Conservation Assessment of Odonata (Dragonflies and Damselflies) in the Northeastern Region

Project Directors

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Timeline: Spring 2012 to Spring 2014

Project Description

We propose to conduct 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 and this project will follow a procedure similar to assessments already conducted in the northeast for certain vertebrate taxa (e.g., birds, reptiles and amphibians). It includes 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 will serve 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.

Background, Need, Goals, and Scope

Considerable progress has been made in recent years in the evaluation of vertebrate taxonomic groups from a regional conservation perspective. Partners in Flight and the North American Bird Conservation Initiative have prioritized bird species on both continental and regional scales using standardized criteria beginning in 2001. More recently, Northeast Partners in Amphibian and Reptile Conservation (NEPARC) conducted a similar analysis focusing on the 13 northeastern states, using a combination of regional responsibility (the proportion of a species' overall geographic range in the northeast) and conservation concern (the proportion of states listing a species as SGCN). The products of such an exercise are matrices that position species in predetermined categories of vulnerability and responsibility, which helps to prioritize species in the face of limited conservation resources. Few invertebrate taxa have been subjected to similar comprehensive region-wide assessments, at least in part because the distribution and status of most invertebrate taxa is poorly known, and rarely accessible at a regional scale.

An exception to this data deficiency among invertebrates is the insect order Odonata (dragonflies and damselflies), of which over 230 species have been reported in the northeastern U.S. Interest in these conspicuous insects has been growing since the mid-1990s, resulting in a much improved understanding of their distributions (Donnelly 2004 *a,b,c*), status, and habitat relationships. Despite this increased knowledge base, Odonata were treated inconsistently in the northeast SWAPs (Bried and Mazzacano 2010). Although northeast SWAPs were more thorough than those in the rest of the country, there was still wide variation among states which may not reflect pure conservation need. In the last decade, several northeastern states have instituted organized statewide surveys with the goal of collecting baseline data on distribution, including Maine (Brunelle and deMaynadier 2005), New Hampshire, Rhode Island, New York (White et al. 2010), and West Virginia. Of the remaining states, Massachusetts, Maryland, Vermont, Connecticut, New Jersey, and Delaware have comprehensive data compiled largely through the efforts of individuals or small groups of experts. Only Pennsylvania and Virginia have what state experts consider uneven statewide coverage, and even in these states there are considerable recent aggregated data available.

Notably, of the Region's 230 species, about 87% were listed as SGCN by at least one SWAP. This high percentage of SGCN highlights the need for further refinement of the actual status of species in the northeast. To conserve Odonata effectively, we propose to apply consistent and comprehensive criteria across all states to identify which species are most important regionally as well as the most vulnerable. The resulting prioritization scheme will serve to direct limited state and regional resources toward conservation actions that benefit Odonata and their habitats and thereby guide implementation of SWAPs. Under RCN Topic 2 **(**Identify High Priority Northeast Species of Greatest Conservation Need), we will compile available status and distributional information for all Odonate species in all 13 states in Region 5. Regional responsibility will be evaluated and all states within the northeast region will benefit by having updated information at regional scales on which to base conservation decisions that benefit Odonates and their habitats.

.**Objectives, Methods, and Timeline**

Objective 1: Assess regional responsibility for all species of Odonata in the northeast.

To achieve this objective we will compile existing distributional data from the northeast into a common database. This step will involve data requests to all of the state partners listed as collaborators. To the extent possible, we will coordinate this task with the ongoing effort to develop a comprehensive northeastern invertebrate database (RCN grant 2009-11), although in addition to specimens we intend to incorporate verified photos, published records and other sources where appropriate. Because of variation in the extent and nature of survey effort among states we plan to conduct this assessment at the county level, with any available finer-scale data being incorporated as appropriate. Once data have been compiled and mapped in ARC GIS, we will use them to delimit each species' range in the northeast using polygons, and compare this range to that depicted in the U.S. (or North America as a whole) using Donnelly's (2004 *a,b,c*) range maps. The proportion of the overall range that falls within the northeast will inform "regional responsibility," and can be used to prioritize species based on the extent to which regional conservation actions will benefit a species versus actions elsewhere. The final step here will be to develop regional responsibility thresholds (e.g., low, moderate, high) as a means of prioritizing species based on this criterion. We will consult with our Odonata expert collaborators (via email and conference call) to help us assign cut-offs for regional responsibility (i.e., NEPARC used a cut-off of 50% of the species' range occurring in the northeast as high responsibility). We will begin the work on this objective upon receipt of the grant, and expect it will be completed by the fall of 2012.

Objective 2: Assess the regional vulnerability of each species occurring in the northeast.

