoidea blandingii (Emys blandingii)	y		
Reptile	Spotted Turtle	Clemmys guttata	y		
Reptile	Wood Turtle	Glyptemys insculpta (previously called Clemmys insculpta)	y		

Table 9: New Hampshire and Vermont

Taxa	Common Name	Latin Name	Habitat on Borderland (according to NH)?	Habitat on Borderland (according to VT)?	If no habitat on borderland, habitat in/on shared resource?	Notes
Amphibian	Blue-spotted Salamander	Ambystoma laterale	y			NH has town maps
Amphibian	Fowler's Toad	Bufo fowleri (Bufo woodhousii fowleri)	n	y		
Amphibian	Jefferson Salamander	Ambystoma jeffersonianum	y			VT relates species to general
Bird	American Bittern	Botaurus lentiginosus (Botaurus lentiginosus)	y			habitat types, and geographically to
Bird	American Black Duck	Anas rubripes	y			one of seven biophysical regions
Bird	American Woodcock	Scolopax minor	y			except for insect groups, which are
Bird	Bald Eagle	Haliaeetus leucocephalus (Haliaeetus leucophalus)	y			given species-by-species by town.
Bird	Canada Warbler	Wilsonia canadensis		y		VT biophysical regions neighboring
Bird	Cerulean Warbler	Dendroica cerulea	y			NH are Northern Highlands,
Bird	Common Loon	Gavia immer	y			Southern Vermont Piedmont, and
Bird	Eastern towhee, Rufous-sided Towhee	Pipilo erythrophthalmus (Pipilo erythrophthalmus)	y			Northern Vermont Piedmont
Bird	Great Blue Heron	Ardea herodias	y			
Bird	Least Bittern	Ixobrychus exilis	n			Population distribution in
Bird	Northern Harrier	Circus cyaneus	y			biophysical regions described as
Bird	Osprey	Pandion haliaetus	y			"Certain" warranted inclusion as a
Bird	Pied-billed Grebe	Podilymbus podiceps	y			'yes' in this chart.
Bird	Red-shouldered Hawk, Red Shouldered Hawk	Buteo lineatus	n	y		
Bird	Rusty Blackbird	Euphagus carolinus	y			Process:
Bird	Sedge Wren	Cistothorus platensis (Cistothorus plantensis)	n			NH maps checked for borderlands
Bird	Spruce grouse	Falcipectus canadensis	y			NH plan checked for common
Bird	Veery	Catharus fuscescens		y		resource
Fish	American Brook Lamprey	Lampetra appendix	n			Then for blanks and 'n's', VT plan
Fish	American Eel	Anguilla rostrata		y	Connecticut River Watershed	checked for borderland or common
Fish	American Shad	Alosa sapidissima		y	Connecticut River Watershed	resource
Fish	Atlantic Salmon	Salmo salar			Connecticut River Watershed	
Fish	Bridle Shiner	Notropis bifrenatus	n			
Fish	Brook Trout, Eastern Brook Trout	Salvelinus fontinalis	y			
Fish	Lake Trout	Salvelinus namaycush	y			
Fish	Lake Whitefish	Coregonus clupeaformis (Coregonus clupeaformis)	y			
Fish	Redfin Pickerel	Esox americanus (Esox americanus americanus)	n			
Fish	Round Whitefish	Prosopium cylindraceum (Prosopium cylindraceus)	y			
Fish	Sea Lamprey	Petromyzon marinus	n			
Insect	Cobblestone Tiger Beetle	Cicindela marginipennis	y			
Mammal	Northern bog lemming	Synaptomys borealis sphagnicola (Synaptomys borealis)	n			
Mammal	Red Bat, Eastern Red Bat	Lasiurus borealis	y			
Mammal	Silver-haired Bat	Lasiorycteris noctivagans	n			
Mussel	Brook Floater	Alasmidonta varicosa	n			
Mussel	Dwarf Wedge Mussel	Alasmidonta heterodon	y			
Reptile	Ribbon Snake (Eastern Ribbonsnake)	Thamnophis sauritus (Thamnophis sauritus sauritus)	n	y		
Reptile	Spotted Turtle	Clemmys guttata	n	y		

