

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

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## **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.<sup>1</sup> 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."<sup>2</sup> 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."<sup>3</sup> 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

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<sup>1</sup> 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).

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

<sup>3</sup> 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.

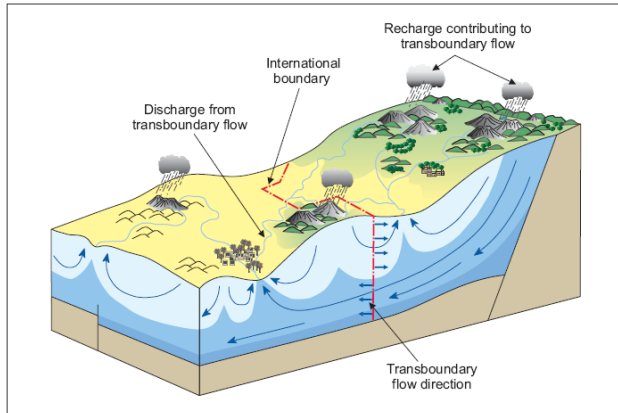


Figure 1

## **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."<sup>4</sup>

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."<sup>5</sup>

## **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

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

<sup>5</sup> 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.<sup>6</sup> 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

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<sup>6</sup> 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.<sup>7</sup>

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).

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<sup>7</sup> 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.<sup>8</sup> In Maine, it is believed that the majority of Blue Spotted Salamanders are really hybrids.<sup>9</sup> 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.<sup>10</sup> 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

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<sup>8</sup> 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](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](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>.

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

<sup>10</sup> The four states were CT, PA, NY, and MA.

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

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.<sup>15</sup> 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-<sup>16</sup>100%.<sup>17</sup> 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,

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

<sup>12</sup> 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.

<sup>13</sup> 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.)

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

<sup>15</sup> This is based on results presented in our Regional study.

<sup>16</sup> 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.

<sup>17</sup> 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.<sup>18</sup> 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.<sup>19</sup>

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.<sup>20</sup> 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.<sup>21</sup> 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

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<sup>18</sup> 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?*

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

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

<sup>21</sup> 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.<sup>22</sup> 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.”<sup>23</sup> Differing priorities across states in regard to dam removal also has a significant effect on the number of removal projects.<sup>24</sup> 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.”<sup>25</sup> 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.<sup>26</sup>

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

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

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

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

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

<sup>26</sup> Trout Unlimited, “Eastern Water: The Problem,”

[http://www.tu.org/site/c.kkLRJ7MSKtH/b.3267717/k.7196/Eastern\\_Water\\_The\\_Problem.htm](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.<sup>27</sup> 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.

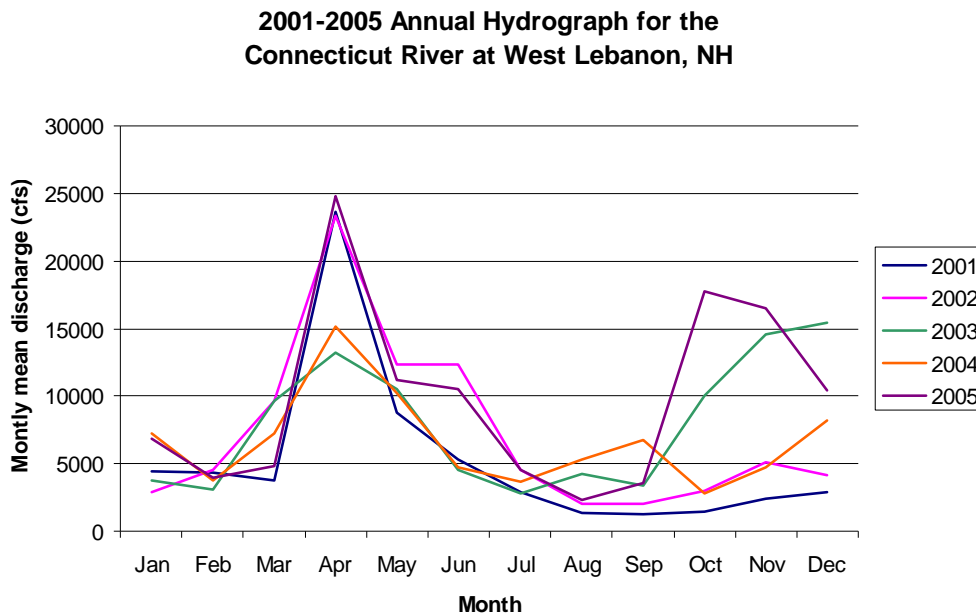


Figure 2<sup>28</sup>

## 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

<sup>27</sup> 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>.

<sup>28</sup> 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.<sup>29</sup> 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.<sup>30</sup> 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.”<sup>31</sup>

## **Water Quality**

Six agencies in the study area listed pollution as one of the general threats facing the biodiversity of their state.<sup>32</sup> 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.<sup>33</sup> Decreased water quality exacerbates the problems caused by other anthropogenic alterations to freshwater ecosystems.

