GRANT AGREEMENT PERFORMANCE REPORT

TO: U.S. FISH AND WILDLIFE SERVICE
DIVISION OF FEDERAL AID
HADLEY, MA

FROM: MARYLAND DEPARTMENT OF NATURAL RESOURCES
ANNAPOLIS, MD

GRANT AGREEMENT: T-1-1 and T-1-2

GRANT TITLE: STATE WILDLIFE GRANTS

TOTAL COSTS: T-1-1 $277,203 in FY 07, $1,991,162 in TOTAL
T-1-2 $706,123 in FY 07

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Planning

Job No.: 101

Job Title: Comprehensive Wildlife Plan Development

Principal Investigator: Therres

Job Objective:

By October 2005, develop a comprehensive wildlife plan for Maryland in accordance with the requirements of the U.S. Fish & Wildlife Service's State Wildlife Grants and Wildlife Conservation and Restoration Program.

Activities/Findings:

The Maryland Wildlife Diversity Conservation Plan was finalized and submitted to the U.S. Fish and Wildlife Service in late September 2005. The plan is available on the DNR website http://www.dnr.state.md.us/wildlife/divplan_wdcp.asp. An executive summary of the plan was printed and is available to interested partners and the public. The plan was approved by the U.S. Fish and Wildlife Service in May 2006.

Work during this reporting period focused on identifying priorities to be addressed during implementation of the plan and integrating it into other planning efforts. Staff worked with Maryland's Wildlife Diversity Advisory Committee to identify the priority overarching conservation actions that should be addressed first by the Department. The top 5 actions identified were: (1) secure adequate funding; (2) develop a core network of protected lands; (3) incorporate wildlife diversity conservation at the local land use planning level; (4) collaborate with partners to implement the plan; and (5) identify the most important sites for wildlife diversity conservation.

Staff participated in regional wildlife diversity planning efforts through the Northeast Wildlife Diversity Technical Committee. Staff also participated in a workshop with the Department of Defense (DoD) to incorporate state wildlife action plans into DoD's Integrated Natural Resource Management Plans (INRMPs).

Reasons for deviations (if any):

None

Recommendations:

Though the first version of the comprehensive action plan has been completed, this plan is a living, dynamic document that needs to be updated periodically with the most current scientific and administrative information. If the inventory, monitoring or research results indicate that a major change may be required due to significant changes in the status or condition of species of Greatest Conservation Need or key wildlife habitats, a revision of the Wildlife Diversity Conservation Plan will be warranted.

An effective monitoring framework or strategy is needed that monitors the status and condition of species and habitats, conservation action effectiveness, and incorporates new information and adaptive responsiveness of the action plan. Long-term and short-term progress needs to be measured, assessed, and used to revise conservation actions and the implementation of the plan.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Planning

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 database, Biotics, was maintained through entry of new data and updates of existing data. The annual data exchanges with NatureServe was performed in September. It was completed in late October, just before the Data Manager took another position in Virginia. From November to April, maintenance of the database was minimal and the position vacancy was announced and applicants were interviewed. A new Biotics manager was hired in April and emphasis was placed on providing the appropriate and necessary training in the specific Biotics software and Natural Heritage methodology.

Volunteers created a tracking spreadsheet of data that are currently awaiting entry into the database, organized by species, project, and geographic area.

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-Planning

Job No.: 103

Job Title: Assess Rare Freshwater Fish Conservation Needs

Principal Investigator: Kazyak, Stranko

Job Objective:
Use existing data, primarily from the Maryland Biological Stream Survey (MBSS) to establish the current status and management needs of rare freshwater fish that occur in Maryland’s streams.

Activities/Findings:
This job was completed during the previous reporting period.

Reasons for deviations (if any):
None

Recommendations:
Additional, comprehensive monitoring to fill in geographic gaps, and targeted monitoring to determine the extent and size of rare fish populations to help guide future management decisions at the state and local levels.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Planning

Job No.: 104

Job Title: Assess Hellbender Population Status

Principal Investigator: Thompson, Feller

Job Objective:

The objectives of this project are to conduct analysis of the hellbender population in the Youghiogheny River and to continue the population analysis of the Casselman River population. If nests or other evidence of reproduction cannot be documented in the Casselman River, the feasibility of a reintroduction program will be assessed.

Activities/Findings:

This job was completed during the previous reporting period.

Reasons for deviations (if any):

None

Recommendations:

Continue population monitoring, focusing on hellbender reproduction in the Casselman River, and continue distributional surveys in the Youghiogheny River, exploring the use of the burrow probe camera in the remote whitewater (wild and scenic) section from Swallow Falls to Kendall.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Planning

Job No.: 105

Job Title: Identify Critical Stopover Habitat for Songbirds

Principal Investigator: Brewer

Job Objective:

Objectives of this job are to: (1) identify specific areas that support high concentrations of migratory songbirds during stopovers or have high rates of occupancy, (2) link areas identified as high-use stopover sites with specific habitat types, and (3) assess how landscape features (e.g., habitat size, distance to similar habitat, fragmentation) affect which areas are used by migrants.

Activities/Findings:

This study was conducted under contract with the New Jersey Audubon Society as part of a comprehensive evaluation of bird and bat migration in the Appalachian Mountains.

Results of the study indicated that areas occupied by the highest numbers of birds and with the greatest frequency during migration stopover periods generally had proportionately less developed land compared to other areas, even in areas with relatively little urban development. Birds may be more sensitive to development in spring compared with fall, especially as development intensity increases. High density, high occupancy migration stopover sites tended to have lower values for the amount, distribution, and landscape characteristics of agricultural patches in the region, although some migratory birds do use this habitat type. For forest types, patterns differed between Piedmont and coastal areas. Conifer-dominated and mixed forest types were associated with higher use in the Piedmont and lower use in the Coastal Plain, where deciduous forests and wooded wetlands had higher occupancy. Data from the 3 years showed that migrants tended to persist in their use of stopover areas to a large degree, especially during the fall migration period and especially in the Sterling, VA analysis area covering the Maryland Piedmont, and Ridge and Valley.

Areas of concentration in Maryland for migratory stopover sites appear to include major river systems (Nanticoke, Pocomoke, Marshy Hope, Choptank, Tuckahoe) in the portion of the Delmarva Peninsula covered by the analysis, and possibly areas along the western shore of the Chesapeake Bay (limited radar coverage). In the Piedmont and Ridge and Valley, areas with radar coverage indicated a concentration of migrant activity along the major mountain ridges (Catoctin, South, Blue Ridge) and in southern Montgomery County (Sugar Loaf Mountain, Monocacy Natural Resources Management Area, Little Bennett and Little Seneca Regional Parks, Seneca Creek State Park, areas along Potomac River near Mason Island, section of McKee-Beshers Wildlife Management Area).

Flight call analyses indicate that the Allegheny Plateau region and the Delmarva Peninsula are particularly important songbird migration corridors. During different seasons, however, the mid-Atlantic Ridge and Valley and Piedmont regions also have notable migration events. Several medium-distance migrants, such as chipping sparrow, savannah sparrow, and yellow-rumped warbler, were among the most commonly recorded at all sites. Among long-

distance migrants, common yellowthroat and ovenbird were consistently the most commonly recorded species. Flight call data did consistently validate radar classification of migration events.

A final report for this project has been produced by the contractor (Mizrahi et al. 2006).

Reasons for deviations (if any):

This grant was used to cover data analyses for spring and fall 2004 and 2005 from Dover, DE and Sterling, VA NEXRAD stations rather than analysis of 2003 and 2004 data. A final report was received in December 2006 that included the analysis of all NEXRAD data collected in 2003-2005 at 2 locations and a portion of the flight call analyses, carried out under this grant and under other contracts.

Recommendations:

Based on this study, increased attention needs to be given to the conservation of migratory stopover habitat concentration areas that have been identified by the study.

Literature Cited:

Mizrahi, D.S., K. Peters, P. Hodgetts, and V. Elia. 2006. Oases along the flyway: preserving critical habitat for migratory songbirds in Maryland. Final report. Submitted to the Maryland Department of Natural Resources. 97pp.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Planning

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:

During 2006, compilation work continued on the first iteration of *The Natural Communities of Maryland: Classification of Ecological Community Groups* (Harrison 2007). After thorough review several nomenclatural changes where made at the upper levels of the hierarchy and at the Ecological Community Group level resulting in a robust and meaningful classification that is gaining wide acceptance and use with other Departments and agencies within the State. At the finest level, several regional analyzes of vegetation sample plot data have made it possible to refine many USNVC vegetation association concepts while justifying accurate state and global conservation ranks. Web versions of the classification and other suitable public material on natural plant communities have been initiated.

Approximately 154 USNVC vegetation associations have been recognized as known and potential to the state of Maryland. Information regarding these vegetation associations was compiled from NatureServe databases into the *Classification of Vegetation Communities of Maryland: first iteration* (Harrison 2004). Of the 154 recognized vegetation associations, ecologists have collected data to support 108 of the 154 vegetation associations. These data are housed in the Maryland Vegetation Plot Database which now houses data from 1,385 vegetation sample plots throughout the State of Maryland. In the fall/winter of 2006, work steadily continued on the plot database which is a critical component for standard archiving and management of vegetation plot data collected by Maryland Natural Heritage Program ecologists. Emphasis was placed on crosswalking legacy plot data to vegetation association and ecological community group. Spatial data from 3 previous classification projects were quality controlled for accuracy and mapped in GIS-based applications. Approximately 800 sample plots representing tidal wetland vegetation from Maryland and Virginia were compiled and analyzed for regional consistency. Forty-nine vegetation types representing tidal marshes, tidal scrub shrub wetlands, tidal hardwood swamps, and tidal bald cypress swamps were recognized and crosswalked to existing vegetation associations in the USNVC. Modifications to the global concepts and ranks were drafted for 5 USNVC associations.

Fieldwork during this period focused on several rare Ecological Community Groups (Harrison 2007) in which information were lacking. These included Shale Barrens (collected soil data), Intertidal shores, Montane-Piedmont Basic Oak-Hickory Forests and Woodlands, Coastal Plain Basic Seepage

Swamps, Eastern Hemlock-Hardwood Forests, Coastal Plain Dry Calcareous Woodlands, Pine-Oak Heath Woodlands, Chestnut Oak Forests, Coastal Plain Acidic Seepage Bogs and Fens, Piedmont Basic Seepage Swamps, Inland Sand Dune Woodlands, and Basic Mesic Forests.

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., compiler. 2004. Classification of vegetation communities of Maryland: First iteration. A subset of the International Classification of Ecological Communities: Terrestrial Vegetation of the United States, NatureServe. Maryland Natural Heritage Program, Maryland Department of Natural Resources, Annapolis. 243 pp.

