

GRANT AGREEMENT PERFORMANCE REPORT

TO: U.S. FISH AND WILDLIFE SERVICE  
SPORT FISH AND WILDLIFE RESTORATION PROGRAM  
HADLEY, MA

FROM: MARYLAND DEPARTMENT OF NATURAL RESOURCES  
ANNAPOLIS, MD

GRANT AGREEMENT: T-1-3

GRANT TITLE: STATE WILDLIFE GRANTS

PROJECT TITLE: IMPLEMENTATION

TOTAL COSTS: \$1,089,127

## JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 102

Job Title: Natural Heritage Program Database Management

Principal Investigator: Davidson

### Job Objective:

Enhance, maintain, and operate the Natural Heritage Program database for rare, threatened and endangered species, including utilizing GIS technology to map species locations and habitats. Develop and maintain data for other wildlife species of greatest conservation need not currently tracked in the existing database.

### Activities/Findings:

The Natural Heritage Program's central GIS, Biotics, was maintained through data entry and performing routine administration procedures such as data integrity checks, regular backups, and installation of software updates. A new Biotics manager was hired just prior to this reporting period (in April 2007) and emphasis was placed on providing the appropriate and necessary training in the specific Biotics software and Natural Heritage methodology. Additional documentation of protocols and quality control procedures were created. New filing systems were developed to allow for more efficient data entry flow for multiple individuals. Additional staff were trained to increase the volume of data being entered. From July through December of 2007, 48 precise Element Occurrence Records were edited or newly entered, but from January through June of 2008, that number increased to 136. Additional edits were made to 56 Element Tracking records, 52 Element Ranking records, and a number of Site Basic records, Contacts records, and Reference records.

Because access to Biotics and the volume of data entered into Biotics is limited by its capacity as a single-user system, and it is designed to be a multi-user system, a team of several NHP staff developed recommendations for options to improve the situation. To improve data access by NHP staff, we have initiated quarterly dumps from Biotics into a format and location that all NHP staff can use.

NatureServe postponed our annual data exchange with them from September to July 2008. By the end of June, our state-specific data was exported and provided to NatureServe. We expect to receive updates of the global data from NatureServe in late August or early September to import and complete the exchange.

Updated field survey forms and instructions were written, and new data collection methods were developed as staff began to use field data recorders. The Trimble Juno GPS devices are being used for several projects within NHP and new data collection forms were developed for more efficient transfer of data into central data management files. Standard formats and data transfer methods and schedules are still under development.

As part of the development of Maryland's Wildlife Diversity Conservation Plan, a master database was developed (in the form of an Excel spreadsheet) to house data on the species that were designated as

of greatest conservation need (GCN). Portions of this spreadsheet were entered into Biotics; however, this master tracking sheet will likely be maintained in its present form (the fields/columns it includes), at least for the foreseeable future, as the list of GCN species is modified over time. A separate spreadsheet was developed to maintain data on species that are being considered for addition to our GCN list.

Reasons for deviations (if any):

None

Recommendations:

This job should continue, since it is the foundation for nearly all other jobs and work that the Natural Heritage Program does. Because the rollover to Biotics took years to complete, the filing cabinets contain about 2500 records awaiting entry into Biotics. This will be a major focus of NHP's data management staff, since this info is required for numerous other projects, including environmental review and development of a network of conservation lands to sustain Maryland's biodiversity.

## JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 106

Job Title: Natural Community Classification

Principal Investigator: Harrison

### Job Objective:

To use rare and unique natural vegetative communities as coarse filters for rare invertebrate conservation by completing the natural community classification in Maryland, identifying and mapping the rare and unique natural communities of Maryland, and developing conservation strategies for these communities.

### Activities/Findings:

Refinements to the first iteration of *The Natural Communities of Maryland: Classification of Ecological Community Groups* (Harrison 2007) continued throughout FY 08. Several new concepts were added to the classification to address habitat types that were not adequately covered in the first iteration. These included descriptions for Vernal Pools, Wet Meadows, Baymouth Barrier Wetlands, and Coastal Plain Non-riverine Saturated Forests. During FY 08, fieldwork continued statewide in various natural communities to address critical information gaps. The information obtained from this fieldwork assisted us in developing sound community descriptions and conservation ranks, as well as a better understanding of regional distribution patterns, threats, and management needs. In the Montane and Piedmont regions of Maryland we focused on Northern Hardwood Forests, Basic Mesic Forests, and Basic Woodlands. The Coastal Plain field surveys addressed Dry Calcareous Woodlands, Basic Seepage Swamps, Basic Mesic Forests, Upland Depression Swamps, Non-riverine Saturated Forests, and Intertidal Shores.

At the finest level of the classification, we made edits to several vegetation associations that were incorporated in the U.S. National Vegetation Classification. These edits were made in conjunction with ecologists from the Virginia Natural Heritage Program to ensure regional consistency and ultimately meaningful concepts for each vegetation association. The vegetation associations represented include Acidic Cove Forests, Coastal Plain Bottomland Forests, and two globally rare Maritime Forest types. In addition we drafted and submitted with approval a vegetation association description of globally rare (G3) woodlands and forests characterized by Shortleaf Pine that are restricted to Maryland, Delaware, and New Jersey. The official name is Shortleaf Pine/Southern Red Oak, Water Oak)/Hillside Blueberry Forest (CEGL006851) and the full global concept can be found by clicking on the link below:

[http://www.natureserve.org/explorer/servlet/NatureServe?searchCommunityUid=ELEMENT\\_GLOBAL.2.807522](http://www.natureserve.org/explorer/servlet/NatureServe?searchCommunityUid=ELEMENT_GLOBAL.2.807522)

We continued archiving data in our Vegetation Plot Database, which now houses data from 1411 sample plots. In addition, we updated site information for 95 samples plot previously archived. During the spring of 2008, we drafted a "Natural Community Observation" data field

form to be used among staff working on various projects throughout the State. The field form allows the field investigator to rapidly collect enough information about the site to characterize the natural community and its current condition. Because of its simplicity and efficiency at capturing natural community information this form is being used by other agencies such as Maryland's Forest Service in their statewide forest assessment project.

Reasons for deviations (if any):

None

Recommendations:

This job should be continued until the Maryland Natural Community Classification is complete.

Literature Cited:

Harrison, J.W. 2007. The Natural Communities of Maryland: First approximation. Maryland Department of Natural Resources, Wildlife and Heritage Services, Annapolis, MD. Unpublished report. July 2007. 112pp.

## JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 107

Job Title: Status Assessment of Dragonflies and Damselflies

Principal Investigator: McCann

### Job Objective:

Determine the status, distribution, abundance and natural community associations of Maryland's dragonflies and damselflies.

### Activities/Findings:

This project involved a continuation of on-going statewide odonate surveys. During 2008, surveys focused primarily on streams and wetlands in the Allegheny Plateau physiographic region. Some additional survey work was also conducted in the Ridge and Valley and Blue Ridge.

In the Allegheny Plateau, we systematically surveyed 35 1<sup>st</sup>-4<sup>th</sup> order streams on 2-3 days during 2008. Wetland surveys focused on high quality sites that have received little or no past survey effort in the past and offered the greatest potential for state or globally rare odonates. High quality wetland sites were identified based on wetland ecological significance rankings (score  $\geq$  50) by Berdine et al. (1991), aerial photos, NWI wetland maps, and NHP staff knowledge of wetland conditions.

Streams were selected based primarily on stream biotic integrity data from DNR's Maryland Biological Stream Survey Program. In an effort to focus survey efforts on high quality streams, which are most likely to support rare or unique odonate fauna, only those streams with a minimum combined biotic integrity index (CBI) score of 4 were selected. From this pool of potential survey locations, we selected a total of 35 streams, with at least one stream per 8-digit watershed. However, no surveys were conducted in either the Deep Creek Lake or Little Youghiogheny River watersheds where only 1 stream scored  $\geq$  4 and we were unable to obtain landowner permission to conduct surveys there. In watersheds where it was logistically infeasible to survey all high quality streams (e.g., Savage River watershed), we focused on those sub watersheds (12-digit hydrological units) with little or no past survey work and streams of exceptional quality based on a combination of MBSS data (biotic integrity indices, fish and benthic community data, etc.), DNR Fisheries Service data on native brook trout populations, and NHP staff knowledge of stream conditions. Landowner permission was obtained for all streams bordered by private land.

Along each stream, we surveyed at least a 1-km long section. Where possible, we focused on those stream sections bordered by DNR lands (vs. private lands) and favored high quality sections over those obviously degraded by, for example, acid mine drainage or agricultural practices).

Surveys were conducted by 6 observers: 2 experienced NHP staff, 3 trained technicians and odonate expert Richard Orr. Prior to conducting surveys, technicians were given intensive training on odonate ecology, taxonomy, survey techniques and specimen processing by

NHP staff and Richard Orr. Stream and wetland surveys were timed so as to occur during the adult flight periods of most potentially occurring state and globally rare species in the Allegheny Plateau, late May to mid-July for most lotic species and mid-July to August for most lentic species. For each stream or wetland, surveys were separated by at least 1-2 weeks to capture the flight periods of as many potentially occurring rare species as possible. Because most streams were relatively small and it was unlikely that multiple observers would significantly increase species detection rates along the same stream section, stream surveys were usually conducted by a single observer. However, in wetlands, where a variety of relatively large, often open habitats were present and odonate abundance and species richness was much higher, surveys were conducted by teams of 3-5 observers to maximize survey coverage and species detection. Surveys were only conducted during suitable weather conditions (e.g., warm, sunny, Beauford wind scale  $\leq 3$ ) when adult odonates were active and detection was relatively high.

During each stream survey, the observer spent from mid-morning to late afternoon-early evening (~1000-1600), sometimes earlier or later depending on weather conditions and odonate activity levels, systematically searching for adult odonates and exuviae along at least a 1-km section of each stream and adjacent seepage wetlands, vernal pools, floodplain forests and light gaps. Generally, the same section of stream and adjacent habitats were surveyed during each visit. For each species observed, we recorded the number of individuals observed or estimated abundance categorically (e.g., 2-3, 4-10, 11-20, etc.). Adult vouchers were collected for S1-S2 species, species that represented county records, and any species where field identification might be difficult. All exuviae, regardless of species, were collected. For each survey, we recorded survey start and end time, weather conditions, stream characteristics (e.g., size, gradient, substrate), surrounding habitat conditions, and noted conservation needs and threats. Downstream and upstream survey end points were recorded with a GPS. For each S1-S2 species observed, we recorded its location with a GPS, estimated the number of individuals observed by sex and age, and took detailed notes on habitat conditions, distribution along the stream, and behavior including evidence of reproduction (e.g., tandem pairs, tenerals, exuviae, etc.).

During wetland surveys, we generally followed the same protocol as above except that surveys were by necessity, given the large size of the wetlands and habitat conditions, less systematic and more opportunistic, focusing on those habitats (e.g., beaver impoundments, seepage wetlands, streams) that were most likely to support rare or unique odonate fauna.

During the FY 08 reporting period of this project (i.e., May-June 2008), we conducted 59 surveys at 42 streams, ponds and wetlands yielding 113 records of rare or watchlist species. As summarized in Table 1 below, this includes 54 records of 20 species ranked S1-S2, and represents 43 new element occurrences. Highlights include 4 newly documented species for the state: Appalachian Jewelwing (*Calopteryx angustipennis*, G4/S1), Maine Clubtail (*Ophiogomphus mainensis fastigiatus*, G4TU/S1), Moustached Clubtail (*Gomphus adelphus*, G4/S1), and Brush-tipped Emerald (*Somatochlora walshii*, G5/S1). The *fastigiatus* subspecies of the Maine Clubtail, which may receive full species status, is probably a highly globally rare taxon and restricted to large, high quality streams in the Central Appalachians. The Appalachian Jewelwing is nearly completely confined to the southern and

central Appalachians, where it tends to be rare to uncommon, occurring only along large streams and small rivers with high water quality. The other 2 species, Moustached Clubtail and Brush-tipped Emerald, share a boreal to sub-boreal distribution that extends southward through parts of the central and/or southern Appalachians. The Brush-tipped Emerald record from The Glades may represent the southernmost extant population for this species and further points to the ecological significance of this high elevation peatland.

