# FEDERAL AID PERFORMANCE REPORT

WILDLIFE MANAGEMENT
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## NORTHEAST WILDLIFE TEAMWORK STRATEGY

## REGIONAL CONSERVATION NEEDS GRANT PROGRAM

| STATE | GRANT | PERIOD |
|---|---|---|
| CONNECTICUT | T-7-R-1 | 10/1/2007 – 12/31/2017 |
| DELAWARE | T-4-R-1 | 3/13/2008 – 12/31/2017 |
| DISTRICT OF COLUMBIA | T-6-R-1 | 12/27/2007 – 12/31/2017 |
| MASSACHUSETTS | T-5-R-1 | 8/28/2007 – 12/31/2017 |
| MARYLAND | T-9-R-1 | 9/1/2007 – 12/31/2017 |
| MAINE | T-5-R-1 | 9/1/2007 – 12/31/2017 |
| NEW HAMPSHIRE | T-8-R-1 | 9/1/2007 – 12/31/2017 |
| NEW JERSEY | T-8-R-1- | 9/1/2007 – 12/31/2017 |
| NEW YORK | T-15-P-1 | 3/5/2008 – 12/31/2017 |
| PA – GAME | T-48-R-1 | 9/13/2007 – 12/31/2017 |
| PA – FISH | T-55-R-1 | 12/26/2007 – 12/31/2017 |
| RHODE ISLAND | T-5-P-1 | 4/1/2008 – 12/31/2017 |
| VIRGINIA | T-3-R-1 | 9/1/2007 – 12/31/2017 |
| VERMONT | T-1-5 | 9/1/2007 – 12/31/2017 |
| WEST VIRGINIA | T-6-R-1 | 10/23/2007 – 12/31/2017 |

**REPORT DESCRIPTION**: The purpose of the Northeast Wildlife Teamwork Strategy (NEWTS) was to develop, coordinate and implement conservation actions that were regional/sub-regional in scope, and build upon the many regional initiatives that already existed. The objectives of NEWTS were to 1) address regional wildlife conservation issues with the input and involvement of multiple parties involved in the creation and implementation of the State Wildlife Action Plans; and 2) to utilize a funding mechanism that was equitable to all Northeast states and the District of Columbia for base-level program funding, and to provide states and the District with the opportunity to obligate additional funds at their discretion to augment work on regional projects. This report describes activities for the jobs under the Northeast Wildlife Teamwork Strategy.

**JOB 1: ADMINISTRATION**

Activity 1: Partnership Development

In most years, the RFP process annually solicited partner participation in the RCN grant program. This was accomplished through working with the NE Directors to secure grant funding commitments, and with the Northeast Wildlife Administrators, Northeast Fisheries Administrators, and the Northeast Fish and Wildlife Diversity Technical Committee to generate Regional Conservation Need topic areas and score and rank proposals. Partnerships with grant applicants were developed through solicitation of proposals and providing guidance on goals, objectives and methodology.

Activity 2: Regional grant amendment and report writing

All jurisdictions had an approved federal aid grant. WMI worked with the selected contractors to gather information on work accomplished and funds expended. WMI verified that information with the RCN Technical Coordinators. The requirement for annual performance report writing was satisfied by this report.

Activity 3: Regional project contracting

Grant recipients from 2007-2016 engaged in active contracts with WMI. In conjunction with Technical Coordinators, progress toward grant milestones was monitored.

Activity 4: Reporting Accomplishments

The RCN website – www.RCNGrants.org -- was formatted to display products and activities produced by the RCN funded projects.

Activity 5: Technical Committee facilitation

Coordination of RCN grant and topic review at the Northeast Wildlife Diversity Technical Committee occurred at their annual meeting.

## JOB 2: DEVELOPMENT OF REGIONAL CONSERVATION NEEDS AND THE SELECTION OF PROPOSALS FOR IMPLEMENTATION

The text that follows is a case study of the Regional Conservation Needs grant program developed for NEAFWA Directors to advise how RCN fit into the suite of landscape conservation cooperatives active or planned within the Northeast region. Following the case history, projects funded by the RCN grant program are summarized.

Case Study: Regional Conservation Needs (RCNs)

Overview:

- The RCN program was created in 2007 as an outgrowth of the state wildlife grants program approved by Congress.
- The states agreed to commit 4% of their annual SWG apportionment to address regional/landscape conservation needs.
- Approximately $250,000-$300,000 was available annually.

Partners:

Northeast Association of Fish & Wildlife Agencies, Inc.
Wildlife Management Institute
U.S. Fish and Wildlife Service
Many non-governmental organizations that share our conservation priorities

Purpose:

- Addressed critical landscape-scale wildlife conservation needs by combining agency resources, leveraging money, establishing priorities from state wildlife action plans.
- The central goal was to develop, coordinate, and implement conservation actions at the regional or sub-regional scale, build on other regional initiatives (e.g., joint ventures), and compliment the work of individual states.

Results:

The overall approach yielded these products—

- Maps that describe regional habitats
- Consistent terminology to describe the attributes and status of those habitats
- Identification of regional conservation focus areas
- Consistent metrics to measure success and gauge effectiveness
- Project specific outcomes and strategies based on SWAPs (see below)

Success/Strengths in Approach:

- Centralized coordination for both administration (WMI), project management (e.g., Terwilliger Consulting), and project selection (NEAFWA). All were considered essential.
- The RCN program was innovative and admired by many around the country as an effective model for landscape conservation.
- Landscape-scale priorities and coordination reflected the needs of individual state fish and wildlife agencies.
- Pooling of money/leveraging of match
- Standardization of methods and approach to conservation (e.g., nomenclature and methods)
- Process of developing consensus yields strong buy-in amongst stakeholders

Weaknesses Identified in Approach:

- An annual planning cycle was not sustainable for reasons as mundane as an adequate amount of time for agency reviews. Building enough "review time" into the planning process is essential.
- The initial approach of using "requests for proposals" may have led to insufficient focus, in the opinion of some, and that approach has been replaced by endorsing larger projects spread over a longer time frame, with clear deliverables.
- Need greater involvement of other regional experts (e.g., Fisheries interests, other technical committees) to ensure that the full array of potential needs were identified and addressed via RCN funding/support.
- As a regional program with diverse stakeholders, need to ensure that oversight was also diverse (i.e., greater involvement of Administrators and Directors).
- Need to ensure regional balance in distributing these shared resources.
- Administrative challenges of contracting for some jurisdictions.
- The RCN approach may not be a true "landscape" program; is it more of a supplemental program?

Additional Findings:

- A strong and well managed governance structure was needed, addressing both the policy and technical issues, both in breadth and depth. (This ensures effective buy in at all levels of the agencies and requires appropriate delegations of authority.)
- The program would need to be updated in the event the Recovering America's Wildlife Act passes and substantially increases funding for all fish and wildlife species.

**Projects Funded through Regional Conservation Needs Grant Funds:**

The RCN Program solicited requests for proposals for 10.25 years, during which time 47 grant agreements were issued with a total of $3,411,216 of federal funds awarded. In several cases, grant recipients completed their projects for less than the awarded amount; therefore the actual federal expense was $3,194,937. Grant recipients were responsible for providing at least a 1-to-1 match ratio of non-federal funds (cash, in-kind services, waived overhead, volunteer expense). Grant recipients exceeded the 1:1 ratio and contributed $3,651,665 in non-federal match, allowing RCN federal funds to leverage $446,728 greater than was required.

WMI administration of the RCN grant program (Job 1) was set at a level not to exceed $10,500 per state per year. WMI charged $7,073 per state per year to administer the program, resulting in an underbilling of $3,426 per state per year, or a total program savings of $526,831 .

Project descriptions of RCN grants are tabled below. In each, the RCN project number is identified, the recipient organization, the title of the project, an abstract of the project, and a link to the final products on the RCN grants web page is provided.

# 2007

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| 2007-1 | NE Regional Habitat Classification System | $ 131,615 |
| | Contractor: The Nature Conservancy | Status: Complete |
| https://rcngrants.org/content/northeastern-terrestrial-wildlife-habitat-classification | | |

This project created a comprehensive wildlife habitat map of the eastern region, including all states from Maine to Virginia, west to New York, Pennsylvania and West Virginia. The map consists of a spatially comprehensive GIS grid of 30-meter pixels with a legend portraying the Northeastern Terrestrial Habitat Classification System (NETHCS), with map legends that range from coarser-scale with higher accuracy (habitats or groups of habitats) to finer-scale with lower accuracy (NVC associations or alliances).

Project Results: Maps were created using a variety of already developed and compiled GIS data layers, drawing from TNC's Ecological Land Unit (ELU) classification (Anderson and Olivero 2001), National Land Cover Dataset (NLCD) as well as data developed in the course of ongoing mapping efforts in the east. NatureServe is a partner in two major national mapping efforts,

LandFire and GAP, providing expertise in the application of the Terrestrial Ecological Systems Classification. Final maps are available at rcngrants.org.

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| 2007-2 | NE Regional Connectivity Assessment Project | $ 124,845 |
| | Contractor: The Nature Conservancy | Status: Complete |
| https://rcngrants.org/content/northeast-aquatic-connectivity | | |

The goal of this project was to support both the Northeast Fish Passage Initiative (NEFPI) and aspects of The Nature Conservancy's Northwest Atlantic Marine ecoregional assessment through the development of a regional database and specific tools and analysis. The NEFPI was developed by the Northeast states to "reconnect fragmented river, stream, coastal, reservoir, lake, and estuarine habitat by removing or bypassing key barriers to fish passage thereby enhancing populations of fish including: diadromous, obligate coldwater, Federal/State listed, and species of Greatest Conservation Need (SGCN)." In the same timeframe, The Nature Conservancy worked with state, federal and other partners to undertake an ecoregional assessment for the Northwest Atlantic Marine (NAM) ecoregion to identify the ecological systems, natural communities, and species that are representative of an ecoregion, establish long-term goals for the abundance, condition and distribution of these systems, communities, and species, and develop a portfolio of conservation areas and strategies that, if conserved or implemented, would achieve the long-term goals.

Project Results: Staff members from state and federal wildlife agencies, local universities, The Nature Conservancy and other conservation groups collaborated to calculate more than 70 different metrics that affect habitat in the Northeast's vast interconnected river systems. The outcomes - a final report with appendices, a results spreadsheet and a connectivity tool - will assist resource agencies in the Northeastern U.S. to strategically reconnect fragmented aquatic habitats by targeting removal or bypass of key barriers to fish passage.

The database produced considers nearly 14,000 dams in thirteen states and the District of Columbia and identifies locations where dam removal or fish passage construction would likely have the most significant ecological benefit. The assessment tool can be customized to consider either anadromous fish like Atlantic salmon, shad and alewife that migrate between fresh and saltwater environments, or resident fish species like brook trout; and can be used at the scale of states, regions or river basins.

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| 2007-3 | Identifying Relationships Between Invasive Species and SGCN in the Northeast | $ 77,676 |

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| | Contractor: Virginia Polytechnic Institute, CMI | Status: Complete |
| https://rcngrants.org/content/identifying-relationships-between-invasive-species-and-species-greatest-conservation-need | | |

The overall goal of the project was to produce a concise set of documents that identifies the most critical potential interactions between invasive species (including terrestrial and aquatic species) and Species of Greatest Conservation Need in the Northeast Region.

Project results: The original goal of this project was to produce a list of invasive species that posed the most significant threat to SGCNs in the Northeast Region. However, during the process of completing the project it became evident that the true value in this effort lies in the data assembled and the ability for future users to customize it for their specific needs. Therefore, the goal of this project was amended to focus on the provision of these data tables and a process for modifying them to allow users to modify them and generate lists reflecting their own importance criterion. The final report provides background information on how these data tables were developed and how they should be interpreted for prioritizing and ranking invasive species threats to SGCNs. The report provides background information on how the lists of SGCNs and invasive species were compiled and attributed.