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

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Planning

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, focusing on streams, seepage wetlands, and mountain peatlands in the Allegheny Plateau, Ridge and Valley, Blue Ridge and upper Eastern Shore regions, with potential habitat for state and globally rare taxa. Field surveys continued to be a joint effort between NHP biologists and Richard Orr, a regional odonate expert. Other odonate experts and amateur naturalists also contributed records.

Although 2007 data reporting and specimen processing has not yet been completed, survey data thus far have yielded at least 23 new localities for 18 species ranked S1-S3. These data provide much needed, site-specific information on biodiversity hotspots for the state's odonate fauna and freshwater aquatic ecosystems as a whole.
Highlights include the following new occurrences:

Table 1. Significant new odonate records during 2007.

Scientific Name	Common Name	Global Rank	State Rank	County	Locality
Boyeria grafiana	Occellated Darner	G5	S1	GA	Casselman River
Cordulegaster erronea	Tiger Spiketail	G4	S2	GA	Monroe Run tributary
Dromogomphus spoliatus	Flag-tailed Spinyleg	G5	S1	FR	Frederick Watershed*
Gomphus adelphus	Mustached Clubtail	G4	S1	GA	Casselman River*
Gomphus quadricolor	Rapids Clubtail	G3G4	S1	AL	Wills Creek
Gomphus rogersi	Sable Clubtail	G4	S1	QA	Unicorn Branch
Lanthus parvulus	Northern Pygmy Clubtail	G4	S1	AL	High Run, Dan's Mtn
Lanthus parvulus	Northern Pygmy Clubtail	G4	S1	GA	Elk Lick Run
Leucorrhinia frigida	Frosted Whiteface	G5	S1	FR	Cunningham Falls State Park*
Ophiogomphus mainensis	Maine Clubtail	G4	S1	GA	Casselman River*

*State Record

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.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Planning

Job No.: 108

Job Title: Assess Conservation Needs of Freshwater Biota (other than fish)

Principal Investigator: Kazyak, Stranko

Job Objective:

The primary objective of this proposed addition to the comprehensive plan is to use existing data, primarily from the Maryland Biological Stream Survey (MBSS), to establish the current status and management needs of imperiled and uncommon benthic macroinvertebrates and herpetofauna that occur in Maryland streams. A secondary objective will be to conduct supplemental field studies to more firmly establish the distribution and abundance of selected rare fish species for which insufficient data currently exists.

Activities/Findings:

This job was completed during the previous reporting period.

Reasons for deviations (if any):

None

Recommendations:

Additional, comprehensive monitoring to fill in geographic gaps, and targeted monitoring to document the distribution of rare taxa along with threats to populations to help guide future management decisions at the state and local levels.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Planning

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 Sorting and Identification- Sorting of invertebrate pitfall and malaise pan traps from 5 paired old growth-managed forest sites in Garrett County continued after collection of invertebrates was completed in June 2006. Trap contents were sorted to identify the orders of species present and the families of beetles captured. Malaise pan and pitfall captures were identified for sorting first due to the greater likelihood of beetle captures compared to the malaise collecting head. Beetles of the family Carabidae were then identified to species with the assistance of staff at the Carnegie Museum, Pittsburgh, PA. Identification of pseudoscorpions (members of at least 3 families so far) is being carried out by a cooperator from McGill University. Cooperators from the University of Maryland and USDA-Smithsonian Institution are working on Opiliones (harvestmen) and Hymenoptera, respectively.

Samples and specimens were entered into Biota, a relational biodiversity database. In total, about 75% of the samples have been sorted at least partially, and almost 71,000 samples have been logged into the database. Large numbers of Diptera, Collembola, Thysanoptera, and Coleoptera have been identified so far in samples, including at least 46 beetle families. One new family of beetle for Maryland was documented (Eucinetidae), and 5 species captured were not reported to be in Maryland in a recent reference. Individuals (n=683) of 41 species of carabid beetles were captured in the study, including 1 species not documented previously for Maryland. Eleven carabid species were found only in old growth forest stands, most of which are associated with bark, downed wood, or land snails. Six species were found only in second-growth stands. A publication on carabid beetle diversity in old growth and managed stands is in preparation.

Bird Point Counts- Data collection using standard point count methodology was completed July 8, 2006 at 33 “triplet” points (33 old growth, 33 mature stands, and 33 younger stands). Fifty-one points were located in Garrett County, and 48 points were located in Allegany County. Data were recorded in 3 time periods (0-3, 3-5, and 5-10 minutes after start) and 4 distance bands

(0-30, 30-50, > 50 m, and flyovers) for calculation of detection probability corrections. Counts at each point were repeated from 2 to 4 weeks after the first point count. Counts were conducted from ½ hour after sunrise to 10 AM. A total of 70 species was detected at point counts in 2006. One state Threatened species, Blackburnian Warbler, was tallied at point counts in 2006. In 2006, 8 state rare breeding species were tallied at point count locations. All point count data were entered into a database and were also entered into the Maryland Breeding Bird Atlas project. Preliminary analysis suggests that more woodpeckers (downy, hairy, red-bellied, and pileated) and other bark/cavity-associated species (white-breasted nuthatches, black-capped chickadees, tufted titmice, and great crested flycatchers) were found in old growth forest compared to younger/managed stands. Further analyses will be carried out when vegetation plot data collection is completed in summer 2007.

Vegetation Data- Vegetation data were collected at 39 study areas, using standard community plot data collection techniques in 1 20 x 20 m plot at each location. Plot data were collected at 17 old growth, 13 mature, and 9 younger forest areas, with 19 plots in Garrett County and 20 plots in Allegany County. Data collected at all plots included GPS location, general information on landscape position and physical characteristics, 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). At the 10 sites where both insect and bird data were collected, a laser range finder was used to quantify foliage height profiles by measuring the minimum foliage height above 1.4 m at 2 m intervals in a grid across the entire plot. Cover classes and strata for herbaceous species were also recorded, and these 10 plots were revisited several times to record any changes in herbaceous vegetation. For the 29 vegetation plots where only bird data were collected, herbaceous species data were recorded only as percent ground cover for this general category. 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.

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-Planning

Job No.: 110

Job Title: Assess Breeding Distribution of Rails and Other Marshbirds

Principal Investigator: Brinker, McCann

Job Objective:

Using Atlas methodology, determine the current statewide breeding distribution of marshbirds (i.e., rails, pied-billed grebe, American bittern, least bittern).

Activities/Findings:

This job was completed during the previous reporting period.

Reasons for deviations (if any):

None

Recommendations:

Compare results to the 1987 breeding bird atlas and evaluate changes in distribution and relative abundance of marshbird species to help with the assessment of the conservation needs of these species. Repeat the project during the next breeding bird atlas, some 15-20 years in the future.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Planning

Job No.: 111

Job Title: Investigate Reintroduction of Northern Pinesnake on the Eastern Shore

Principal Investigator: Smith

Job Objective:
1. Determine if pinesnakes still occur within sand ridge communities on Maryland's Eastern Shore.
2. If pinesnakes are not extant, assess the feasibility of reintroduction
3. Determine species richness for herpetofauna within sand ridge communities on Maryland's Eastern Shore.
4. Determine species richness for small mammals within sand ridge communities on Maryland's Eastern Shore.
5. Sample beetle species found in sand ridge communities on Maryland's Eastern Shore.

Activities/Findings:
This job was completed during the previous reporting period.

Reasons for deviations (if any):
None

Recommendations:
Based on these findings, we proposed an experimental reintroduction (or repatriation) of pinesnakes to the Delmarva Peninsula.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Planning

Job No.: 112

Job Title: Assess Population Structure and Condition of Wood Turtles

Principal Investigator: Thompson

Job Objective:
To assess the status of the wood turtle population in Maryland's Ridge & Valley physiographic province and evaluate the impacts of human recreation on this population.

Activities/Findings:
This job was completed during the previous reporting period.

Reasons for deviations (if any):
None.

Recommendations:
Continue mark-recapture research and put transmitters on different individuals to record what habitats are being used. This information will help the Forest Manager make decisions that result in the conservation of wood turtle populations.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Planning

Job No.: 113

Job Title: Inventory of Rare Reptiles and Amphibians

Principal Investigator: Smith

Job Objective:
To assess the population status of rare species of reptiles and amphibians in Maryland or those of regional conservation concern.

Activities/Findings:
This report encompasses the period of March 1, 2007 through June 30, 2007. No active survey work was conducted during this time period, as fieldwork for the 2007 field season did not begin until July 1, 2007 and will be summarized in next year’s report.

Reasons for deviations (if any):
None

Recommendations:
Continued funding of this project is needed.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Planning

Job No.: 114

Job Title: Comprehensive Rare Bat Surveys

Principal Investigator: Brewer, Limpert

Job Objective:

1) Evaluate rare bat use of winter hibernacula and summer roosts (natural and man-made) in western Maryland;
2) Determine species, relative abundance, and temporal use of roosts;
3) Assess potential impacts from wind energy or other development and identify strategies for protection.

Activities/Findings:

During summer 2006, locations for netting at potential summer roosts and maternity colony sites were determined. Mist nets were set at 9 sites for 27 net nights (total 70.75 hours) from June 5 to July 26, 2006. Most bats were captured at Finzel Swamp, Dan's Mountain Wildlife Management Area (WMA), and Warrior Mountain WMA. Six species were captured: 74 northern myotis, 34 little brown myotis, 27 big brown bats, 4 silver-haired bats, 7 eastern pipistrelles, and 18 eastern red bats. Adult bats comprised 69% of the captures and juveniles 31%. Male captures represented 64% of the captures and females 36%, with 27% of captured females pregnant and 18% lactating. Acoustic surveys recorded 3,415 bat calls. Thirty-two percent of the calls were big brown/silver-haired bat, 19% little brown myotis, 16% northern myotis, 10% eastern pipistrelle, 5% eastern red bat, and 0.9% hoary bat.

Fall 2006 surveys took place from early September to the end of October, and concentrated on mines openings where bats were present or might be present from initial surveys. Surveys totaled 21 trap nights and 15 acoustic monitoring nights. Fifty-two individual bats were captured, representing 3 species. Thirty-two bats were eastern pipistrelles, 19 were northern myotis, and 1 was a little brown myotis. Preliminary acoustic data show that other bat species, such as big brown bat (*Eptesicus fuscus*), eastern red bat (*Lasiurus borealis*), silver-haired bat (*Lasionycteris noctivigans*), and hoary bat (*Lasiurus cinereus*) occur in or are using the habitat surrounding the mines.