Table 10: New Jersey and New York

Taxa	Common Name	Latin Name	Habitat on Borderland (according to NJ)?	Habitat on Borderland (according to NY)?	Notes
Amphibian	Blue-spotted Salamander	Ambystoma laterale	y		NJ associates species with 26 different geographical conservation zones and regions, as well as with habitat descriptions.
Amphibian	Fowler's Toad	Bufo fowleri (Bufo woodhousii fowleri)	y		
Amphibian	Jefferson Salamander	Ambystoma jeffersonianum	y		
Amphibian	Longtail Salamander (Long-tailed salamander) (Eurycea longicauda)	Eurycea longicauda	y		
Amphibian	Marbled Salamander	Ambystoma opacum	y		Conservation zones bordering NY include: Piedmont Plains (Northern and Raritan Bay) and Skylands (Upper Delaware River Valley and Kitatinny Ridge, Kitatinny Valley, and Northern Highlands).
Amphibian	Tiger Salamander (Eastern tiger salamander)	Ambystoma tigrinum	n	y	
Bird	American Bittern	Botaurus lentiginosus (Botaurus lentiginosus)	y		NY distribution information only available by watershed (in Species Group Reports)
Bird	American Black Duck	Anas rubripes	y		
Bird	Atlantic brant	Branta bernicla	y		NY Watersheds bordering NJ are the Atlantic, Delaware, Lower Hudson, and Upper Hudson.
Bird	Bald Eagle	Haliaeetus leucocephalus (Haliaeetus leucophalus)	y		
Bird	Black scoter	Melanitta nigra	y		Process: NJ maps & tables checked for borderlands NJ plan checked for common resource
Bird	Black-crowned Night-heron	Nycticorax nycticorax	y		
Bird	Cattle egret	Bubulcus ibis	n	y	Then for blanks and 'n's', NY plan checked for borderland or common resource
Bird	Common eider	Somateria mollissima	n	y	
Bird	Glossy ibis	Plegadis falcinellus	y		Then for blanks and 'n's', NY plan checked for borderland or common resource
Bird	Great Egret	Ardea alba	y		
Bird	Greater Scaup	Aythya marila	y		Then for blanks and 'n's', NY plan checked for borderland or common resource
Bird	Harlequin Duck	Histrionicus histrionicus	n	y	
Bird	Horned grebe	Podiceps auritus	y		Then for blanks and 'n's', NY plan checked for borderland or common resource
Bird	King Rail	Rallus elegans	y		
Bird	Least Bittern	Ixobrychus exilis	y		Then for blanks and 'n's', NY plan checked for borderland or common resource
Bird	Lesser Scaup	Aythya affinis	y		
Bird	Little Blue Heron	Egretta caerulea	y		Then for blanks and 'n's', NY plan checked for borderland or common resource
Bird	Long-tailed duck	Clangula hyemalis	y		
Bird	Northern pintail	Anas acuta	y		Then for blanks and 'n's', NY plan checked for borderland or common resource
Bird	Osprey	Pandion haliaetus	y		
Bird	Pied-billed Grebe	Podilymbus podiceps	y		Then for blanks and 'n's', NY plan checked for borderland or common resource
Bird	Red-throated loon	Gavia stellata	y		
Bird	Snowy Egret	Egretta thula	n	y	Then for blanks and 'n's', NY plan checked for borderland or common resource
Bird	Surf scoter	Melanitta perspicillata	y		
Bird	Tricolored heron	Egretta tricolor	n	y	Then for blanks and 'n's', NY plan checked for borderland or common resource
Bird	White-winged scoter	Melanitta fusca	y		
Bird	Yellow-crowned Night-heron, Yellow-crowned Nightheron, Yellow-crowned Night heron	Nyctanassa violacea (Nyctanassa violaceus)	y		Then for blanks and 'n's', NY plan checked for borderland or common resource
Fish	Atlantic Sturgeon	Acipenser oxyrinchus (Acipenser oxyrhynchus)	n	y	
Fish	Banded Sunfish	Enneacanthus obesus	n	y	Then for blanks and 'n's', NY plan checked for borderland or common resource
Fish	Brook Trout, Eastern Brook Trout	Salvelinus fontinalis	y		
Fish	Comely shiner	Notropis amoenus	n	y	Then for blanks and 'n's', NY plan checked for borderland or common resource
Fish	Ironcolor shiner	Notropis chalybaeus (Notropis chaleybaeus)	n	y	
Fish	Rainbow Smelt	Osmerus mordax	n	y	Then for blanks and 'n's', NY plan checked for borderland or common resource
Fish	Shortnose Sturgeon	Acipenser brevirostrum (Acipenser brevirostrum)	n	y	
Mussel	Brook Floater	Alasmidonta varicosa	y		Then for blanks and 'n's', NY plan checked for borderland or common resource
Mussel	Dwarf Wedge Mussel	Alasmidonta heterodon	y		
Mussel	Eastern Pond Mussel	Ligumia nasuta	n	y	Then for blanks and 'n's', NY plan checked for borderland or common resource
Mussel	Green floater	Lasmigona subviridis	n	n	
Mussel	Tidewater Mucket	Leptodea ochracea	y		Then for blanks and 'n's', NY plan checked for borderland or common resource
Mussel	Yellow lampmussel	Lampsilis cariosa	y		
Reptile	Queen snake	Regina septemvittata	n	n	Then for blanks and 'n's', NY plan checked for borderland or common resource
Reptile	Spotted Turtle	Clemmys guttata	y		
Reptile	Wood Turtle	Glyptemys insculpta (previously called Clemmys insculpta)	y		Then for blanks and 'n's', NY plan checked for borderland or common resource