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| 2007-4 | Development of Avian Indicators and Measures for Monitoring Threats and Effectiveness of Conservation Actions in the Northeast | $ 110,299 |
| | Contractor: American Bird Conservancy | Status: Complete |
| https://rcngrants.org/content/development-avian-indicators-and-measures-monitoring-threats-and-effectiveness-conservation | | |

Protocols:

Grassland Bird Protocol
https://rcngrants.org/sites/default/files/final_reports/Grassland%20Bird%20Protocol%20and%20Standard%20Operating%20Procedures.pdf

Tidal Marsh Bird Protocol
https://rcngrants.org/sites/default/files/final_reports/Tidal%20Marsh%20Bird%20Protocol%20and%20Standard%20Operating%20Procedures.pdf

Mountain Bird Protocol
https://rcngrants.org/sites/default/files/final_reports/Mountain%20Bird%20Protocol%20and%20Standard%20Operating%20Procedures.pdf

Northeastern wildlife and wildlife habitats are at risk from a variety of anthropogenic threats. Monitoring these threats and the effectiveness of conservation actions is the key to optimizing allocation of limited resources. Birds stand out among other wildlife taxa as particularly useful indicators, as they are widespread, observable, and sensitive to environmental change. Techniques for monitoring birds are also relatively advanced, with new field and statistical methods promising to add value to decades of past surveys. Funding was used to develop regionally coordinated bird monitoring programs that measure both threats and management effects. Programs focused upon marshes, grasslands, and mountain forests - habitats that span the northeastern landscape, contain a high percentage of vulnerable species, and encompass the region's major management issues. Products of this work include a peer-reviewed survey design, protocol, and regional database for each indicator group. This project was used accelerate implementation of "A Framework for Coordinated Bird Monitoring in the Northeast" and initiate essential components of "The Northeast Monitoring and Performance Reporting Framework".

Objectives

- To develop regionally coordinated survey designs and monitoring protocols for three indicator groups: grassland birds, marsh birds, and mountain birds
- To incorporate methods to investigate the region's most significant threats and the effectiveness of management and conservation actions
- To identify, expand, and/or build data management systems for each of the indicator groups in order to facilitate aggregation and analysis of data at desired spatial scales

- To provide coordination services for implementing key elements of "A Framework for Coordinated Bird Monitoring in the Northeast" and "The Northeast Monitoring and Performance Reporting Framework"

Project Results: Products of this work include peer-reviewed survey design, protocol and standard operating procedures for each indicator group (grassland, tidal marsh and mountain forest birds) along with a regional database for each indicator group. Support for this project accelerated implementation of "A Framework for Coordinated Bird Monitoring in the Northeast", "The Northeast Bird Monitoring Handbook" and initiated essential components of "The Northeast Monitoring and Performance Reporting Framework".

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| 2007-5 | Conservation Status of Key Habitats and SGCN in the Eastern Region | $ 106,373 |
| | Contractor: The Nature Conservancy | Status: Complete |
| https://rcngrants.org/content/conservation-status-fish-wildlife-and-natural-habitats-northeast-landscape | | |

This project summarized the regional conservation status of each key habitat and species target by overlaying information on the location and condition of the target with information on conservation land ownership and management. Because the State Wildlife Action Plans in most States identified loss of habitat due to degradation, conversion and fragmentation as the primary problem impacting SPCN in their states, the report serves as a solid platform for SGCN conservation. Production of this report also facilitated collaboration and brought into focus the regional context of the individual state conservation actions.

Product: A report detailing the Regional Conservation Status of Key Habitats and Species of Greatest Conservation Need (SGCN). The report used agreed-upon regional protocols based on the ownership, management and conversion rates of land on which species and key habitats are located. Organization and format followed the recommendations developed by NEAFWA's Northeast Regional Indicators and Performance Measures workshop. Final report is available at rcngrants.org.

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| 2007-6 | An interactive, GIS-based application to estimate continuous, unimpacted daily streamflow at ungauged locations in the Connecticut River Basin | $ 96,138 |
| | Contractor: USGS | Status: Complete |

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| https://rcngrants.org/content/interactive-gis-based-application-estimate-continuous-unimpacted-daily-streamflow-ungaged |

This proposal addressed Priority RCN Topic 3: Development of Instream Flow Standards, Guidelines, and Policies though the development of a seamless, multi-state GIS-based point-and-click application that allows users to identify a stream reach of interest in the Connecticut River basin and obtain estimated continuous daily, unimpacted or "natural" streamflow at the selected location. Streamflow estimates are intended for use to obtain environmental-flow statistics from software such as the Indicators of Hydrologic Alteration (Richter and others, 1996). The application spans the entire Connecticut River basin, including the states of Connecticut, Massachusetts, New Hampshire and Vermont.
The project integrates work completed in cooperation with the Massachusetts Department of Environmental Protection and the Connecticut Department of Environmental Protection.

Project Results: This project presents the first publicly available, map-based, regional software tool to estimate historical, unregulated, daily streamflow time series (streamflow not affected by human alteration such as dams or water withdrawals) at any user-selected ungauged river location. The map interface allows users to locate and click on a river location, which then links to a spreadsheet-based program that computes estimates of daily streamflow for the river location selected. For a demonstration region in the northeast United States, daily streamflow was, in general, shown to be reliably estimated by the software tool. Estimating the highest and lowest streamflows that occurred in the demonstration region over the period from 1960 through 2004 also was accomplished but with more difficulty and limitations. The software tool provides a general framework that can be applied to other regions for which daily streamflow estimates are needed.

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| 2007-7 | Proposal to Establish a Regional Initiative for Biomass Energy Development For Early-Succession SGCN in the Northeast | $ 73,942 |
| | Contractor: Virginia Polytechnic Institute, CMI | Status: Complete |

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| https://rcngrants.org/content/establishing-regional-initiative-biomass-energy-development-early-succession-sgcn-northeast |

This purpose of this project was to gather information about biomass production in the Northeast and establish a cooperative relationship with the biomass energy industry to minimize the negative impacts on and maximize benefits for SGCN.

Project Results: Overall, the results of this project show that biomass energy development will impact SGCN at the state and regional levels. We found that, in general, biomass systems that utilize wood from existing mature forests will result in a net negative impact to SGCN as these forests are converted to a younger state. Biomass systems implemented on existing agricultural land would result in a larger potential net positive for SGCN regardless of which biomass system was implemented. Some of the biomass systems presently under discussion result in structural or floristic components similar to those needed by species whose natural habitats are increasingly rare on the landscape. This is particularly true for "early successional species" that utilize habitats maintained through frequent disturbance. Ultimately, the interest in biomass energy development may supply the only real landscape level alternative for addressing the shortage of shrub and grassland habitat for the region. We recommend that wildlife resource management agencies become active participants in the planning and implementation phases of biomass energy project development to mitigate potential negatives and maximize potential benefits.

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| 2007-8 | Implementing Bird Action Plans for Shrubland-Dependent Species of Greatest Conservation Need in the Northeast | $ 80,736 |
| | Contractor: NEAFWA | Status: Complete |
| https://rcngrants.org/content/implementing-bird-action-plans-shrubland-dependents-northeast | | |

State Wildlife Action Plans for states in the Northeast Association of Fish and Wildlife Agencies collectively identify 87 Species of Greatest Conservation Need that are dependent upon shrubland habitats. Work under this project improved the conservation status of shrubland dependent SGCN within the northern end of Bird Conservation Region 28, which encompasses 5 states (MD, OH, PA, VA, and WV). The purpose of the project was to increase the effectiveness of existing agency and NGO private landowner technical assistance programs by giving those programs access to demonstration areas, coordinated response-monitoring data, BMPs, and

outreach tools. American Woodcock was chosen as the best SGCN species to represent the guild of shrubland dependent SGCN in the project area.

A team of experienced biologists selected management techniques for the restoration of shrublands in BCR 28. Biologists were contracted to provide technical assistance within each state in the project area, monitoring protocols were developed to measure population response, and demonstration areas were developed to showcase the use of the BMPs and response of woodcock and other shrubland species. Work was accomplished through partnership-driven sharing of technical assistance, manpower, land management, land access, and financial resources, leveraging state and federal funding from various incentive and grant programs potentially including State Wildlife Grants, NRCS Wildlife Habitat Incentives Program, North American Wetlands Council Act, USFWS Private Stewardship Grant Program, NRCS Fish and Wildlife Conservation Grant and NRCS Environmental Quality Incentive Program.

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| 2007-9 | Exploring the Connection Between Arousal Patterns in Hibernating Bats and White Nose Syndrome: Immediate Funding Needs for the Northeast Region | $ 100,000 |
| | Contractor: Bucknell University | Status: Complete |
| https://rcngrants.org/content/exploring-connection-between-arousal-patterns-hibernating-bats-and-white-nose-syndrome | | |

The objective of this project was to determine if the hibernating patterns of bats are disrupted (which could lead to starvation) by monitoring little brown bats and hibernacula at affected sites, suspected sites, and control sites during 2008-2009.

Project Results: While this project is now officially completed, because of the importance of these findings, and the continued rapid spread of WNS, we will continue to monitor hibernation patterns in WNS affected bats using the supplies purchased with this grant supplemented by those purchased with other funds. The resources from this RCN grant will assist in the longitudinal analysis of the influence of WNS on a given hibernaculum over time, providing important information about bats in an unaffected year, during the first year of infection, when mortality is high, but some survivorship occurs, and in the second year of infection, in which nearly all remaining bats will perish.

# 2008

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| 2008-1 | MacroHABSIM: Creation of a Regional Simulation Model of Fish Community Instream Habitat | $ 128,631 |
| | Contractor: Rushing Rivers Institute | Status: Complete |
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This project was intended to create a regional tool, MacroHABSIM, that estimated the amount of water needed to sustain healthy aquatic ecosystems to inform management actions in a watershed to protect the health of aquatic fauna. Some of the specific products of this work were to be: 1) an analysis of ecological integrity of all river segments in southern New England, 2) an index of hydrological habitat alteration for all river segments in southern New England for the purpose of identifying high quality river segments in need of protection and degraded river segments in need of rehabilitation, and 3) a definition of the (target) fish community that impacted stream segments would be capable of supporting if flow/habitat conditions were restored. The principal investigator curtailed the scope of work and did not complete all of the deliverables promised in the proposal. The grant was terminated prior to the end date.

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| 2008-2 | Development of Model Guidelines for Assisting Local Planning Boards with Conservation of SGCN and their Key Habitats through Local Land Use Planning | $ 300,429 |
| | Contractor: Natureserve | Status: Complete |
| https://rcngrants.org/content/development-model-guidelines-assisting-local-planning-boards-conservation-species-greatest | | |

NatureServe, Defenders of Wildlife (Defenders), the Environmental Law Institute (ELI), the Pennsylvania Natural Heritage Program (PHNP), and the Virginia Natural Heritage Program (VNHP) collaborated to provide a survey and synthesis of the programs, policies and innovations throughout the 13 Northeastern states (from Maine to Virginia). The products integrated conservation information on

species of greatest conservation need (SGCN) and their habitats with land use planning decisions. This work built upon the Northeast Terrestrial Wildlife Habitat Classification System (NETWHCS) developed by NatureServe under a separate RCN grant, as well as on the map of this classification by The Nature Conservancy in collaboration with NatureServe, also under a previous RCN grant.

The project provided conservation information about SGCN and their habitats that is accessible, easily understood by a variety of users, and that can be applied effectively at local or regional levels. The project inventoried the variety of approaches and tools available to land use planning institutions and partners throughout the Northeast region and make this information readily available through the LandScope.org website. This was accomplished through the following steps:

1. Inventory each state's the existing relevant resources and delivery mechanisms for species of greatest conservation need (SGCN) provided by states or other organizations to the land use planning community.
2. Characterize each state's current planning and legal framework
3. Compile best management practices for SGCN related to land use planning.
4. Identify funding sources that are available to aid multi-jurisdictional wildlife conservation or resource planning efforts.
5. Identify and describe the most innovative programs and projects in the form of case studies
6. Formulate a vision and description of a complete toolkit for land use planners on how to integrate information on SGCN and apply it at local or state levels of land use planning in the Northeast region.
7. Build and deliver an initial toolkit targeting users of different levels of sophistication via a website component to Landscope.org
8. Deliver a final report summarizing the methods and legal frameworks from the region and from each state to achieve alignment of wildlife conservation with land use planning and accomplishments and a detailed approach for a complete toolkit.