Trapping with mist nets was carried out near water bodies in Allegany and Garrett counties from May 25 to June 25, 2007 at 12 sites for 13 net nights (total 48 hours). Most bats were captured at Big Run State Park, Buffalo Run, and Warrior Mountain WMA. Six species were captured: 27 northern myotis, 42 little brown myotis, 5 big brown bats 1 silver-haired bat, 4 eastern pipistrelles, and 15 eastern red bats. All bats captured were adults. Male captures represented 51% of the captures and females 49%, with 93% of captured females pregnant and 7% lactating.

Reasons for deviations (if any):

This job started in January 2006 when a graduate student was secured to perform the tasks.

Recommendations:

Job should be continued as data collection continued through the summer months in 2007. Fall 2007 will be spent on analyzing data, assessing potential impacts, and preparing the report/thesis. A final report for this project is due in February 2008.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Planning

Job No.: 115

Job Title: Distribution and Abundance of Eastern Narrow-mouthed Toad

Principal Investigator: McCarthy

Job Objective:

Obtain current, detailed information on the distribution, abundance and habitat associations of eastern narrow-mouthed toad and other co-occurring anurans in southern Maryland.

Activities/Findings:

A total of 109 wetlands were selected for surveys for Eastern narrow-mouthed toad (*Gastrophryne carolinensis*) in St. Mary's and southern Calvert counties in southern Maryland. The majority of survey points were selected based on wetland type, as identified in National Wetlands Inventory and DNR wetlands maps, with review of aerial images to assess current landscape condition. Additional sites were identified in consultation with a herpetologist familiar with this species from which most of our historical records in St. Mary's County were obtained. Sites were targeted in the vicinity of current and historical records for *G. carolinensis* in order to improve our understanding of the current status of this species in the geographic area from which the majority of Maryland's historical records originate.

Field surveys were conducted from May 7 – July 31, 2007, and consisted of nighttime call surveys (broadcasting recordings of possible anuran species), and/or daytime dipnet and upland surveys. One, 2-member crew surveyed 92 sites with assistance on several days/evenings from a consulting herpetologist. Twenty-six sites were both call surveyed and dipnetted. Seventy-two sites were call surveyed only, while only dipnet and upland surveys were conducted at 20 sites. Dipnet surveys were conducted twice at all sites, once in May-early June and again in late June-July. Call surveys were conducted more than once at 26 promising sites, and up to 4 times at 5 sites identified as on or very near a location recorded for G. carolinensis from 2000-2007. Drought conditions in southern Maryland during the field season limited the opportunity to conduct dipnet surveys and call surveys. Areas that normally are inundated were dry, precluding dipnet surveys, and call surveys were restricted to 15 nights from May 16-July 30 due to the lack of rain and the need to conduct call surveys during or shortly after rain.

Total survey efforts for 2007 yielded observations of 27 species of herpetofauna. Dipnet surveys produced 11 species of herpetofauna: 8 species of larval anurans and 3 species of larval caudates. Call surveys yielded 7 species of anurans. One species heard calling, Green treefrog (*Hyla cinerea*), was not detected in larval stage during dipnet surveys. Upland surveys yielded observations of an additional 15 species of reptiles, caudates and anurans not detected by call and dipnet surveys, including the only observations of rare and declining species, Six-lined race runner (*Cnemidophorus sexlineatus*, GCN), Eastern box turtle (*Terrapine carolina carolina*, GCN) and the target species, Eastern narrow-mouthed toad (GCN and State Endangered).

The Eastern narrow-mouthed toad was observed at a single site in 2007. From 1 to 3 individuals were observed on each of 3 visits from June 3-June 22. Subsequent visits failed to yield any observations. This site was reported to have harbored this species in the early 1990's, but the species had not been observed since by herpetologists who frequent the site. The toads were found under debris (an old door, piece of tin, plastic sheeting) in and adjacent to a borrow pit that is adjacent to nontidal wetlands. Repeated dipnet surveys and call surveys at this site did not yield any observations. Repeated surveys of the site at which this species was found in 2006 did not yield any observations.

Reasons for deviations:

Upon evaluating the results of the extensive survey effort in 2006, which yielded a single observation of the Eastern narrow-mouthed toad despite intensive effort over a broad geographic area, we concluded that we should focus our survey effort in 2007 to the areas from which this species was historically reported most frequently, primarily in southern St. Mary's County. We believed this would increase our chance of success and give us not only better data on the status of the species in this area, but, with increased observations we felt we would be able to refine and improve our survey protocols to increase our success in detecting this species.

In order to increase the potential for observation of the target species during the drought, cover boards were placed at several promising sites, including the site at which the species was found in 2006 and sites on public land in the vicinity at St. Mary's River State Park and the Salem Tract, managed by the DNR Forest Service. These boards were checked weekly and after rain. While the cover boards did not yield any observations of the Eastern narrow-mouthed toad, they did result in observations of additional species of snakes. For call surveys, we also increased the window of time since precipitation occurred, starting just prior to and during rain, and on subsequent nights up to 48 hours after rain to allow for more surveys because there were so few rain events.

A consultant was hired to assist in guiding the selection of sites for placement of coverboards and to provide expertise regarding the selection of sites for calling surveys. The long-term contractual zoologist who was expected to guide this work resigned from his position with the Natural Heritage Program in May, and the consultant helped to get the project underway and shared his data and experience regarding the target species.

Recommendations:

The populations identified in 2006 and 2007 should be monitored regularly. Development is proposed adjacent to the 2007 location which may be detrimental to the long-term survival of the species at this site. Maintain contact with these landowners.

Conduct call surveys only during a year with ample precipitation, focus efforts around the area of St. Mary's County with historic records. Fund a

pair of local biologists to conduct the surveys, possibly a student from a local college working with a professor or other professional biologist. Only conduct surveys on warm, rainy nights. This would result in a much more limited effort than in previous years, but may well provide just as much data on the target species. Surveying for the Eastern narrow-mouthed toad is an exercise in adaptive management!

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Planning

Job No.: 116

Job Title: Survey to Establish the Status, Distribution, Abundance, and Tolerance of GCN Aquatic Species

Principal Investigator: Stranko

Job Objective:

The primary goal of this project is to use random and targeted sampling by the MBSS to provide information necessary to accurately determine the distribution and abundance of blackbanded sunfish, bridle shiner, and mud salamander in Maryland. A secondary goal is to collect sufficient coincident physical, chemical, and landscape data to accurately describe tolerance limits of these and other Greatest Conservation Need (GCN) aquatic species. This analysis will include an assessment of important stressors for each GCN species.

Activities/Findings:

This job was completed during the previous reporting period.

Reasons for deviations (if any):

None

Recommendations:

Changes to the listing status of the target species should be considered and aggressive protection measures should be implemented.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Planning

Job No.: 117

Job Title: Inventory Freshwater Benthic Macroinvertebrates

Principal Investigator: Stranko, Broward

Job Objective:

Compile species-level benthic macroinvertebrate data collected from external sources (e.g. federal, state, and local agencies; academia, and historical literature) to supplement the DNR's existing data, primarily generated by genus-level MBSS and family-level Stream Waders collections. These data will then be used to address the following objectives:

1) Establish a geographically referenced list of Maryland's benthic macroinvertebrate species.
2) Target and prioritize genera where species identifications are lacking.
3) Initiate a species-level benthic macroinvertebrate voucher collection.

Activities/Findings:

This job was performed under contract with DNR's Maryland Biological Stream Survey (MBSS). One hundred organism subsamples and large/rare taxa searches were conducted on benthic macroinvertebrate samples collected at 29 MBSS Sentinel Sites and 3 Stream Waders sites on the same reach as these MBSS Sentinel Sites. All samples were collected during spring 2007. Species identifications were made (when possible) on all specimens within the orders Odonata, Plectoptera, Ephemeroptera and Trichoptera. Taxonomic data were compiled by taxon and site within a Microsoft Excel spreadsheet. Separate files were created for MBSS and Stream Waders sample results and these data have been reduced for reporting purposes. They have also been imported into ArcMap to map distributions of select taxa.

Reasons for deviations (if any):

None.

Recommendations:

Continue species level identifications at select MBSS and Stream Waders sites should occur to help elucidate the distributions and potential listing potential of these under reported yet ecologically valuable aquatic fauna.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Planning

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 from March 1, 2007 to June 30, 2007. Data provided improve our understanding of native and non-native crayfish and mussel distributions. MBSS documented the presence of the non-native red swamp crayfish (*Procambarus clarkii*),in 12, 8-digit watersheds in Maryland's Coastal Plain in 2006. In 2007, MBSS documented the presence of the non-native rusty crayfish (*Orconectes rusticus*) in the northern portion of the Monocacy River watershed and in the lower Susquehanna River. 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. Physical habitat and water chemistry data collected concomitantly with crayfishes and mussels in 2007 will be used at the end of MBSS Round 3 to describe the habitat preferences and status of Maryland's mussel and crayfish species.

This job is continuing under federal aid grant T-1-2.

Reasons for deviations (if any):

None

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-Planning

Job No.: 119

Job Title: Status Assessment of Maryland’s Boreal Small Mammals

Principal Investigator: Feller

Job Objective:

Conduct an intensive survey of potential habitat to determine the status, distribution and abundance of boreal small mammals in Garrett and western Allegany counties, with a primary focus on the state endangered rock vole and water shrew.

Activities/Findings:

This job was completed during the previous reporting period.

Reasons for deviations (if any):

None

Recommendations:

Limited potential habitat has been identified for water shrews and will warrant future trapping efforts to better define this species range and abundance in Maryland. Determining water shrew habitat limits in reference to stream size was initiated in this project. Trapping efforts along lower Big Run and Poplar Lick, where water shrews have been captured in the headwaters, were hampered by raccoon disturbance, negating results.

Potential rock vole habitat on the west flank of Backbone or elsewhere on the Allegheny Plateau off of Backbone should be surveyed when such areas are located to further investigate its distribution.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Planning

Job No.: 120

Job Title: Coordinate 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 activities needed for priority conservation actions, including information needs for better management, restoration, etc., and any additional IMR needed to address identified threats. 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 developed in part through participation in Northeast Coordinated Bird Monitoring Partnership (NECBMP), which held a workshop to identify monitoring needs based on management issues in September 2006. 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 through monthly conference calls and a meeting held Feb. 22-23, 2007 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. In addition, a literature review of monitoring for rare/priority species, threat scoring, and prioritization processes for conservation is ongoing. 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.

This job is continuing under federal aid grant T-1-2.

Reasons for deviations (if any):

None

Recommendations:

This job should be continued to allow the completion of the targeting system and specification of targets and actions for the near future.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Planning

Job No.: 121

Job Title: Breeding Status of Black Rail

Principal Investigator: McCann

Job Objective:

Locate extant breeding sites for black rail on the lower Eastern Shore, and document the extent and relative size of these populations.

