

**US Fish and Wildlife Service - US Department of Energy
Interagency Agreement for Activities at Upton Ecological and Research Reserve
Brookhaven National Laboratory**

Fiscal Year 2004 Accomplishments

Fiscal year 2004 was an extremely active and research-intensive period for the Upton Ecological and Research Reserve (UERR). In its fourth year, the UERR program moved beyond the initial stages of establishing projects and collecting baseline data that characterized the program's early years. This year focused on the continuation of several ecological and conservation-based research projects. The program emphasized herpetology and ecological restoration monitoring, and was conducted for the most part by in-house staff, interns, and volunteers. Additional research also continued through funding to research that was conducted by outside university scientists through the funding that was provided to outside scientists using allocations from the UERR budget. Highlights include a renewed and enhanced focus on education (including our undergraduate internship programs, volunteer involvement, and multiple partnering endeavors) as well as our research on the innovative Peconic River restoration project, hognose snake ecology, and a spotted-turtle relocation project. Another area that should be highlighted is the coverage that the aforementioned projects and other program projects received through various media outlets, conference papers and posters, and scientific publications.

ADMINISTRATION:

Biologist Peter Kelly left the UERR program in January 2004 after three years of service. Jeremy Feinberg entered into his second full year as a U.S. Fish & Wildlife Service biologist, and continued his focus on herpetology and Pine Barrens ecosystems.

RESERVE MANAGEMENT:

- Conducted breeding surveys of New York State endangered eastern tiger salamanders. Twenty of 57 ponds surveyed were found to have active breeding populations in 2004, and 24 ponds have been shown to host breeding since 2003. Nine of the wetlands confirmed in 2004 were newly discovered breeding ponds, although each was part of previously known wetland complexes where tiger salamander breeding activity has been previously documented in adjacent ponds.
- Conducted emergence surveys of Eastern Tiger Salamander and other salamander species. The data were used to estimate the total emergence of tiger salamanders from the two ponds.
- Provided oversight, report design input, and expertise for prescribed burn conducted on BNL property.
- Assisted researchers from Hofstra University and SUNY Stony Brook on various projects including research on birds, snapping turtles, and invasive vegetation.

- Provided input to BNL's environmental restoration project for the Peconic River. Comments were provided on road placement, re-vegetation strategies, and project effects on wildlife.

RESEARCH:

In October and November 2003, Requests For Proposals (RFP) were mailed to various higher learning institutions and environmental specialists notifying them of grants available for Pine Barrens-related research. Each RFP was sent to more than 100 addressees. Three projects from outside researchers were selected for funding in 2004 and a number of other projects were conducted in house. In total, five projects were initiated and completed in 2004. Three additional projects were initiated in 2004 but are still in progress. Four projects that were initiated prior to 2004 are still in progress. One project initiated prior to 2004 was completed.

THE FOLLOWING RESEARCH PROJECTS WERE *INITIATED THIS YEAR OR CONTINUED FROM PRIOR YEARS* AND ARE STILL IN PROGRESS:

Design of a research and monitoring plot program for the Central Pine Barrens of Long Island

Michael Batcher, Consulting Ecologist and Environmental Planner, Buskirk, NY

The goal of this project is to develop monitoring protocols for long-term, multi-purpose research plots that will ultimately be established for ecosystem-wide studies of the CPB by scientists and researchers in the future. The plots will be distributed throughout the CPB to represent as much of the ecosystem as possible. Future associated projects will likely include biotic research, soil analyses, nutrient cycling analyses, prescribed fire research, and pollution analyses. There are several primary attributes associated with this project. One is determining appropriate locations, distributions, numbers, and sizing of monitoring plots. Another is to establish standardized research protocols and data collection methodologies that will include statistical protocols, a user's manual, and data sheets. Development of the methodologies will also require testing of protocols as well as an estimate of time requirements. The final element will be the development of a database in which future data will be stored.