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| 2008-3 | Regional Focal Areas for Species of Greatest Conservation Need, Network Resilience and Connectivity | $ 146,826 |
| | Contractor: The Nature Conservancy | Status: Complete |
| https://rcngrants.org/content/regional-focal-areas-species-greatest-conservation-need-based-site-adaptive-capacity-network | | |

Focal areas for 500 species of great conservation concern were identified with respect to their resilience and adaptive capacity. The analysis utilized a previously compiled regional database of over 40,000 known species locations, contributed by the Natural Heritage

programs and ranked for current viability through the TNC ecoregional planning assessments. A regional team of scientists representing Fish and Wildlife agencies and private conservation organizations summarized the regional resiliency status of each SGCN species by coupling information on the current viability estimate of each mapped location with information relative to 1) the sites adaptive capacity; 2) the sites contribution and significance as part of a regional collection of representative occurrences; and 3) its connectivity with other sites across major latitudinal, elevation and isolation gradients. Findings were based on already developed high-quality data and expert opinion provided by the regional steering committee.

Products: A set of maps and accompanying report identifying focal areas for Species of Greatest Conservation Need (SGCN) in the Northeast based on the criteria of site adaptive capacity, network resilience and connectivity.

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| 2008-5 | Regional Indicators and Measures: Beyond Conservation Land | $ 129,608 |
| | Contractor: The Nature Conservancy | Status: Complete |
| https://rcngrants.org/content/regional-indicators-and-measures-beyond-conservation-land | | |

This project created a report summarizing the status of approximately 30 key indicators and measures specific to eight habitats and two regional species groups. The report effectively implements 75% of the NEAFWA's Northeast Monitoring and Performance Reporting Framework (Tomajer et al. in prep) developed with funding from the National Fish and Wildlife Foundation in 2006 and built upon another RCN grant awarded in 2007 which assesses the conservation status of the land containing those performance targets and summarizes their current status with respect to ownership, management intent and conversion rates. A steering committee of scientists representing Fish and Wildlife agencies, private organizations and others, directed the work. The final product helps NEAFWA states broadly assess the status of key habitats and Species of Greatest Conservation Need. Centralizing the collection and analysis of data recommended in the Northeast Monitoring and Performance Reporting Framework provides NEAFWA member states with a cost-efficient mechanism for reporting on the status of fish and wildlife, and their habitats within each state and across the Northeast region.

# 2009

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| 2009-1 | Assessing the Impacts of Climate Change on SGCN | $ 338,780 |
| | Contractor: Manomet | Status: Complete |
| https://rcngrants.org/content/assessing-likely-impacts-climate-change-northeastern-fish-and-wildlife-habitats-and-species | | |

Manomet Center for Conservation Sciences (Manomet) and the National Wildlife Federation (NWF) assisted states in the Northeastern Region to meet the challenge of climate change by:
(1) Conducting a series of one to one and half day workshops, depending on the need, throughout the Northeast. Workshops will be designed to educate state personnel on future climate change and its likely impacts on ecological resources and update them on how adaptation planning is proceeding in the Northeast and further afield. (2) Using Climate Wizard to map projected spatial variability in annual and seasonal temperature and precipitation change across the region over the remainder of this century in successive time steps. Maps of projected climate change in the Northeast will be produced.
(3) Developing a model of important habitats across the Northeast region to identify those that are likely to be most vulnerable to a changing climate and deliver a report on habitat vulnerability.
(4) Identifying vertebrate SGCN at risk from climate change and produce a report on SGCN vulnerability.
(5) Identifying appropriate climate change indicators for the habitats shown to be vulnerable in previous tasks and develop general guidance on choosing indicator species and methods to monitor.
(6) Identifying adaptation opportunities for the most vulnerable habitats and species by convening an expert panel comprising habitat experts from all 13 states to identify opportunities for increasing or maintaining resilience in the face of climate change. The results of the deliberations of the panel will be a report on adaptation options.

Project Results: The NEAFWA Habitat Vulnerability Assessment Model is now being used by multiple states to complete their state vulnerability assessments. In addition, the model has been used as an important component of training courses for Federal and NGO practitioners in vulnerability assessment.

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| 2009-2 | Geospatial Condition Analysis of Northeast Habitats<br>Based on the Northeast SGCN Habitat Maps | $ 114,604 |
| | Contractor: The Nature Conservancy | Status: Complete |
| https://rcngrants.org/content/geospatial-condition-analysis-northeast-habitats-based-northeast-sgcn-habitat-maps | | |

TNC l evaluated and summarized the current condition of terrestrial and aquatic habitats across a region of thirteen states. Using newly available region-wide habitat maps of streams (Olivero and Anderson 2008) and terrestrial ecosystems (Ferree et al.in prep) TNC overlayed compatible datasets relative to factors that elucidate the condition and quality of each habitat. The selection of metrics followed Tomajer et al (2008) and their calculation and application was guided by a thirteen statesteering committee. The committee reviewed results and helped design the format for the final report. The metrics were calculated relative to each habitat type, for example, dams, impervious surfaces and toxic release points for stream systems, or road density, patch size, canopy closure and projected housing density for terrestrial forests.

Product: A report documenting the current condition of each wildlife habitat was mapped for the eastern region. The report described the reasoning behind of each condition measure, explanation of how it was calculated, maps and statistical tables summarizing the results of applying the measure to each habitat type and an interpretation of its meaning. The final set of condition measures and criteria was developed by a collaborative team of scientists from state Fish and Wildlife agencies, and private conservation organizations. The measures were based on available information and justified using relevant literature.

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| 2009-3 | Development of an Online Database to Enhance the Conservation of SGCN Invertebrates in the Northeastern Region | $ 183,865 |
| | Contractor: Carnegie Mellon Museum of Nat. Hist. | Status: Complete |
| https://rcngrants.org/content/development-online-database-enhance-conservation-sgcn-invertebrates-northeastern-region | | |

This one-year project developed a suite of online-accessible tools that allow operation of a database of occurrence records (spatial and temporal) to enhance conservation management of invertebrate species of greatest conservation need (SGCN) in the Northeast Region.

The data exploited are derived from authoritatively determined specimens in institutional collections, and a wide range of other information not documented directly by specimens (literature, notes, reports, etc.). The tools allow the scientific community to add, edit and download species-specific data records in a secure manner for the purpose of generating distribution maps, phenological plots, and conservation management plans, directly improving efforts for invertebrate conservation. The underlying functionality of the website is a database designed to contain unique specimen data records of invertebrates, specifically those of greatest conservation need, as indicated by state wildlife action plans (SWAPs) in the Northeastern Region. Carnegie Museum of Natural History, perhaps the largest depository of SGCN relevant records in the NE Region, captured data from approximately 10,000 SGCN specimens.

The web-accessible database was completed in May 2012. However, project staff continue to encourage those familiar with the invertebrate SGCNs from each state to login and download the state list of SGCN taxa from the site and annotate it with the **most current** conservation status for each species, and also double check the list for possible additions to the list or those that might need to be removed. The list on the SGCNInverts website was compiled from state SWAPs (which are now several years old and may have been updated since their initial release), and the old NBII SGCN website which was pulled from the web earlier this year due to funding cuts to the NBII program. Project staff would like a representative from each state in the region to provide an updated list, and project staff will continue to update nomenclature and taxonomic placement according to published literature. Once the updated lists from each state are received, project staff will update the database so that it displays the proper state ranks (right now it displays the presence/absence of a species on a state list). We are also looking for user input or feedback on possible features that users in the conservation community might like to see incorporated into the site, especially those that might relate to use or display of specimen records. Please contact James Fetzner at FetznerJ@CarnegieMNH.org with your contributions. Your input can help the collection grow and impact the conservation of rare invertebrates.

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| 2009-4 | Development of Noninvasive Monitoring Tools for New England Cottontail Populations: Implications for Tracking Early Successional Ecosystem Health | $ 98,257 |
| | Contractor: University of New Hampshire | Status: Complete |
| https://rcngrants.org/content/development-noninvasive-monitoring-tools-new-england-cottontail-populations-implications | | |

Project Overview: The overarching goal of this project was to develop new monitoring tools for measuring the effectiveness of conservation actions for the New England cottontail (NEC), a Species of Greatest Conservation Need in the Northeast. The current

method for monitoring NEC consists of a survey of suitable habitat for signs of lagomorph occupation and the noninvasive collection of fecal pellets for genetic species identification to determine presence/absence rates (Kovach et al. 2003, Litvaitis et al. 2006). While this method has proven successful for identifying areas of NEC occupation in a range-wide inventory (Litvaitis et al. 2006), it suffers from problems of detection, on a patch-specific scale. That is, if detection rates vary with environmental or other factors, then a seemingly unoccupied patch may not be truly vacant, but may appear so due to poor detection, i.e. a "false absence". This project addressed this concern through a systematic study of detection. The outcome of this effort is a standardized protocol dictating the number and circumstances of site visits needed to accurately determine patch occupancy. Yet, knowledge of patch occupancy per se is an insufficient measure of the success of management efforts. A meaningful indicator of population recovery must yield information about population health and persistence. To this end, we developed 2 new tools for population monitoring: 1) a genetic mark-recapture based method for estimating the number of individuals occupying a site; and 2) a population index based on pellet counts, for assessing relative abundance without reliance on genetic analysis. We developed guidelines for implementing these monitoring tools into an adaptive management framework currently being developed by the Service and its partners for NEC throughout its range. This project provided critical baseline information, currently lacking, on the sizes of remnant populations of NEC and a method for monitoring the effects of ongoing and future management and restoration efforts. Furthermore, monitoring NEC may yield insight into the health of imperiled early successional (shrubland) habitats, for which it may serve as an ideal indicator species.

Project Results: In the first year of the project, an initial field season targeted 26 sites in Maine, 9 sites in NH, 7 sites in NY, and 6 in MA. Due to an unusually mild winter with very little snow precipitation, survey visits were insufficient for an analysis of detection, but provided insight into optimal sampling for detection, including sites with sympatric eastern and New England cottontails. In the second field season of the project, detection data were thoroughly collected (4-6 visits) from 26 sites in Maine (only 15 were occupied), 7 in NY, 6 in NH, 10 in CT; and an additional 2 visits to 4 sites in MA. Exhaustive surveys for population estimation were conducted on 11 sites in ME, 6 in NY, 5 in NH, 1 in CT and 1 in MA. Species identifications were completed and NEC were not detected on a subset of sites in NY and CT. 310 samples collected for population estimation were genotyped to determine unique individuals from multiple patches range-wide. The project was completed in May 2012.

# 2010

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| 2010-1 | Laboratory and Field Testing of Treatments for White Nose Syndrome: Immediate Funding Need for the Northeast Region | $ 100,000 |
| | Contractor: Bucknell University | Status: Complete |
| https://rcngrants.org/content/laboratory-and-field-testing-treatments-white-nose-syndrome-immediate-funding-need-northeast | | |

Hibernating bats in the NE USA have experienced sudden and dramatic declines over the past three winters due to an emerging infectious disease dubbed "White Nose Syndrome" (WNS). An estimated one million bats have died thus far, with the most likely pathogen being the newly described cold-loving fungus *Geomyces destructans* (Gd). This proposal sought to address these declines by developing and optimizing treatments for WNS. Tasks included: (1) testing potential treatments for efficacy against cultured Gd (the fungal pathogen associated with WNS) under laboratory conditions; (2) testing potential treatments for safety in healthy bats, and (3) testing potential treatments for efficacy against Gd in hibernating bats. In year 1, trials were primarily conducted under strictly controlled conditions in a captive setting, in which microclimate is tightly controlled and in which each bat's behavior can be tracked. Limited, highly selective field trials were also conducted. Treatments that showed evidence of being effective in the first year's trials were optimized during year 2, with the goal of developing a feasible protocol for treating free-ranging bats within affected hibernacula.