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

<sup>30</sup> Trout Unlimited, “Eastern Water FAQ’s,”

[http://www.tu.org/site/c.kkLRJ7MSKtH/b.3303627/k.C035/Eastern\\_Water\\_FAQs.htm](http://www.tu.org/site/c.kkLRJ7MSKtH/b.3303627/k.C035/Eastern_Water_FAQs.htm).

<sup>31</sup> Trout Unlimited, “Eastern Water FAQ’s.”

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

<sup>33</sup> Eastern Brook Trout Joint Venture (EBTJV), *Eastern Brook Trout: Roadmap to Restoration*, [http://www.easternbrooktrout.org/docs/EBTJV\\_RoadmapToRestoration\\_FINAL.pdf](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.<sup>34</sup> 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.<sup>35</sup> 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).<sup>36</sup> 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

<sup>34</sup> This is based on results presented in our Regional study.

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

<sup>36</sup> 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*

<b>Total Numbers of Freshwater SGCN, SGCN, and Species in Study Area States</b>									
	<b>CT</b>	<b>MA</b>	<b>ME</b>	<b>NH</b>	<b>NJ</b>	<b>NY</b>	<b>PA</b>	<b>RI</b>	<b>VT</b>
<b>Invertebrates</b>									
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
<b>Vertebrates</b>									
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
<b>Total</b>	<b>209</b>	<b>141</b>	<b>104</b>	<b>69</b>	<b>186</b>	<b>247</b>	<b>92</b>	<b>111</b>	<b>153</b>
<b>Total SGCN Species</b>	<b>475</b>	<b>257</b>	<b>213</b>	<b>84</b>	<b>289</b>	<b>537</b>	<b>572</b>	<b>364</b>	<b>323</b>
<b>Total Species</b>	<b>&gt;20636</b>	<b>7333-9333, estimated</b>	<b>17000+</b>	<b>10000+</b>	<b>&gt;10992</b>	<b>&gt;1385, estimated</b>	<b>&gt;10854</b>	<b>870+</b>	<b>15464-36464, estimated</b>

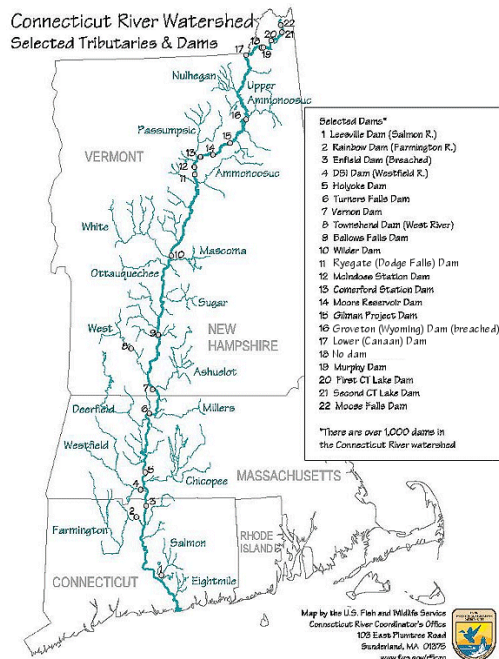
Figure 3

## 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.<sup>37</sup> 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).<sup>38</sup> It flows through four states, and has a watershed that extends more than 11,000 square miles.<sup>39</sup> 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.

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

<sup>38</sup> Map and information from Wikipedia, “The Connecticut River,” [http://en.wikipedia.org/wiki/Connecticut\\_River](http://en.wikipedia.org/wiki/Connecticut_River).

<sup>39</sup> *ibid*.