Other highlights include a newly discovered population of the globally rare Spine-crowned Clubtail (*Gomphus abbreviatus*, G3G4/S1) at Sideling Hill Creek. The only other recent Maryland record is from along the Potomac River in Montgomery County. We also documented a population of the Harpoon Clubtail (*Gomphus descriptus*, G4/S1) in a tributary of the Savage River. This represents the only known MD population outside of the Casselman River watershed. In addition, several rare to uncommon clubtails (*Lanthus parvulus*, *L. vernalis*) and spiketails (*Cordulegaster erronea*, *C. erronea*) associated with pristine headwater streams and forested seeps were found along a number of streams in the Savage, Casselman and Youghiogheny River watersheds. These findings further illustrate the relatively pristine conditions found in these streams and their importance for maintaining populations of aquatic species dependant on these conditions.

Surveys of high quality streams and wetlands continued, as planned, through July-September 2008. During the winter of 2008-2009, NHP staff will be working with regional odonate experts to complete a comprehensive status review of Maryland odonate species. The last such review was completed in 1999. Since then, surveys and other sources have yielded a significant amount of new information and we anticipate quite a few s-rank changes and perhaps a few legal status changes. These status changes will be incorporated into a planned, larger revision of the MD Rare, Threatened and Animals Species List, which is scheduled to be completed by June 2009. In terms of inventory prioritization, we also expect there to be some taxonomic, geographic and habitat shifts. During the 2009 field season, we will build upon 2008 survey efforts in western Maryland by continuing to systematically survey Allegheny Plateau streams and wetlands but with a greater emphasis on wetlands and larger streams and rivers in both the Allegheny Plateau and Ridge and Valley. A summary of this status review and inventory work (7/1/2008-6/30/2009) will be provided in next year's FY 09 report.

Reasons for deviations (if any):

None.

Recommendations:

As planned, this is a multi-year effort involving odonate inventory and some monitoring throughout the state. This project should be continued.

Literature Cited:

Berdine, M. A., E. L. Thompson, R. Bartgis, and D. D. Boone. 1991. The wetlands of Maryland's Allegheny Plateau. Final report submitted to Maryland Bureau of Mines. Maryland Department of Natural Resources, Natural Heritage Program, Annapolis, Maryland. 568 pp.

Table 1. Summary of S1-S2 dragonfly and damselfly species records based on western Maryland surveys during May-June 2008. Underlined species represent state records. Bolded and italicized sites represent new element occurrences.

Species	Common Name	Grank	Srank	Site	County
<i>Aeshna canadensis</i>	Canada Darner	G5	S2	Mt. Nebo Wildlife Mgt Area	GA
<i>Aeshna tuberculifera</i>	Black-tipped Darner	G5	S2	Mt. Nebo Wildlife Mgt Area	GA
<i>Aeshna verticalis</i>	Green-striped Darner	G5	S2	Mt. Nebo Wildlife Mgt Area	GA
<i>Calopteryx amata</i>	Superb Jewelwing	G4	S2	<b>Big Run</b>	GA
				<b>Mudlick Run</b>	GA
				<b>Poplar Lick Run</b>	GA
				Savage River	GA
<u><i>Calopteryx angustipennis</i></u>	Appalachian Jewelwing	G4	S1	<b>Potomac River, Upper</b>	AL
				<b>Sideling Hill Creek</b>	AL/WA
<i>Cordulegaster erronea</i>	Tiger Spiketail	G4	S2	<b>Buck Hill Spring</b>	GA
				<b>Hunting Creek</b>	FR
				<b>Folly Run</b>	GA
				<b>Puzzley Run</b>	GA
<i>Cordulegaster obliqua</i>	Arrowhead Spiketail	G4	S2	<b>Buffalo Run</b>	GA
				<b>Fikes Run</b>	GA
				<b>Mill Run</b>	GA
<i>Enallagma annexum</i>	Northern Bluet	G5	S1	Mt. Nebo Wildlife Mgt Area	
<i>Gomphus abbreviatus</i>	Spine-crowned Clubtail	G3G4	S1	<b>Sideling Hill Creek</b>	AL/WA
<u><i>Gomphus adelphus</i></u>	Moustached Clubtail	G4	S1	<b>Casselman River</b>	GA
<i>Gomphus descriptus</i>	Harpoon Clubtail	G4	S1	Casselman River	GA
				<b>Casselman River, North Branch</b>	GA
				<b>Casselman River, South Branch</b>	GA
				<b>Mudlick Run</b>	GA
<i>Gomphus rogersi</i>	Sable Clubtail	G4	S1	<b>Casselman River, South Branch</b>	GA
				Muddy Creek	GA
<i>Gomphus viridifrons</i>	Green-faced Clubtail	G3	S1	Sideling Hill Creek	AL/WA
<i>Ladona julia</i>	Chalk-fronted Skimmer	G5	S2	<b>Dan's Mountain State Park Pond</b>	AL
				<b>Frostburg Reservoir</b>	GA
				<b>Staub Run Pond</b>	AL
				<b>Warrior Run</b>	AL

<i>Lanthus parvulus</i>	Northern Pygmy Clubtail	G4	S1	<b>Casselman River</b>	GA
				<b>Casselman River, South Branch</b>	GA
				<b>Fikes Run</b>	GA
				<b>Gap Run</b>	GA
				<b>Little Laurel Run</b>	GA
				<b>Monroe Run</b>	GA
				<b>Mudlick Run</b>	GA
				<b>Piney Creek UT1</b>	GA
				<b>Poplar Lick Run</b>	GA
				<b>Spring Lick Run</b>	GA
<i>Lanthus vernalis</i>	Southern Pygmy Clubtail	G4	S1	<b>Bear Pen Run</b>	GA
				<b>Casselman River, South Branch</b>	GA
				<b>Little Bear Creek</b>	GA
				<b>Little Bear Creek UT1</b>	GA
				Little Hunting Creek	FR
				<b>Little Laurel Run</b>	GA
				<b>Lostland Run</b>	GA
				<b>Mill Run</b>	GA
				Puzzley Run	GA
				<b>Staub Run</b>	AL
<i>Leucorrhinia hudsonica</i>	Hudsonian Whiteface	G5	S1	<b>The Glades</b>	GA
<u><i>Ophiogomphus mainensis fastigiatus</i></u>	Maine Snaketail	G4TU	S1	<b>Casselman River</b>	GA
<i>Rhionaeschna mutata</i>	Spring Blue Darner	G4	S1	Mt. Nebo Wildlife Mgt Area	GA
<u><i>Somatochlora walshii</i></u>	Brush-tipped Emerald	G5	S1	<b>The Glades</b>	GA

## JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 109

Job Title: Assess Wildlife Value of Old Growth Forest

Principal Investigator: Brewer

### Job Objective:

1. Quantify vegetative and other old growth forest characteristics that typically support rare animal species.
2. Document rare birds, salamanders, and select terrestrial invertebrates in old growth and adjacent areas as indicators of biodiversity.
3. Compile and analyze collected data.
4. Summarize the wildlife value of old growth forest and adjacent forest.
5. Compare old growth vegetative characteristics and species presence, density, and diversity for select indicator groups between old growth and adjacent forest to assess their potential impact on each other in terms of wildlife value and rare species needs.

### Activities/Findings:

**Invertebrate Identification-** In this grant reporting period, identification of pseudoscorpions (members of at least 3 families so far) is being carried out by a cooperator from McGill University (Dr. Chris Buddle). A cooperator from the University of Maryland (Dr. Jeff Shultz) has identified the 1,491 Opiliones (harvestmen) captured, finding 9 species representing 5 genera. Records of 1 species are only the second in Maryland. Cooperators from the USDA-ARS Systematic Entomology Laboratory have sorted malaise trap head samples to extract Hymenoptera (Infraorder: Parasitica; Dr. Michael Gates); Diptera (Family: Tephritidae; Dr. Allen Norrbum); and Neuroptera (Dr. Oliver Flint), which will be identified in the coming year when more staff are available. Ants in the samples are being identified by Dr. Tim Foard.

Remaining specimen identifications were entered into Biota, a relational biodiversity database. A publication on carabid beetle diversity in old growth and managed stands is in preparation.

**Vegetation Data-** Vegetation data collection was completed at 39 study areas, using standard community plot data collection techniques in 1 20 x 20 m plot at each location, to complete data collection for old growth and mature forest plots. Data from the 24 remaining younger forest areas will be collected in early fall 2008. Data collected at all plots included GPS location, general information on landscape position and physical characteristics, percent ground cover, evidence of disturbance, vegetation structure and physiognomy, diameter at breast height for all woody stems > 2.5 cm diameter, species cover class by stratum for woody vegetation, snag DBH and condition class, and downed coarse woody debris size and condition class (along 2 50-m transects). Preliminary analyses suggest that in old growth forest plots, vertical vegetation structure is more varied and coarse woody

debris volumes are at least double. Controlled comparisons suggest that species composition differs between old growth and mature second growth stands. Further analyses using bird point count data will be carried out when vegetation plot data collection is completed in fall 2008.

Reasons for deviations (if any):

Salamanders were not targeted for capture. Insect data, especially for downed-wood associated beetles, should provide larger sample sizes to indicate the impact of terrestrial habitat features in old growth systems on wildlife.

Recommendations:

Job should continue so that insect identification, vegetation data collection, data analyses, and publication of work can be completed.

## JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 118

Job Title: Collect Crayfish and Mussel Data as Part of the Maryland Biological Stream Survey

Principal Investigator: Stranko

### Job Objective:

Include the collection of freshwater mussel and crayfish information at all MBSS sites sampled during 2006 to document (1) distribution and abundance information for crayfish throughout Maryland's freshwater streams and (2) locations where freshwater mussels are observed during by MBSS crews.

### Activities/Findings:

This job was performed under contract with DNR's Maryland Biological Stream Survey (MBSS). Crayfish and/or mussel data were collected from sites sampled statewide beginning March 1, 2008. Data provided improve our understanding of native and non-native crayfish and mussel distributions. As a result of State Wildlife Grant funded crayfish surveys by the Maryland Department of Natural Resources (MDNR) Maryland Biological Stream Survey, it has become clear that invasive crayfish species are a significant threat to Maryland's native crayfishes and to the integrity of Maryland streams and rivers. Four non-native invasive crayfishes are now established in Maryland waters. The impacts of these species on native crayfish diversity and stream ecosystems are currently unknown, but appear to be severe based on information from other areas of the United States. These introductions have primarily occurred as a result of the transfer and release of live crayfishes used as bait by Maryland anglers. In October 2008, MBSS personnel will conduct a mail survey of Maryland's freshwater anglers. The objectives of this survey are to:

1. Determine how many anglers use live bait in Maryland's freshwater systems
2. Determine the types of live bait anglers use in Maryland
3. Determine where anglers who fish in Maryland get their live bait (e.g. bait shop, self-caught, internet, etc.)
4. Understand how anglers dispose of unused bait in Maryland

Data provided by this survey will guide future regulatory action and focus educational outreach aimed to prevent future introductions of invasive crayfish species.

### Reasons for deviations (if any):

\$6,500 of funds will be used to conduct the Angler mail survey with permission from Glenn Therres (MDNR Heritage Program) and USFWS.

### Recommendations:

Annual monitoring of mussels and crayfishes should be continued to improve our knowledge of these ecologically important taxa. The distribution of native, as well as the effects of introduced species and other stressors on native species, should continue to be an integral part of effective crayfish and mussel conservation planning.

## JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 120

Job Title: Coordinate Targeted Inventory, Monitoring, and Research

Principal Investigator: Brewer

### Job Objective:

The overall objective of this job is to better target inventory, monitoring, and research activities from the State Wildlife Action Plan that are needed to implement priority conservation actions for GCN species and habitats. Specific objectives include:

1. Catalogue existing IMR activities and those that are planned for the future.
2. Begin to coordinate with partners to identify all of our roles in addressing these needs and to identify opportunities for collaboration.
3. Provide guidance on inventory and monitoring protocols so that results can contribute to region-wide efforts and databases.
4. Establish a mechanism for consistent communication of activities/outcomes of inventory, monitoring, and research to land managers and other partners.
5. Explore organization of more formalized state working groups or other means to achieve better partner collaboration and implementation of priority activities.

### Activities/Findings:

Maryland's State Wildlife Plan and those of several other states were reviewed to identify IMR prioritization methods and threat analysis. Information on these elements has been compiled for Maryland from our species database. Inventory and monitoring protocols for species of greatest conservation need and for rare habitats continue to be tested in part through participation in Northeast Coordinated Bird Monitoring Partnership (NECBMP), which held a workshop to address management issues through monitoring for species/habitat working groups October 3-5, 2007 in Laurel, MD. Several staff attended that workshop and used the information to better carry out current monitoring activities. NECBMP also includes a compilation of bird monitoring activities and their objectives in the state and region. A staff member participated on the NECBMP Steering Committee, which developed a framework for coordinated bird monitoring and a draft monitoring handbook for managers through monthly conference calls and a meeting held March 16-18, 2008 in Hadley, MA. This system focuses on a process to target monitoring based on management needs that can be generalized to species other than birds, and supporting statistical design, secure data repository, and data visualization tools. In addition, a literature review of monitoring for rare/priority species, multiple species, threat scoring, and prioritization processes for conservation is ongoing. A draft system to target IMR based on program goals and outcomes was presented at a meeting of all staff in February 2008. Comments received on the draft system have been incorporated and more

information is being added to define specific IMR activities for the next 3-5 years. As part of an outreach strategy to universities, research institutions, NGOs and other IMR partners, information is being compiled on the expertise of these partners in species of greatest conservation need and their habitats.