Project Start Date: February 2004

Project Duration: 1 year

Radio-telemetry of spotted turtles (*Clemmys guttata*) at Brookhaven National Laboratory

Jeremy Feinberg, U.S Fish & Wildlife Service/Brookhaven National Laboratory (Upton Ecological and Research Reserve)

This 2-3 year study is being used to develop a better understanding of the survival, life history, ecology, and behavior of captive-raised spotted turtles, with a focus on habitat use, home-range size, and movement patterns relative to feeding, nesting, and hibernation activity. The release of 30 juvenile spotted turtles occurred between two BNL locations in an effort to augment an existing but highly depleted native spotted turtle population. The captive-raised turtles, donated by the Cold Spring Harbor Fish Hatchery and Aquarium, came from stock that was acquired several years ago within the Peconic river watershed, and are of very similar geographic and genetic origin. This project was initiated in October 2003, and will continue through the middle of 2005. The only cost for this project was that of the radio transmitters. Total cost for this purchase was \$1,390.10. Final data analysis for 2004 is in progress and a report will be presented upon completion. An intern will be hired to continue this project for BNL through the summer of 2005.

Project Start Date: September 2003

Project Duration: 2 years



Three captive-raised spotted turtles with radio transmitters prior to release at BNL.

Establishment of a database for existing Central Pine Barrens research

Conservation Management Institute, Virginia Tech, Blacksburg, VA

The goal of this project is to compile and consolidate existing historic biotic and ecosystem data regarding the Central Pine Barrens (CPB) of Long Island for use in the creation of a searchable and comprehensive electronic database. The research team was charged with obtaining existing data and research regarding CPB biota (e.g., plants, invertebrates, fish, herpetofauna, avifauna, and mammals) and biotic communities (e.g., wetlands, grasslands, scrublands, forest). The data focuses on species distributions and historic ranges, historic habitat descriptions and information, endangered species, museum collections, and invasive species information. This data was collected from government agencies, non-governmental organizations, and various local and regional research institutions (colleges, universities, museums, botanical gardens, etc.). The research team is using the data to design and develop an electronic database that will meet the needs of future CPB researchers. The prototype database is complete and has been created in Microsoft Access. It has the capability of being searched using fields such as investigator name(s), species, keywords, time of research, publication date, summary of research/results, and journal/source. A comprehensive annotated bibliography of all published investigations within the CPB will also be provided as a reference compendium to the database.

Project Start Date: February 2004

Project Duration: 1 year

Herpetological inventories at Brookhaven National Laboratory

Jeremy Feinberg, U.S Fish & Wildlife Service/Brookhaven National Laboratory (Upton Ecological and Research Reserve)

This 3-year study is being used to develop a better understanding of the diversity, distribution, and abundance of herpetofauna at BNL. Intensive survey and trapping methodologies were implemented to answer these questions. By November 2004, 27 species (5 turtle, 9 snake, 8 frog, 5 salamander) had been confirmed, making BNL one of the most diverse land parcels on Long Island. Highlights from 2004 include the discovery of two species listed as “species likely to occur onsite” in the FY03 Accomplishments Report. These species include the musk turtle (*Sternotherus odoratus*), a rapidly decreasing species in the BNL vicinity of the Peconic River, and the eastern worm snake (*Carphophis amoenus*) an extremely secretive species that looks like an earthworm and lives underground. Future inventory work will continue to target areas where current knowledge is limited, specifically at sites in the eastern and southern sections of the BNL property. Anthropogenically-impacted habitats (flooded roads, ditches, tire ruts, disturbed sandy areas, altered ponds, and disturbed grasslands) continue to support a surprisingly diverse number of amphibian and reptile species, especially for reproduction and feeding during periods of flooding. The possibility of documenting 3 additional species in the future is likely based on anecdotal reports, the diverse habitat types at BNL, and confirmed

populations in neighboring offsite locales. Continued effort will emphasize surveys for these species in 2005. A partnership is being developed between BNL and Longwood High School so that this research can continue through the summer of 2005.

Project Start Date: November 2002

Project Duration: 3 years



A musk turtle found at BNL. This is the first musk turtle found on the BNL property in since the mid 1990s.