## Lake Champlain

### The Lake Champlain Basin

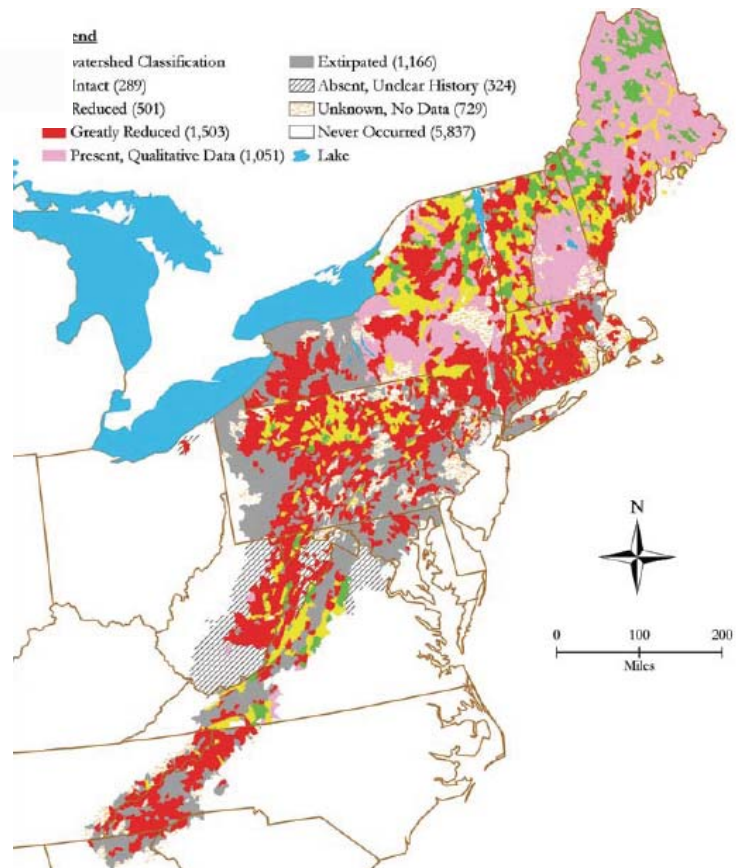


As an international basin, Lake Champlain offers an especially interesting example of interstate management. Over the course of its 120-mile length, Lake Champlain flows from Whitehall, New York north to the Canadian border, where it drains into the Richelieu River in Quebec (see map at left).<sup>40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

At a max depth of 400 feet and average depth of 64 feet, the lake has a wide range of species that inhabit it.<sup>41</sup> There are over 40 species in the Lake that are protected in Vermont and/or New York, 3 of which enjoy federal protection.<sup>42</sup> 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.



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

<sup>41</sup> *ibid.*

<sup>42</sup> 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.”<sup>43</sup> 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.<sup>44</sup>

### ***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.

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<sup>43</sup> EBTJVa, p. 6.

<sup>44</sup> *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.”<sup>45</sup> 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.<sup>46</sup> 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.”<sup>47</sup>

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

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

<sup>46</sup> 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.

<sup>47</sup> 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.<sup>48</sup> 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.<sup>49</sup> 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,

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<sup>48</sup> 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.

<sup>49</sup> 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.<sup>50</sup> 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.<sup>51</sup> However, even this has been difficult when working on grant proposals for border-regions for the same reasons mentioned above.<sup>52</sup>

### **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.”<sup>53</sup>

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.”<sup>54</sup> 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.<sup>55</sup> As is evidenced in the SWAPs, state agencies have different

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

<sup>51</sup> 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.

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

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

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

<sup>55</sup> 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.<sup>56</sup> “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.<sup>57</sup> 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.”<sup>58</sup> 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.<sup>59</sup> 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

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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.

<sup>56</sup> 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.

<sup>57</sup> CTDEP, p. 3-2.

<sup>58</sup> Glennon 2002, p. 210.

<sup>59</sup> 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](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.<sup>60</sup>

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."<sup>61</sup> 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.<sup>62</sup> (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.

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

<sup>61</sup> Trout Unlimited, "Water Policy," [http://www.tu.org/site/c.kkLRJ7MSKtH/b.3267719/k.854E/Water\\_Policy.htm](http://www.tu.org/site/c.kkLRJ7MSKtH/b.3267719/k.854E/Water_Policy.htm).

<sup>62</sup> (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** <sup>63</sup>

<sup>63</sup> 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.<sup>64</sup> 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.<sup>65</sup> 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."<sup>66</sup>

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."<sup>67</sup>

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."<sup>68</sup> 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.<sup>69</sup> Similarly, non-agency groups working for conservation and restoration consistently mention a need to find funding, time, equipment, and information.<sup>70</sup>

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<sup>64</sup> 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.

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

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

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

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

<sup>69</sup> This information comes from results described in our Regional Study.

<sup>70</sup> 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.”<sup>71</sup>

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.<sup>72</sup>

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.”<sup>73</sup>

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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.

<sup>71</sup> 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.

<sup>72</sup> 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.

<sup>73</sup> 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.”<sup>74</sup>

### ***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.<sup>75</sup> 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...”<sup>76</sup> 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.”<sup>77</sup> 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

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

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

<sup>76</sup> 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.

<sup>77</sup> 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.<sup>78</sup> Since the Alstead flood, state agencies have partnered on a number of connectivity projects where culverts have been replaced.<sup>79</sup>

## **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.<sup>80</sup> 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.<sup>81</sup>

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.<sup>82</sup>

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.”<sup>83</sup> 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

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<sup>78</sup> 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>.

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

<sup>80</sup> Adler, 1995, p. 2.

<sup>81</sup> 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.

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

<sup>83</sup> 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."<sup>84</sup>

### ***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.<sup>85</sup> 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."<sup>86</sup> 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."<sup>87</sup> 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.<sup>88</sup>

### ***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.<sup>89</sup>

## **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

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

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

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

<sup>87</sup> 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.

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

<sup>89</sup> 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.<sup>90</sup> From the agency perspective, the SWAPs are a tool to leverage funding, both from state and private sources.<sup>91</sup> 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."<sup>92</sup> 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.<sup>93</sup> 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."<sup>94</sup>

## **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..."<sup>95</sup>

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

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<sup>90</sup> 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.

<sup>91</sup> This is information from our regional piece.

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

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

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

<sup>95</sup> 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.<sup>96</sup> 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...”<sup>97</sup> 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.<sup>98</sup>

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.<sup>99</sup> 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.

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<sup>96</sup> 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.

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

<sup>98</sup> 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.

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