Table 11: New Jersey and Pennsylvania

Taxa	Common Name	Latin Name	Habitat on Borderland (according to NJ)?	Notes
Amphibian	Jefferson Salamander	Ambystoma jeffersonianum	y	NJ associates species with 26 different geographical conservation zones and regions, as well as with habitat descriptions. Conservation zones bordering PA include: Piedmont Plains (Central, Southern) and Skylands (Upper Delaware River Valley & Kittatinny Ridge, Kittatinny Valley, Upper Delaware/Musconetcong River Valley, Central Highlands, and Southern Highlands).
Bird	American Bittern	Botaurus lentiginosus (Botaurus lentiginosus)	y	
Bird	Bald Eagle	Haliaeetus leucocephalus (Haliaeetus leucophalus)	y	
Bird	Black-crowned Night-heron	Nycticorax nycticorax	y	
Bird	Great Egret	Ardea alba	y	
Bird	King Rail	Rallus elegans	y	
Bird	Least Bittern	Ixobrychus exilis	y	
Bird	Marsh Wren	Cistothorus palustris	y	
Bird	Northern Harrier	Circus cyaneus	y	
Bird	Osprey	Pandion haliaetus	y	
Bird	Sedge Wren	Cistothorus platensis (Cistothorus plantensis)	y	
Bird	Short-eared Owl	Asio flammeus	y	
Bird	Virginia Rail	Rallus limicola	y	
Bird	Yellow-crowned Night-heron, Yellow-crowned Nightheron, Yellow-crowned Night heron	Nyctanassa violacea (Nyctanassa violaceus)	n	
Fish	Atlantic Sturgeon	Acipenser oxyrinchus (Acipenser oxyrhynchus)	n	
Fish	Banded Sunfish	Enneacanthus obesus	n	
Fish	Bridle Shiner	Notropis bifrenatus	y	
Fish	Hickory Shad	Alosa mediocris	y	
Fish	Ironcolor shiner	Notropis chalybaeus (Notropis chaleybaeus)	y	
Fish	Rainbow Smelt	Osmerus mordax	y	
Fish	Shortnose Sturgeon	Acipenser brevirostrum (Acipenser brevirostrum)	y	
Reptile	Queen snake	Regina septemvittata	y	
Reptile	Spotted Turtle	Clemmys guttata	y	