Activities/Findings:

During 1990-1992, black rail was the third most frequently detected species during an intensive survey of breeding marshbirds throughout the Chesapeake Bay and Coastal Bays region. However, not a single black rail was detected during a similar survey in 2005-2006. Moreover, the species was documented at only 12 blocks during the 2nd iteration of the MD/DC Breeding Bird Atlas in 2002-2006 (versus 18 blocks in during the 1st atlas in 1983-1987), representing a 33% decline. The 2nd atlas also documented a significant range contraction with no birds detected on Assateague Island, the Coastal Bays mainland or at Deal Island WMA. All 3 areas supported black rails during the 1st atlas period as well as during the 1990-1992 marshbird study. These data along with mounting anecdotal evidence point to a severe decline in black rail populations in Maryland, a region long thought to be a global stronghold for this elusive marshbird.

In 2007, we conducted the most intensive black rail survey to date in an attempt to locate extant breeding sites and determine the extent and relative size of these populations. We focused on the lower Eastern Shore in areas that have been known to support black rails in the past, including areas that have been traditionally considered regional and perhaps global population strongholds (e.g., southern Dorchester County). We also included 2 recent black rail breeding sites on the mid- (Easton Sewage Treatment Plant) and upper Eastern Shore (Eastern Neck National Wildlife Refuge). In total, we surveyed all Eastern Shore point-count locations (n = 97) where black rail was detected during the 1990-1992 marshbird study, herein referred to as “positive points”. Results from this study provide the most comprehensive and reliable benchmark for examining changes in black rail distribution and abundance in Maryland. In addition, we selected 59 point-count locations where no black rails were detected during 1990-1992. These “negative points” were selected using the following criteria: (1) based on 2007 field reconnaissance and digital marsh vegetation data, the negative point currently occurred within 100 m of potential black rail habitat (e.g., high marsh dominated *Spartina patens* and/or *Distichlis spicata*), (2) 1 or more other rails (e.g., Virginia Rail, Clapper Rail) were detected at the negative point during 1990-1992 surveys, and (3) the “black rail survey protocol” was applied during at least 1 survey during 1990-1992 (see below for explanation). In addition, in an effort to locate at least 1 negative point near or, ideally, within the same marsh system as a positive point, only those negative points that occurred in an atlas block with at least 1 positive point were selected. Finally, all point-count stations, both negative and positive, were separated by at least 440 m (0.25 mi) to minimize redundant detections and maintain statistical independence among stations.

In total, our inventory survey design involved surveys at 156 point-count locations distributed by county as follows: Kent – 4, Talbot – 2, Dorchester – 81, Somerset – 31, and Worcester - 38. The majority of these stations occurred along rural public roadsides. Others required short hikes from a nearby road or, in the case of Assateague Island National Seashore, the ocean beach ORV trail. Each location was surveyed 3 times, separated by at least 1 week, over a 6-week period during mid-May through late June, 2007 for a total of 468 point-counts. Surveys were conducted at night by highly experienced observers, beginning 1 hour after sunset and ending by 1 hour before sunrise. No surveys were conducted during a steady rain or when wind speeds exceed 20 km/hr (Beaufort wind speed code of '3').

A variety of marshbird survey techniques, including those specifically designed for black rail, were evaluated during the 1990-1992 marshbird study. The most effective of these for detecting black rail, which we refer to as the "black rail survey protocol", was used during 2007 surveys. In an analysis of 1990-1992 detection probabilities, we determined that this technique would yield an approximate detection rate of 84% using 3 replicates per point-count location. This 10-minute long point-count protocol involved the use of an audio lure and alternating periods of silence, black rail advertisement calls and grunts, and Virginia rail calls. Vocalizations were broadcast at approximately 80 decibels (similar volume as during 1990-1992) using an MP3 player and 2 speakers set at a 90-120 degree angle from each other. The observer stood 10-15 m away from the speakers to help facilitate detection. During surveys, the number of black rails and nocturnal marshbirds was recorded. For each black rail detected, more detailed observations were recorded including: (1) the distance category (near = < 100 m, medium = 100-200 m, far = > 200 m) and direction (to nearest 10 degrees) that the bird was detected, (2) the type of vocalization heard (e.g., grunt, ki-ki-keer call), and (3) the survey period(s) during which the bird was detected. We also recorded wind speed and direction, air temperature, cloud cover, and moon phase during surveys.

In addition the surveys described above, we conducted denovo surveys by boat in previously unsurveyed potential habitat in an effort to increase the chances of detecting black rail. Survey methods and protocol were the same as described above. Boat surveys were limited to 2 nights in the Fishing Bay area where we conducted a single point-count at 26 locations.

We detected black rails at 10.3% (16 of 156 locations) of all point-count locations. At most locations (11 of 16), only a single black rail was heard. A maximum of 3 birds were detected at 1 site. For all but 2 of the 16 locations, black rail was heard during just 1 of 3 surveys or replicates. Taking into account the possibility of repeated observations of the same individuals on more than 1 night of surveys, the minimum and maximum total number of individual birds detected during 2007 was 22 and 24, respectively.

Black rail was detected at only 16.5% (11 of 97) of the point-count locations where it was recorded during the 1990-1992 study. It was also observed at 1 negative point and 3 denovo points (via boat surveys), all in southern Dorchester County. However, the latter 4 locations probably do not represent new breeding localities (i.e., discretely different tidal marsh systems) but rather extensions of existing or known breeding sites in the Fishing Bay area. We have not yet statistically compared these findings to 1990-1992 study results but they probably represent a highly significant decline.

Thirteen of the 16 point-count locations where black rail was detected occurred in southern Dorchester County. Elsewhere, only a single bird was recorded at 1 location each at Fairmont Wildlife Management Area (Somerset County), Assateague Island National Seashore (Worcester County) and a man-made nontidal marsh at Easton Sewage Treatment Plant (Talbot County). Survey

results provide further evidence that black rail may be extirpated from most previously occupied sites on the Eastern Shore including Worcester County's mainland marshes, Deal Island WMA (Somerset County), Pocomoke Sound (Somerset County) and Eastern Neck National Wildlife Refuge (Kent County).

With the exception of Easton Sewage Treatment Plant, all black rails occurred in extensive tidal marsh areas dominated by *Spartina patens* and/or *Distichlis spicata*. In southern Dorchester County, the species was sparsely but widely distributed. However, most birds occurred in expansive tidal marshes in Fishing Bay WMA and areas south of Blackwater National Wildlife Refuge. In Fishing Bay WMA, where large marsh units have been established with 1 of 4 prescribed fire frequencies (annual, every 3-5 years, every 7-10 years, no burning), all birds occurred in marshes designated as "no burn" areas. More detailed analyses are in progress.

Reasons for deviations (if any):

None.

Recommendations:

The project is nearing completion. Additional more detailed analyses in progress.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Planning

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:

A team of 8 interested NHP staff were assembled 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 Natural Heritage Programs/Conservation Data Centers and private conservation organizations, such as The Nature Conservancy, and reviewed available materials. The workgroup convened to discuss these materials and make preliminary decisions on the development of the project.

Early in the project, it became apparent that we lacked sufficient data on a number of key habitats and natural communities to incorporate any meaningful targeted areas for these elements of biodiversity with a minimal level of accuracy. 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 natural community types (ranked S1 & S2 in Maryland) had draft polygon maps developed and several others were underway.

Reasons for deviations (if any):

None.

Recommendations:

Next steps include continuing to mine habitat data from existing data sources and developing rapid assessment protocols for collecting the highest priority community data. 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-Planning

Job No.: 123

Job Title: Population Status of Freshwater Mussels

Principal Investigator: McCann

Job Objective:

(1) Determine the status and distribution of freshwater mussels, especially the state and federally endangered Dwarf Wedge Mussel (*Alasmidonta heterodon*), in the Corsica River watershed.

(2) Determine the current status of the state endangered Brook Floater (*Alasmidonta varicosa*) and Green Floater (*Lasmigona subviridis*).

Activities/Findings:

Corsica River Watershed Inventory

In 2005, A. heterodon was incidentally discovered in Three Bridges Branch, a small tributary of the Corsica River on Maryland's Eastern Shore. This was the first record from the Corsica River watershed, an area dominated by large agricultural fields and small forest tracts with rapidly expanding residential development.

In 2006, to document the mussel's distribution, relative abundance and age/size distribution throughout the Corsica River watershed, we conducted surveys at 32 100-m long stream sections spaced systematically at 1 km intervals along all perennial non-tidal streams. At each location, we conducted timed, bank-to-bank surveys during which we recorded the number of live and dead shells of all species detected on the stream substrate surface. Surveys were conducted by teams of 3-5 biologists using a combination of snorkeling and waterscope techniques. We also searched the shoreline and floodplain for middens and spent shells. If live specimens of rare, threatened or endangered species were found (e.g., *A. heterodon*), we marked (using uniquely coded tags glued to the periostracum), aged and measured each individual. The precise location and habitat conditions were also documented.

At 18 of the 32 survey locations described above, DNR's Maryland Biological Stream Survey (MBSS) Program evaluated stream conditions using a statewide standardized stream monitoring protocol. This protocol includes data collection on water chemistry, physical stream habitat features, benthic macroinvertebrates, fish communities and surrounding landscape conditions. Water temperature data loggers were also placed at 8 stream locations.

Inventory results during 2006 are summarized below in Table 1. Mussels were present at 23 (72%) of 32 sites. We found a total of 7,249 live mussels and 495 dead shells comprising 5 native unionid or freshwater mussel species. Of these, 15 live (0.2% of total) and 6 dead *A. heterodon* were recorded at 6 locations (Figure 2). All of these locations were in the upper portion of Three Bridges Branch (2 locations) and an unnamed 2nd order tributary (4 locations). The stream sections in which *A. heterodon* was found were exceptionally small (mean = 2.2 m wide, range = 1.5-2.5 m) and shallow (mean = 19 cm max depth, range = 8-25 cm) for this species, with low-moderate flow over predominantly sandy-small gravel substrates.

Elliptio complanata was, by far, the most common species, representing over 95% of all live mussel detected. Mill Stream Branch supported exceptional densities of this species with over 500 live individuals (range = 76-1721, mean = 756, n = 7) found at some locations. *E. complanata* is the most common native mussel in Maryland and considered relatively secure. Still, streams like Mill Stream Branch that support such high densities are uncommon in Maryland and probably indicative of relatively high quality stream conditions.