Project Results: We report the results of two in vitro studies of pharmaceutical/organic compounds and the results of two studies of treatments in control and Pd infected little brown myotis in vivo, performed at the bat research facilities in the Reeder lab at Bucknell University. As has been found by other laboratories, a number of chemical agents, including, from this study 5,7-hexadecadiynoic acid and heptadecanoic acid, are effective at killing or inhibiting the growth of Pseudogymnoascus (but Pichia spent medium (PSM) was not effective). Unfortunately, both systemic and dermatophyte (superficial) fungal infections in humans and animals are notoriously difficult to treat, and often require prolonged chemical application to achieve a cure. Traditional antifungal agents are also known to

have relatively high side effect profiles and the use of these drugs in hibernating animals is novel. While treatment with the strong antifungal agent voriconazole was very clearly harmful to bats, trials with subcutaneously terbinafine implants were more promising. We can make no specific treatment recommendations at this time, but rather urge the research community to continue to pursue mitigation options for WNS.

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| 2010-2 | Instream Flow for Great Lakes Basin of NY and PA | $ 100,000 |
| | Contractor: The Nature Conservancy | Status: Complete |
| https://rcngrants.org/content/instream-flow-recommendations-great-lakes-basin-new-york-and-pennsylvania | | |

Project Description: This project employed the Ecological Limits of Hydrologic Alteration (ELOHA) framework in the Great Lakes drainage of New York and Pennsylvania to develop an objective, spatially explicit process for evaluating the ecological impacts of new withdrawals of water from the tributaries of Lakes Erie, Ontario, and the upper St. Lawrence River.

This project provided the information necessary to develop and implement instream flow standards for managing the Great Lakes surface and ground-waters of New York and Pennsylvania under the terms of the Great Lakes Compact. Additional multi-state benefits will include:

- A test of the transferability of the holistic, ELOHA-based technique being developed in the Susquehanna Basin to the Great Lakes Basin;
- Guiding implementation of the Great Lakes Compact in at least two states, with useful information for other states and provinces in the Great Lakes Basin that are part of, or work closely with, NEAFWA (e.g. Vermont, Ontario, Quebec, Ohio);
- Assessment and documentation of the transferability of the project methods and models, to enable other NEAFWA states to determine the utility and applicability of the approach to their states or watersheds.

This two-year project began in January 2011, and engaged technical advisors from agencies, universities, and stakeholders in combining testable models of ecological responses to flow alterations with an assessment of current alterations in different types of streams. This combination enabled New York and Pennsylvania to clarify the flows necessary to sustain aquatic life, and implement instream flow policies that balance human and ecosystem needs.

Project Results: We combined the life history requirements of target species with the typical hydrographs for streams of different types to frame 54 hypotheses of how these species would respond to specific alterations in the flow components. We aggregated these hypotheses into 11 general flow needs, and used a weight of evidence approach to evaluate the support for these flow needs in the scientific literature. Over 300 scientific publications on responses of the target fish and mussels to flow alterations were synthesized in this evaluation.

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| 2010-3 | Identification of Tidal Marsh Bird Focal Areas BCR 30 | $ 76,301 |
| | Contractor: University of Delaware | Status: Complete |
| https://rcngrants.org/content/identification-tidal-marsh-bird-focal-areas-bird-conservation-region-30 | | |

This project determined state level responsibility for the conservation of tidal marsh bird species and provide the baseline for long-term monitoring of the entire tidal marsh bird community along the Atlantic coastline from Virginia to Maine (Bird Conservation Region 30). This unique biological community is important on a global scale, is under imminent threat of loss or severe degradation, and its unique characteristics present management challenges necessitating large-scale, collaborative conservation action. The eastern North American shoreline possesses the highest level of vertebrate biodiversity and endemism of any tidal marsh region worldwide. This project focuses on the tidal marshes from New Jersey to Virginia and complements existing and ongoing surveys and research being conducted from NY – ME. Tidal marshes are key habitat for Species of Greatest Conservation Need in State Wildlife Action Plans and surveys to identify focal areas within each state are a priority conservation need. To address these information needs, the primary objectives of this project were to identify regional population centers for tidal marsh birds within BCR 30 and provide all states in BCR 30 with a detailed description of their regional responsibility for tidal marsh bird species. This required new tidal marsh bird surveys in areas that lack extensive survey work (NJ – VA) which were combined with existing data from NY – ME to provide region-wide products that can be used to identify the relative importance of each state for the conservation of tidal marsh breeding birds.

Project Results: We detected tidal marsh specialist birds throughout the Northeast at varying densities in the subregions and provide the first comprehensive assessment of the distribution for these taxa in the Northeast USA. Marshes in the core and near the peripheries of the study area hosted species in the highest and lowest density ranges. The flexibility and probabilistic design of our sampling framework was critical to successful development and implementation of our regional monitoring scheme. By sampling marsh birds in saltmarsh breeding habitat in all ten coastal northeast states in two years, we have created a baseline platform for future monitoring efforts. Our systematic data collection at the regional scale provides contemporary information on patterns of occurrence and abundance of specialist tidal marsh species and allows for the identification of priority areas for their conservation.

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| 2010-4 | Northeast State of the Frogs: Development of regional analysis for frog call survey data from the North American Amphibian Monitoring Program (NAAMP). | $ 54,591 |
| | Contractor: USGS Patuxent Wildlife Research Center | Status: Complete |
| https://rcngrants.org/content/northeast-state-frogs-development-regional-analysis-frog-call-survey-data-north-american | | |

This project provided a Northeast regional trend assessment for amphibians and develop associated analytical methods, using 11 years (2001-2011) of survey data from the North American Amphibian Monitoring Program (NAAMP, website: www.pwrc.usgs.gov/naamp). NAAMP is a collaborative effort among USGS, State Agencies, and other partners, to monitor calling amphibians using a standard, peer-reviewed protocol. NAAMP is active in over 20 states, including 10 northeastern states (Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, Hudson region of New York, Pennsylvania, Virginia, and West Virginia). A modeling and trend assessment framework was developed for regional reporting, resulting in the first regional level analysis using NAAMP data. In addition, this framework would become the methodology for future reporting on NAAMP results.

There are 30 species of frogs and toads in the Northeast. We anticipated being able to report occupancy trends for 18 of these species, 12 of which are designated as Species of Greatest Conservation Need in one or more Northeast states. In addition, Northeast Partners in Amphibian and Reptile Conservation (NEPARC) proposed 7 of these species as 'high responsibility' for the Northeast. The majority of omitted species are restricted to southeastern Virginia.

Project Results: We present the first regional trends in anuran occupancy from North American Amphibian Monitoring Program (NAAMP) data from 11 northeastern states using 11 years of data. NAAMP is a long-term monitoring program where observers collect data at assigned random roadside routes using a calling survey technique. We assessed occupancy trends for 17 species. Eight species had regional trends whose 95% posterior interval did not include zero; of these seven were negative (*Anaxyrus fowleri, Acris crepitans, Pseudacris brachyphona, Pseudacris feriarum-kalmi complex, Lithobates palustris, Lithobates pipiens, and Lithobates sphenocephalus*) and one was positive (Hyla versicolor-chrysoscelis complex). We also assessed state level trends for 103 species/state combinations; of these, 29 showed a decline and nine showed an increase in occupancy.

# 2011

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| 2011-1 | Conservation Action Plan for the Eastern Black Rail | $ 68,926 |
| | Contractor: Center for Conservation Biology, College of William and Mary & Virginia Commonwealth University | Status: Complete |
| https://rcngrants.org/content/support-status-assessment-and-conservation-action-plan-eastern-black-rail-across-northeast | | |

The eastern Black Rail is the most endangered bird in the Northeast region of the U.S. and along the Atlantic Coast. Populations have declined by 85 % in the Northeast since 1992 and have reached dangerously low levels. Black Rails now breed in only a dozen or fewer locations per state within its breeding range. It is unlikely that Black Rails will persist in the Northeast without timely and appropriate conservation actions. This project supported the creation of a black rail working bibliography, black rail occurrence database and black rail status assessment. The project was terminated before all of the deliverables were produced due to a personnel issue.

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| 2011-2 | Wood Turtle Conservation Strategy | $ 200,661 |
| | Contractor: USGS Massachusetts Cooperative Fish and Wildlife Research Unit | Status: Complete |
| https://rcngrants.org/content/wood-turtle-glyptemys-insculpta-northeastern-united-states-status-assessment-and | | |

This project developed a Conservation Strategy for the North American Wood Turtle in the Northeast Region (Maine to Virginia). The primary objective was to gather all available occurrence and population data for this region, and undertake a series of spatial meta-analyses to evaluate region-wide trends in occurrence, occupancy, historic habitat loss, threats, and data deficiencies, and to make general and specific recommendations regarding the status and conservation of wood turtles in the Northeast region and at two finer scales. The final report included a status assessment and conservation strategy with recommendations specific to each of 12 northeastern states and at least 12 major northeastern watersheds (HUC4-level). The Conservation Strategy identified populations of region-wide significance, assess the likely historic and current occurrence of wood turtles, critically review the listing status, S-rank, and protective measures in each state, articulate research and inventory priorities, and identify data deficiencies. Additionally, through this process we generated Best Management Practices and evaluate Detection Protocols for the wood turtle in the Northeast Region..

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| 2011-3 | Conservation Assessment of Odonata | $ 79,342 |
| | Contractor: New York Natural Heritage Program | Status: Complete |
| https://rcngrants.org/content/conservation-assessment-odonata-dragonflies-and-damselflies-northeastern-region | | |

This project conducted the first Region-wide conservation assessment for an invertebrate taxon: the order Odonata (dragonflies and damselflies). Over 230 species occupy a wide range of forested lentic and lotic habitats in the northeast region. The project followed a procedure similar to assessments already conducted in the northeast for certain vertebrate taxa (e.g., birds, reptiles and amphibians). It included measures of regional responsibility, conservation concern, and vulnerability in a matrix format that can be used to prioritize species and conservation actions. Odonata are well suited to an assessment of this sort because their distributions and habitat affinities are relatively well known and the number of species is manageable, especially as compared to other insect groups. Furthermore, Odonata are well represented on northeastern imperiled species lists due to narrow distributions, low population abundance, documented threats, and declines of many species. At present, nearly 200 different species are listed as Species of Greatest Conservation Need (SGCN) by at least one northeastern State Wildlife Action Plan (SWAP). This two year assessment project served to identify which of these are critical to consider for regional conservation actions, and individual states will also be able to use this information to aid in revising their SGCN lists.

Project Results: To provide a procedure for conservation assessment of dragonflies and damselflies, this project developed and tested a prioritization framework based on species vulnerability and the responsibility of the region for protecting the species (see reverse for methods). When the prioritization framework was applied, 41 species of 228 regional Odonata species (18%) were found to be

vulnerable with ranks of R1 or R2. The report also examined the degree of agreement between state species of greatest conservation need identified in 2005 State Wildlife Action Plans and this new conservation assessment.

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| 2011-5 | A Guide to the Northeast Terrestrial Habitat Map | $ 55,526 |
| | Contractor: The Nature Conservancy | Status: Complete |
| https://rcngrants.org/content/guide-terrestrial-habitat-map | | |

The objective of this report was to ensure good understanding and widespread use of the **Northeast Terrestrial Habitat map**. We accomplished this by: 1) creating a printable, web-based guide to the Northeast Terrestrial Habitat map with description of the habitat types, species composition and ecology of each habitat, example photographs, wildlife associations and distribution patterns, and guidance on cross-walking the habitats to other (state) classification schemes, 2) Producing a report on the data and methods used to create the map including internal validation mechanisms, suggested uses of the GIS data and map, and examples of external validation and accuracy check, and 3) developing a training module on using the habitat map with 2-3 hosted Web Ex trainings.

Project Results: The Northeast Terrestrial Habitat Classification System and GIS Map were developed as a comprehensive and standardized representation of habitats for wildlife that would be consistent with other regional classification and mapping efforts. The map is based on the ecological systems classification created by NatureServe, and used over 70,000 inventory points contributed by the State Natural Heritage programs and the USDA Forest Service FIA program, to create an accurate model of where these habitats occur.