Vernal-pool drift-fence monitoring at Brookhaven National Laboratory

Jeremy Feinberg, U.S Fish & Wildlife Service/Brookhaven National Laboratory (Upton Ecological and Research Reserve)

This study is being used to develop a better understanding of salamander breeding within several vernal pools at BNL. In 2003, two pools were monitored using drift-fence arrays. One pool has been anthropogenically impacted whereas the other pool is relatively pristine and natural. In 2004, a third pond was added to the study. This pond was part of the “Meadow Marsh” project designed to remove contaminants and improve habitat quality for tiger salamanders at BNL. Results from 2003 provide estimates of 3,020 state-endangered tiger salamander (*Ambystoma tigrinum*) larvae emerging from the 0.52-acre altered pool, whereas only 142 of these salamanders are estimated to have emerged from the 0.43-acre natural pool, despite the fact that the natural pool had twice as many egg masses as the altered pool. It is believed that competition from a robust population of larval marbled

salamanders (*Ambystoma opacum*), another state-listed species (special concern), reduced the number of tiger salamanders in the natural pool. The 2003 data indicate that an estimated 2,514 larval-marbled salamanders emerged from the natural pool in 2003. Additional species captured at the altered pool include Fowler's toad (*Bufo woodhousii fowlerii*), green frog (*Rana clamitans*), and bullfrog (*Rana catesbeiana*). Additional species captured at the natural pool include green frog, wood frog (*Rana sylvatica*), spadefoot toad (*Scaphiopus holbrookii*), four-toed salamander (*Hemidactylium scutatum*), and red-spotted newt (*Notophthalmus viridescens*). Environmental influences (e.g., precipitation, temperature), and seasonal patterns are currently being analyzed. Data from 2004 is still being analyzed, and Valorie Titus, a PhD student from SUNY Binghamton, will continue this project for several years as part of her doctoral research through BNL.

Project Start Date: June 2003

Project Duration: 3 years

Radio-telemetry of hognose snakes (*Heterodon platyrhinos*) at Brookhaven National Laboratory

Jeremy Feinberg and Kristine Hoffmann, U.S Fish & Wildlife Service/Brookhaven National Laboratory (Upton Ecological and Research Reserve)

This 3-year study has been used to develop a better understanding of hognose snakes (*Heterodon platyrhinos*) and their life history, ecology, and behavior. This research has focused on habitat use, home-range size, and movement patterns relative to feeding, nesting, and hibernation activity. This study continues to provide an understanding of population size for developing long-term management strategies for habitat preservation and enhancement at BNL. Five snakes were monitored in FY03 and 13 snakes were monitored at different points in FY04. Thus far, snakes were most often captured during spring in open scrub areas, areas adjacent to building structures in the RHIC, and edge habitats between forest and grassland areas. In 2003, snakes showed a mid-season preference for heavily vegetated/forested habitats indicating a shift in habitat preference between the early and latter parts of the season. Prior to the onset of winter, the snakes returned to the open habitats where they were first captured in the spring to hibernate by burrowing in the loose sand. In 2004, most of the snakes stayed in the same habitats throughout the duration of the year. We also found several examples of snake predation for the first time. It appears that hawks and mammals (possibly raccoons) killed these snakes. One snake was also killed by vehicular traffic on the east side of BNL. In both years, snakes showed movement patterns characterized by periods of movement interspersed with extended periods of stationary aestivation that lasted from several days to several weeks. While aestivating, snakes buried themselves under leaves, grasses, or debris. Preliminary estimates indicate that snakes moved around defined territories that can be as large as 84 acres, encompass a wide range of habitats including retention basins, scrub lots, ball fields, and landfills. There were 36 different hognose snakes observed at BNL since 2003 and eight additional unconfirmed sightings reported to the researchers by

various lab employees. The only cost for this project was that of the radio transmitters. An intern will be hired to continue this project for BNL through the summer of 2005.