Other notable findings included the detection of *E. fisheriana*, a watchlist species, at 11 sites. As with *E. complanata*, the highest numbers of *E. fisheriana* were recorded in Mill Stream Branch (present at 7 of 7 sites, mean = 58 live individuals, range = 2-189). We also found 1 live *Anodonta implicata*, a watchlist species, in Gravel Run. This species is typically associated with larger, more slow-moving streams and rivers; thus, its local rarity in the small, nontidal streams of the Corsica River watershed was not surprising. Finally, it was significant that the Asiatic Clam (*Corbicula fluminea*) was absent in nearly the entire Corsica watershed. Since its accidental introduction in the state's waters over 30 years ago, this introduced bivalve is now ubiquitous in the majority of Maryland's freshwater streams and rivers. It may be contributing to declines in native freshwater mussels by outcompeting native species for food and space. The Asiatic Clam is notably absent in all Maryland streams containing extant populations of Dwarf Wedge Mussel.

Brook Floater and Green Floater Status Assessment

To identify and prioritize survey needs, we compiled all available Maryland data on the distribution, abundance, habitat associations and status of Brook and Green Floater. The primary data source was the Maryland Natural Heritage Program's biotics database on rare, threatened and endangered species, and the Program's freshwater mussel database. Other sources included museum specimen data, published data and unpublished records from non-DNR biologists. We also reviewed published rangewide habitat and life history information.

For the two species, we compiled a total of 69 records represented approximately 40 localities along the following 11 streams in the Piedmont and Ridge and Valley physiographic provinces: Town Creek, Sideling Hill Creek, Conococheague Creek, Antietam Creek, Toms Creek, Monocacy River, Linganore Creek, Little Pipe Creek, Gwynns Falls, and Potomac River (scattered sites between the confluence with Sideling Hill Creek downriver to Potomac Gorge). Of these, no surveys were considered warranted in Town Creek, Antietam Creek, Little Pipe Creek, Gwynns Falls and the lower Potomac in Montgomery County. Past survey coverage in these streams has been reasonably sufficient and recent enough to conclude that both species are probably extirpated. We also did not survey the Potomac Gorge area because of the difficulty and safety risks involved in effectively surveying this deep, high-volume, whitewater section of the Potomac River. All other streams were targeted for surveys.

During 2006-07, we conducted surveys at 56 sites along the following streams: Conococheague Creek, Licking Creek, Linganore Creek, Monocacy River, Sideling Hill Creek, Toms Creek and various sections of the upper Potomac River in Allegany, Washington and Frederick counties. These surveys included 29 of the 34 localities where 1 or both species was previously documented. We were unable to survey 4 locations on the Potomac River because of high flow conditions and 1 site along Conococheague Creek because it was inaccessible. At each brook and green floater location, we surveyed a 200-m long section that was centered on the approximate site where the species was

recorded. If the exact location was uncertain or unknown, and/or if potential habitat continued further up or downstream, the survey was extended up to 400 m to ensure that the site was thoroughly surveyed.

In addition to surveying known brook and green floater sites, we surveyed 27 locations where neither species has been recorded in the past. Sites were chosen nonrandomly based on the presence of potential habitat; i.e., riffles, runs and pools with suitable substrates that are unlikely to become exposed during low flow conditions or droughts. We also attempted to distribute sites so as to provide adequate, representative coverage of the entire Maryland length of each stream. At each site, we conducted a minimum 100-m long survey. Survey methods at all sites were similar to that described above for the Corsica River.

Surveys during 2006-07 spanned a total stream length of 11.2 km and involved 783 person hours of survey effort. We found a total of 4,447 live unionid mussels and 2,114 dead shells representing 8 species (Table 2).

Historic or recent records for green floater exist from 5 streams and rivers: Sideling Hill Creek, Conococheague Creek, Toms Creek, Monocacy River, and at least 7 widely scattered locations on the Potomac River from as far west as near the confluence of Sideling Hill Creek to the Potomac Gorge in Montgomery County. During 2006-07, we conducted surveys in the first 4 streams and portions of the upper Potomac. Green floater occurred only in Sideling Hill Creek and a single section of the Potomac River in Washington County near the confluence of the Cacapon River. Given our findings and the cumulative evidence provided by earlier surveys in each of these streams as well as over 1,200 other locations throughout the state since 1990, Sideling Hill Creek and the upper Potomac River (scattered sites in western Washington and eastern Allegany counties) probably support the state's only remaining populations. In 2007, we did find a single old relic shell in Conococheague Creek but it's highly unlikely the species is still extant there. This stream is highly degraded and has a long history of poor water quality due to siltation and excessive nutrient inputs from surrounding agriculture and, more recently, rapidly expanding commercial and residential development. No live green floaters, as well as very few live native mussels of any species, have been found in Conococheague Creek since at least 1990. The stream's naturally high alkalinity probably accounts for the persistence and occasional collection of an old relic shells which would otherwise disintegrate more rapidly under less alkaline conditions.

We found a total of 58 live green floaters, 2 from the single upper Potomac River site and the remainder from Sideling Hill Creek. At Sideling Hill Creek, the species was detected at 8 of 21 survey locations at widely scattered sites spanning an 8-km section. Age and size distribution data indicate the presence of multiple age classes (mean age = 5.7 years, range = 3-12, n = 48), including recent recruits, a preponderance of mature individuals, and relatively old individuals. Remarkably, 43 of the 56 green floaters occurred in a single 70-m long pool, which alone exceeds the total number of specimens ever collected or reported in Maryland and may be among the highest densities reported for the species. The factors responsible for this "hotspot" are unclear but the geomorphology of the pool and areas immediately up- and downstream appeared unique in providing a sizeable refugium from both high flow events and drought conditions along with suitable substrate conditions and perhaps reliable exposure to fish hosts. A better understanding of this "hotspot" and green floater habitat requirements in general, including fish hosts, would greatly aid in the conservation of this species. The green floater population in Sideling Hill Creek is critical to the species' long-term survival in Maryland and is probably among the most viable populations in the mid-Atlantic region and perhaps rangewide.

Historic or recent brook floater records exist for 11 streams and rivers: Conococheague Creek, Licking Creek, Sideling Hill Creek, Linganore Creek, Monocacy River, Toms Creek, Town Creek, Antietam Creek, Little Pipe Creek, Gywnns Falls, and at least widely scattered sections of the Potomac River from as far west as near the confluence of Sideling Hill Creek to the Potomac Gorge. During 2006-07, we conducted surveys in the first 6 of these streams and portions of the upper Potomac River. We found a total of 12 live and 4 dead brook floaters in Licking Creek (4 live/3 dead at 2 of 7 sites), the upper Monocacy River (6 live/0 dead at 2 of 10 sites), and at 3 widely scattered sites on the Potomac River (2 live/1 dead at 2 of 6 sites). Additional Potomac surveys in Washington County, especially west of Hancock, may yield other sites but this species will probably prove to be highly rare and widely scattered wherever found. These 3 streams and rivers probably support the only extant populations in the state. Age/size distribution is too scant to yield much insight into the age structure and viability of these populations.

The apparent absence of brook floater in Sideling Hill Creek and Town Creek is puzzling. Water quality in both streams is fairly high and the mussel fauna is otherwise generally intact. Also, both streams are among the most intensively surveyed in Maryland (in terms of mussels) and it seems unlikely that it was overlooked. Although the species has been reported from the 2 streams, no valid specimens are available. We suspect that the species was misidentified or mistakenly reported.

Reasons for deviations (if any):

None

Recommendations:

For Dwarf Wedge Mussel, a systematic inventory should be conducted in the Herring Run watershed in Caroline County where a single fresh dead A. heterodon shell was incidentally found in 2007. Additional denovo inventory work is also needed in other streams with potential dwarf wedge mussel habitat. For brook and green floater, some additional survey work is needed to better determine the distribution and age/size distribution of these species in the stream systems where they remain extant. For all 3 species, research is needed to determine or refine our understanding of fish host requirements, habitat requirements, and the types of habitat degradation that represent the greatest threat to population viability.

Table 1. Summary of freshwater mussels found at 32 sites in the Corsica River watershed during 2006.

Species	**Live**	**Dead**	**% Total Live**	**No. sites**	**% sites**
Alasmidonta heterodon	15	6	0.2	6	18.8
Anodonta implicata	0	1	0	1	3.1
Elliptio complanata	6,929	475	95.6	23	71.9
Elliptio fisheriana	191	4	2.6	11	34.4
Pyganodon cataracta	114	9	1.6	4	12.5
TOTAL	7,249	495			

Table 2. Summary of freshwater mussels found at 56 sites along 7 streams and rivers during 2006-2007 surveys for Brook Floater (*Alasmidonta varicosa*) and Green Floater (*Lasmigona subviridis*) in Maryland's Piedmont and Ridge and Valley physiographic regions.

Species	Live	Dead	% Total Live	No. sites	% sites
Alasmidonta varicosa	12	4	0.3	7	12.5
Anodonta implicata	0	3	0	1	1.8
Elliptio complanata	2,617	1,384	58.9	45	80.4
Elliptio producta	1,114	191	25.1	33	58.9
Lampsilis sp.[1]	208	448	4.7	41	73.2
Lasmigona subviridis	58	3	1.3	8	14.3
Pyganodon cataracta	4	3	0.1	5	8.9
Strophitus undulatus	434	78	9.8	35	62.5
TOTAL	4,447	2,114			

[1]Tentatively *Lampsilis cardium x cariosa*. Unable to reliably distinguish between the 2 species; apparent intergrades exist due to suspected hybridization

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Planning

Job No.: 124

Job Title: Identify Indiana Bat Maternity Colonies

Principal Investigator: Limpert

Job Objective:

1. Identify Indiana bat maternity roosts and foraging areas through mist netting and radio telemetry.
2. Develop a color banding protocol in Maryland compatible with surrounding states for possible adoption as protocol for the Northeast Bat Working Group. No color banding protocol currently exists that would easily identify state of origin or species from a distance, particularly if the band number cannot be read.
3. Cooperate with current rangewide projects involving the collection of Indiana bat morphometrics, wing punches and/or hair samples for DNA population analyses.
4. Collect information on roost, area surrounding the roost, and landscape information on Indiana bat summer habitat for comparison with other northeastern sites.

Activities/Findings:

Field work for this job was scheduled to begin in May 2007. During this reporting period, we identified a contractor who was capable of conducting the research and initiated contract paperwork with the University of Maryland's Appalachian Lab.

This job is continuing under federal aid grant T-1-2.

Reasons for deviations (if any):

Objective #2 was modified to reflect coordination of banding efforts by members of the Northeast Bat Working Group and input from Indiana bat researchers. Colored bands don't last very long because the bats chew them off. Since a more permanent marker was needed, Suzi Oettingen of USFWS had recommended that Prozana Ltd. Bands should be used and recommended a number sequence for Maryland that was not duplicated by other states in species range who were banding Indiana bats.