Reasons for deviations (if any):

None

Recommendations:

This job should be continued to allow the specification of targets and actions for the near future, and to allow the completion of the monitoring handbook for managers and other components being developed by the NECBMP by December 31, 2008.

## JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 122

Job Title: Identify Biodiversity Conservation Network (BioNet)

Principal Investigator: Davidson

### Job Objective:

The primary objective of this project is to develop a GIS data system that identifies the lands and waters necessary to conserve the full complement of Maryland's native terrestrial and freshwater plants and animals by focusing on the species of Greatest Conservation Need and the key habitats and natural communities they require. This Biodiversity Conservation Network will become an important tool to focus and prioritize both proactive and reactive protection projects, including environmental review, targeted species inventory/monitoring work, and protection planning, as well as other conservation activities, such as restoration projects and targeted management actions of public land managers.

### Activities/Findings:

During the period July 2006 through June 2007, a team of NHP staff met over several months to develop a draft of the framework for the project, including the purpose, goals, scope, criteria, and important "sideboards" that will be incorporated. We researched similar focal area projects already developed by other organizations. Early in the project, it became apparent that we lacked sufficient data on a number of key habitats and natural communities (or Ecological Community Groups) to incorporate any meaningful targeted areas for these important elements of biodiversity. We also lacked accurate potential distribution maps for those species of Greatest Conservation Need that were not already being tracked within the Biotics database. We decided to first try to fill the missing habitat/natural community data for those rarest habitats where we had point data or raw data in other formats that could be used to develop polygons in GIS. By June 30, about 10 of 27 rare (ranked S1 & S2 in Maryland) ecological community groups (ECGs) had draft polygon maps developed and several others were underway.

During the period July 2007 through June 2008, we continued to develop polygon maps for habitats based on existing point data and other data sources; 45 of 50 ECGs ranked S1-S3 were drafted by March. In addition, a new rapid assessment protocol to collect ECG data for the highest priority natural communities and high quality examples of common natural communities was developed. This new protocol was implemented using new data collection methods via field data recorders. The Trimble Juno GPS devices are being used for several projects within NHP and new data collection digital forms were developed for more efficient transfer of data into central data management files. A detailed instruction manual was also developed. This new protocol was used during a "pilot" project in Maryland's Southern Region. About 89 new ECG observation records were collected during late summer 2007 and spring 2008 from 6 different ECG types, including Coastal Plain-

Piedmont Acidic Seepage Swamps, Mixed Oak-Heath Forests, and Coastal Plain-Piedmont Bottomland Forests. GIS analyses of these records led to the development of 220 new ECG polygons. In addition, a new ranking system was drafted to prioritize these areas based on three primary factors: size, condition, and landscape context.

While work was underway to fill important data gaps, the project team met infrequently and needed to be revitalized. A new, smaller subgroup was formed from the team to flesh out the criteria for Tiers within the BioNet more specifically. Because of field schedules and limited available time, this task was not finished by the end of this reporting period.

Reasons for deviations (if any):

None

Recommendations:

Next steps include finalizing the specific criteria for various Tiers within BioNet, reviewing and editing the drafted ECG maps as needed, reviewing the results of the pilot project with the full work team, compiling the final GIS data layers and running the analysis based on the criteria of the Tiers, submitting the final GIS product for broader review beyond the work team, and developing project documentation.

This job should continue, since the BioNet will build upon the "raw" location data managed within Biotics, as well as incorporate numerous other data sources, to form the foundation for nearly all other jobs and work that the Natural Heritage Program does and increase Program efficiency by focusing staff on the most important areas for biodiversity conservation.

## JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 201

Job Title: Environmental Review

Principal Investigator: Larney

### Job Objective:

Annually, coordinate and carry out the environmental assessment and review of required projects (federal, state, local and private sources) per state and federal laws and coordinate with other DNR, state, local, and federal government agencies in influencing the conservation of wildlife species of greatest.

### Activities/Findings:

From July 1, 2007 to June 30, 2008 the environmental review office of the Natural Heritage Program processed a total of 3,058 projects. These proposals were reviewed for the purpose of identifying and mitigating potential impacts to state and federal listed species (including those with a state rare status), colonial water nesting birds, Forest Interior Dwelling Species (FIDS), and unique and sensitive natural communities types harboring species of greatest conservation needs (e.g., bogs, shale barrens, vernal pools, etc.). The projects reviewed came from all 23 counties in the State. They were submitted by local jurisdictions, private landowners, consultants, sister agencies in the state (e.g., Maryland Department of the Environment, State Highway Administration, Critical Area Commission, etc.). Projects were also reviewed for permits associated with authorities pertaining to the branches of the U.S. Armed Services, U.S. Corp of Engineers, National Park Service, and U.S. Fish and Wildlife Service. The annual break down for this work is as follows:

The review process itself consisted of 2 distinct phases. Initially, a screening procedure took place using a GIS based remote sensing approach. Sophisticated software (i.e., Wildlife and Heritage Service Conservation Information System [CIS]) and state of the art imagery was used to determine whether potential ecological conflicts for a given proposal existed. The ultimate determinations for this were made using actual known occurrences of the species themselves and the corresponding habitat protection areas associated with each. Once potential conflicts were identified using the distributional depictions delineated within the CIS framework, further evaluations took place for projects of concern (Phase 2).

In the second phase, projects of concern identified in Phase 1 were forwarded to regional offices across the State for a closer evaluation by a species level expert. These regional staff then worked directly with the applicants to help facilitate project outcomes that avoided and minimized impacts to the resources in question. In some cases mitigation measures were negotiated. The specific amount and ultimate level of technical involvement varied by project depending on its nature, scope, scale, and legal status of the species involved. Field reviews, site visits, and extensive meetings were often required

during this phase to resolve the complex resource concerns associated with the projects in question.

In addition to the 3,058 projects discussed above, a large amount of project review work took place in the public land arena in Maryland. Maryland DNR owns and manages close to 500,000 acres of land. Regional staff from the Natural Heritage Program were seated in various committees, work groups, and regional teams within DNR's organizational framework. All proposed management activities during this period on DNR owned lands were evaluated for potential impacts by our ecologists and species level experts. The staff from the Natural Heritage Program routinely evaluated proposed management activities relating to silviculture on state forest and recreational development activities in state parks. An extensive amount of analysis and input was also provided during the creation of long-term management plans for many of the land-units across the state during this reporting period. This was done with the explicit intent of integrating wildlife diversity conservation principles into the overall process of public land management.

Reasons for deviations (if any):

None

Recommendations:

Continue to fund this project. The nature of this involvement and input is essential given the development pressures associated with this fast growing State. There are also programmatic obligations pertaining to public land stewardship that must be addressed. In addition, failing to offset the impacts of development and incompatible management practices will detract from our primary conservation mission and result in undesirable outcomes for the species and habitat we are charged to protect.

## JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 202

Job Title: Important Bird Areas Project

Principal Investigator: Therres

### Job Objective:

By December 2005, (1) identify and refine the sites selected in Maryland as IBAs (2) educate the public and area organizations about the availability of IBA evaluation data; (3) develop a comprehensive selection of tools to protect the identified sites; (4) develop conservation plans for each site; (5) partner with appropriate organizations that are already actively involved in the management and protection of selected sites.

### Activities/Findings:

Funding was provided to the Maryland/DC office of National Audubon Society to support their Important Bird Area program for Maryland. This funding helped support the Bird Conservation Director position, who coordinates the program.

A Technical Committee met regularly to guide the selection of appropriate sites for designation as Important Bird Areas (IBA) in Maryland. Two staff from the Natural Heritage Program serve on this committee. Criteria for selection of Maryland IBAs had been developed previously. The criteria are provided on the following webpage [http://www.audubonmdcdc.org/PDFs/MD-DC\\_IBACRITERIA\\_Feb2006.pdf](http://www.audubonmdcdc.org/PDFs/MD-DC_IBACRITERIA_Feb2006.pdf).

Several sites had been nominated as IBAs in Maryland and were reviewed by the Technical Committee using the established criteria. Through March 2008, 26 sites were determined to meet the criteria for Maryland IBA. They are Cranesville Swamp, Wolf Swamp, Finzel Swamp, Chapman Forest, Belt Woods, Jug Bay, Fort Smallwood, Hart-Miller Island, Eastern Neck NWR, Southern Dorchester County, Central Chesapeake Islands, Somerset-Wicomico Marshes, Maryland Coastal Bays, Assateague Island, Parker's Creek, Patuxent Research Refuge, Chino Farms, Green Ridge Forest, Patapsco Valley, Great Cypress Swamp, Pocomoke-Nassawange, Prettyboy, South River Greenway, Tuckahoe Creek, Idylwild, and Lower C&O Canal.

The first statewide season of IBA Bird Blitz was completed in the summer of 2007 and data from this effort helped in the designation of several IBAs. No less than 50 volunteers completed 46 bird counts at 11 sites across Maryland. Bird Blitz helps the determination by producing a breeding season count of:

- 1) At-risk bird species that can then be compared with the threshold population sizes required for a site to qualify as an IBA.
- 2) Members of bird species assemblages that are characteristic of each major habitat type. Sites with particularly well-represented species assemblages will qualify as IBAs.

Bird Blitzes were conducted at Catoctin Mountain National Park, Sugarloaf Mountain, C&O Canal, Patapsco Valley State Park, Gunpowder

Falls and Prettyboy Reservoir, Zekiah Swamp, Calvert Cliffs State Park, South River Greenway, Tuckahoe State Park, and Idylwild Wildlife Management Area. At-risk species were the primary targets of the surveys. Many participants also counted secondary target species, which assist the review of IBA nominations by providing data on bird species assemblages' representative of different habitat types.

Reasons for deviations (if any):

The development of tools to protect the sites and development of conservation plans for each site have not been completed.

Recommendations:

This job should be continued. Many more sites will be eligible for IBA designation in Maryland. Developing conservation strategies for each IBA will need to be developed and those actions will need to be coordinated with the various landowners and partners for appropriate conservation.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 204

Job Title: Coordinate the Second Breeding Bird Atlas Project

Principal Investigator: Therres

Job Objective:

Through the 2006 breeding season, (1) coordinate the collection of breeding bird data by volunteers from 1260 atlas blocks in Maryland; (2) complete the collection of breeding bird data in 252 atlas blocks per field season; and (3) recruit volunteers to collect breeding bird data in unassigned blocks.

Activities/Findings:

Funding to support the coordination and data collection efforts of the Second Maryland/DC Breeding Bird Atlas Project were provided to the Maryland Ornithological Society. One Wildlife and Heritage Service (WHS) staff person served on the Atlas Board, which was responsible for oversight of the statewide effort. Three WHS staff served as county coordinators, who were responsible for recruiting volunteer help in their counties of responsibility and ensuring that sufficient data was collected from each survey block.

Data collection began during the breeding season of 2006. By the end of the 2006 field season, data had been collected from all 1284 atlas blocks. Data editing and analysis were completed during this job segment.

During the 2007 breeding season, the remaining 148 miniroutes were surveyed to assess relative abundance of breeding species.

Preparation of the final atlas book began during this job segment. A general format for species accounts was developed and 52 were written by the end of June 2008.

Reasons for deviations (if any):

None

Recommendations:

This job should be continued through the preparation of the final Atlas products.

## JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 211

Job Title: Study Bird and Bat Migration Over Appalachian Ridges

Principal Investigator: Brewer

### Job Objective:

The overall objective of the project is to increase our understanding of the characteristics and dynamics of nocturnal bird and bat migration through the Appalachians.

Specific objectives include:

- 1) Develop the design and protocols to sample nocturnally migrating birds and bats at multiple locations in the Appalachian Mountain region of the mid-Atlantic states, including several locations in western Maryland.
- 2) Document density/passage rates, flight direction, and flight altitudes of migrating birds and bats during fall and spring at each location.
- 3) Obtain information on the identity and relative abundance at each location of bird species that call while migrating.
- 4) Model the effects of weather, site and landscape characteristics, or other variables on migrant density/abundance and flight characteristics.
- 5) Map observed and predicted migrant densities for the region to identify the locations and weather conditions where/when migrants are most at risk.