Project Start Date: May 2003

Project Duration: 3 years



An eastern hognose snake at BNL and surgically implanted with a radio transmitter. This snake has assumed a threatening pose to scare off potential predators, but it is completely harmless and non-venomous.

Factors promoting invasion of exotic plant species in forests of the Upton Reserve

Jessica Gurevitch, Department of Ecology & Evolution, SUNY Stony Brook

This study focuses on developing and understanding of the conditions under which native and non-native plants thrive, why invasion by exotic species is more problematic in some ecosystems than in others, and how invasive plants threaten forest health. In April 2002, the researchers established study plots and recorded existing vegetation. They then experimented with forests in and outside the Reserve, by altering light conditions through the creation of forest gaps and modifying soil nutrients by adding nitrogen. In 2003, the research focused on comparative studies of the growth and success of native plants versus invasive plants planted in forested-research plots that were followed throughout the summer. In 2004, the researchers carried out field experiments within and outside of the

Reserve on the effects of herbivory and soil nitrogen in facilitating or suppressing the spread of invaders.

Project Start Date: April 2002

Project Duration: 3 years

THE FOLLOWING RESEARCH PROJECTS HAVE BEEN *INITIATED THIS YEAR OR IN PRIOR YEARS AND COMPLETED:*

White-tailed deer survey for Brookhaven National Laboratory, Wertheim National Wildlife Refuge, and Rocky Point Wilderness Area, Long Island, New York

Susan Bernatas, Vision Air Research, Inc. Boise, ID

The goal of this project was to conduct infrared, aerial surveys for white-tailed deer on three land parcels in the Central Pine Barrens. This information will be used in management decisions and as a means of verifying the more typical, and less accurate surveys that are done by biologists in vehicles on the ground. The surveyed land parcels include BNL, Wertheim National Wildlife Refuge (a property of the U.S. Fish & Wildlife Service), and Rocky Point Wilderness Area (a property of the New York State Department of Environmental Conservation). The total number of deer reported from BNL was 412, while 231 deer were reported from the Wertheim Refuge and 314 from Rocky Point. Analysis of the imagery indicated that the BNL deer herd appeared to be atypically malnourished. This is likely to be the result of overpopulation from the lack of natural predators and/or hunting as well as heavy competition for limited food resources. However, the number of deer reported in this survey was far less than the numbers estimated by ground surveys conducted at both BNL and the Wertheim Refuge.

Project Start Date: February 2004

Project Duration: 1 year



Picture of infrared deer images taken during the aerial survey conducted over the Wertheim National Wildlife Refuge on 28 February 2004.

Seasonal food intake affecting ^{137}Cs levels in white-tailed deer at Brookhaven National Laboratory

Esperanza Florendo and Tim Green, Brookhaven National Laboratory (Upton Ecological and Research Reserve)

This statistical analysis project was conducted during the summer of 2004 using deer samples from road kill on or near BNL, hunter donations, and deer killed on or near U.S. Fish & Wildlife Service properties in Long Island, most specifically the Wertheim National Wildlife Refuge. The samples were obtained between 2000 and 2003. BNL sampling technicians collected and analyzed the samples. “Wet” weight values were used for analyses as these were the values that were likely to be found in consumed meat. The results indicate that ^{137}Cs levels increase significantly between seasons from the first half to the second half of the year. Additional tests also showed that deer found >1 mile from BNL had significantly lower ^{137}Cs levels than deer found < 1 mile from BNL. This may be due to the fact that some deer at BNL are grazing in areas that contained/contain contaminated soil prior their scheduled clean up from 2003 to 2005. Though these areas are fenced in and unavailable to deer, plants surrounding enclosed sites may continue to absorb ^{137}Cs below the cleaned soil. Because of soil contamination within BNL property, deer that consume vegetation growing on or near these contaminated areas would be expected to have higher ^{137}Cs levels. The annual late-season increases in contamination may be due to the fact that deer increase their food intake during the summer months, thus

increasing the likelihood of eating contaminated plants at BNL. Though food intake begins to decrease around October, the biological half-life of ^{137}Cs is approximately 100 days and therefore, ^{137}Cs levels continue to be elevated until the end of the year.