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| 2011-6 | A Guide to the Northeast Aquatic Habitat Map | $ 36,335 |
| | Contractor: The Nature Conservancy | Status: Complete |

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| https://rcngrants.org/content/guide-aquatic-habitat-map |

The goal of this project was to ensure the understanding and widespread use of the **Northeast Aquatic Habitat classification system** by creating a printable web-based guide to the Northeast Aquatic Habitat Classification and GIS database. The guide included: descriptions of the habitat types, example photographs, statistics and distribution patterns, guidance to using crosswalks to other (state) classification schemes, and ,when available, wildlife associations for NE fish and mussels . To create the guide we convened a steering committee of state-based practitioners to guide the development of a classification scheme that simplifies the full classification into logical stream types. The steering committee reviewed the format of the guide.

Project Results: The Northeast Aquatic Habitat Classification System presents a standard aquatic classification and GIS map for 13 northeastern states and the District of Columbia. The classification and GIS dataset focus on freshwater streams and rivers, with a basic layer for lakes, and were designed to consistently represent aquatic habitat types across this region in a manner designed for conservation planning by the participating states.

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| 2011-7 | Northeast Regional Conservation Synthesis for State Wildlife Action Plan Revisions | $ 280,774 |
| | Contractor: Terwilliger Consulting | Status: Complete |
| https://rcngrants.org/content/northeast-regional-conservation-synthesis-state-wildlife-action-plan-revisions-0 | | |

This project produced a synthesis of the growing volumes of regional conservation data and information produced through the Regional Conservation Needs (RCN) program and Landscape Conservation Cooperatives (LCCs); see attached Synthesis Table of Contents. This synthesis l provided the regional context for the elements that states are required to review and revise in their State Wildlife Action Plans (SWAPs) by 2015. Producing a synthesis of regional information on behalf of all states in the Northeast saves each state significant time and effort in reviewing and determining how to incorporate regional data and information products into their respective SWAP revisions. This synthesis was envisioned as a set of components organized by the required elements of SWAPs

that can be readily incorporated into each state's SWAP revision process. Web access to this synthesis of regional information will not only improve use of this information for SWAP revisions, but will also improve access to and use of regional information by states and conservation partners during continued implementation of priority actions. Synthesis and delivery of data, maps and other tools generated through the RCN program and LCCs ensures they are adopted and thus realize the cost savings and efficiencies originally envisioned when these collaborative efforts were conceived.

Project Results: As a part of the process, input from the NE Fish and Wildlife Diversity Technical Committee was gathered, organized, and provided to the USFWS regarding the workload prioritization to address petitioned species, assisted the committee in tracking the Regional Conservation Opportunities Areas project, and continued to maintain the Synthesis and Lexicon reports with final updates. RCN fact sheets, Synthesis summary were also developed. A TWS article was drafted and provided for a special SWAP issue, and several posters and oral presentations were provided for the 2016 NEAFWA conference.

# 2012

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| 2012-1 | Detecting the extent of mortality events from Ranavirus in Amphibians in the Northeast U.S. | $ 228,134 |
| | Contractor: MD Department of Natural Resources | Status: Complete |
| https://rcngrants.org/content/detecting-extent-mortality-events-ranavirus-amphibians-northeastern-us | | |

Ranaviruses likely represent the greatest pathogen threat to the biodiversity of amphibians in North America. In order to begin to better understand the extent to which Ranavirus is impacting amphibian and reptile populations in the Northeast U.S. and to develop and test a sampling protocol that could be used throughout the region, we proposed a survey of amphibian larvae at a number of wood frog (Rana sylvatica) breeding ponds in Maryland, Delaware, New Jersey, Pennsylvania, and Virginia. Wood frogs have the highest mortality and infection rates of northeast amphibians and their breeding ponds (primarily vernal pools) may be the main source of the disease for other affected species. Our approach involved sampling 10 ponds per state per year for two years, with samples spread over different watersheds and physiographic provinces to test the applicability of these methods to a diversity of regional conditions.

Outcomes from this effort included a standard regional Ranavirus sampling protocol, a relative frequency of mortality events within the 5-state sampling area 2 which can be extrapolated to a regional perspective, a summary of known or suspected Ranavirus events in the 13 northeastern states, and publications in peer-reviewed scientific journals.

Project Results: We began this study with knowledge of the geographic distribution of Ranavirus within the five-state study area limited to four of the northeastern states (not in Delaware), 16 counties and the city of Virginia Beach, Virginia. Based on the results of this study and other subsequent lab-confirmed Ranavirus infections (including Calvert County, MD and Fairfax Co., VA in 2015) we now know viral infection occurs in all 5 states (including every county in Delaware) and in an additional 16 counties; all numbers which unfortunately will expand as we look farther afield. It is possible that more than one strain of Frog Virus 3 exists in the Northeast region, which future analysis of samples collected for this study may aid in determining. As other researchers have noted, observing die-offs is very difficult because they happen so quickly – studies like this one are a challenging trade-off between attempting to monitor a large geographic area and monitoring individual wetlands often enough to observe and study die-offs. In many cases during the course of this study it appeared that we had missed die-offs by days at most. This study has helped establish sampling protocols than can be used across large geographic areas.

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| 2012-2 | The Conservation Status of the Brook Floater Mussel, *Alasmidonta varicose*, in the Northeast | $ 187,969 |
| | Contractor: Saint Anselm College | Status: Complete |
| https://rcngrants.org/content/conservation-status-brook-floater-mussel-alasmidonta-varicosa-northeastern-united-states | | |

The brook floater (Alasmidonta varicosa) occurs along the Atlantic slope from the Canadian Maritimes to Georgia. In Canada it is designated as a Schedule 1 Special Concern Species that is confined to 15 watersheds in Nova Scotia and New Brunswick where it is considered "never abundant, representing between 1-5% of the total mussels present" (Department of Fisheries and Oceans Canada 2016). In the United States it is listed as critically imperiled (S1) in 10 states: New Hampshire, Vermont, Massachusetts, New York, Connecticut, New Jersey, West Virginia, Virginia, North Carolina, and Maryland; imperiled (S1S2) in Pennsylvania; imperiled (S2) in Georgia; imperiled (S3) in Maine (in 2007 Maine amended the status of A. varicosa to threated from special concern); extirpated (SX) in two states (Rhode Island and Delaware), and unranked (SNR) in South Carolina. However, the South Carolina State Wildlife Action Plan 2015, lists A. varicosa as highly imperiled. Here we report on: (1) the biology and life history of A. varicosa, (2) the distribution and condition of all known populations from Maine to Georgia, (3) the human impacts on populations (4) the results of models using environmental factors at both the HUC 12 level and stream level as predictors of population condition, and (5) the

results of a survey sent to mussel biologists from Maine to Georgia concerning threats to this species. Alasmidonta varicosa is a strict riverine species that favors low productivity streams and appears to have a low tolerance to eutrophication. It is a small mussel with a moderate life span, moderate age of reproductive maturity and low fecundity. Because it is a host fish generalist, A. varicosa populations are unlikely to be limited by the availability of a particular host fish. Our model results show a strong relationship between the rapid replacement of riparian forests with residential, commercial, agricultural and industrial development and the condition of A. varicosa populations. Protecting and restoring riparian forestlands may be our most practical tool for conserving this species. Survey respondents scored the loss of riparian forests, habitat fragmentation, agricultural runoff of nutrients and toxins, urbanization and development as the most spatially extensive and the most severe threats to A. varicosa populations. Captive propagation, reintroduction and population augmentation may be needed in order to maintain or rescue A. varicosa populations. We document a dramatic contraction in the distribution range of this species. Surveys show that many populations consist of declining numbers of older animals and show little or no evidence of recruitment. Sharp declines in the size and spatial extent of populations as well as population extirpations have occurred throughout the range, however important populations persist in multiple states including Maine, which appears to hold the largest selfsustaining populations range-wide. Dams, impoundments and waters that are heavily polluted isolate many populations throughout the range. We note that current and projected increases in extreme precipitation and drought will seriously impact remaining A. varicose populations.

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| 2012-3 | Assessment and evaluation of prevalence of fungal dermatitis in New England Timber Rattlesnake populations | $ 71,697 |
| | Contractor: Rhode Island Zoological Society | Status: Complete |
| https://rcngrants.org/content/assessment-and-evaluation-prevalence-fungal-dermatitis-new-england-timber-rattlesnake | | |

This proposal describes a comprehensive evaluation to provide a baseline health assessment of multiple New England populations as well as to provide scientific support for future policy and wildlife management decisions for this species. The study provided evidence of the extent of fungal dermatitis among multiple rattlesnake populations and evaluate potential underlying stressors or factors predisposing the species to fungal disease. The data gathered attempted to elucidate whether the fungal disease seen is a primary pathogen or a secondary opportunistic invader, in addition to providing insight as to whether these are isolated cases or if they are indicative of wider health concerns within Timber Rattlesnake populations and provided a geographical map of fungal infections identified in New England populations. The study also evaluated presence of heavy metals and toxins as potential immune system

stressors thus utilizing the Timber Rattlesnake as an indicator of potential environmental pollutants as well as overall ecosystem health.

Project Results: We believe we accomplished the objectives of this study. This data:

- Provides an initial prevalence rate for each of the nine populations. This can be used by biologists going forward to determine if the incidence of dermatitis is going up or down in the respective populations.
- Shows that the overall prevalence rate of infection with dermatitis in the nine populations of timber rattlesnakes is approximately 33%.
- Shows no evidence that this is an opportunistic infection by snakes that are immune suppressed.
- Show no evidence that paramyxovirus is currently a significant problem for wild timber rattlesnakes in the nine sampled populations
- Shows that in spite of a high incidence of dermatitis that the timber rattlesnakes sampled appear to be in overall good health. Overall sampled snakes were in good body condition with minimal pathological changes.
- Provides strong evidence that O. ophiodiicola has a strong association with dermatitis in timber rattlesnakes in the northeastern populations.
- Shows that the prevalence of dermatitis in these populations of snakes is much higher in the spring than in the summer. Additional statistical analysis is in progress at this time.

Once completed this data will be prepared for publication in the Journal of Zoo and Wildlife Medicine.

# 2013

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| 2013-1 | Developing a Coordinated Research Approach for Hellbender Conservation in the Northeast with benefits to Wild Mudpuppy Populations | $ 197,500 |
| | Contractor: Smithsonian Zoological Park | Status: Complete |
| https://rcngrants.org/content/developing-coordinated-research-approach-hellbender-conservation-northeast-benefits-wild-1 | | |

Our primary objectives were to 1) **better document hellbender distribution** in the northeast region, and 2) **develop standardized methodologies** to monitor hellbender populations while collecting opportunistic information about mudpuppy distribution. These objectives were achieved through stream surveys (including environmental DNA detection), improved communication among individuals working with hellbenders or mudpuppies, and the establishment of a regional stakeholder working group. Within the first year of the project we produced standardized protocols that ensure the consistency and efficiency of hellbender/mudpuppy surveys while minimizing disturbance of stream boulder habitat. During this time we also collected environmental DNA (eDNA) samples from a total of ~130 sites in NY, PA, MD, WV, and VA. Samples were tested for hellbender DNA and archived for future DNA-based detection of mudpuppies or other stream species. In the second year, we employed conventional surveys to 'ground-truth' a subset of eDNA sites. This approach generated presence/absence data for a broad geographical area and information about abundance, demographics and animal health for a key subset of sites. Project deliverables included 1) a more comprehensive map of hellbender distribution in the northeast, 2) an eDNA archive (for detection of other stream-dwelling species) and 3) a protocol and communication framework to enable coordinated and efficient conservation of hellbenders and mudpuppies.

Project Results: In Year 1, our team established a communication framework and worked collaboratively to develop standard, optimized protocols for eDNA sample collection and analysis. Over the following two years, we collected eDNA samples from a total of 200 sites in New York (59), Pennsylvania (42), Maryland (22), West Virginia (15), and Virginia (62). Through an extraordinary amount of volunteer help, we used our NEAFWA funding more efficiently and exceeded our original target number of 130 sites by almost 50%. We confirmed the presence of hellbender eDNA at 9 of 10 sites (90%) with recent hellbender observations and at 25 of 51 sites (49%) with historic records of the species. Additionally, we detected hellbender eDNA at 5 sites with anecdotal records and 34 sites with no previous records of hellbenders. Rockturning surveys were conducted for 43 of the eDNA-negative sites. Hellbenders were found only at a single site, suggesting a low incidence (2.3%) of false negatives. Rock-turning surveys also were conducted at 31 of the eDNA-positive sites, and the species was detected at 11 of these locations. Based on the lack of contamination in our negative controls, we consider it unlikely that the remaining 23 sites represent false positives. More likely, the eDNA signal represents a low-density or upstream population. Across all sampling sites in NY, PA, and VA, eDNA concentrations were correlated positively with both detectability (i.e., number of positive eDNA sample replicates per site) and hellbender abundance, as estimated by rock-turning surveys.