To achieve this objective we will compile existing data on the vulnerability of Odonata across the northeast. In addition to SGCN status, such data could also include NatureServe State (S) and/or Global (G) rarity ranks, State listing (T&E) status, and/or habitat vulnerability assessments. Because these various vulnerability assessments have been conducted using a variety of methods and are not always current, we will develop a straightforward method for combining available state vulnerability metrics into a single regional vulnerability score for each species and the relevant thresholds (i.e., NEPARC used 25%, 50%, 75% of states listing as SGCN) for regional levels of concern. We will begin work on this objective upon receipt of the grant, and expect it to be completed by the spring of 2013. During 2012 we will organize and announce the convening of a special working group session to be held at the Northeast Regional Meeting of the Dragonfly Society of the Americas (DSA) in the summer of 2013. This annual event draws about 50 experts and enthusiasts, and serves as the ideal forum to seek input from knowledgeable Odonatologists on all elements of this project in an academic setting. This working group session will be organized and delivered as a stand-alone conference workshop to be incorporated into the official schedule of the larger DSA conference. We expect to invite 15 conference participants to spend one day in a classroom setting in order to help us refine our draft products developed in objectives 1 and 2.

Objective 3: Combine responsibility and vulnerability into a single prioritization matrix and habitat crosswalk.

After the responsibility and vulnerability scores have been obtained for all species, and thresholds set for both factors, species will be categorized into a two-dimensional responsibility-vulnerability matrix. The matrix will identify species at both ends of the conservation spectrum, from highest priority ("high vulnerability, high responsibility") to lowest ("low vulnerability, low responsibility"). Groupings within the matrix may be associated with different sets of conservation actions, but it is not the intent of this project to identify particular conservation

actions. However, because of the large number of species present in the region, and the association of many of them with high water quality, we also propose to assign species to habitat groupings. Habitat categories will be based on a condensed list from a recently completed Northeast Habitat Classification under a previous RCN grant. Species will be assigned to habitats based on available data and expert knowledge. Such a cross-walk will serve to identify commonalities both among and between Odonata and other taxa sharing these habitats. A final step will be to distribute the final matrix product to Odonata experts within and outside the region for additional peer review, and to modify it based on their input. We will begin work on this objective following completion of objectives 1 and 2 with final completion anticipated for the spring of 2014.

Outcome

The primary outcome of this project will be a comprehensive and explicit tool by which individual Odonates can be prioritized on a regional scale, which can then guide both state and regional conservation actions. Supplemental products include: 1) updated region-wide distribution maps for all 230 species, 2) uniform methods for assessing vulnerability, 3) a habitat cross-walk of Odonata species, and 4) a list of high-priority aquatic habitats hosting disproportionate numbers of at-risk Odonata. Of these supplemental products, the range maps will be particularly useful for identifying areas where additional survey work is needed for the highest priority species.

Literature Cited

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Qualifications of project directors and principal collaborators

Jeff Corser received his B.S from SUNY ESF, and his M.S. in Forest Ecology from Duke University. He has worked as a Zoologist for the NY Natural Heritage Program since 2005 participating on several teams involved with biodiversity assessments and analyses throughout the state. Prior to arriving at NY Heritage, he worked for USGS as an amphibian ecologist, and as a stewardship ecologist for the Tennessee Natural Heritage Program. He was a co-author and active field researcher on the recently completed New York State Dragonfly and Damselfly Survey, and is currently authoring an article for a peer-reviewed journal analyzing the data from this five-year survey effort.

Erin White received a B.A. in Biology from Kalamazoo College in Kalamazoo, MI, and an M.S. in Conservation Biology from Antioch New England. In her current position as a Zoologist with NY Natural Heritage, she coordinated the statewide New York Dragonfly and Damselfly Survey (2005-2009) from 2006 until the conclusion of the project and was the lead author on the final report. She has worked on a variety of projects including a Nature Conservancy project to develop a Freshwater Conservation Blueprint for NYS and inventories for rare animals under State Wildlife Grants projects.

Dr. Pamela Hunt received a B.S. in Biology from Cornell University, an M.A. in Zoology from the University of Montana, and a Ph.D. in Biology from Dartmouth College. In her current position as Senior Conservation Biologist at New Hampshire Audubon, she coordinates the "New Hampshire Dragonfly Survey," led the revision of New Hampshire's list of Threatened and Endangered Species, serves on the State "Wildlife Action Plan Implementation Team," and coordinates avian research and monitoring in New Hampshire in conjunction with regional efforts.

Dr. Phillip deMaynadier received his B.S. in Natural Resources from the University of Michigan and Ph.D. in Wildlife Biology from University of Maine. He works as a wildlife biologist for Maine's Department of Inland Fisheries and Wildlife, serving as Leader for the Reptile, Amphibian, and Invertebrate Group. Some of his recent projects include managing the state's program for identifying and protecting high value vernal pools, researching the effects of road mortality on endangered turtles, helping coordinate statewide atlasing efforts for butterflies, dragonflies, amphibians, and reptiles, and advising landowners and land trusts on protection standards for rare and endangered species.

The other collaborators on the cover page of this proposal are listed to indicate the breadth of regional participation in this proposed project. All state collaborators have agreed to provide data and expertise in reviewing the products of this project. Not listed are several additional Odonata experts from academia and elsewhere who will also play important roles in reviewing this work.