Assessment of vegetation along Peconic River post remediation

Wendy Finn and Tim Green, Brookhaven National Laboratory (Upton Ecological and Research Reserve)

This project was conducted during the summer of 2004 as a means of assessing the status, efficacy, and progress of a contamination cleanup in the Peconic River at Brookhaven National Laboratory. The Peconic River runs through the BNL property and is the focus of a remediation project aimed at eliminating contaminated sediments that were inadvertently created by the past practices of BNL. This project focused on assessing the current status of vegetation restoration efforts that were conducted in April 2002. The methods used in this project included identifying native and invasive plant species, mapping various plant species, and comparing present results with the immediate post-restoration conditions in 2002. The restoration project objective was to obtain 80-85 percent long-term survivability among planted vegetation species. In October 2002, six months after the vegetation restoration project, the project was determined to have achieved a 98 percent survival rate among planted wetland species. However, two years later, in 2004, current survivorship for planted species was calculated at 21 percent. Thus, this project does not appear to have had long-term success. Many of the restored plants appear to be stressed and stifled by reed canary grass, an invasive grass that has invaded the area. There were no preliminary percentages noted for each species planted in the area in April 2002, which makes it difficult to compare data. It was assumed that the project area would have no reed canary grass present after the restoration. However, research from this project suggests that reed canary grass now dominates 79 percent of the “restored” area. It is unclear how this invasive species was introduced into the wetland habitat, but it may require more management than initially anticipated.

Limnological studies of ponds at the Brookhaven National Laboratory

Elisa Bosshart, Ivan Suarez, and Tim Green, Brookhaven National Laboratory (Upton Ecological and Research Reserve)

The Brookhaven National Laboratory is located in a section of the historic oak/chestnut forest region of Long Island's coastal plain. Forest types are typically oak-pine or pine-oak. The goal of this project was to establish baseline water quality information for the ponds at BNL using data collected from wetlands during the summer of 2004, and exploring correlations with data from site vegetation maps. The wetlands surveyed included vernal ponds, coastal plain ponds, recharge-basins, and wetlands. The results of the pond limnology tests indicated certain trends in pH, dissolved carbon dioxide, and total hardness. Influencing factors on these chemical conditions correlate with water infiltration

sources and the flora surrounding and inhabiting the pond locations. Ponds predominately fed by precipitation, within Oak/Pine borders, have pH values ranging from 4.5 to 6.5, carbon dioxide values ≥ 6 ppm, and total hardness values ≤ 16 ppm. Ponds within Oak/Pine borders that tend to be storm/cooling water fed have pH values ranging from 7 to 9, carbon dioxide values ≤ 6 ppm, and total hardness values ≥ 16 ppm. No significant levels of phosphates (≤ 0.01 ppm) were detected in any pond. Low levels of nitrates (≤ 2.2 ppm) were detected at three of the recharge basins. Several factors appear to have influenced these results. Oak leaves, pine needles, and natural precipitation possess acidic properties that result in a lower pH in some of the ponds tested. Decaying organic material increases the amount of carbon dioxide released as a result of the decomposition process and consequently lowers the pH value. The transport of water through concrete or metal conduits and water runoff from roadways may be a source of increased hardness values in man-made ponds or recharge basins. Runoff from roadways has a buffering affect in ponds that receive storm water, resulting in a neutral to basic pH. Daily weather conditions, photoperiods, canopy cover, and atmospheric temperatures influence oxygen concentrations. Low levels of nitrate and phosphate values indicate minimal natural or anthropogenic influences such as pesticide use and municipal waste dumping.