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| 2013-3 | The Northern Diamondback Terrapin (Malaclemys terrapin terrapin) in the NE United States: A regional conservation strategy | $ 119,425 |
| | Contractor: SUNY | Status: Complete |
| https://rcngrants.org/content/northern-diamondback-terrapin-malaclemys-terrapin-terrapin-ne-united-states-regional | | |

The overarching goal of this project was a conservation strategy/plan that will help achieve long-term sustainability of the northern diamondback terrapin population in the Northeast and mid-Atlantic regions. Under RCN Topic 5 - Design and implement conservation strategies for the Northeast and mid-Atlantic Species of Greatest Conservation Need (NE SGCN) we identifed the species current and historical populations, habitat (known and unknown occupancy), threats, prioritize locations for regional and individual state management, data gaps, and reviewed the regulatory status in each state. The conservation strategy also included components from RCN Topic 7 - Identify and Assess Threats to NE SGCN as we will articulate threats regionally and for each individual state and addressed major components of RCN Topics 3 (identifying data gaps). The final report describes a strategic initiative for implementation of conservation actions across eight states within the Northeast and mid-Atlantic regions with recommendations specific to each state and region-wide and the identification of the most important sites for this species. The results of the proposed conservation strategy/plan could be used to solicit additional funding for implementation for more regionally significant sites for terrapins in the Northeast and mid-Atlantic regions in the future.

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| 2013-3 | Distribution and Conservation Status of the Newly Described Species of Leopard Frog in the Coastal NE | $ 216,357 |
| | Contractor: SUNY | Status: Complete |
| https://rcngrants.org/content/distribution-and-conservation-status-newly-described-species-leopard-frog-coastal-ne | | |

Through a multi-agency collaborative effort, we 1) Determined conclusively which leopard frog species occur presently and occurred historically in the nine states; 2) Refined the northeastern distribution of the new species relative to the two other leopard frogs; 3) Contrast multi-level habitat associations among the three species; and 4) Refined the separation of species via field characters (calls, morphology) to facilitate future inventory, monitoring, and status assessments of the new species without reliance on genetic testing. Extensive bioacoustic surveys in 2014 defined the ranges of each species and identify sites for an intensive survey effort of occupied sites in 2014-2015 to characterize habitat associations, obtain tissue for genetic testing, and examine suspected rangewide morphological differences. The study provided northeastern states with a better capacity to implement sound, well-informed conservation strategies for native amphibians and their habitats.

Project Results: We confirmed Rana kauffeldi in eight eastern US states: CT, NY, NJ, PA, DE, MD, VA, and NC. Eighty-nine percent of R. kauffeldi locations were within 20 km, 77% were within 10 km, and just under 50% were within 1 km of coastal waters. The range of R. kauffeldi that we drew covers just over 46,500 km2 . Our survey data also support the notion that R. kauffeldi has disappeared from a large part of its historical range in southern NY and CT, including much of the Hudson Valley and all of Long Island. We found a near-perfect match of population-level calling with genetics of individual frogs, demonstrating that the unique call identified previously is reliably associated with genetic identity.

# 2014

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| 2014-1 | Design and Implement Conservation Strategies for NE SGCN | $ 125,772 |
| | Contractor: High Branch Conservation Services | Status: Complete |
| https://rcngrants.org/content/design-and-implementation-sustaining-wildlife-populations-ne-forests | | |

Northeastern forests provide essential habitat for a large suite of birds and mammals that occur in no other setting. This group includes several habitat specialists listed as species of greatest conservation need (SGCN) in multiple states. Their vulnerability to various stressors has prompted the formation of several species--level conservation and research initiatives. We proposed to work with these

focused partnerships and with key forest stewards to integrate current ecological and biogeographic information into on-- the--ground habitat enhancement. This collaboration produced spatially explicit management and conservation support for five regional SGCN whose combined ranges encompass thirteen northeastern states. The focal species are: Bicknell's Thrush, Wood Thrush, Canada Warbler, Rusty Blackbird, and American Marten. By engaging both experts and end users, we produced scientifically sound and practical guidelines for conserving these species and other SGCN in their guilds. In addition, we used available occurrence data, distribution models, and stakeholder input to delineate and prioritize areas that exhibit high management and conservation potential. To promote uptake, we uploaded the best practices and GIS layers to online information networks and mapping platforms. Furthermore, we worked directly with habitat stewards to ensure that the recommended practices are implemented in management and conservation opportunity areas. Bridging wildlife science and forest stewardship in a deliberate, inclusive process will expedite tangible results for these and other SGCN.

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| 2014-3 | Regional SWAP Database Framework | $ 130,445 |
| | Contractor: Terwilliger Consulting | Status: Complete |
| https://rcngrants.org/content/regional-swap-database-framework | | |

The objectives of this project were to:

- To compile key information from the 14 NE SWAPs in a streamlined database and provide state agencies (and their partners) with easy access to this information through simple queries and reports.
- To allow identification of region-wide patterns and priorities based on a compilation of data contained in the individual NE SWAPS, regarding key SWAP species, habitats, threats and actions.
- To enable states to work together on shared regional priorities identified in their SWAPS

Project Results: The Database compiled basic information on key SWAP data fields that elucidates common or shared species, habitats, threats and actions. Analyses are limited due to data variability, however key patterns and priorities have been revealed. The database with its many reports and queries, can be used by individual states and their partners to answer many questions and organize data from the 14 northeast SWAPs.

# 2015

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| 2015-1 | Determining the effects of Land-locked Alewives on Anadromous Alewife Restoration | $ 169,866 |
| | Contractor: UC Santa Cruz | Status: Complete |
| https://rcngrants.org/content/determining-effects-landlocked-alewives-anadromous-alewife-restoration | | |

Dam removal and fish passage projects are a critical component of anadromous alewife restoration, reconnecting runs to prime spawning habitat in coastal lakes. However, landlocked alewife populations have become established in many coastal New England lakes. The effects of landlocked alewives on anadromous alewife restoration are currently unknown. We investigated the effects of landlocked alewife presence on anadromous alewife restoration in Rogers Lake, which once hosted one of the largest anadromous alewife runs in Connecticut. Thus, effective restoration could substantially bolster regional alewife production. From 2015-2017, we stocked spawning anadromous adults into Rogers Lake. Each summer, we sampled juvenile alewives from the lake. We developed a novel set of microhaplotype genetic markers to identify anadromous, landlocked, and hybrid juveniles. Estimates of spawning time show that anadromous alewives spawn earlier in the spring than landlocked alewives, but that there is a period of overlap in spawning time. Therefore, the potential for hybridization between life history forms does exist. Results of genetic monitoring indicate that anadromous alewives are successfully spawning in Rogers Lake. From our sample of juveniles genotyped in 2017, we identified 1,154 landlocked individuals (90.6%), 75 anadromous individuals (5.9%), and 45 hybrids (3.5%). The identification of anadromous juveniles indicates that anadromous alewife are able to successfully spawn and juveniles to rear in a lake containing a landlocked population. The identification of hybrids indicates that the two life history forms can successfully spawn together and produce viable and competitive offspring. Applying our proportions to the total number of juvenile alewives in Rogers Lake, we estimate that the lake contained about 400,000 landlocked, 26,000 anadromous, and 15,500 hybrid juveniles in August 2017. These estimates suggest that anadromous production is high enough to initiate anadromous alewife restoration. They also show that landlocked alewives are still substantially more common in the lake compared to anadromous or hybrids. Hybrids are less common than anadromous juveniles, but they are present at ecologically and evolutionarily relevant abundances. Future work will continue to track the abundance of each life history form to better understand how anadromous production and hybridization are proceeding as the restoration project continues.

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| 2015-2 | Conservation and Management of Rare Wetland Butterflies | $ 173,641 |
| | Contractor: MD Department of Natural Resources | Status: Complete |
| https://rcngrants.org/content/conservation-and-management-rare-wetland-butterflies-strategies-monitoring-wetland | | |

Fourteen species of wetland-inhabiting butterfly species of Greatest Coservation Need (SGCN) status were surveyed in 2016 and 2017 at multiple sites across four states - Maryland, New Jersey, Pennsylvania and West Virginia. Survery data was used to evaluate the status of each species in all states where they occurred as well as refine the distribution data for each species across the region. All data points were mapped in ArcGIS and used to model species distribution in terms of both habitat and climate. The results are presented for each species and several examples are explored in greater depth. Best Management Practices (BMPs) were developed for both modeling procedures. A final goal of the project was to intiate habitat enhancement projects in a small number of survey areas in Maryland and Pennsylvania. The results of these projects are still being reviewed by the various NHPs that participated in the projects. Some species will be reassessed as to their conservation status of inclusion as SGCN. Modeling outputs will be used to guide further survey work and prioritize sites for enhancement and protection.

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| 2015-3 | Identifying and Targeting Intervention Strategies for Allegheny Woodrat *Neotoma magister* Recovery | $ 217,674 |
| | Contractor: Frostburg State University | Status: Complete |
| https://rcngrants.org/content/identifying-and-targeting-intervention-strategies-allegheny-woodrat-neotoma-magister | | |

The relationships between woodrat population dynamics and abiotic forest conditions and biotic pathogen loads have been speculated, but there have been few long-term studies to address these speculations. Our two-tiered study that will: **Objective 1.** Determine interactions between woodrat populations and forest dynamics using dendrochronology, mast production data, and inventories; **Objective 2.** (a) Determine incidence of raccoon roundworm (*Baylisascaris procyonis)* parasite load in raccoon feces, (b) population analysis based on previous mark/recapture data, (c) compare efficacy and detection patterns between live-trapping and remote cameras for detecting presence of Allegheny woodrats.

**Obj. 1.** Between October 1 and December 30 we analyzed tree cores at woodrat sites and masting sites (Fig. 3, Table 2, 3, & 4). We prepared the material for the project as a manuscript and we presented the research at the following venues: The Oak Symposium in Knoxville, Tennessee and at the Society of American Foresters Meeting in Albuquerque, New Mexico.
**Obj. 2.** During the 4th quarter we continued our camera-trapping study at 2 new sites to evaluate presence and activity patterns of Allegheny woodrats (*Neotoma magister*) and other species. Between 2-8 remote cameras were placed at 2 sites (Potomac-Garrett State Forest [Lostland Run] and Allegany County [Pinnacle Rocks]) between 15 October 2017 and 20 December 2017 (Figure 1) for a total of 476 trap-days (defined as the sum of 24 [hr] periods that each camera was operational) (Table 1). We compared the influence of different baits (peanut butter mixed with oats versus sardines) and distance from core-areas (i.e., interior portions of rock formations) to peripheral areas (i.e., interface of rock formations with surrounding forest) edge of int detection rates of woodrats. Raccoon scat samples were sent to Dr. Mahan at Penn-State Altoona for analysis. The Sheather's fecal flotation method was used to analyze the samples for presence of endoparasitic eggs.
A total of 1338 independent detections were recorded, with 325 independent detections of woodrats, 80 independent detections of raccoons, and 15 independent detections of other carnivores (Figure 2). Interestingly, at Lostland Run, woodrats were detected 0.8 km from the nearest large rock formation. No woodrats were detected at Pinnacle Rock throughout the survey period. Peanut butter mixed with oats and sardines performed equally as well in attracting woodrats, but sardines attracted a greater variety of other animals to camera sites. If detecting other species in addition to woodrats, use of sardines may be a more effective bait. Woodrat detection rates were similar in core and peripheral areas. Peripheral areas were much easier to access for placing and monitoring cameras, and provided a greater variety of options for attaching cameras. Peripheral sites thus offer advantages as camera sites if the intention of the project is to determine presence or absence of woodrats, especially if the study involves multiple sites and is time limited.