Table 12: New York and Pennsylvania

Taxa	Common Name	Latin Name	Habitat on Borderland (according to NY)?	Notes
Amphibian	Eastern massasauga	<i>Sistrurus c. catenatus</i> (<i>Sistrurus catenatus catenatus</i>)	y	NY distribution information only
Amphibian	Eastern Spadefoot, Eastern Spadefoot Toad	<i>Scaphiopus holbrookii</i>	n	available by watershed (in Species Group Reports)
Amphibian	Hellbender	<i>Cryptobranchus alleganiensis</i>	y	NY Watersheds bordering PA are the
Amphibian	Jefferson Salamander	<i>Ambystoma jeffersonianum</i>	y	Allegheny, Delaware, Lake Erie,
Amphibian	Southern leopard frog (Coastal Plain Leopard Frog)	<i>Rana sphenoccephala</i>	n	Southwest Ontario, and Susquehanna.
Amphibian	Western chorus frog, Western striped chorus frog	<i>Pseudacris triseriata</i>	y	
Bird	American Bittern	<i>Botaurus lentiginosus</i> (<i>Botaurus lentiginosus</i>)	y	
Bird	Bald Eagle	<i>Haliaeetus leucocephalus</i> (<i>Haliaeetus leucophalus</i>)	y	PA only associates species with general
Bird	Black Tern	<i>Chlidonias niger</i>	y	habitat types, not geographically specific
Bird	Black-crowned Night-heron	<i>Nycticorax nycticorax</i>	y	habitats. Perhaps they do in
Bird	Great Egret	<i>Ardea alba</i>	y	Appendices, however, these are not
Bird	King Rail	<i>Rallus elegans</i>	y	available.
Bird	Least Bittern	<i>Ixobrychus exilis</i>	y	
Bird	Osprey	<i>Pandion haliaetus</i>	y	
Bird	Yellow-crowned Night-heron, Yellow-crowned Nightheron, Yellow-crowned Night heron	<i>Nyctanassa violacea</i> (<i>Nyctanassa violaceus</i>)	n	
Fish	Atlantic Sturgeon	<i>Acipenser oxyrinchus</i> (<i>Acipenser oxyrhynchus</i>)	n	
Fish	Banded Sunfish	<i>Enneacanthus obesus</i>	n	
Fish	Blackchin shiner	<i>Notropis heterodon</i>	y	
Fish	Bluebreast darter	<i>Etheostoma camurum</i>	y	
Fish	Eastern sand darter	<i>Ammocrypta pellucida</i> (<i>Ammocrypta pellucidum</i>)	y	
Fish	Gilt darter	<i>Percina evides</i>		
Fish	Gravel chub	<i>Erimystax x-punctatus</i>	y	
Fish	Iowa darter	<i>Etheostoma exile</i>	y	
Fish	Ironcolor shiner	<i>Notropis chalybaeus</i> (<i>Notropis chaleybaeus</i>)	y	
Fish	Lake sturgeon	<i>Acipenser fulvescens</i>	y	
Fish	Longear sunfish	<i>Lepomis megalotis</i>	y	
Fish	Longhead darter	<i>Percina macrocephala</i>	y	
Fish	Mooneye	<i>Hiodon tergisus</i>	y	
Fish	Mountain brook lamprey	<i>Ichthyomyzon greeleyi</i>	y	
Fish	Ohio lamprey	<i>Ichthyomyzon bdellium</i>	y	
Fish	Rainbow Smelt	<i>Osmerus mordax</i>	n	
Fish	Redfin shiner	<i>Lythrurus umbratilis</i>	y	
Fish	Shortnose Sturgeon	<i>Acipenser brevirostrum</i> (<i>Acipenser brevirostrum</i>)	n	
Fish	Silver chub	<i>Machrybopsis storeriana</i>		
Fish	Spotted darter	<i>Etheostoma maculatum</i>	y	
Fish	Streamline chub	<i>Erimystax dissimilis</i>	y	
Reptile	Blanding's Turtle	<i>Emydoidea blandingii</i> (<i>Emys blandingii</i>)	y	
Reptile	Bog Turtle	<i>Clemmys muhlenbergii</i>	n	
Reptile	Northern cricket frog	<i>Acris crepitans</i>	n	
Reptile	Queen snake	<i>Regina septemvittata</i>	y	
Reptile	Ribbon Snake (Eastern Ribbonsnake)	<i>Thamnophis sauritus</i> (<i>Thamnophis sauritus sauritus</i>)	y	
Reptile	Spotted Turtle	<i>Clemmys guttata</i>	y	