Distribution and species richness of Odonates at Brookhaven National Laboratory

Susan Costa and Tim Green, Brookhaven National Laboratory (Upton Ecological and Research Reserve)

Research conducted during the summer of 2004 was a continuation of the qualitative odonate identification and cataloging research conducted during the summer of 2003. The research for 2004 focused mainly on the adult population of odonates with an emphasis on the species richness (number of species) of these aquatic insects at Brookhaven National Laboratory. The goal was to survey all the ponds at the Lab, catalog, and preserve one male and female of every species found. Part of the research project was also to continue looking for the three species of damselflies on the New York State list of threatened and endangered species. Twenty-eight ponds and the Peconic River were surveyed or resurveyed at the Lab during the summer of 2004. A total of fifteen new species were found at the Lab - nine new damselflies, and six new dragonflies. To date a total of forty-six species have been found at BNL. Tables were created that show the distribution for each species and species richness of each location surveyed at BNL.

Effects of fire on the ericaceous understory and edaphic factors and their role in phosphorus cycling in the pine barrens ecosystem at Upton ecological and research reserve: Implications for Management

Amy Tuininga, Professor, Fordham University

Dr. Tuininga recently completed the fieldwork for her study that investigated the effects of prescribed burning and wildfires on cycling of nutrients between trees and understory

vegetation. However, the data are still being processed in the laboratory and a report of the final results is pending. The primary goals of the study were to determine how phosphorus becomes available following fire, how burning affects its availability, and how management for fire might affect the long-term availability of phosphorus in the ecosystem, ultimately affecting forest health. Other goals included determining the role of the understory vegetation in interacting with overstory plants via mediation by mycorrhizal fungi (which help the roots of understory plants acquire and retain nutrients) following fire. This study began in May 2003 with a prescribed burn on State lands adjacent to BNL. The burn was performed in cooperation with NYS Department of Environmental Conservation, The Nature Conservancy, The U.S. Forest Service, local volunteer fire departments, and NOAA. The wildfire studied was at Rocky Point, which burned April 2004. Plant, soil, and mycorrhizal samples have been collected and processed from both sites and statistical comparisons are underway. All sampling and billing for this project has been completed.

Assessment of the effects of fire on the orange-striped oakworm (*Anisota senatoria*)

Peter Kelly and Manuel Lerdau, Department of Ecology and Evolution, SUNY Stony Brook

This project was interrupted and finished during the first year of its original two-year duration as a result of Peter Kelly's departure from the UERR program. This project was designed to study the controlling effects of fire on the orange-striped oakworm (*Anisota senatoria*), a native forest species that is extremely abundant within the UERR, BNL, and adjacent regions of the Pine Barrens. The study began in May 2003 with a prescribed burn on State lands adjacent to BNL. After the fire, research plots were established to monitor and compare post-burn survivorship of orange-striped oakworms with survivorship among conspecifics from adjacent, non-burned plots, to see to what role, if any, fire plays in reducing populations of this species. Results showed statistically significant decreases in survivorship among oakworm pupae and adults in burned plots versus unburned plots. The original \$12,000 funding allotment for this project was not used and thus returned to the UERR budget.

**THE FOLLOWING RESEARCH PROJECTS WERE COMPLETED *PRIOR TO*
2004:**

Invasive species mapping project at Brookhaven National Laboratory

Peter Kelly and Timothy Walters, U.S Fish & Wildlife Service/Brookhaven National Laboratory (Upton Ecological and Research Reserve)

An invasive-species mapping project was conducted in 2003 to map and document invasive plant species on the BNL property in order to establish baseline information for potential future management and control efforts. This data can also be helpful in

developing a better understanding of the causative agent(s) that allow invasive species to become established in specific areas, rate of spread, and potential vehicle(s) of transmission between areas. The researchers conducted their project using methods developed by the University of Montana, which combined remote sensing with rigorous field observations. The most abundant invasive plant species at BNL were found to be Japanese barberry (*Berberis thunbergii*), multiflora rose (*Rosa multiflora*), Japanese honeysuckle (*Lonicera japonica*), black locust (*Robinia pseudoacacia*), common mullein (*Verbascum thapsus*), and Oriental bittersweet (*Celastrus orbiculatus*). Two additional species of interest include bamboo (*Bambusa* spp.) and kudzu (*Pueraria montana*). Comparison between the 2003 mapping data and historic aerial photographs indicates that anthropogenic habitat disturbance (e.g., roads and trails) might be the primary factor in the establishment of invasive plants at BNL. The mapping data obtained during this project can also be used in the future; by comparing it to future invasive maps, researchers will be able to plot and track the rate at which invasives spread over time.