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| 2015-4 | Wildlife Diversity Conservation Coordination | $ 401,412 |
| | Contractor: Terwilliger Consulting | Status: Complete |
| https://rcngrants.org/content/wildlife-diversity-conservation-coordination-northeast-using-swap-revisions-inform-regional | | |

To accomplish the project objective of collaboratively developing clear conservation goals and strategies for action in the northeast region this proposal outlines three major components:

1. A thorough review of species, habitats, threats, and actions identified in the 14 Wildlife Action Plans produced by the northeastern states and the District of Columbia
2. When requested, provide assistance to state agencies in determining regional species and habitats of greatest conservation need, the threats impacting the region, and the actions that could be taken at the regional scales to limit the impact of the

threats and support populations of species of greatest conservation need along with other critical aspects of ongoing regional collaboration.

3. A sustained effort to facilitate the collaboration of representatives of the northeastern states to address issues of common conservation concern over the three-year duration of this grant.

Project Results:

- Prioritized conservation investments
- Communicated conservation needs
- Improved conservation outcomes through proactive regional conservation

Regional Species of Greatest Conservation Need receive a higher level of conservation attention as evidenced by the significant amount of RCN and Competitive SWG funding, in addition to state and partner investments.

# 2016

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| 2016-1 | Conservation Genetics of the Wood Turtle from Maine to Virginia | $ 44,008 |
| | Contractor: Antioch University New England | Status: Complete |
| https://rcngrants.org/content/conservation-genetics-wood-turtle-me-va | | |

This study uses genetic data to identify genetic diversity across the study area (Maine to Virginia), to identify the number of populations in the study area and determine the success of genetic assignment of individuals to sites of origin. Tissue samples were collected as blood, tail tips, toenails and shell shavings or scutes from 1,895 Wood Turtles. Tissue samples were genotyped at 16 microsatellite markers for 1,244 individuals. Genetic data were analyzed for genetic diversity, genetic clustering, full siblings, and genetic assignment. The Bayesian genetic clustering analysis indicated that there are likely 3 to 5 clusters with 4 clusters providing the most optimal clustering pattern in the data set. The major population groups identified were northern ME, Potomac, coastal MA and NJ/NY. Sites in PA and NH showed admixture with the neighboring clusters. The results indicate that clear genetic differences among

populations (or subpopulations) are detectable across the study area. The Bayesian clustering analysis indicate that an island stepping-stone model describes the population genetic structure where sites are exchanging individuals with neighboring sites creating a gradation of genetic structure over the study area.

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| 2016-2 | Five-Factor Analyses of Petitioned Species | $ 34,391 |
| | Contractor: Virginia Polytechnic Institute and State University | Status: Complete |
| https://rcngrants.org/content/five-factor-analysis-petitioned-species | | |

Since 2010, the U.S. Fish and Wildlife Service (USFWS) has received numerous listing petitions for potentially imperiled species. More than 25% of the species on the complete list occur in at least one state of the Northeast Association of Fish and Wildlife Agencies (NEAFWA). Many of these species have been included as Species of Greatest Conservation Need in one or more Wildlife Action Plans developed by NEAFWA state members.

A preliminary evaluation by state fish and wildlife agencies in the NEAFWA identified a number of these species for which states think that sufficient information exists to support a case that federal protection under the ESA is not warranted. The state NEAFWA partnership believes that actions may be able to be taken sooner if relevant data are assembled for species of potentially lower conservation concern. The objective of this project is to facilitate state input and engagement in the USFWS listing process by synthesizing existing state and regional information, using the "five-factor analysis" approach of the USFWS for status reviews of selected species that have already been judged to have substantial available information, on-going conservation action, and possibly a lower likelihood of federal listing.

Five-factor status reviews were created for Little brown bat, Northern red-bellied cooter, Popeye shiner and Chesapeake logperch. By providing this information in a form readily used by the Endangered Species review team, the NEAFWA states can facilitate and/or potentially accelerate listing decisions for these four species of relatively low conservation concern and decrease the time needed for agency staff to respond to Service requests for information. The ultimate potential benefit is reduction of state agency staff time needed for Section 7 compliance reviews for all WSFR funded grants.

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| 2016-3 | Additional Support for SWAP Data Delivery and RCN Regional Database | $ 56,260 |
| | Contractor: Terwilliger Consulting | Status: Complete |
| https://rcngrants.org/content/facilitate-state-swap-data-delivery-and-population-rcn-regional-database | | |

The goal of this project is to facilitate and support regional collaboration on shared priorities identified in state wildlife action plans by compiling key information from the remaining NEAFWA Wildlife Action Plans in a database with simple query and report functions. This effort will allow identification of regional patterns and priorities of species of greatest conservation need, habitats, threats and conservation actions.

The purpose of the database tool is to capture, organize, analyze, and report on key elements of State Wildlife Action Plans in the Northeast Region. Gathered from the fourteen Northeast Region Wildlife Action Plans, the data include: Species, Habitats, Threats, and Actions and the relationships among these elements. (Note: Data from the New Jersey SWAP data will be added when available, as will other state updates.)

Due to the different approaches and data structures of SWAPs, information provided by each state varies. The data provided by states were standardized to fit within the regional database structure. To access detailed information about each state, and to clarify any questions you may have, it is strongly recommended that you refer to a state's current Wildlife Action Plan.

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| 2016-4 | Gating Critical Bat Hibernacula | $ 221,800 |
| | Multiple Contractors | Status: Complete |

Human disturbance to bats during hibernation has been a well-documented threat to bats in the

Northeast and many pre-WNS conservation efforts focused on better protection of critical winter habitat. Protection of these sites, even those severely impacted by WNS, remains a useful component of long-term conservation actions for cave bats. Recent efforts in the Northeast to monitor survivorship of bats at affected sites have suggested that bats may be exhibiting an increased resistance to fungal exposure. Proactively addressing compounding conservation threats will enable any rebounding populations to respond more quickly. It also ensures that sites subject to future fungal treatment or management efforts will be secure and remain available as suitable habitat for cave bats to utilize.

Project leaders in Connecticut, New Jersey, New Hampshire, and Pennsylvania identified restoration opportunities, selected vendors to carry out construction activities and provided oversight of the program. Sites include:

In Connecticut, entrance barriers were constructed on hibernaculum in five towns. In New Hampshire, entrance barriers were constructed on an abandoned mine. In New Jersey, construction improved air flow as well as new gating to restrict access. In Pennsylvania, construction resulted in a new gate to restrict human access and air flow management to restrict the escape of cold air in the winter.

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| 2016-5 | Northern and Peripheral Populations of the Timber Rattlesnake: Preserving Viability and Function | $ 120,000 |
| | Contractor: The Orianne Society | Status: Complete |
| https://rcngrants.org/content/northern-and-peripheral-populations-timber-rattlesnake | | |

The timber rattlesnake (*Crotalus horridus*) was historically widespread throughout eastern North America but now persist in four New England states in small, isolated populations. The goal of this study was 1) assess the population viability of New England timber rattlesnake populations, 2), describe the population genetics structure of timber rattlesnakes in New England and provide recommendations for genetic management and monitoring, and 3) develop a standardized protocol for monitoring timber rattlesnake populations informed by model-based estimates of occupancy and abundance.

Model-based estimates of population growth and PVA results suggest that populations in Vermont, New Hampshire, and Connecticut may be declining while the Berkshire Mountains metapopulation does not appear to be declining under current conditions. In all cases, population persistence was highly sensitive to survival suggesting that reducing anthropogenically-induced mortality is important for population persistence. Available data strongly suggest that some timber rattlesnake populations in New England will benefit from genetic rescue. While long generation times and logistical considerations may make genetic and phenotypic monitoring difficult, we recommend that it accompany any genetic rescue efforts. We used simulations to evaluate the use of presence-absence and count data to provide estimates of occupancy and abundance using hierarchical models and identify optimal sampling designs.

We recommend that managers consider the ecology and conservation status of each population, their available financial and logistical resources, potential impacts to individual animals, and the type and quality of information provided by each method of monitoring. We suggest that radio telemetry is most appropriate for addressing specific research questions requiring detailed information on individual movements and habitat use, population-specific estimates of space use, or precise information on the presence, cause, and timing of mortality. We recommend that managers implement monitoring protocols using mark-recapture and/or gestation/shedding site occupancy and abundance. We recommend that managers maximize the number of sites to increase statistical power to detect trends in state variables but recognize that substantial limits to statistical power may occur. Pooling analyses among populations and regions may substantially increase the statistical power for detecting trends in occupancy and abundance and we encourage a collaborative approach to delineating sites and collecting and analyzing data.

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| 2016-5 | Assessing the Status of Land Snails in the Northeast Region | $ 47,153 |
| | Contractor: The Appalachian Conservation Biology | Status: Complete |
| https://rcngrants.org/content/assessing-status-land-snails-northeast-region | | |

Land snails are an integral part of native habitats throughout the Northeast, playing important roles in cycling organic material and creating soil, moving energy and nutrients in food chains, and hosting major wildlife parasites. This project informs the important conservation needs and opportunities associated with 245 land snail species of the northeastern United States, many of which are listed as Species of Greatest Conservation Need or Data Deficient by many of the 14 State Fish and Wildlife Agencies. This project will

assist states in proactive participation in the USFWS Federal Prelisting Process and potentially lead to preventing or minimizing additional listings under the Federal Endangered Species Act.

The primary deliverable is a comprehensive Northeast Region Land Snail website, established by expanding and upgrading the existing land snail and slug website of the Carnegie Museum of Natural History with data compiled from other museum collections.

As of March 2018, there are now a total of 317 species profiles for the region, 311 with specimen records and another six that may be reported in future. Fifty of the species are non-native. Regional maps are completed and integrated for all profiles. Citations for all new profiles have been added to the References page. Nearly all species have images now. Older profiles have been updated and corrected for 30+ species. Illustrations by Kathy Schmidt are being added to profiles for species that occur in New York State.

**Funding Levels for Projects Funded through Regional Conservation Needs Grant Funds:**

Financial data for recipients of RCN grants are tabled below. In each, the RCN project number is identified, the amount of the award, the amount requested by the recipient, and the amount paid to the recipient is summarized.

| Project Number | Organization | Project Title | Award | Match | Paid |
|---|---|---|---|---|---|
| RCN 2007 (1) | The Nature Conservancy | Reg Habitat Maps: NE Terrestrial Habitat Classification System | $65,805.58 | $65,809.16 | $65,806.00 |
| RCN 2007 (2) | The Nature Conservancy | Northeast Regional Connectivity Assessment | $55,965.00 | $68,880.00 | $55,966.00 |
| RCN 2007 (3) | Conservation Management Institute, Virginia Polytechnic Institute and State University | Invasive Species and SGCN | $38,838.00 | $38,838.00 | $38,455.34 |
| RCN 2007 (4) | American Bird Conservancy | Avian Indicators and Measures | $54,000.00 | $56,299.00 | $47,483.34 |
| RCN 2007 (5) | The Nature Conservancy | Conservation Status of Key Habitats and Species | $53,186.74 | $53,186.74 | $46,084.28 |
| RCN 2007 (6) | USGS | GIS based Application to Estimate Stream Flow | $48,069.00 | $48,069.00 | $45,421.11 |
| RCN 2007 (7) | Conservation Management Institute at Virginia Tech | Biomass Energy Initiative | $36,971.00 | $36,971.00 | $36,837.54 |
| RCN 2007 (8) | Northeast Association of Fish and Wildlife Agencies | Grassland/Shrubland Landscape Initiatives | $30,736.00 | $50,000.00 | $30,736.00 |
| RCN 2007 (9) | Bucknell University | WNS in Bats | $50,000.00 | $50,000.00 | $49,991.22 |
| RCN 2008 (1) | Rushing Rivers Institute | GIS Application to Estimate Target Fish Communities | $64,131.00 | $64,500.00 | $58,654.00 |
| RCN 2008 (2) | NatureServe | Model Guidelines for Local Planning Boards | $149,146.20 | $151,283.05 | $149,145.98 |
| RCN 2008 (3) | The Nature Conservancy | Focal Area Resilience and Adaptive Capacity | $73,413.00 | $73,413.00 | $44,468.58 |
| RCN 2008 (5) | The Nature Conservancy | Key Habitat and Species Indicators and Measures | $64,804.00 | $64,804.00 | $42,419.31 |
| RCN 2009 (1) | Manomet | Assessing Impacts of Climate Change on SGCN | $180,000.00 | $187,373.69 | $179,999.26 |
| RCN 2009 (2) | The Nature Conservancy | Condition Analysis for NE Habitats | $60,167.00 | $60,167.00 | $60,167.00 |