### Activities/Findings:

Work focused on collection and processing of data to assess both broad-scale and site-specific patterns of nocturnal migration through the region. Two methods, acoustic monitoring and portable marine radar sampling, were used to obtain site-specific information on the abundance and movements of nocturnal migrants at multiple sites in the region. X-band marine radar data from spring and fall 2006 for 3 sites (Backbone Mountain, Potomac State Forest, Garrett County, MD; Jack Mountain, Highland Wildlife Management Area, Highland County, VA; Sharp Knob, Monongahela National Forest (MNF), Pocahontas County, WV) were analyzed in 2007-2008. Data on target position and altitude were extracted from each radar image, using software developed by New Jersey Audubon Society staff. The software removes stationary radar reflectors, smoothes the data, locates the centroid of each discrete target that remains, and exports information on each target's position to a text file. Mean target numbers, altitude, speed, and direction are calculated for each hour of sampling. Major findings of the study were as follows:

1. Average nightly target (i.e., birds, bats) passage was higher in fall ( $4146.28 \pm 483.69$  SE) compared with spring ( $2487.69 \pm 591.79$  SE); however, in both seasons, passage was highly variable among nights sampled and differences were not statistically significant.

2. Nightly temporal patterns in passage were similar in spring and fall in that there was a marked increase in detected targets during the first hour after sunset. Target detection increased rapidly afterward and peaked 2-3 hours after sunset. Detections then gradually declined in subsequent hours until sunrise the following morning.

3. The proportion of targets detected in the 0-100 m above radar level (arl) stratum was highly variable during spring and fall data collection period. There was a significant difference in the mean proportion of targets (arcsine transformed) detected in the 0-100 m stratum during spring (0.13, 11,254 targets) compared with fall (0.07, 26,580 targets). The proportion of targets in the 0-100 m arl stratum was significantly greater at the West Virginia site, but the Maryland and Virginia sites were not significantly different from each other. This result could be related to the higher elevation of the West Virginia site compared with the Maryland and Virginia sites.

4. Flight directions of targets in spring were northerly on 93% of the nights we analyzed for the spring migration study period. Site-specific mean flight directions were northwesterly at all sites and highly significant statistically. Small, but statistically significant differences in flight direction among study sites were present. In fall, target flight directions were southerly on 82% of the nights we sampled. Mean flight direction was southeasterly and highly significant at all sites. Statistically significant differences among sites were also found in the fall. Among-site differences in flight direction were likely the result of very large sample sizes, which provided the statistical power to detect small differences.

5. Results suggest that synoptic (i.e., regional-scale) weather patterns are important determinants of variation in the flight dynamics and behavior patterns. Pressure systems (i.e., highs, lows) and frontal boundaries that produced winds that would vector birds and bats toward their seasonally appropriate goals (i.e., northerly in spring, southerly in fall) resulted in greater numbers of detected targets, on average, than when these conditions were not occurring. Similarly, greater numbers of targets were detected in the 2 lowest altitudinal strata we considered ((i.e., < 100 m, >100 m and <200 m) when regional-scale weather patterns were favorable for passage. Analyses of local-scale weather conditions, which typically reflect regional-scale patterns, also suggest that wind speed and direction are important determinants of flight dynamics and behavior. An information theoretic approach to model selection showed that as winds tended to blow in the direction of the assumed goal, numbers of targets we detected increased and, as winds became more opposing, birds flew at lower altitudes. In fall, "cloud cover/precipitation" also showed the greatest support in models of passage magnitude and the proportion of targets detected in the < 100 m stratum.

As part of the overall study, acoustical detectors were again used in fall 2007 to monitor the passage of migrating birds over 31 sites (MD, WV, VA), recording the calls made by migrating birds in flight to index their abundance. Sites were openings on ridges, knobs, slopes, or valleys, on lands owned by the USDA Forest Service (George Washington and Jefferson National Forests, Monongahela National Forest), U.S. Fish and Wildlife Service, the states, or The Nature Conservancy. In Maryland, acoustic data were collected in fall 2007 at Backbone Mountain, Meadow Mountain, and at 2 sites on Big Savage Mountain. At each site, an autonomous recording unit was placed, and serviced at regular intervals through the season. The microphones can

detect and record calls up to about 300 m AGL, the altitudinal zone that potentially could be occupied by wind turbines.

The sound recordings are currently being analyzed under another funding source to extract flight call data, with assistance from biologists in the Bioacoustics Research Program, Powdermill Nature Reserve (PNR). Recordings are scanned in XBAT, sound analysis software developed at the Cornell Lab of Ornithology, to detect sounds that could be flight calls (i.e., of similar duration and frequencies); each recording must be scanned once to detect calls made by sparrows or warblers, and 1 or more additional times to detect the lower and longer calls made by thrushes, grosbeaks, and tanagers. Detected sounds are then reviewed, and those confirmed to be flight calls are clipped, exported, and summarized. Recordings from 2006 are being analyzed first so that results can be compared with those from the radar sampling. Although great progress has been made to date, considerable work remains to complete analysis of the 2006 recordings, and to analyze those from other seasons.

Gates (2006) describes the findings from the completed funding match project.

Reasons for deviations (if any):

None

Recommendations:

This job has been completed. The final report is referenced below (Mizrahi et al. 2008).

Literature Cited:

Gates, J. E. 2006. Daily and seasonal patterns of bird and bat activity along central Appalachian ridges: implications for wind energy generation. Progress report. Appalachian Laboratory, Frostburg, Md. 55 pp.

Mizrahi, D.S., Fogg, R., Peters, K.A., and P.A. Hodgetts. 2008. Assessing bird and bat migration patterns in the mid-Atlantic Appalachian Mountain region using marine radar. Draft final report. New Jersey Audubon Society, Cape May Court House, NJ. 137 pp.

## JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 212

Job Title: Assist with the Restoration and Preservation of Bog Turtle Habitat

Principal Investigator: Smith

### Job Objective:

To collaborate with the U.S. Fish and Wildlife Service (USFWS) and Environmental Defense (ED) to protect and restore bog turtle habitat in Maryland.

### Activities/Findings:

This report is for the period July 1, 2007 through June 30, 2008. The list of activities below is somewhat chronological through this period.

1) Completed and submitted the 5-year status review spreadsheet and questionnaire for bog turtles in Maryland to USFWS, PA Field office. The spreadsheet included 207 unique locations from 1941-2008, of which 82 were known extant (40%).

2) Participated in a phone conference of the Steering Committee for the newly formed Bog Turtle Conservation Alliance, a non-profit that will be the northern sister organization to Project Bog Turtle, which covers the southern populations. (Note: this organization is currently moribund.)

3) Attended a meeting at the Chesapeake Bay Field Office (USFWS) to discuss coordinated bog turtle restoration efforts. USFWS, NRCS, ED and DNR in attendance. ED lost all staff (2) who had been doing this in MD, so a big part of this meeting was discussing who would pick up ongoing ED projects (a mixture of USFWS & DNR) and how would ED get back into the game. Sustainability of restoration effort is still a big problem. DNR gave a presentation on our activities in 2007, plus some of the preliminary results from telemetry work and implications to restoration effort, specifically the critical role of hibernacula and how current restoration work only in winter could be harmful.

4) Provided technical assistance on managing invasive vegetation and reducing impacts from animal waste on a bog turtle wetland to a landowner that owns part of BA-30. We also provided technical advice to ED on a number of potential bog turtle wetland restoration sites.

5) Spent a day in the field with DNR's LIP Coordinator visiting 2 experimental goat conservation grazing sites in Carroll County (CA-1, CA-31a) to benefit bog turtle habitat. Goats appear to be removing skunk cabbage; an added benefit. Also visited with 2 private landowners (CA-31a & Ray site) in Carroll County to provide technical assistance on bog turtle habitat concerns, plus investigated a State Highway Administration (SHA) report of 2 dead bog turtles at CA-148 (were dead - marked adult male and female, unknown cause.).

6) Attended a field meeting with NRCS and DNR's LIP Coordinator to discuss potential bog turtle restoration project at CA-33.

7) At the request of NRCS' MD State Biologist, created a spreadsheet of all bog turtle sites in Patapsco and Gunpowder drainages

including acreages, grazing history and number of parcels/landowners. NRCS is targeting these 2 watersheds with landowner incentives that could be used for bog turtle conservation efforts.

8) Attended a field meeting with USFWS and DNR's LIP Coordinator to meet with landowners and discuss bog turtle restoration at HA-73 and HA-28. Conservation grazing, fencing, providing alternate watering sources and invasive control were part of all discussions. USFWS will be the lead on these 2 former ED projects.

9) Met with the Conservation Coordinator for the Mid-Atlantic Turtle & Tortoise Society (MATTs) and a landowner to visit HA-410. MATTs will be adopting this site to conduct habitat restoration, under DNR guidance.

10) Prepared a report on Phase II bog turtle surveys conducted at Wolf Hill Bog in 2007 and submitted to SHA in an effort to convince SHA to retain ownership of this property rather than sell for development. No bog turtles are present, but this wetland serves as an important linkage for 2 adjacent sites, and it contains the state threatened plant *Sanguisorba canadensis*.

11) Attended a field meeting with USFWS, NRCS, a fencing contractor and a landowner to discuss goat fencing/conservation grazing project at bog turtle sites CA-73 and CA-28. Fencing to be installed in February 2008.

12) Met with DNR's LIP Coordinator and a fencing contractor to discuss goat gate installation at CA-1. We also visited CA-147 and CA-148 to discuss management issues and potential LIP project at CA-147.

13) Attended bog turtle wetland restoration meeting at CBFO with USFWS, NRCS, EDF and DNR. Discussed ED consultant Jason Tesauro contract work for ED in MD (WREP grant from NRCS). Outcome was that DNR sets up site meetings with landowners and ED, and then ED develops restoration/ grazing plans. We visited 10 potential restoration sites over 3 days (BA-41, BA-44, BA-151, CA-24, CA-25, CA-114, HA-32, HA-33, HA-55, HA-56). Plan implementation is still to be determined.

14) Completed Phase II surveys during the April 15-June 15 survey window. Results for 2008: 54 surveys at 25 sites (bog turtles found at 14 sites) with 145 live and 5 dead bog turtles (note that 57 of these turtles were caught at 2 telemetry study sites, HA-111 & HA-229) plus conducted telemetry on 9 BTs at HA-229 and 8 BTs at HA-111 (different funding source).

15) Met with USFWS at HA-410 to discuss multiflora rose control (spraying). We also visited: CE-184 - observed results of multiflora rose mowing completed by USFWS contractor; CE-122 to discuss wetland restoration; and CE-151 to observe the results of multiflora rose mowing completed by USFWS contractor. We discussed further restoration steps.

16) Prepared and sent a spreadsheet on restoration project sites to Jason Tesauro (ED contractor). Sites included the lead agency (USFWS, DNR or ED): CE-151, CA-28, BA-71, CA-73, CA-47 (USFWS); HA-410, HA-33, CA-114, BA-30, BA-151, CA-24/25 (ED); CA-82, CA-147 (DNR).

17) Performed several Environmental Reviews of development projects that could impact bog turtles and their habitat.

Reasons for deviations (if any):

None

Recommendations:

This project should be continued until the bog turtle has met recovery goals.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 213

Job Title: Technical Assistance to Land Planners & Managers

Principal Investigator: Larney

Job Objective:

To ensure that Maryland's species of greatest conservation need and their associated key habitats receive the appropriate levels of protection needed to maintain overall viability. This will be accomplished by ensuring that pertinent biological information is taken into consideration during land use planning and management activities at both the State and local level. Implementing this overarching statewide conservation action, which is identified in Maryland's Wildlife Diversity Conservation Plan, will help lead to the avoidance and minimization of undesirable environmental impacts.

Activities/Findings:

No work was charged to this job during this grant period. All technical assistance formally conducted under this job were performed under jobs 219 and 220.

Reasons for deviations (if any):

All technical assistance formally conducted under this job was performed under jobs 219 and 220.

Recommendations:

Discontinue this project now that jobs 219 and 220 have replaced it.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 214

Job Title: Sentinel Site Sampling by the Maryland Biological Stream Survey

Principal Investigator: Stranko

Job Objective:

Ensure that monitoring at 26 MBSS Sentinel Sites continued during 2008, with 6 new Sentinel Sites (locations determined by Natural Heritage Program in 2007) monitored for the second consecutive year. All MBSS biological, physical habitat and chemical data were collected at each site. Reports detailing results at Sentinel sites and tracking trends are currently being prepared and will be updated annually. Variability in physical, chemical, hydrologic, and biological factors at these sites over time will be instrumental in documenting the potential influence of global climate change on Maryland's streams.