A Physiological analysis on the effects of early and late season defoliation on oak trees

Richard Wilkens, Professor, Dowling College and Dirk Vanderklein, Professor, Montclair State University

This project was listed as “complete” in the 2003 Accomplishment Report when the fieldwork phase ended. However, the data are still being processed in the laboratory and a report of the final results is still pending. This study was conducted to determine the effects of leaf removal on tree health and longevity. This is an important issue at BNL because large-scale defoliation of oak trees has been documented for the past several years throughout much of the BNL property. The researchers measured photosynthesis, water uptake from soil, and other physiological parameters in oak trees exhibiting different levels of gypsy-moth defoliation in the spring and summer of 2002. Later in the fall, the researchers measured the same trees, some of which had been defoliated again, this time by the orange-striped oakworm. Preliminary results suggest that only severe defoliation has an impact on water relations. Data analysis of nitrogen and carbon-14 levels within leaves is currently in progress and a final report is still pending.

Invasive, exotic non-invasive, and native woody vines of the Northeastern United States, SUNY Stony Brook

Isabel Ashton and Manuel Lerdau, Department of Ecology and Evolution, SUNY Stony Brook

This project was listed as “complete” in the 2003 Accomplishment Report when the fieldwork phase ended. However, the data are still being processed in the laboratory and a report of the final results is still pending. The project investigated the role of physiology and natural enemies (mammalian and insect herbivores) in determining the success of temperate invasive vines at BNL as well as the mechanisms by which imported vine

species become invasive. This study compares invasive and non-invasive vines by looking at differences in leaf longevity, resource usage (light, nutrients, and water), and susceptibility to pests and pathogens. Preliminary analysis of the herbivory data suggests that invasive vines are just as susceptible to damage from herbivores as native vines, but the invasives show a much greater ability to re-grow after damage. Preliminary data also indicate that invasive vines grow significantly faster than native and non-invasive vines, both in the absence of mammalian herbivores and in the presence or absence of insect herbivores. However, when deer are present, invasive vines do not grow faster. This result suggests that high deer populations may be restricting invasive species growth and reducing abundance and thus dampening their impacts on forest communities.

A gypsy moth population study in the Upton Ecological and Research Reserve, Brookhaven National Laboratory, Upton, New York

Longwood High School Science Department, Longwood High School, Middle Island, NY

The gypsy moth (*Lymantria dispar*) is one of the most important defoliating insects in both forested and residential areas in the northeastern United States. Since its introduction into the U.S. near Boston, Massachusetts in the late 1860's, it has expanded its range to include all of the northeastern states, and most of the Mid-Atlantic States. The results from this study indicate that the gypsy moth population at UERR is significant. Many of the oak trees in UERR were observed to have suffered defoliation from the gypsy moth during May and June of 2002, and many of the same trees were defoliated a second time by the orange-striped oakworm later that summer. There is certainly cause for concern because significant tree mortality may occur. An egg mass density threshold of 250 egg-masses per acre has been used elsewhere to justify treatment in both forest and residential areas. The egg mass density in the Upton Reserve was more than double that number. One potential method for controlling this exotic pest is to promote the spread of *Entomophaga maimaiga*, a fungus that prefers cool, damp weather. Future studies should be conducted for the purpose of determining if the population is increasing or declining to aid decisions regarding possible future management efforts. Egg mass surveys may be useful in monitoring the status of this species at BNL. Large numbers of old, non-viable egg masses (> 50%) are indicative of a declining population.