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| RCN 2009 (3) | Carnegie Museum of Natural History | Invertebrate Online Database | $91,907.00 | $92,326.11 | $91,684.00 |
| RCN 2009 (4) | University of New Hampshire | Noninvasive Monitoring Tools for New England Cottontail | $49,126.00 | $49,131.00 | $48,464.28 |
| RCN 2010 (1) | Bucknell University | Lab and Field Testing of WNS | $100,000.00 | $66,277.32 | $63,266.25 |
| RCN 2010 (2) | The Nature Conservancy | Instream Flow Models Great Lakes Basin | $100,001.00 | $133,611.49 | $100,000.50 |
| RCN 2010 (3) | University of Delaware | Identification of Tidal Marsh Bird Focal Areas | $76,301.00 | $93,313.91 | $75,938.55 |
| RCN 2010 (4) | USGS | Regional Analysis of Frog Monitoring | $42,347.26 | $55,701.88 | $42,347.26 |
| RCN 2011 (1) | College of William and Mary and VA commonwealth University | Conservation Action Plan for the Eastern Black Rail | $34,463.00 | $84,842.65 | $34,463.00 |
| RCN 2011 (2) | USGS Massachusetts Cooperative Fish and Wildlife Research Unit | Wood Turtle Conservation Strategy | $100,000.00 | $118,522.76 | $99,889.32 |
| RCN 2011 (3) | New York Natural Heritage Program | Conservation Assessment of Odonata | $38,604.00 | $36,740.37 | $30,526.50 |
| RCN 2011 (5) | The Nature Conservancy | Terrestrial Map Guidance | $27,763.07 | $27,763.07 | $27,763.07 |
| RCN 2011 (6) | The Nature Conservancy | Aquatic Map Guidance | $18,167.86 | $18,167.86 | $18,167.86 |
| RCN 2011 (7) | Terwilliger Consulting | RCN Regional Synthesis for SWAP revisions | $143,300.00 | $137,474.40 | $137,474.40 |
| RCN 2012 (1) | MD Dept of Natural Resources | Extent of mortality events from Ranavirus in Amphibians | $88,900.40 | $139,233.40 | $88,900.90 |
| RCN 2012 (2) | Saint Anselm College | Conservation status of Brook Floater Mussel | $72,940.00 | $115,966.51 | $72,003.28 |
| RCN 2012 (3) | Rhode Island Zoological Society | Fungal Dermatitis in NE Timber Rattlesnake | $81,148.71 | $37,693.35 | $34,003.72 |
| RCN 2013 (1) | Smithsonian Zoological Park | Hellbender Conservation | $99,846.00 | $99,999.59 | $97,500.45 |
| RCN 2013 (2) | Conserve Wildlife Foundation of NJ | Northern Diamondback Terrapin Conservation Strategy | $45,499.00 | $73,931.66 | $45,494.00 |
| RCN 2013 (3) | SUNY | Leopard Frog in Coastal NE | $105,764.00 | $110,963.64 | $105,393.93 |
| RCN 2014 (1) | High Branch Conservation Services | Best practices wildlife populations NE forests | $62,731.00 | $63,041.92 | $62,731.00 |
| RCN 2014 (2) | Terwilliger Consulting | Coordination and I&E support | $170,000.55 | $170,000.55 | $170,000.55 |

| | | | | | |
|---|---|---|---|---|---|
| RCN 2014 (3) | Terwilliger Consulting | Database | $60,000.00 | $70,445.00 | $60,000.00 |
| RCN 2015 (1) | UC Santa Cruz | Determining effects of Landlocked Alewives on Anadromous Alewife Restoration | $83,594.00 | $86,359.81 | $83,506.86 |
| RCN 2015 (2) | Maryland Department of Natural Resources | Conservation and Management of Rare Butterfly | $83,350.00 | $90,291.36 | $83,350.00 |
| RCN 2015 (3) | Frostburg State University | Strategies for Allegheny Woodrat Recovery | $99,804.00 | $117,870.80 | $99,804.00 |
| RCN 2015 (4) | Terwilliger Consulting, Inc. | Wildlife Diversity Conservation Coordination | $199,250.00 | $202,162.75 | $199,250.00 |
| RCN 2016 (1) | Antioch University New England | Conservation genetics of the Wood Turtle from ME to VA | $22,000.00 | $22,012.85 | $21,996.00 |
| RCN 2016 (2) | Virginia Polytechnic Institute and State University | Five-factor analysis of petitioned species | $30,000.00 | $29,905.24 | $29,905.24 |
| RCN 2016 (3) | Terwilliger Consulting, Inc. | Facilitate State SWAP Data Delivery and Population of RCN Regional Database | $25,000.00 | $31,260.50 | $25,000.00 |
| RCN 2016 (4) | Armstrong Drilling, Inc. | Bat Cave Gating | $110,900.00 | $119,777.03 | $110,900.00 |
| RCN 2016 (5) | The Orianne Society | Northern and peripheral populations of the Timber Rattlesnake | $60,000.00 | $63,706.00 | $60,000.00 |
| RCN 2016 (6) | Appalachian Conservation Biology | Assessing the Status of Land Snails in the Northeast Region | $63,276.00 | $23,576.75 | $23,576.75 |

Table 1. NEWTS RCN Job 1 administration and Job 2 project charge breakdown by project (grant) and state agency for the period October 1, 2017 to December 31, 2017.

| AGENCY | JOB 1 ADMIN | JOB 2 | | | | | | | | | | QTR EXPENSE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2015(1) | 2015(2) | 2015(3) | 2016(1) | 2016(2) | 2016(4) | 2016(5) | 2016(6) | CORRECTION | JOB 2 TOTAL | TOTAL INVOICE |
| CT | $8,280.56 | $947.94 | $865.76 | $1,444.98 | $590.19 | $1,037.99 | $156.19 | $1,478.09 | $460.99 | 0 | $6,982.12 | $15,262.68 |
| DE | $8,280.56 | $947.94 | $865.76 | $1,444.98 | $590.19 | $1,037.99 | $156.19 | $1,478.09 | $460.99 | 0 | $6,982.12 | $15,262.68 |
| DC | $8,280.56 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | 1315.02 | $1,315.02 | $9,595.58 |
| ME | $8,280.56 | $947.94 | $865.76 | $1,444.98 | $590.19 | $1,037.99 | $156.19 | $1,478.09 | $460.99 | 0 | $6,982.12 | $15,262.68 |
| MD | $8,280.56 | $1,639.52 | $1,497.39 | $2,499.19 | $1,020.78 | $1,795.27 | $270.14 | $2,556.46 | $797.31 | 11634.08 | $23,710.15 | $31,990.71 |
| MA | $8,280.56 | $1,941.69 | $1,773.36 | $2,959.80 | $1,208.91 | $2,126.14 | $319.93 | $3,027.62 | $944.26 | 0 | $14,301.71 | $22,582.27 |
| NH | $8,280.56 | $947.94 | $865.76 | $1,444.98 | $590.19 | $1,037.99 | $156.19 | $1,478.09 | $460.99 | 0 | $6,982.12 | $15,262.68 |
| NJ | $8,280.56 | $2,947.89 | $2,692.33 | $4,493.60 | $1,835.39 | $3,227.93 | $485.72 | $4,596.57 | $1,433.58 | 0 | $21,713.02 | $29,993.58 |
| NY | $8,280.56 | $8,657.18 | $7,906.67 | $13,196.50 | $5,390.05 | $9,479.57 | $1,426.44 | $13,498.89 | $4,210.05 | 0 | $63,765.37 | $72,045.93 |
| PA Game | $8,280.56 | $0.00 | $1,983.66 | $3,310.79 | $0.00 | $2,378.28 | $357.87 | $0.00 | $1,056.24 | 0 | $9,086.84 | $17,367.40 |
| PA Fish | $8,280.56 | $2,171.95 | $0.00 | $0.00 | $1,352.28 | $0.00 | $0.00 | $3,386.66 | $0.00 | 0 | $6,910.89 | $15,191.45 |
| RI | $8,280.56 | $947.94 | $865.76 | $1,444.98 | $590.19 | $1,037.99 | $156.19 | $1,478.09 | $460.99 | 0 | $6,982.12 | $15,262.68 |
| VT | $8,280.56 | $947.94 | $865.76 | $1,444.98 | $590.19 | $1,037.99 | $156.19 | $1,478.09 | $460.99 | 0 | $6,982.12 | $15,262.68 |
| VA | $8,280.56 | $3,317.05 | $3,029.48 | $5,056.31 | $2,065.23 | $3,632.15 | $546.55 | $5,172.18 | $1,613.11 | 0 | $24,432.06 | $32,712.62 |
| WV | $8,280.56 | $947.94 | $865.76 | $1,444.98 | $590.19 | $1,037.99 | $156.19 | $1,478.09 | $460.99 | 0 | $6,982.12 | $15,262.68 |
| | | | | | | | | | | | | |
| | | $27,310.84 | $24,943.19 | $41,631.05 | $17,004.00 | $29,905.24 | $4,500.00 | $42,585.00 | $13,281.47 | $12,949.10 | $214,109.89 | $338,318.29 |

[1] Amounts are the federal share billed to states. Match is provided by WMI and contractors and shown on Table 2.

Table 2: Summary of Job 1 and Job 2 expenses, non-federal match and the basis for billing for the period 10/01/2017 to 12/31/2017.

| | | | | | |
|---|---|---|---|---|---|
| NE RCN EXPENSE | | | | | |
| APPROVED PR0JECT | JOB 2 | | JOB 1 | | |
| **Project Number** | **CONTRACTOR CHARGE** | **CONTRACTOR MATCH** | **WMI CHARGE** | **WMI MATCH** | **TOTAL** |
| **2015(1)** | $27,310.84 | $27,310.84 | $12,016.77 | $12,016.77 | $78,655.22 |
| **2015 (2)** | $24,943.19 | $24,943.19 | $10,975.00 | $10,975.00 | $71,836.39 |
| **2015(3)** | $41,631.05 | $41,631.05 | $18,317.66 | $18,317.66 | $119,897.42 |
| **2016 (1)** | $17,004.00 | $17,004.00 | $7,481.76 | $7,481.76 | $48,971.52 |
| **2016 (2)** | $29,905.24 | $29,905.24 | $13,158.31 | $13,158.31 | $86,127.09 |
| **2016 (4)** | $4,500.00 | $4,500.00 | $1,980.00 | $1,980.00 | $12,960.00 |
| **2016 (5)** | $42,585.00 | $42,585.00 | $18,737.40 | $18,737.40 | $122,644.80 |
| **2016 (6)** | $13,281.47 | $13,281.47 | $5,843.85 | $5,843.85 | $38,250.63 |
| **CORRECTION** | **$12,949.10** | $12,949.10 | $35,697.60 | $35,697.60 | $97,293.41 |
| | | | | | |
| Subtotal Jobs 1 & 2 | $214,109.89 | $214,109.89 | $124,208.35 | $124,208.35 | $676,636.48 |
| . | | | | . | |
| | | | | | |
| | | | | | |
| Total Charge and Match | $428,219.78 | | $248,416.70 | | $676,636.48 |
| TOTAL NE RCN EXPENSE AND BASIS FOR BILLING | | | | | |
| Total Charge and Match Attributable to Contractor and to WMI | ATTRIBUTED TO CONTRACTOR | | ATTRIBUTED TO WMI | | |
| | $428,220 | | $248,417 | | |
| Federal Share of Total (50%) | $214,110 | | $124,208 | | |
| Federal Share of Total by State | Varies -- see Table 2 | | **$8,280.56** | | |