Activities/Findings:

This job was performed under contract with DNR's Maryland Biological Stream Survey (MBSS). One additional Sentinel site was added during 2008, resulting in a current total of 33 MBSS Sentinel sites. Analyses of spatial and temporal trends are currently being conducted and a report will be completed describing results by the end of the year.

Reasons for deviations (if any):

None

Recommendations:

Continue annual sampling of Sentinel Sites. Add additional parameters to those collected by MBSS at these sites and add additional sites when trends in conditions are necessary.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 215

Job Title: Eastern Tiger Salamander Habitat Management at Massey Pond

Principal Investigator: Tyndall

Job Objective:

By 30 June 2008, manually cut, stump-treat, and remove all Red maple, Sweetgum, and River birch from 4 Carolina bay wetlands and chemically treat the same invasive taxa along the perimeter of each wetland. At Massey Pond, complete *Sparganium* removal, and install a water control structure on the eastern berm to prevent fish entry.

Activities/Findings:

All targeted woody plants in and around each of the 4 wetlands were successfully managed in fall 2007; few required retreatment in spring/summer 2008. In Massey Pond, less than 20% of the original *Sparganium* population was present in 2007 (first hand-pulled in September 2006), and all remaining plants were treated with glyphosate.

Twenty-three egg masses were counted in Massey Pond in March 2008, about the same number as in March 2007 (21 egg masses).

Construction of a water control structure does not appear warranted at this time, as no fish appear to be in the pond anymore.

Reasons for deviations (if any):

None

Recommendations:

Continue annual egg mass counts, and monitor for retreatment of non-native invasives, *Sparganium*, and woody plants.

## JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 216

Job Title: Restoration of a Natural Community and Endangered Beetle Habitat at Sharptown Dunes

Principal Investigator: Tyndall

### Job Objective:

The objective of this project is to restore the oak-lichen dune community and requisite habitat for 2 rare beetles, *Schoenicus puberulus* and *Helops cisteloides*, on 2 dune complexes at Sharptown Dunes.

### Activities/Findings:

Based on 2006 and 2007 baseline surveys, 80% of *H. cisteloides* on Virginia pine utilize trunks  $\geq 20$  cm in diameter-at-breast-height (dbh). Therefore, this dbh was selected as the threshold for removing Virginia pines from the indigenous oak-lichen dune community during August-November 2007. All Virginia pines smaller than 20 cm dbh were cut and stacked in piles for burning rather than disposal by chipping or harvest. Since a microhabitat requirement for *S. puberulus* is a patchy arrangement of bare sandy soil and reindeer moss, pile burning was deduced as a potential method for removing dense pine litter from small patches of soil. To maximize fire intensity when burned, limbs and logs were stacked in separate piles. Limb piles were then burned during winter 2007-08 once in the "red slash" drying phase; i.e., the most flammable phase. Surprisingly, most fires failed to oxidize the entire litter layer though burning was very intense. A second attempt will be made with the log piles during winter 2008-09, after drying during the summer of 2008. Because of greater fuel load, log piles are expected to generate longer-lasting fires that should burn through the litter layer of Virginia pine. Preliminary work proved raking and blowing to be impractical because of the depth and volume of leaf litter present.

Surveys were conducted for both beetle species in spring 2008. *Schoenicus puberulus* was not observed, and *H. cisteloides* continued to be much more present on the East Dune than on the West Dune. In the spring 2006 baseline survey, 75% of *H. cisteloides* occurred on the East Dune, and 73% in spring 2008 after Virginia pine management. Although much smaller, the East Dune (3 acres) has a greater density of large pines than the West Dune (12 acres).

Permanent vegetation plots were resampled in spring 2008, and photos taken at permanent points. Herbaceous layer vegetation was the same as in 2006 and is expected to change slowly due to excessive Virginia pine litter. Many oaks and sassafras trees are now growing in full sunlight.

Reasons for deviations (if any):

None.

Recommendations:

Restoration efforts should continue with burning of all log piles during winter 2008-09, and management of all remaining Virginia pines on the West Dune. The latter recommendation will help reduce recolonization by Virginia pine and increase the amount of microhabitat for *S. puberulus*, without threatening the population of *H. cisteloides*. Both beetle species should be resurveyed in 2-3 years to monitor the effectiveness of restoration activities.

## JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 218

Job Title: Habitat Restoration and Management for Eastern Sedge Barren Planthopper

Principal Investigator: Selfridge

### Job Objective:

The following objectives will be met during the establishment of management guidelines for Eastern Sedge Barren Planthopper (*Limotettix minuendus*) conservation at Soldiers Delight: (1) quantify the size of the existing population; (2) characterize biotic and abiotic microhabitat conditions for the extant population and any newly discovered ones; (3) locate, map and survey all host sedge populations; and (4) double habitat coverage at the extant site by removing Virginia pine woodland followed by rotational prescribed burning.

### Activities/Findings:

The current findings are discussed in the order of the stated objectives.

(1) *Limotettix minuendus* individuals were collected throughout Soldiers Delight across multiple subsites in dry, upland areas. Wetland subsites were also surveyed but *L. minuendus* was never found. It was not feasible to measure percent cover of the host sedge, *Eleocharis tenuis*, due to its extremely patchy distribution in upland areas. Instead, we used a simpler and more practical method that compared the capture rates of *L. minuendus* individuals between subsites by dividing the number of individuals collected by the number of times the sweep net was used. The number of sweeps gives some indication of the percent cover of *E. tenuis* at a given subsite. In areas where the percent cover of *E. tenuis* was overwhelming and could not be sampled completely, the numbers of *L. minuendus* individuals within the subsite were extrapolated.

Approximately 150 individuals in total were collected throughout Soldiers Delight in 2007 across multiple subsites in dry, upland areas. In 2008, a selection of subsites was re-sampled and the numbers decreased by 53%. This is not necessarily worrisome, as many insect populations often fluctuate dramatically from year to year. Further, the numbers of *L. minuendus* individuals found likely represents only a small percentage of the actual population at each subsite. This data will provide a benchmark by which we can compare the population size at each subsite over time and look at overall population trends.

(2) *Limotettix minuendus* was found only in open, upland areas where *E. tenuis* was present. It was never found in wetland areas, despite the fact that *E. tenuis* was most abundant in these areas and typically persisted as tall, dense clusters. Upland sites where both *E. tenuis* and *L. minuendus* were present exhibited significant variation in both the way in which they had been managed (i.e. burning vs. mechanical clearing) and in the date of last management activity.

Obtaining data from vegetation plots had been planned for late summer of 2008 to examine variations in microhabitat, but due to the severe summer drought many of the plants had died and a survey was not possible. Vegetation sampling will therefore be postponed until 2009. Typically, microhabitats supporting *L. minuendus* and *E. tenuis* were dominated by *Aristida dichotoma* and *Cerastium arvense* var. *villosum* (serpentine chickweed), but there were exceptions to this. Plot data will help us determine if variations in microhabitat affect the abundance of *L. minuendus*.

In an effort to better characterize the abiotic components of the microhabitats supporting *E. tenuis* and *L. minuendus*, soil samples were collected from a portion of the subsites. This data has not yet been analyzed.

(3) All areas supporting *E. tenuis* were located and surveyed for *L. minuendus* throughout Soldiers Delight. These included a large variety of habitats including but not limited to dry grasslands, savannah, burn units, wetlands, power line corridors, and fire breaks. The mapping has not yet been completed for all subsites but the data necessary to do this has been collected.

(4) Removal of Virginia pine in order to double habitat coverage at the original site where *L. minuendus* was first observed has been completed. The area has not yet been burned but is on the schedule for fall of 2008; this is largely dependent upon weather and resources.

Reasons for deviations (if any):

There were no significant deviations from the original objectives although vegetation plots were postponed until 2009 due to the summer drought. One additional task was performed, however; in 2006 and again in 2008, a significant number of days were spent throughout central Maryland searching for additional populations of *L. minuendus* outside of Soldiers Delight. Habitat information from other sites would have provided additional insights on the microhabitat requirements of *L. minuendus*. With assistance from other DNR staff, new survey areas were identified that were expected to support populations of *E. tenuis* as well as the other dominant plant species that frequently co-occurred with *E. tenuis* in dry, upland areas at Soldiers Delight. Beltsville Agricultural Research Center was also surveyed, as this is the only other site known to have supported *L. minuendus* in the past. In total, 13 additional sites were surveyed across 5 counties - Anne Arundel, Baltimore, Cecil, Harford and Montgomery. *Eleocharis tenuis* was present at many of the sites surveyed, but *L. minuendus* was never encountered. In the absence of additional populations of *L. minuendus* we are forced to rely solely on habitat data obtained from Soldiers Delight, which may or may not represent the ideal habitat for this species.

Recommendations:

Within Soldiers Delight, it appeared that *L. minuendus* occurred in most upland areas that supported *E. tenuis*. However, the highest numbers of *L. minuendus* individuals were not correlated with abundance of *E. tenuis* (as determined by the number of sweeps). This suggests that while *L. minuendus* distribution is necessarily driven by the presence of *E. tenuis*, the abundance of *L. minuendus* may be driven by any number of other factors. We will spend the fall and winter of 2008 looking at other variables that may have impacted the abundance and

distribution of *L. minuendus* including soil data and the type and frequency of management activities. Activities in 2009 will include follow-up surveys of *L. minuendus* at Soldiers Delight (this will likely occur annually) and compiling microhabitat data from vegetation plots. This species has persisted at Soldiers Delight since its discovery in the 1980's. Although the 2008 survey showed a decrease in the number of individuals as compared to 2007, we should not assume that this represents a trend toward decreasing population size. Future management for the species should entail periodic surveys of *L. minuendus* and will likely involve maintenance of those areas that support *E. tenuis*, as well as opening up new areas (i.e. removal of Virginia pine) that may increase habitat for both species. Completion of data analysis will aid in determining the specific conservation measures needed.

## JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 219

Job Title: Technical Assistance for Land Use Planning and Management to County Governments

Principal Investigator: Larney

### Job Objective:

To ensure that Maryland's species of greatest conservation need and their associated key wildlife habitats receive the appropriate levels of protection needed to maintain overall viability. This will be accomplished by ensuring that pertinent biological information is taken into consideration during land use planning and management activities at the local county level. Implementing this overarching statewide conservation action, which is identified in Maryland's Wildlife Diversity Conservation Plan, will help lead to the avoidance and minimization of undesirable environmental impacts.

### Activities/Findings:

From July 1, 2007 to June 30, 2008 the Regional Operations staff of the Natural Heritage Program (NHP) provided technical guidance to multiple organizational entities. Proactive and targeted efforts were undertaken by NHP staff to assist with land planning activities with local government authorities during this period. Specifically, biological information pertaining to the conservation of Maryland's species of greatest conservation needs was provided to planning authorities during planning efforts through direct coordination with 7 local jurisdictions. Consultation with these planning entities took place and biological information was provided to the following jurisdictions.

Talbot County: Assistance was provided to aid in the updating and development of a more accurate county-wide Natural Resource Base Map. This information was needed to be used as part of the counties sensitive areas element of their overall Comprehensive Plan.

Calvert County: Assistance was provided for the updating and development of their local Habitat Protection Area Map. This map layer was to be used to facilitate resources protections via county ordinance and the State's Critical Area Law.

Allegany County: Maps depicting Ecological Significant Areas (ESA's) were provided to the County planning groups for use in the development of the sensitive areas element of their Comprehensive Plan. ESA's site designations are based on known occurrences of sensitive species their associated protection boundaries. Specific biological information pertaining the species needs and habitat conditions associated with each ESA was provided in a narrative report.

Cecil County: Information pertaining to species of greatest conservation need and their associated key wildlife habitats was provided to the County Planning Committee for use in the sensitive areas element section of their Comprehensive Plan.

The municipalities of Queenstown, Chestertown, and Eastport: Draft versions of their Comprehensive Plans were reviewed and comments

were provided pertaining to their sensitive area elements through the State Clearinghouse process.

Reasons for deviations (if any):

None

Recommendations:

Continue to fund this project. The nature of this involvement and input is essential across the board. Failing to fully integrate resource protection efforts into land-use planning efforts at the local government level will detract from our primary conservation mission.

## JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 220

Job Title: Technical Assistance for Land Use Planning and Management on State Owned Lands

Principal Investigator: Larney

### Job Objective:

To ensure that Maryland's species of greatest conservation need and their associated key wildlife habitats receive the appropriate levels of protection needed to maintain overall viability. This will be accomplished by ensuring that pertinent biological information is taken into consideration during land use planning activities at the State level on publically owned land. Implementing this overarching statewide conservation action, which is identified in Maryland's Wildlife Diversity Conservation Plan, will help lead to the avoidance and minimization of undesirable environmental impacts.

### Activities/Findings:

From July 1, 2007 to June 30, 2008 the Regional Operations staff of the Natural Heritage Program (NHP) provided technical guidance regarding the conservation and protection of sensitive resources to a number of resource management entities. At the State level, from an internal DNR perspective, NHP staff worked in close coordination with the Department's Regional Interdisciplinary Teams. The ID teams, which were made up of representatives from most of the major natural resource disciplines of this agency, provided the framework to integrate principles of biodiversity conservation directly into our larger Department's planning exercises. Examples of this type of work for the reporting period include reviewing and providing ecological evaluations of proposed timber harvesting activities (State Forest Annual Planning Processes) and providing recommendations for protection measures associated with trail construction, infrastructure improvements, and general property maintenance on state lands. The principle public lands involved with silvicultural planning were Green Ridge, Potomac Garrett, Pocomoke, Chesapeake, and Savage River State Forests. In addition to State Forests and Parks, natural resource planning activities also took place on specific Wildlife Management Areas (WMA's). NHP staff participated as members of internal Wildlife and Heritage Service (WHS) planning teams. These teams, which were made up of representatives from all of the WHS programs, developed 15 year Comprehensive Management Plans for Prather's Neck, Mount Nebo, and Grove Farm WMA's.

### Reasons for deviations (if any):

None

### Recommendations:

Continue to fund this project. The nature of this involvement and input is essential across the board. Failing to fully integrate resource protection efforts into land-use planning efforts at the

publically owned state level will detract from our primary conservation mission on State lands.

## JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 221

Job Title: Biodiversity Assessment on Wildlife Management Areas

Principal Investigator: McCann

### Job Objective:

As needed, conduct inventory, monitoring and research (IMR) on Wildlife Management Areas to provide updated information on the population status and extent, threats, management and restoration needs for select GCN species, natural communities and Key Wildlife Habitats.

### Activities/Findings:

The Wildlife Management Area Planning Process was initiated in 2008. This is a multi-year process, spanning at least 3-5 years. The Wildlife & Heritage Service (WHS) oversees the management of 41 Wildlife Management Areas (WMA's), ranging in size from under 20 acres to over 29,000 acres. The WMA system encompasses a total of 104,000 acres, with WMAs located in 17 of Maryland's 23 counties. WMA's comprise an important component of the state's biodiversity. They include some of the largest remaining forest tracts and tidal marshes in the state. They also contain a variety of natural community types and unique habitats (Delmarva bays, shale barrens, sandstone outcrops, forest seepage wetlands, vernal pools, springs, old growth forest, etc.) and support numerous rare, threatened and endangered species. Many of these species have been identified as species of Greatest Conservation Need.

During the winter of 2008, NHP staff compiled and reviewed rare, threatened and endangered species occurrence data for several WMA's in the western region. The purpose of the review was to identify important IMR and conservation needs for each WMA. During spring-summer 2008, field investigations focused on Mt. Nebo WMA where the first WMA plan for the western region was being developed. Appropriate restoration and protection of a large wetland complex, the centerpiece of the property, was identified as a top conservation need by NHP staff. To better determine how best to pursue this, we spent 2 field days evaluating current wetland conditions, adjoining stream systems and the adjacent forested uplands. During these visits, potential habitat for the Bog Copper (*Lycaena epixanthe*), a State Endangered butterfly, was identified in part of the wetland. As part of the SWG-funded odonate project, we also spent 5 days conducting surveys for rare, threatened and endangered odonates in the wetland and adjoining stream systems. These surveys yielded records for 2 rare dragonflies and damselflies, including updated occurrence data for the Spadderdock Darner (*Rhionaeschna mutata*), a State Endangered species.

Over the next year, additional odonate and butterfly surveys are planned to help identify conservation needs for Mt. Nebo. In addition, small mammal surveys were conducted in fall 2008, focusing on potential habitat for the State Endangered southern water shrew (*Sorex palustris punctulatus*). These findings will be provided in next year's FY 09 SWG report.

Reasons for deviations (if any):

None.

Recommendations:

This project is on-going and should be continued.

## JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 222

Job Title: Biodiversity Assessment on State Forest Lands

Principal Investigator: McCann

### Job Objective:

As needed, conduct inventory, monitoring and research (IMR) on State Forest lands to provide updated information on the population status and extent, threats, management and restoration needs for select GCN species, natural communities and Key Wildlife Habitats.

### Activities/Findings:

The process of revising the Ten-Year Management Plans for all of the major State Forest lands (Pocomoke, Green Ridge, Potomac-Garrett, Savage, possibly Cedarville) was started in fall-winter 2006-07. These state forests comprise over 131,000 acres and together represent an important part of the state's biodiversity. They include some of the most ecologically significant areas in the state, including numerous occurrences for rare, threatened and endangered species, rare natural communities and unique habitats.

To help identify conservation needs on state forests in western Maryland, population monitoring was conducted for several GCN species (wood turtle, timber rattlesnake, Jefferson salamander) during spring-summer 2008. In Green Ridge State Forest, as part of a long-term study of wood turtles, the state's largest remaining populations were monitored at 5 locations along Town Creek, Sideling Hill Creek and Fifteenmile Creek. A total of 43 individuals were captured, marked, aged and measured; this included 39 recaptures. Recent monitoring data indicate that these populations are relatively stable and larger than suspected. We also monitored populations of timber rattlesnake at 6 sites in Green Ridge State Forest and Potomac-Garrett State Forest. Relatively few females were found at 1 site this year. Recent ATV incursions resulting in den disturbance is suspected but data is inconclusive. For Jefferson salamander, population monitoring via egg mass counts at 3 vernal pool sites on Green Ridge State Forest and Potomac-Garrett State Forest indicate stable populations, perhaps due to above-average precipitation during late winter-spring 2008.

In addition to population monitoring of GCN species on western region state forest lands, de novo inventory work resulted in the discovery of an old growth forest area in the Savage Ravines Wildland on Savage River State Forest. In addition, as part of the SWG-funded odonate project, we conducted numerous odonate surveys along streams in Savage River State Forest, Potomac-Garrett State Forest and Green Ridge State Forest, yielding numerous new records of state and globally rare species. These findings point to the significance of these relatively pristine stream systems for maintaining aquatic biodiversity.

In the eastern region, we conducted numerous denovo natural community surveys in Pocomoke State Forest. The primary goal of this work was to locate and characterize a potentially globally rare, pond

pine (*Pinus serotina*) dominated community type that may be restricted to the lower Delmarva peninsula.

Reasons for deviations (if any):

None.

Recommendations:

This project is on-going and should be continued.

## JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 223

Job Title: Monitor Rare Plant Communities and Associated Key Wildlife Habitats in Southern Maryland

Principal Investigator: McCarthy

### Job Objective:

1) To document the current conditions, including threats and habitat management needs, in standard NHP format, in order to update the Natural Heritage Program's database regarding the status and condition of rare plant communities and associated key wildlife habitats in Anne Arundel County.

2) To prepare summaries of this information by site for presentation to staff of county planning and zoning agencies both as a report and in a meeting with PowerPoint presentation, and to make this information available to other conservation partners.

3) To provide updated mapping of rare communities and associated key wildlife habitats for use in the biodiversity conservation network.

### Activities/Findings:

This project was not initiated prior to July 1, 2008.

### Reasons for deviations (if any):

We determined that it would be most efficient to hire a long-term contractual employee in early winter 2008 to plan and prepare for the field season, and then begin field work in early spring 2009. We have received approval to hire for this position, and have advertised. We will schedule interviews for November 2008.

### Recommendations:

Initiate field work as planned in early spring 2009, complete field work through an extension to include late summer 2009, conduct analysis and prepare reports of work winter 2009.

## JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 224

Job Title: Factors Affecting Anuran Community Structure within Delmarva Bays

Principal Investigator: Smith

### Job Objective:

1) Monitor population levels of all anurans, including Carpenter Frog (*Rana virgatipes*) and Barking Treefrog (*Hyla gratiosa*), in Delmarva Bays using call surveys and dip net surveys.

2) Characterize ponds with 6 parameters: mean pond pH, mean pond temperature, mean pond conductivity, pond canopy cover, relative hydroperiod, mean aquatic vegetation.

3) Examine the factors that shape anuran community structure on the Delmarva Peninsula, and specifically investigate the role of forest buffer size.

4) Provide useful population data to state agencies and land managers.

### Activities/Findings:

This project was conducted under contract by Towson University graduate student Duncan Simpson during the 2007 and 2008 field seasons. This report is a short summary of his findings. A full report/thesis will be provided to DNR in 2009.

A total of 55 study ponds were selected in 3 counties (Kent, Queen Anne's and Caroline) in the Maryland portion of the Delmarva Peninsula. Using aerial photographs, digitized National Wetland Inventory (NWI), and data extracted from previous work on the Delmarva Peninsula the proportion of forest cover surrounding ponds within a 500m radius was visually estimated. Ponds were assigned to 1 of 5 cohorts based on the proportion of their forest cover (0-20%, 21-40%, 41-60%, 61-80%, 81-100%). Data were collected from March 2007 through August 2008. In 2008, 2 water samples were collected per pond in March and June to measure pH and conductivity. Each time a pond was visited, presence or absence of water was recorded in order to calculate a drying score, a measure of relative hydroperiod. Canopy cover was measured in July 2007, using a spherical densiometer positioned at a fixed point in the center of each wetland.

Calling anuran surveys were conducted March-August 2007 and 2008. Based on the protocols outlined by the North American Amphibian Monitoring Program (NAAMP), surveys began at least ½ hour after sunset, lasted 5 minutes, and were conducted from the edge of each wetland. Parameters recorded at time of surveys included air and water temperature, relative wind speed and cloud cover at each site (NAAMP protocol). Calling surveys were conducted at each wetland 3 times a month. Surveys were always concluded before 0100h.

Dipnet and minnow trap surveys were conducted to sample the presence (or absence) of all amphibian larvae and fish. Dipnet surveys were performed in each wetland twice a year, once in the spring (April-June 21<sup>st</sup>) and summer (June 22<sup>nd</sup>-August 3<sup>rd</sup>). During a survey, each

wetland was walked in parallel transects, 5m apart, haphazardly sampling at least 5m from the previous sweep. In small wetlands, or those nearly dry, a minimum of 30 sweeps were conducted. Minnow traps were placed overnight at each study site at least once over the 2-year period. Minnow traps were placed along the edge of ponds and were only partially submerged to prevent air-breathing juvenile and adult amphibians from drowning. During each sampling event voucher specimens of non-protected species were preserved (MD-DNR collection permit #42715). All tadpoles were identified to species and non-vouchered individuals were released immediately. Vouchers are housed in the Museum of Zoology at Towson University.

A total of 14 anuran species were recorded during the 2007 field season. Southern Leopard Frogs (*Rana sphenoccephala utricularia*) and Northern Spring Peepers (*Pseudacris crucifer*; both 53 of 55 ponds) were the most frequently recorded species, while Eastern Spadefoots (*Scaphiopus holbrookii*), a species of Greatest Conservation Need (GCN), were the least heard (2 ponds). Of considerable interest, Carpenter Frogs and Barking Treefrogs were recorded in 11 and 5 ponds, respectively. Another GCN anuran species the New Jersey Chorus Frog (*Pseudacris kalmi*) was found at 35 ponds.) Mean pHs of all 55 ponds ranged from 3.562-7.618 and drying scores ranged from 9-24. Massey Pond (Kent Co.) had the highest anuran species diversity (11 species). It had a mean pH of 4.86 and a drying score of 19. It also had breeding Eastern Tiger Salamanders (*Ambystoma t. tigrinum*; 25 egg masses recorded), another GCN and state endangered species.

During the 2008 field season, 14 anurans were recorded. Species relative abundances were similar to 2007, with Southern Leopard Frog and Northern Spring Peeper again the most often recorded species (both found in 54 ponds) and Eastern Spadefoot the least recorded (5 ponds). Other GCN species were recorded in 16 (Carpenter Frog), 10 (Barking Treefrog), and 42 (New Jersey Chorus Frog) ponds. 2008 was a wetter year than 2007, and this was reflected in higher drying scores and species richness at most sites.