Objective #3 was deemed not applicable any more because the researcher was unaware of anyone requesting these DNA and hair samples for Indiana bats. Much of the DNA data on Indiana bats throughout the range had already been collected and reported.

Recommendations:

Job should be continued as data are being collected during the summer of 2007. Summer and fall 2007 will be spent on analyzing data, assessing potential impacts, and preparing the reports.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Planning

Job No.: 125

Job Title: Survey of Groundwater Invertebrates

Principal Investigator: Feller

Job Objective:

Determine the species composition, status, distribution, abundance and habitat associations of subterranean macroinvertebrates in upper Piedmont and Coastal Plain groundwaters.

Activities/Findings:

Seventy-one groundwater emergences, either seeps or springs, were sampled in 9 counties of the Coastal Plain and upper Piedmont physiographic regions during the spring of 2007. Early onset of a persistent and severe drought greatly affected sampling efforts this year, as many springs and seeps were flowing at substantially reduced rates and in some instances were found completely dry. Regardless, subterranean macroinvertebrates were documented at 13 new localities, more than doubling the number of sites previously known for this group in the region. Species determinations are pending, however a quick look at a couple of lots revealed a least 1 new site for S. tenuis potomacus (S3 G4), *S. pizzinii* (S1 G2G4), *S. indentatus* (S1 G3), a subterranean isopod of the genus *Caecidotea* (the first from the Coastal Plain in MD), and a subterranean flatworm. The arduous task of specimen dissection and construction of appendage slide mounts for positive species identification will be completed over winter.

Hopefully the drought will subside with winter rain and snow, allowing another field season in spring of 2008 to compliment the compromised survey work in 2007.

This job is continuing under federal aid grant T-1-2.

Reasons for deviations (if any):

Drought conditions greatly reduced the effectiveness of 2007 surveys. An extension is requested to continue collecting in 2008, or later, when normal flows resume.

Recommendations:

Conduct surveys at additional habitat locations in spring 2008.

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, 2006 to June 30, 2007 the environmental review office of the Natural Heritage Program processed a total of 3,234 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 review 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 conflicts for a given proposal existed. The ultimate determinations for this were made using the 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 evaluation took place for each project of concern.

In the second phase projects of concern identified in Phase One 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, and scale. 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 3,234 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 activities during this period on DNR owned land 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.

This job is continuing under federal aid grant T-1-2.

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 offset the impacts of development and incompatible management practices will detract from our primary conservation mission.

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:

(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; and (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 was formed 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. The first task of the Technical Committee was to develop criteria for designating a site as an IBA. The initial draft of the criteria was developed in 2004. It was subsequently modified and finalized in November 2005. The criteria are provided on the following webpage http://www.audubonmddc.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 June 2007, 22 sites were determined to meet the criteria for Maryland IBA. The following 14 sites have been designated as IBAs in Maryland: Cranesville Swamp, Wolf Swamp, Finzel Swamp, Chapman Forest, Belt Woods, Jug Bay, Fort Smallwood, Hart-Miller Island, Eastern Neck NWR, Blackwater-Fishing Bay Marshes, Central Chesapeake Islands, Deal Island, Maryland Coastal Bays, Assateague Island, Chino Farms, and Parker’s Creek. The following sites have been determined to meet the criteria as an IBA and will be designated as such in the near future: Fairhill NRMA, Great Cypress Swamp, Green Ridge Forest, Patapsco Valley, Patuxent Wildlife Research Refuge, and Pocomoke-Nassawango.

This job is continuing under federal aid grant T-1-2.

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.: 203

Job Title: Restore Habitat for Amphibians in Carolina Bays

Principal Investigator: Tyndall

Job Objective:

By June 2005, identify and expand marsh community habitat in a minimum of 20 Carolina bays on state lands with extant and historical rare amphibian populations.

Activities/Findings:

This job was completed during the previous reporting period.

Reasons for deviations (if any):

None.

Recommendations:

Trees that were retreated by the drill-and-syringe technique in 2006 should be revisited during 2007, and those still showing substantial resistance; i.e., at least 1 main trunk or major branching system still alive, should be retreated, preferably with Imazapyr according to published results

Wetlands in the Cypress Branch Ponds Complex and Marshyhope Sand Ridge Complex should be managed during 2007 – 2008, at an additional cost of about $12,000.

Surveys of amphibian response to the wetland restoration efforts should be conducted periodically to assess the success of this habitat work.

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 1,260 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. Two staff people served as county coordinators.

Data collection began during the breeding season of 2002. Volunteers were assigned survey blocks in which to collect breeding bird data. Each block was a 10 km by 10 km square in which the observer attempted to document all breeding bird species. Three categories of evidence of breeding were used for each species of bird observed, namely observed, possible, probable, and confirmed. The appropriate designation was recorded by the observer based on established criteria.

The fifth and final field season of the second Breeding Bird Atlas for Maryland and the District of Columbia (2002-2006) took place in 2006. At the end of field work there was coverage for 1,284 blocks. For all practical purposes this total represents 100% coverage for this atlas; 1,213 of these blocks (94% of the total number) have records of 50 or more bird species. Blocks that match or exceed their species totals from the 1983 to 1987 atlas number 760 (59%) and 361 more blocks are within 10 species of their 1980s total; that is, 87% of all blocks have similar bird diversity to 1983-1987. Overall 74 bird species (37%) have increased, occurring in 105% or more of the blocks that they did in the 1980s, and 50 (25%) have declined to 95% or less of their 1980s atlas distributions, showing a slight excess of increasing over declining nesting species. This result reversed the apparent trends in the atlas data detailed in last year’s report and can be attributed to the efforts of our volunteer observers in the final field season. Nonetheless a bird fauna with a quarter of its members losing ground is a sobering situation. Targeted work on night birds was notably successful for common species (Eastern Screech-owl improved by 313 blocks) and provided support for the declines observed in other species such as Whip-poor-will, American Woodcock, and Barn Owl.

In addition to the standard breeding bird atlas data collection, breeding bird abundance data was collected using miniroute breeding bird surveys. Miniroutes were conducted similar to the national Breeding Bird Survey, except on routes with 15 stops instead of the standard 50 stops. Miniroutes were contained entirely within individual blocks. The goal is to

collect miniroute data from 680 blocks. Through the 2006 field season, data had been collected from 520 miniroutes. The remaining miniroutes will be surveyed during the 2007 breeding season.

This job is continuing under federal aid grant T-1-2.

Reasons for deviations (if any):

None

Recommendations:

Consideration should be given to fund data analysis and preparation of the final Atlas products.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 205

Job Title: Evaluate Use of CREP Buffers by Birds

Principal Investigator: McCann, Harvey

Job Objective:

The objective of this project is to measure bird species use and relative abundance during the 2004 breeding season on CREP grass and riparian forest buffers compared to similar sites that lack CREP in 4 regions of the state. Secondary objectives are to evaluate differences in bird use associated with buffer age and juxtaposition with existing forest buffers.

Activities/Findings:

This job was completed during the previous reporting period. A final report (Blank and Gill 2006) for this job has been produced and was submitted previously.

Reasons for deviations (if any):

None

Recommendations:

Based on the findings of this study, greater consideration should be given to how conservation buffers are designed and managed if conservation of grassland-dependent birds is a priority goal of the Conservation Reserve Program.

Literature Cited:

Blank, P. J., and D. E. Gill. 2006. Bird use of Conservation Reserve Enhancement Program (CREP) buffers bordering row crop fields in Maryland. Final report. Submitted to the Maryland Department of Natural Resources. 29pp.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 206

Job Title: Assessment of Abnormality Prevalence in Amphibians from Stormwater and Agricultural Ponds

Principal Investigator: Smith, Driscoll

Job Objective:

Evaluate the prevalence of abnormalities in frogs from stormwater and agricultural ponds and compare with that observed on national wildlife refuges.

Activities/Findings:

This job was completed during the previous reporting period.

Reasons for deviations (if any):

None.

Recommendations:

A second year of this study should be considered in order to get complete samples at sites where this did not occur in 2005. Also, resampling sites with malformations, particularly Jackson Lane Preserve, is warranted to investigate causal factors.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 207

Job Title: Morbidity/Mortality Investigations for Wildlife Species of Special Concern

Principal Investigator: Driscoll

Job Objective:
1. Conduct appropriate post-mortem tests to diagnose wildlife morbidity and mortality events
2. Conduct pro-active baseline health assessment on species of concern
3. Develop event and baseline health data.

Activities/Findings:
This job was completed during the previous reporting period.

Reasons for deviations (if any):
None

Recommendations:
Funding should be continued. Future efforts should include expanding existing monitoring efforts for species of concern.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 208

Job Title: Assess Genetic Variation and Road Mortality of Box Turtles

Principal Investigator: Therres

Job Objective:
The objective of this study is to compare genetic structure of populations of eastern box turtles occurring in central Maryland habitats fragmented by roads with those in relatively contiguous habitats and to quantify road mortality as a percent of the population.

Activities/Findings:
This job is being conducted under contract with the University of Maryland. A final report, summarizing the results of this study is due to DNR by December 31, 2007.

Reasons for deviations (if any):
None

Recommendations:
None, pending final results of this study.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 209

Job Title: Assist Appalachian Bird Conservation Efforts

Principal Investigator: Brewer

Job Objective:

The mission of the Appalachian Bird Conservation Initiative (AMBCI) is to: provide the quantity and quality of habitat in the Appalachian Mountains necessary to maintain and improve Appalachian bird populations at non-declining levels or increasing levels through a cooperative partnership of private, state, federal, tribal, and non-government land owners and managers.

Activities/Findings:

Staff attended meetings of the AMBCI Steering Committee in Charleston, WV on February 7-8, 2006 and in Shepherdstown, WV on May 31-June 1, 2007. At these meetings, a concept plan, vision, and mission statement were approved and the decision was made to proceed toward the development of and Appalachian Mountains Joint Venture. Bylaws, an implementation plan, funding, and additional partners were also discussed. Technical groups and tasks were refined, and a future workshop in August 2007 was discussed to coincide with completion of technical group tasks.

This job is continuing under federal aid grant T-1-2.

Reasons for deviations (if any):

The regional initiative coordinator resigned in mid-March 2006. An Executive Committee was formed to advise the Steering Committee and to try to secure a new coordinator. A new coordinator started in late February 2007. Support funds were provided later than expected as a result of the vacant position.

Recommendations:

Continue job now that new coordinator is assigned.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 210

Job Title: Repair and Maintain Bat Gates at Caves and Mines

Principal Investigator: Feller

Job Objective:

Repair and provide overdue maintenance to Maryland cave gates on public and private property to protect nongame, rare, threatened and endangered bat species, unique geological features, and provide public safety.