Table 13: New York and Vermont

Taxa	Common Name	Latin Name	Habitat on Borderland (according to VT)?	Habitat on Borderland (according to NY)?	Notes
Amphibian	Blue-spotted Salamander	Ambystoma laterale	y		VT relates species to general habitat types, and geographically to one of seven biophysical regions except for insect groups, which are given species-by-species by town. VT biophysical regions neighboring NY are Taconic Mountains and Champlain Valley
Amphibian	Four-toed salamander	Hemidactylium scutatum	y		
Amphibian	Fowler's Toad	Bufo fowleri (Bufo woodhousii fowleri)		n	
Amphibian	Jefferson Salamander	Ambystoma jeffersonianum	y		
Amphibian	Western chorus frog, Western striped chorus frog	Pseudacris triseriata	y		
Bird	American Bittern	Botaurus lentiginosus (Botaurus lentiginosus)	y		
Bird	American Black Duck	Anas rubripes	y		
Bird	Bald Eagle	Haliaeetus leucocephalus (Haliaeetus leucophalus)		y	
Bird	Black Tern	Chlidonias niger	y		
Bird	Black-crowned Night-heron	Nycticorax nycticorax		y	
Bird	Blue-winged Teal	Anas discors	y		Population distribution in biophysical regions described as "Certain" warranted inclusion as a 'yes' in this chart.
Bird	Common Loon	Gavia immer		y	
Bird	Least Bittern	Ixobrychus exilis	y		
Bird	Osprey	Pandion haliaetus	y		
Bird	Pied-billed Grebe	Podilymbus podiceps	y		
Fish	American Eel	Anguilla rostrata	y		
Fish	American Shad	Alosa sapidissima		n	
Fish	Atlantic Salmon	Salmo salar			
Fish	Blackchin shiner	Notropis heterodon	y		
Fish	Blueback Herring	Alosa aestivalis	y		
Fish	Brook Trout, Eastern Brook Trout	Salvelinus fontinalis	y		Process: VT maps checked for borderlands VT plan checked for common resource Then for blanks and 'n's', NY plan checked for borderland or common resource
Fish	Eastern sand darter	Ammocrypta pellucida (Ammocrypta pellucidum)	y		
Fish	Lake sturgeon	Acipenser fulvescens	y		
Fish	Mooneye	Hiodon tergisus	y		
Fish	Round Whitefish	Prosopium cylindraceum (Prosopium cylindraceus)		y	
Insect	A Mayfly	Ameletus tertius		n	
Insect	A mayfly	Eurylophella bicoloroides	y		
Insect	A tiger beetle	Cicindela ancocisconensis		y	
Insect	American Rubyspot, American Rubspot (VT)	Hetaerina americana	y		
Insect	Black Meadowhawk	Sympetrum danae	y		
Insect	Brook Snaketail	Ophiogomphus aspersus	y		
Insect	Cobblestone Tiger Beetle	Cicindela marginipennis		n	
Insect	Cobra clubtail	Gomphus vastus	n		
Insect	Comet Darner	Anax longipes	n		
Insect	Ebony Boghaunter	Williamsonia fletcheri	n	y	
Insect	Forcinate Emerald	Somatochlora forcipata	y		
Insect	Gray petaltail	Tachopteryx thoreyi		n	
Insect	Lake emerald	Somatochlora cingulata	n		
Insect	New England Bluet	Enallagma laterale	n		
Insect	Rapids Clubtail	Gomphus quadricolor	y		
Insect	Ringed Emerald	Somatochlora albicincta	n		
Insect	Roaring Brook Mayfly, A Mayfly	Epeorus frisoni		n	
Insect	Skillet Clubtail	Gomphus ventricosus	n		
Insect	Spatterdock Darner	Aeshna mutata (Aeshna mutata)	n		
Insect	Spine-Crowned Clubtail	Gomphus abbreviatus	n		
Insect	Subarctic bluet	Coenagrion interrogatum	n		

Table 13: New York and Vermont

Taxa	Common Name	Latin Name	Habitat on Borderland (according to VT)?	Habitat on Borderland (according to NY)?	Notes
Insect	Subarctic Darner	Aeshna subarctica	n		
Mussel	Alewite floater	Anodonta implicata		n	
Mussel	Black sandshell	Ligumia recta	y		
Mussel	Brook Floater	Alasmidonta varicosa	n		
Mussel	Dwarf Wedge Mussel	Alasmidonta heterodon	n		
Mussel	Eastern Pearlshell	Margaritifera margaritifera	y		
Mussel	Elktoe	Alasmidonta marginata		n	
Mussel	Pink heelsplitter	Potamilus alatus	y		
Mussel	Pocketbook	Lampsilis ovata	y		
Reptile	Common mudpuppy	Necturus maculosus	y		
Reptile	Ribbon Snake (Eastern Ribbonsnake)	Thamnophis sauritus (Thamnophis sauritus sauritus)	y		
Reptile	Spotted Turtle	Clemmys guttata		y	
Reptile	Stinkpot (Common Musk Turtle)	Sternotherus odoratus	y		
Reptile	Wood Turtle	Glyptemys insculpta (previously called Clemmys insculpta)	y		
Snail	Boreal Turret Snail, Mossy valvata	Valvata sincera	y		
Snail	Buffalo pebblesnail	Gillia altilis	y		
Snail	Fingered valvata (Fringed valvata)	Valvata lewisi	y		
Snail	Spindle lymnaea	Acella haldemani			