Three salamander species were recorded in both years. The Eastern Tiger Salamander was recorded in 6 ponds, while the Marbled Salamander (*Ambystoma opacum*) was recorded in 19 ponds, and the Red-spotted Newt (*Notophthalmus v. viridescens*) was found in 7 ponds. Interestingly, fish were recorded in 18 of 55 ponds (mean anuran species richness of 4.1).

Reasons for deviations (if any):

This data is currently being analyzed by Duncan Simpson, Towson University, as the basis for his MS thesis, which will be completed in 2009.

Recommendations:

The field portion of this project has been completed, thus there is no need for further project funding. The results of this study should be applied to help us better manage Delmarva bays and other seasonal wetlands for amphibian assemblages, and to consider the ecosystem effects of our land use decisions and recommendations.

## JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 225

Job Title: Protection Guidelines and Baseline Monitoring for the State's Highest Priority Watersheds

Principal Investigator: Stranko

### Job Objective:

Provide effective conservation actions in the form of protection guidelines for the top 10 priority Stronghold Watersheds in Maryland selected by MBSS and NHP. These protection guidelines will include locations of priority areas for protecting aquatic biodiversity in the state along with the ecological requirements necessary to protect the GCN species found in these areas. The following objectives will be used to meet this goal: 1) Identify gaps in available information on aquatic GCN species distributions as well as physical, chemical, and landscape information in the top priority 8-digit Stronghold Watersheds as well as each of the 12-digit Stronghold Watersheds within the 8-digit watersheds; 2) Fill the information gaps using MBSS sampling; 3) Describe the detailed distribution of aquatic GCN species; 4) Describe the ecological requirements of aquatic GCN species in these watersheds; 5) Develop protection guidelines for aquatic GCN species within the Stronghold Watersheds based on ecological requirements; and 6) Communicate results to the state and county planners and those involved in environmental review.

### Activities/Findings:

The first 2 priority Stronghold Watersheds, Zekiah Swamp and Western Branch, were sampled during 2008. Additionally, all odonates collected during benthic macroinvertebrate sampling have been identified to species level for these 2 watersheds producing new records of several listed dragonfly and damselfly species. Sampling in Zekiah Swamp resulted in new records of Warmouth (*Lepomis gulosus*), Flier (*Centrarchus macropterus*), and Swamp Darter (*Etheostoma fusiforme*), as well as the associated chemical, physical habitat, and biological information associated with those sites in areas that had not been previously sampled by MBSS. Sampling in Western Branch resulted in 1 new record of American Brook Lamprey (*Lampetra appendix*) and 1 new record of Warmouth, as well as the associated abiotic and biotic information, in areas that had also not been previously sampled by MBSS. Gaps in 8 other top priority Stronghold Watersheds are currently being identified to determine areas to sample in subsequent years.

### Reasons for deviations (if any):

We have contacted Virginia biologists to obtain information on the distribution and associated abiotic parameters of GCN fish species in Virginia to bolster data set for determining ecological requirements of these species.

Recommendations:

Continued sampling over the next 4 years in the remaining Stronghold Watersheds for aquatic taxa once potential sites have been identified.

## JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 226

Job Title: Statewide Breeding Bird Status Assessment

Principal Investigator: McCann

### Job Objective:

Review the conservation status of the state's breeding bird species and make appropriate state rank and legal status changes. For those species determined to be rare (S1-S2B) or otherwise a high conservation priority, obtain detailed information on their distribution, abundance, threats and conservation needs.

### Activities/Findings:

With the recent completion of 2<sup>nd</sup> MD/DC breeding bird atlas (BBA), we initiated a comprehensive status review of Maryland's breeding bird species.

The atlas is the most important source of information on the statewide breeding status for the majority of the Maryland's bird species. Working with Atlas Coordinator Walter Ellison and Patuxent Wildlife Research Center (which created and maintained the 2<sup>nd</sup> atlas database), we obtained a copy of the 2<sup>nd</sup> atlas database to analyze changes in breeding distribution and block occupancy.

At present, 59 of the state's 215 breeding bird species are ranked S1, S2, SH or SX. Of these, 30 species are state-listed as Endangered (16), Endangered/Extirpated (3), Threatened (4), or In Need of Conservation (7). Another 32 species are watchlist species. In analyses thus far using BBA data along with other key data sources (NHP's Biotics, marshbird and colonial waterbird databases; USGS's Breeding Bird Survey; published literature), we have identified 53 species for potential s-rank changes. Of these, 36 represent downrankings (i.e., S1 to S2) while 17 would involve uprankings (S2 to S1). For 15 of these 53 species, a significant enough change in breeding status has occurred that a legal status revision might be proposed. This includes 7 species that may be added to the state's list or receive a higher legal status, and 8 species that may be delisted or downlisted. Examples of species with substantial declines and for which a change in s-rank and/or legal status may be warranted include Nashville Warbler, Northern Waterthrush, American Bittern, Common Tern, Forster's Tern, and Golden-winged Warbler. Examples of species for which data may support a lower s-rank and/or downlisting or delisting include Bald Eagle, Common Raven, Blackburnian Warbler, Least Bittern, Common Moorhen, Hooded Merganser, and Red-breasted Nuthatch.

During fall-winter 2008-09, we will continue the bird status review and prepare a draft set of s-ranks and proposed legal status changes. After an initial NHP staff review, an ad-hoc committee will review the proposed s-ranks and legal statuses. The committee will be comprised of people with relevant bird expertise from various non-governmental organizations (e.g., MD Ornithological Society), academia, and state and federal agencies (e.g., USGS, USFWS). Once finalized, these changes will be incorporated into a larger, planned revision to

the state's Rare, Threatened and Endangered Animal Species List by June 2009. Concurrent with this review, we will obtain detailed information on the distribution, abundance, threats and conservation needs of bird species ranked S1-S2 and other high priority species. This information will be compiled from a variety of sources including consultation with BBA observers, local and regional bird experts; BBS data; unpublished data and reports; and published accounts.

Reasons for deviations (if any):

Originally, we planned to hire a technician who would interview BBA observers and consult with local and regional bird experts to obtain detailed information on breeding localities for rare species. However, following a preliminary analysis of BBA data, the number of bird species and breeding occurrences for which this detailed locality data was needed was lower than expected and did not warrant hiring a technician. Existing NHP staff will instead complete this part of the project.

Recommendations:

This project is on-going and should be continued.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 227

Job Title: Management and Conservation of the Blackbanded Sunfish on Delmarva Peninsula

Principal Investigator: Stranko

Job Objective:

Management of a meta-population of a rare species, such as the blackbanded sunfish, in a river system that crosses state boundaries presents a unique opportunity for collaboration between 2 state natural resource agencies. Our goal is to ensure the persistence of blackbanded sunfish in Maryland by developing, writing, and most importantly implementing a collaborative Conservation Action Strategy working collaboratively with the Delaware Department of Natural Resources and Environmental Control (DNREC) in order to protect all populations within the Nanticoke River basin. An inter-jurisdictional collaboration between Maryland and Delaware that manages at a basin-wide scale is crucial to the persistence of this species within the Nanticoke River basin and ultimately the Chesapeake Bay drainage.

An interstate multi-agency approach to the conservation of this species is necessary to: 1) determine the current status and locations of extant populations of blackbanded sunfish throughout the Nanticoke River Basin; 2) develop and implement consistent and effective management actions, described in the Conservation Action Strategy; and 3) define and prioritize restoration efforts to reverse the regional decline of this species.

Activities/Findings:

This job was performed under contract with DNR's Maryland Biological Stream Survey (MBSS). MBSS project staff assisted Delaware Natural Heritage Program personnel in the sampling of historical collection locations of blackbanded sunfish in Delaware. No blackbanded sunfish were collected from 11 historical ponds and streams in Delaware.

MBSS project staff identified other potential habitats that may harbor blackbanded sunfish populations in the Maryland portion of the Nanticoke River basin. Over 2,000 open water and swamp habitats were identified from the National Hydrologic Dataset (NHD). A subset of these habitats was selected from Marshyhope Creek watershed (8-digit) for sampling in 2009. This sampling will focus on potential blackbanded sunfish habitats within the Marshyhope Creek watershed not previously surveyed by DNR.

MBSS personnel held the first of several meetings with DNR Fisheries Service and Forest Service staff to begin development of the proposed interstate Conservation Action Strategy.

Reasons for deviations (if any):

None

Recommendations:

Continue monitoring efforts to identify extant populations of blackbanded sunfish in Marshyhope Creek watershed. Continued collaboration with other DNR divisions and between DNR and DNREC to develop and implement the Conservation Action Strategy to ensure the persistence of blackbanded sunfish in Maryland.

## JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 228

Job Title: Common Map Turtle Distribution and Habitat Use in the Lower Susquehanna River

Principal Investigator: Smith

### Job Objective:

- 1) To determine the current distribution of map turtles in the lower Susquehanna River and its tributaries.
- 2) To compare counts of map turtles between sites above and below the Susquehanna hydroelectric dam.
- 3) To develop a monitoring protocol to determine long-term changes in map turtle populations.
- 4) To develop a plan for applied research, specifically investigations of habitat use through radio-telemetry, impacts of recreational activities, and impacts of the Susquehanna hydroelectric dam.

### Activities/Findings:

Surveys were primarily conducted under contract by Towson University (Dr. Richard Seigel and students).

1) To determine the current distribution of map turtles in the lower Susquehanna River and its tributaries we performed visual encounter surveys using spotting scopes and binoculars for basking turtles at 12 unique sites. Surveys were initiated in April 2008 and continued into the next project-reporting period. Different sites were surveyed in each trip dependant upon the time available, weather conditions, and goals of that day.

2) Table 1 gives all sites to be surveyed through October 2008 and their GPS localities, several of which were surveyed between April and June.

3) Basking began sometime before 4 April and stayed more or less constant through June.

4) Since this job was not completed during this reporting segment, the complete results of the surveys will be reported in the next annual report.

### Reasons for deviations (if any):

None.

### Recommendations:

The last map turtles positively identified in Maryland were last seen in the 1980's. Our data indicate that there are at least 40 extant turtles in Maryland (based on maximum counts from a single day), and this is likely an underestimate of the population. Turtles were also found in the main part of the Susquehanna River, as well upstream of the Conowingo Dam. However, compared with the abundant nature of this species in other parts of its range, the population in Maryland should be considered quite rare. In addition, no nests were found through the end of June 2008 and only one small hatchling was observed.

This project should be continued to learn more about status and distribution of northern map turtles throughout the Susquehanna River. Additional data on nesting, habitat use, diet, potential disturbance of basking by boaters, and location of hibernation sites should be determined to provide a more detailed basis for management. Mark-recapture studies and detailed radio telemetry are especially needed to develop a long-term monitoring program for the species.

Table 1. List of localities surveyed for map turtles during 2008.

Site	UTM
Rt. 222, 0.3 mi S Canal Rd (Cecil Co.)	18N 402407E 4386328N
Rt. 222, Steel Island Upstream End (Cecil Co.)	18N 403182E 4385614N
Rt. 222 Steel Island Downstream End	18N 402896E 4385841 N
Rt. 222 Water Treatment Plant (Cecil Co.)	
Public boat ramp at N end of Garrett Island (Cecil Co.)	18N 407343E 4380236N
Owens Landing Marina (Cecil Co.)	18N 407067E 4379513N
Havre de Grace Museum Site (Cecil Co.)	
Deer Creek Bridge-Susquehanna State Park (Harford County)	18N 401356E 4385504N
Beach where Deer Creek enters River	18N 401380E 4385446N
Beach 100 m upstream of Deer Creek entrance to river	18N 401361E 4385558N
Mill Site-Susquehanna State Park (Harford County)	18N 402323E 4384565N 18N
Snake Island Site downstream from Mill	401978E 4384815N
Snake Island site -Susquehanna State Park (Harford County)	18N 402323E 4384565N
Fisherman's Park/Conowingo Dam (Harford County)	18N 399638E 4389780N
Mason-Dixon Trail #1, downstream of Fishermans Park	18N 400069E 4389205N
Mason-Dixon Trail #2, downstream of Fishermans Park	18N 399758E 4389631N
Glen Cove Marina (Harford County)	18N 396837E 4392005N
Rt. 623 Bridge (Harford County)	18N 393217E 4394789N
Broad Creek Boat Ramp (Harford County)	18N 393595E 4394650N

## JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 229

Job Title: Community-level Inventory of Upper Coastal Plain seepage and Headwater Wetlands

Principal Investigator: McCarthy/Harrison

### Job Objective:

- 1) Identify conservation priorities and develop best management practices (BMP's) for Upper Coastal Plain seepage and headwater wetlands in watersheds identified as high priority systems within Southern Maryland (based on MBSS IBI measures and degree of development threat). This will be accomplished through targeted surveys of the invertebrate and herpetofauna communities using these wetlands.
- 2) Refine the classification and state rank of early-successional Coastal Plain acidic seepage wetland communities in order to better understand the habitat associations and requirements of many of the GCN species that utilize this habitat. This will be accomplished using vascular and non-vascular plant sampling complimented with nutrient and pH data. Non-vascular plant species commonly compose a large percentage of the vegetation cover within the early-successional seepage wetlands, requiring the identification of these species for proper community classification.