Activities/Findings:

Equipment and materials for gate repair were purchased including a portable electric generator, electric arc welder, mini-oxygen/ acetylene tanks, cutting and brazing torches, 60’ of 2”/4” wide angle iron, and various welding supplies. A status assessment and field review of all Maryland cave/mine gates, including a detailed analysis of needed repairs was completed in 2006. A reevaluation in early 2007 discovered a new breech at Roundtop Mine #2. All caves/mine gates of medium or high conservation value or of human safety concern were successfully repaired. All gates required welding and a total of 20’ of steel was used, leaving a good supply of material for conducting future repairs. Extensive research of equipment prior to purchase contributed greatly to the ease of repairs, highlighted by a generator and welder combination powerful enough to deep weld 3/8” steel, yet weighed only 64 lbs. and 8lbs. respectfully. Ease of portability will also allow for rapid response by small crews in the repair of future breechings, a key aspect in the psychological war against gate vandals. Quick repair response is believed to reduce the frequency of breaching as vandals learn their hard work yields little gain (i.e., short term access).

Populations of bats have steadily increased at every gated mine and cave in Maryland since the day of gate erection. In addition, speleothem destruction and introduction of toxic materials such as batteries and paint have been eliminated or greatly reduced by the controlled access methods used (i.e., where visitor identity is required for key access).

On site training to Natural Heritage Program staff in the art and science of welding was provided by Phillip Mohler, a professional fabricator with the CSX railroad. Other volunteers were indispensable, including various interested individuals, employees and interns from The Nature Conservancy, and members of the Western Maryland Grotto, a chapter of the National Speleological Society.

Reasons for deviations (if any):

Since the ceiling drips that saturate the John Friend cave gate remained active into the summer this year, painting was postponed. A severe drought is needed to dry this area sufficiently to paint and prevent groundwater contamination. Roundtop Mine #1 gate was not secured to the rock wall around the entrance due to lack of stable rock. Vandals had chipped the limestone shale away from the anchor pins leaving only loosely bedded rock available for re-anchoring. Since this mine is very small, not visible from the rail trail, and supports no rare, threatened or endangered species, it is

a very low priority for repair and possibly not worth the substantial effort it would require.

Recommendations:

Provide base funding to support future cave/mine gate maintenance and repair. Occasional supplies, possible rock drill rental, and salary support to a Heritage staff member is all that should be needed to monitor and maintain these invaluable devices.

Table 1. Maryland cave/mine gate status and repair history – 2007.

Cave/Mine	Location	Status	Repairs Needed	Priority	Results
1. John Friend Cave	Sang Run, Garrett Co.	Secure	Paint needed	Low	Too wet to protect
2. Crabtree Cave	Savage River Dam, Ga.Co.	Breached	Weld in two new angle iron sections	High	Breach repaired
3. Roundtop Mine #1	Hancock, Washington Co.	Breached	Anchor gate to rock	Low	Rock integrity insufficient
4. Roundtop Mine #2	Hancock, Wa. Co.	Breached	Extend base over vandal dug trench	High	Breach repaired
5. Roundtop Mine #3	Hancock, Wa. Co.	Breached	Extend base over vandal dug trench	Med	Breach repaired
6. Roundtop Mine #4	Hancock, Wa. Co.	Breached	Weld in two new angle iron sections	High	Breach repaired

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.

In fall 2006, radar sampling was conducted at 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) where abundance of migrating birds was also monitored acoustically. The sites selected offered the best radar coverage from among a list of candidate sites developed by USGS/USFWS project co-investigators and biologists from the MNF, MD Department of Natural Resources, and VA Department of Game and Inland Fisheries. There are no plans to develop wind power at these sites, but wind power projects are proposed on private lands in the vicinity. At the Backbone Mountain site in Maryland, data were collected on 19 nights (August 16-18, August 31-Sept. 3, Sept. 14-17, 26-30, and October 8-11, 2006). On each sampling night, data collection started at sunset and continued until approximately sunrise the following morning.

Two X-band marine radars were used, 1 with antenna mounted in the horizontal plane (surveillance mode) and set to detect targets (birds and/or bats) out to 2.75 km, the other with antenna mounted in the vertical plane to sample the altitudinal distribution of targets up to 1.4 km AGL, encompassing the flight altitudes of most migrating songbirds. Three to 5 data images

were automatically captured and archived every 10 minutes for each hour that the radar was operated.

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. In Maryland, radar data were collected on Backbone Mountain, Garrett County on 19 nights in fall 2006. Preliminary data analyses indicate a very high number of targets over Backbone Mountain (total 94,713, mean 4,985 SE 923) compared to other sites in the fall, with 6,896 and 10,368 targets traveling through the height range of typical industrial wind turbines (0-100m and 100-200 m respectively). Overall, there was a significant inverse correlation between nightly passage intensity and altitude. Season had a significant effect on mean nightly targets detected, with more targets in the fall. More targets in Maryland were detected at higher elevations than the WV and VA sites. Analysis of horizontal radar data suggest that on average, birds/bats fly along tracks that are not associated with the orientation of ridge lines. Flight tracks are likely associated with destination goals of individuals and modifications produced by wind conditions.

As part of the overall study, acoustical detectors were used in fall 2006 and spring 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 at Dan’s Mountain and Piney Run Reservoir in fall 2005, where they were paired with recorders operated by Jo Anna Leachman to assess the comparability of recordings made by different types of microphones; if comparable, Jo Anna’s recordings from 4 additional Maryland sites can be included in analyses of regional migration patterns. In fall 2006, acoustic data were collected at Backbone Mountain and Meadow Mountain. Acoustic data were collected in spring 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 files are being processed and analyzed. First, the night-time segments of the recordings are identified, and then flight calls are detected and extracted, using the XBAT software developed by programmers in the Bioacoustics Research Program, Cornell Laboratory of Ornithology. For each hour of sampling at each site, recorded calls are counted, to document migrant relative abundance within and among nights. When possible, calls are identified to species or species group, by examining call spectrograms and matching them to a reference set.

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

This job is continuing under federal aid grant T-1-2.

Reasons for deviations (if any):

None

Recommendations:

This job should be continued so that data analyses can be completed. Data analyses have been largely completed for spring 2006 data and partially completed for fall 2006 radar data. Analysis of acoustic data is partially

completed. A final report on results of radar data collection is due December 31, 2007.

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.

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 US Fish and Wildlife Service and Environmental Defense to protect and restore bog turtle habitat in Maryland.

Activities/Findings:
This report is for the period March 1, 2007 through June 30, 2007.

1) We provided technical assistance and expertise on 3 potential bog turtle habitat restoration projects in Carroll, Baltimore and Harford counties, all at sites where bog turtles had never been recorded. Only 1 site in Baltimore County was determined to have suitable habitat in need of restoration. It was in a bog turtle-occupied watershed and contained suitable soils and vegetation, but was in need of hydrologic restoration. The U.S. Fish and Wildlife Service (USFWS) and DNR will partner on this project.

2) We attended a bog turtle site restoration ranking meeting with USFWS and Environmental Defense (ED) to further discuss ranking criteria which will be used to help prioritize restoration and management efforts.

3) We attended a field meeting with USFWS to discuss and provide technical assistance on invasive vegetation management at 4 sites in Harford County (HA-410, HA-229, HA-111, HA-373) and 3 sites in Cecil County (CE-151, CE-184, CE-242).

4) We began discussions with the Mid-Atlantic Turtle and Tortoise Society (MATTS) about adopting a site (HA-410) to conduct long-term vegetation management and assist DNR with population monitoring. The landowner was very supportive of this project.

5) We conducted annual population monitoring of bog turtle sites. We conducted 45 surveys at 18 sites and found 108 live and 6 dead bog turtles at 10 sites. All live turtles were weighed, measured, and permanently marked, then released at point of capture. We were assisted by 45 people including 20 individuals from 12 consulting firms (training & being tested for Phase II survey list), 4 staff from USFWS, 1 MD Natural Resource Police officer (training on poaching deterrence, etc.), 1 staff from Delaware Natural Heritage Program (training), and 14 other volunteers (including 2 landowners). Volunteers contributed 591 hours to this project.

6) We began to prepare population tables for long-term monitoring sites, to better summarize population structure and demographics. We completed tables for CA-171 and BA-30. Adult sex ratios at CA-171 were nearly 1:1 (13F:12M), however they were severely skewed (17F:5M) at BA-30.

7) We were interviewed by Carroll County Times for an April story on bog turtle habitat restoration efforts.

8) We provided technical assistance to the Massachusetts Chapter of The Nature Conservancy (TNC) and Massachusetts Fish & Wildlife with bog turtle surveys at TNC's Shenob Brook Preserve and Jug End preserve in southwestern Massachusetts. We also provided technical assistance to the New York Dept. of Environmental Conservation and NY Chapter of TNC with bog turtle surveys near Dover Plains, Duchess County. We set a 1-day NY record of 29 bog turtles captured.

9) We updated Maryland's list of qualified bog turtle surveyors, adding 3 new consultants who had been trained and/or tested by DNR. The list was submitted to our federal and state partners.

10) DNR provided technical assistance (to NRCS) and/or comments on 2 development projects and 1 pond construction project that could potentially impact bog turtle sites; 2 projects were in Harford County and 1 in Baltimore County. We also continued providing technical assistance to SHA with implementation of the bog turtle habitat conservation plan for the Hampstead Bypass.

This job is continuing under federal aid grant T-1-2.

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 and 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:

From July 1, 2006 to January 30, 2007 the Regional Operations staff of the Natural Heritage Program (NHP) provided technical guidance to multiple organizational entities. At the State level, from an internal DNR perspective, NHP staff worked in close coordination with the Department's Regional Interdisciplinary Teams. This ID team setting provided the framework to integrate principles of biodiversity conservation directly into the larger Department's planning exercises. Examples of this type of work for the reporting period include reviewing and providing ecological evaluations of timber harvesting activities (State Forest Annual Planning Processes) and providing recommendations for protection measures associated with trail construction and maintenance on state lands. NHP staff also worked closely with the Maryland Department of the Environment on the development of a statewide wetland monitoring and assessment strategy. An initiative undertaken with guidance from the U.S. Environmental Protection Agency to meet the requirements of Clean Water Act Section 106(e)(1). Time was taken by NHP staff to ensure that resource protection and monitoring considerations for biodiversity conservation were integrated in the creation of the planning framework for this broadly based effort.