### Activities/Findings:

#### **Objective 1:** *TARGETED SAMPLING OF INVERTEBRATE AND HERPETOFAUNA COMMUNITIES*

A total of 75 locations of seepage and headwater wetlands were selected to survey for invertebrates, herpetofauna, and for habitat characterization. Sites already identified as "seeps" or "bogs" in the Natural Heritage Program database for southern Maryland were included. New sites were selected by reviewing aerial photos, soil maps and USGS topographic quads to detect areas of natural habitat with gravelly or sandy soils and steep slopes. Staff attempted to stratify site selection so that all 5 counties had equal coverage, but this was not successful because this wetland type is not equally distributed across southern Maryland, and there has been more habitat degradation in some areas than others.

Background information and mapping was compiled for each site. A USGS topographic map of the vicinity, aerial photo, tax map and landowner information were assembled. Locations were mapped in ArcGis.

The methods for conducting odonate, crayfish and herpetofauna surveys were determined by consulting staff within the Natural Heritage Program and other units of DNR as well as by reviewing literature.

Herpetofauna: Surveys included visual search of 25m x 25m quadrats. The search was conducted by flipping woody debris and any other debris present on site for 45 minutes. Due to the limited area of the target habitat type, a single quadrat was sampled for most locations. It was decided that visual herpetofauna surveys would be completed prior to

August 1. Where there was sufficient water present, dip net larval surveys were conducted for 15 minutes. Cover boards were placed (2ft x 1ft untreated plywood boards) and checked for the duration of the survey project.

Odonates: A 15 minute search for cast skins was conducted within the 25m x 25m quadrat. Dip net surveys for odonate larvae were conducted for 15 minutes. Aerial netting was conducted for 45 minutes per quadrat.

Crayfish: The method selected for crayfish sampling was to use traps that staff made from used avian mist nets. Traps would be placed in burrows and anchored with short sticks, to be checked within 48 hours of placement. Crayfish sampling was delayed until August to allow more time for surveying for odonates and herpetofauna during the optimal period for those species, spring through mid-summer.

Habitat Characterization: Our community ecologist developed an abbreviated version of the natural community classification survey protocol to use to characterize the key wildlife habitat of each survey location. This format was followed at each survey location (see Appendix).

Three seasonal contractual employees, 2 full-time and 1 part-time, were hired to implement the surveys under the direction of the long-term contractual regional biologist. Prior to July 1, 2008, these staff conducted odonate and herpetofauna surveys and habitat characterizations at 30 locations in southern Maryland. All species of odonates and herpetofauna that were observed were recorded. For rare species, the Natural Heritage Program Rare Animal Survey Form was completed so that all information can be incorporated in the Program's statewide database of rare, threatened and endangered species. The exact location of each quadrat was identified with a Trimble Juno GPS unit, and all data was entered into standardized forms on this unit.

Results as of June 30, 2008: The odonate and herpetofauna data collected is still under analysis. No rare species of herpetofauna were observed. Numerous larval specimens of odonates have been sent to an expert to confirm the identifications made by our staff. Adults of the State Rare dragonfly species, Gray petaltail (*Tachopteryx thoreyia*), were observed at 4 locations. A preliminary assessment of the habitat characterizations is presented in the following section for Objective 2.

**Objective 2:** *NATURAL COMMUNITY CLASSIFICATION OF ACIDIC SEEPAGE BOGS/FENS*

A list of known and potential sample sites were selected by reviewing databases and through consultation with other ecologists. A total of 12 sites known to support early successional seepage bogs/fens were selected for data collection. It was determined through our research that 3 of the 12 sites had enough extant information in our databases available and that sampling was not required, but soil chemistry data was needed. During the FY 08 growing season, we quantitatively sampled the vegetation at 4 sites and collected soil samples at an additional 3 sites.

After the completion of field sampling, data were entered into a Microsoft Access database so subsequent operations could be organized and performed in an efficient manner. A table of plot codes, species, and cover values was exported from the database and transcribed to an Excel spreadsheet where the cover class scores for each species in all strata combined (total cover) was then entered for each vegetation sample plot. All data (23 plots) were then examined using a combination of cluster analysis, statistical analyses, and ordination. The focus of our preliminary analysis was to use cluster analysis to identify the groups, statistical analyses to validate those groups, and ordination to determine environmental gradients. Four distinct groups emerged in our preliminary analysis largely based on differences in floristic composition, hydrological regime, and successional stage.

A significant component of this project is an inventory of the peat mosses that are a significant component of the floristic diversity of these wetlands. Surveys have resulted in the discovery of 5 county records and 1 state record peat moss (*Sphagnum* sp.) species (Darigo 2008). Duplicates of these records have been sent to Carl Darigo of the Missouri Botanical Gardens for confirmation and deposit.

During the spring of 2008, staff attended an excellent training workshop at the Humboldt Institute in Steuben, Maine entitled "Bryophytes and Bryophyte Ecology". This training focused on peat mosses, terminology, taxonomy, and ecology. While at the course, we encountered 15 species and vouchered 13 species for use as a reference collection for this project. Of the species encountered, 11 taxa are known to occur in Maryland or adjacent states.

Reasons for deviations (if any):

None.

Recommendations:

Continue analysis of data through FY 2008-09. Pursue identifying conservation priorities and best management practices. It was difficult to pursue surveys of such different animal groups in a single year with the available staff/funding. Different areas of expertise are required to accurately identify individuals of all of these groups, and the survey methods differ from one group to the next, so that when the optimal survey periods for groups overlap (as for odonates and herpetofauna), choices had to be made as to how to best allow for detection for both groups. For example, conducting nighttime calling surveys in addition to the visual searches may have resulted in detection of more species of herpetofauna, but it was not possible to combine that approach with larval surveys. In the future, focusing survey efforts on a single animal group with accompanying habitat characterization may improve the success in detection and correlation with habitat type. Continue data collection in FY 09 to complete classification of early successional seepage wetlands.

Literature Cited:

Darigo, C. 2008. Mosses of Maryland - county checklist (Working Draft 23 January 2008). Unpublished. Missouri Botanical Gardens, St. Louis, Missouri.

## JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 230

Job Title: Review and Update of the State's Rare, Threatened and Endangered Animal Species List

Principal Investigator: McCann

### Job Objective:

Determine the status (srank, proposed legal status), key information gaps (e.g., inventory, monitoring, research), and priority conservation needs (e.g., habitat protection, restoration) for (1) species in Appendix III, (2) other species that may warrant inclusion on the RTE list, and (3) species already on the RTE list for which a status change may be needed.

### Activities/Findings:

A status review was completed or is in progress for 15 animal species representing 3 crayfish, 2 insects, 6 fishes, 1 amphibian and 3 reptiles. This review involved consultation with species' experts and a review of published literature and unpublished reports and data. It also involved field surveys and population monitoring by NHP staff.

Two of the 15 species, Hoary Elfin (*Callophrys polios*, G5/S1) and Eastern Sedge Barrens Planthopper (*Limotettix minuendus*, G1/S1), may be proposed for state listing as Endangered. Both are confined to a single site, with the world's only known population for the latter occurring at Soldiers Delight NEA in Baltimore County. The only other potential listing change at this point will involve Bridle Shiner (*Notropis bifrenatus*, G3/SH), which is currently listed as State Endangered. The proposed status for this species will be Endangered/Extirpated based, in large part, on recent intensive surveys by fisheries biologists with DNR's MD Biological Stream Survey Program (MBSS) and Frostburg State University.

Of the 3 crayfish reviewed, there is particular concern for 1 species (*Cambarus acuminatus*) whose s-rank will be elevated from S3 to S2. This species is apparently restricted to relatively high quality streams near the Fall Line. On-going work by MBSS and others should shed more light on the distribution and conservation needs of this species. No status changes were warranted for the 2 other crayfish species, *Fallicambarus fodiens* (G5/S4) and *Orconectes obscurus* (G5/S3). The only other proposed additions to the state's Rare, Threatened and Endangered Animal Species List involve Wood Turtle (*Clemmys insculpta*, G4/S4) and Rosyface Shiner (*Notropis rubellus*, G5/S4S5); it is recommended that the s-ranks for both species be changed to S3 but state listing is not warranted.

During the fall-winter of 2008-09, a status review will be completed for approximately 5 moth species, 2 butterflies and 3 reptiles. As part of each species review, the NHP Biotics database will be updated accordingly with element occurrence records and element state ranking forms. Element Decision Forms will also be completed. Together, these data and status summaries outline the necessary conservation actions needed to protect and, hopefully, lead to the

recovery of listed species. Concurrent with this status review, NHP staff are in the process of completing a comprehensive review of the state's breeding bird species and odonates. These reviews are funded under 2 specific SWG projects. Together, in 2009, these 3 review efforts will lead to a significant revision of the state's Rare, Threatened and Endangered Animal Species List.

Reasons for deviations (if any):

None.

Recommendations:

This project is on-going and should be continued.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 231

Job Title: Status and Distribution of Maryland's Moth Fauna

Principal Investigator: Selfridge

Job Objective:

(1) Development of a comprehensive moth database maintained by the Natural Heritage Program.

(2) Revision of Glaser et al. (unpubl.) published as a DNR document or as a series of DNR publications (e.g., the Sphingidae of Maryland).

(3) Establishment of preliminary s-ranks for moth species in Maryland.

(4) Identification of areas that support high moth diversity (and high pollinator diversity), rare species occurrences, and unique assemblages within the State.

Activities/Findings:

We continued to work towards the completion of Objective 1 and continue to add data on moth species currently housed at the Smithsonian National Museum of Natural History. To date, we have completed data entry for over 12 families of moths and are working on a 13<sup>th</sup> family. The database currently contains well over 17,000 records. In the upcoming months, we may be able to start determining/revising s-ranks for species in those families that have already been entered into the database. Objectives 2 and 4 are longer-term goals that will be accomplished when the remaining data from Smithsonian and DNR specimens are added.

Reasons for deviations (if any):

None.

Recommendations:

This project should be continued until the database is completed and until the results are published. Using the database to determine and revise s-ranks, and to identify areas that support high moth diversity and rare species, will be ongoing. The project is moving along at a rapid pace and will undoubtedly be a valuable tool in conservation planning.

## JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 233

Job Title: Patterns of Invertebrate Species Richness on Inland Sand Dunes on the Delmarva

Principal Investigator: Selfridge

### Job Objective:

The objective is to examine species richness and distribution from a community standpoint of selected invertebrate groups and focal plants. Specifically, we will address whether community richness and distribution is correlated with: 1) dune area; 2) measures of connectivity and landscape pattern affecting dispersal of focal species and groups, and 3) land-use and forest management history. Information gathered during this first year will provide the data necessary to guide a targeted investigation comparing sites on-dune and off-dune to test if rare communities harbor rare invertebrates. Answering this question will lend support to the premise that protecting rare communities can act as a surrogate for protection of rare invertebrates. We intend to use this information to aid the development of site-specific recommendations for this rare community on public lands and propose reserve design from a landscape perspective. Ultimately, the design will test how well the BioNet project encompasses rare invertebrate needs.

### Activities/Findings:

During the first year of the project, we have made progress on a number of fronts that get us closer to answering the questions stated in the above objectives. Data on focal insect groups (bees and ants) has been collected from all 30 dunes in the sample. Bees were collected twice in the spring, and once in the summer and the fall of 2008. Ants were collected throughout the year using a combination of pitfall traps, litter samples and timed collections. Many of the samples have been processed and a small percentage of the bees and ants have already been identified. Fifty species of ants have been collected to date; we have only recently started identifying bees. It will take months to process and identify all of the insects, as there are thousands of individuals to look at. We hope to make progress on this front over the fall and winter of 2008, so that we are able to determine where and how to focus our collection efforts the following spring and summer. Vegetation plots were completed at all 30 dunes, and the data has been entered into a plant database. Different approaches to measuring connectivity are currently being evaluated to determine which is most appropriate for our study.

Reasons for deviations (if any):

None.

Recommendations:

This project is just getting started in terms of data processing and analysis, and we will continue to compile and analyze (if appropriate) data over the next several months. Field data collection is expected to continue in 2009, although it will be guided by our 2008 results.