Other targeted efforts were undertaken by NHP staff to facilitate proactive coordination with local planning authorities during this period. Specifically, outreach and planning coordination efforts were initiated in 2 local jurisdictions. Close coordination and consultation took place with the Saint Mary's County Government. The specific focal emphasis for this effort was on the State endangered eastern narrow-mouthed toad (Gastrophyrne carolinensis). In accordance with the County's strategic growth plans a number of public school facilities are in the planning stages to be built. This was of interest because it was recognized that the projected growth would take place in areas identified as supporting significant habitat for this species. In order to ensure that adequate avoidance and mitigation measures would be in place during build-out, it was necessary to work directly with the Department of Public Works and the County School Board so that close planning and coordination to take place. During the consultation process site selection issues and inventory gaps were addressed. Specific

protection guidelines for this species were developed as well to facilitate future conservation effort in that particular region.

Efforts to better coordinate with the Charles County Government also took place during this time. Effort was spent meeting and coordinating with the Planning and Zoning Division of this jurisdiction. The focal emphasis was on improving coordination aspects of the environmental review process itself. The overall intent was to increase process efficiencies and conservation effectiveness. This was accomplished principally by formalizing an integrated review framework that fully utilized protection measures found in existing local ordinances.

This job is continuing under federal aid grant T-1-2.

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 will detract from our primary conservation mission.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 214

Job Title: Sentinel Site Sampling for Freshwater Streams

Principal Investigator: Stranko

Job Objective:

Ensure that monitoring at 26 MBSS Sentinel Sites continued during 2007, with 6 new Sentinel Sites (locations determined by Natural Heritage Program) monitored for the first time during 2007. 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.

Activities/Findings:

This job was performed under contract with DNR's Maryland Biological Stream Survey (MBSS). Locations of the 6 additional Sentinel sites have been chosen by Natural Heritage Program. All 32 sites are scheduled for sampling during summer 2007.

This job is continuing under federal aid grant T-1-2.

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 2007, restore Eastern tiger salamander habitat by removing most of the *Sparganium* population, eradicating all woody plants in the basin and on east and south sides of the perimeter, plus half of the west side, and eradicate the highly invasive sedge, rice field bulrush. Monitor for egg mass production before and after woody plant and *Sparganium* management. Consider installation of a water control structure on the east berm.

Activities/Findings:

2006:	January 23	On-site field review of management plan
	March 1	2 egg masses observed on *Sparganium*
	September	Treated all *Sparganium* and Rice field bulrush (*Scirpus mucronatus*) with glyphosate
	October	Hand-pulled most of the *Sparganium* population, concentrating on the deepest part of the basin
		Treated all woody plants in the basin (including oaks) with Garlon 3A (triclopyr) concentrate using the drill-and-syringe method
		Treated all woody plants on east and south sides of the perimeter, plus half of the west side, with Arsenal (imazapyr) concentrate using the drill-and-syringe method
	December	No egg masses yet; water very deep (> 1 m in deepest part of the basin)
2007:	19 March	25 egg masses observed; largest number ever recorded by DNR in recent times

This job is continuing under federal aid grant T-1-2.

Reasons for deviations (if any):

None.

Recommendations:

Because of excellent reproductive success in March 2007, postpone water control structure construction. Continue egg mass monitoring annually. Remove any remaining *Sparganium.*

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 216

Job Title: Restore Endangered Beetle Habitat at Sharptown Dunes

Principal Investigator: Tyndall

Job Objective:

By June 30, 2007, conduct a comprehensive vegetation study on the primary dune which provides habitat for both beetle species and the natural community, establish permanent monitoring plots and photo-points, and conduct baseline endangered beetle surveys.

Activities/Findings:

A comprehensive vegetation study was completed on the primary dune, and sampling plots were marked with re-bar for long-term monitoring. Permanent photo-points were also established with re-bar, and baseline photographs were taken.

Surveys were conducted for both beetle species throughout the site. *Schoenicus puberulus* was not observed, but *Helops cisteloides* was present in ample numbers for recovery. Because of the relatively small number of lichen-rich native oaks, most of the *H. cisteloides* beetles were found feeding on large Virginia pines. Small to medium-size pines have sparse coverages of bark lichens and, therefore, a relatively small number of foraging beetles. Therefore, restoration efforts were initiated by girdling and cutting pines which are shrouding native oaks and cutting saplings and small tree size classes which lacked foraging beetles. In addition, all pines in historically documented *S. puberulus* habitat were girdled or cut and burned.

This job is continuing under federal aid grant T-1-2.

Reasons for deviations (if any):

None.

Recommendations:

In 2008, surveys should be repeated for both beetle species throughout the site. Restoration will continue with the removal of pine seedlings, saplings and small tree size classes on both dunes.

JOB PERFORMANCE REPORT

State: Maryland

Project Title: State Wildlife Grants-Implementation

Job No.: 217

Job Title: Experimentally Reintroduce Northern Pine Snake

Principal Investigator: Smith

Job Objective:

1) Reestablish viable populations of northern pine snakes at Idylwild WMA and Pocomoke SF using an experimental reintroduction technique employed successfully in New Jersey for 20 years (R. Zappalorti, pers. commun.).

2) Test this experimental reintroduction method. If successful this protocol could be used for other species.

3) Educate the public, both local and regional, about the ecological role of pine snakes, the reintroduction effort, and the importance of restoring native biodiversity.

Activities/Findings:

This report covers the period March 1, 2007 to June 30, 2007. This period was occupied by 2 parallel efforts: continued preparation for proceeding with the reintroduction project, while further assessing the public and scientific community's support of the project.

A public meeting was held at Towson University on March 3, 2007 to present the science behind the proposed reintroduction and elicit comments from the general public and local herpetological community, the latter of which attended in great numbers. A number of the attendees had previously sent in written comments opposed to the project. Presentations were given by Robert Zappalorti (Herpetological Associates), Dr. Richard Siegel (TU), Dr. William Grogan (Salisbury Univ.), and Scott Smith (DNR). The latter presentation was titled "Pinesnake survey projects by DNR and partners: the path to reintroduction". Breakout groups were formed after the presentations to get public input on the reintroduction. About 50% of the attendees supported the project, while about 50% were opposed. Those opposed in the herpetological community felt that the evidence for nativity of pinesnakes to Maryland was inconclusive and that what DNR proposed was an "introduction" of a nonnative species.

Based on the result of this meeting and comments received by DNR following it, we decided to send the original reintroduction project proposal with supporting materials to an independent committee composed of scientists with expertise in mid-Atlantic reptile biogeography. This committee was tasked with answering the question as to whether this snake was native to Maryland. The committee included Dr. Rudolph Arndt (Stockton State College, NJ), Dr. Donald Forester (Towson University, MD) and Dr. Joseph Mitchell (formerly of Richmond University). The committee had not made their final findings to DNR during this reporting period.

DNR made a number of visits to New Jersey with Salisbury University (Dr. Grogan), New Jersey Department of Fish & Wildlife (David Golden) and Herpetological Associates, Inc. (HA; Robert Zappalorti et. al) to observe an ongoing project at Stafford Forge WMA in Ocean County which included construction of artificial pinesnake hibernacula, fenced snake enclosures, and captive incubation of pinesnake eggs (the latter at a facility of HA). A detailed photographic record of the chronology of artificial hibernacula

construction was completed, as well as collecting comprehensive instructions on the minutiae of conducting such a project.

Soil samples were collected at all proposed reintroduction sites plus 1 occupied pinesnake site in New Jersey (Stafford Forge WMA, Ocean Co.) and sent to Brookside Laboratories (OH) for analysis (see Tables 1 and 2) and comparison. The single New Jersey sample had a lower pH than all Maryland samples except for one Idylwild WMA sample (03), the lowest % organic matter of all samples (though Pocomoke 03 and Idylwild 02 were close), the lowest % sand content (Pocomoke 04 was close), and the highest percent silt content (again, Pocomoke 04 was closest). An analysis of sand grain particle size (Table 2) found the single New Jersey sample had the highest percentages in all grain size categories except for the 0.25 mm sieve, for which it had the lowest grain size. Thus, the New Jersey samples appear to have a better mix of all sand grain sizes. All samples had their highest frequencies in the 0.25 mm sieve. Taking all soil characteristics into account, the Pocomoke sites appear to most closely resemble the single New Jersey sample. However, drawing any firm conclusions from this analysis is difficult due to the lack of additional New Jersey samples for comparison.

In June 2007 visual observation surveys were conducted in Anne Arundel County, Maryland at Glendenning Preserve (AA Co. parkland) and at sand and gravel mining sites along the west side of Sands Road, all locations in the vicinity of the 2006 pinesnake capture location. Similar surveys were also conducted at Patuxent Wildlife Research Center's North Tract (formerly Ft. Meade). No pinesnakes were observed though some suitable habitat was noted. This included Virginia and Pitch Pine barrens at the Glendenning Preserve and mixed pine-upland hardwood forests adjacent to retired and reclaimed fields and sand pits.

Table 1. Soil Analysis Results

Location	Clay (%)	Silt (%)	Sand (%)	Organic Matter (%)	pH
NJ-STAFFORD 01	3.52	5.94	88.48	0.61	3.9
IDYLWILD 01	3.55	1.74	94.22	2.12	4.3
IDYLWILD 02	3.55	0.84	95.54	0.76	5.0
IDYLWILD 03	3.55	3.22	92.04	5.78	3.9
POCOMOKE 01	3.51	0.93	95.43	1.26	4.2
POCOMOKE 02	3.54	1.42	94.77	1.30	4.9
POCOMOKE 03	3.56	2.24	93.85	0.73	4.6
POCOMOKE 04	4.46	4.13	90.99	2.05	4.9

Table 2. Sand Grain Analysis

Location	2.0 mm Sieve (%)	1.0 mm Sieve (%)	0.5 mm Sieve (%)	0.25 mm Sieve (%)	0.15 mm Sieve (%)	0.106 mm Sieve (%)	0.053 mm Sieve (%)
NJ-STAFFORD 01	2.06	4.22	14.26	40.13	22.85	5.04	1.98
IDYLWILD 01	0.49	1.03	11.69	60.06	18.74	2.19	0.51
IDYLWILD 02	0.07	0.30	9.49	63.20	20.48	1.59	0.48
IDYLWILD 03	1.19	1.96	11.26	55.25	19.93	2.70	0.94
POCOMOKE 01	0.13	0.55	12.64	44.10	22.69	8.73	6.72
POCOMOKE 02	0.27	0.68	15.77	47.45	20.97	5.75	4.15
POCOMOKE 03	0.35	0.93	17.60	44.34	16.63	9.06	5.29
POCOMOKE 04	0.42	1.00	15.83	42.82	15.67	9.35	6.32

Reasons for deviations (if any):

This job has been delayed due to the concerns raised by various segments of the public.

Recommendations:

Before proceeding with the reintroduction, the independent review committee’s recommendations will need to be seriously considered. Additionally, concerns of the various publics should be addressed. Support from the Maryland herpetological community should also be obtained.