EDUCATION:

Twelve interns worked for the UERR program in 2004. These interns were part of several U.S. Department of Energy and BNL education and internship programs that focused on several key demographic groups including students enrolled in four-year colleges, students enrolled in two-year community colleges, teachers, minority students, and students with disabilities. All students were responsible to work full-time 40-hour weeks during the duration of their internships, assist UERR biologists, conduct independent research, and provide final reports and poster presentations upon completion of the program. Many of these students also returned to BNL during the fall of 2004 to present posters of their research at the annual Pine Barrens Research Forum. In addition to the high quality work

these interns provided, they also allow the UERR program to conduct more in-house research at greatly reduced cost. In addition to the paid interns, the UERR program also provided supervision and training to dozens of volunteers, graduate students, and several university professors working on various BNL projects.

OUTREACH:

- Participated in BNL's "Summer Sunday" event
- Provided consultation on research, discoveries, and important ecological issues to local and regional media sources such as WCBS AM 880, Newsday, and the BNL Bulletin
- Three scientific notes were published in "Herpetological Review"
- Provided tours to local high school science teachers and BNL and DOE employees
- Participated in Heckscher State Park Earth day event
- Presented scientific papers on UERR hognose snake research and tiger salamander research at the New York State Natural History Conference in Albany, New York
- Presented general overview of UERR ecological research to the Brookhaven Executive Roundtable.
- Attended meeting of the Partners in Amphibian and Reptile Conservation and assisted in the development of conservation initiatives and contributed input based on data from UERR research
- Presented the results of several current USFWS/UERR herpetological research at the Ninth Annual Pine Barrens Research Forum at BNL and at the Twenty-Fourth ESRI International User Conference in San Diego, California

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Fiscal Year 2005 Work Plan

Proposed Activity:

Anticipated Completion Date:

Reserve Management:

Program equipment inventory and closeout	4/05
Collect, analyze, and prepare 2003 in-house ecological research data	4/05
Continue drift-fence monitoring throughout amphibian-breeding season	4/05
Continue monitoring radio-telemetered snakes & turtles through hibernation	4/05
Continue hognose snake & spotted turtle radio-tracking projects	4/05
Surveys for undocumented herpetofauna species	4/05
Acquire results from completed UERR-funded research projects	4/05
Provide continued assistance with wildlife surveys (deer, birds, etc.)	As Necessary
Provide support with regional prescribed burn activities	As Necessary
Technical Advisory Group Meetings	03/05

Research:

Provide Professor Gurevitch with necessary work permits and field assistance on their continued invasive vegetation research at BNL. Research plots have been established to compare growth of native and invasive plants. UERR staff will assist with upkeep of experiments.

Assist professor Dale Madison from SUNY Binghamton on wetland buffer research. This project will be initiated by Dr. Madison and a doctoral student, Valorie Titus, and will involve radio tracking tiger salamanders. The goal of this project is to fill a knowledge gap regarding terrestrial habitat use by amphibians. The results from this study can then be used to supplement New York State's habitat conservation efforts and endangered species management practices.

Support and assist remaining projects including work on the Central Pine Barrens research database and establishment of multi-purpose research plots throughout the Central Pine Barrens.

Education/Outreach:

Provided continued consultation to local and regional media sources for reports and feature stories on research, discoveries, and important ecological issues at UERR, BNL and the greater Central Pine Barrens.

Attend scientific and outreach-based meetings and conferences to present slideshows on the UERR program and research projects.

Participate in New York State Parks Earth Day Event by providing information and literature about Upton Reserve.

Participate in the Environmental Services Division (ESD) sponsored Earth Day event at BNL.

Assist with winter “mini-semester” program for undergraduates on tiger salamander genetics.

Provide research opportunities for research at the high school, undergraduate, graduate, and professional levels by providing funding, assistance in developing research projects, and support with technical implementation of projects. Established programs include the Science Undergraduate Laboratory Internship (SULI) program and the Community Summer Science Program (CSSP) for high school students. Additional opportunities exist outside these programs.

Present UERR research at annual Pine Barrens Research Forum. These presentations will be an overview of the research that USFWS/UERR staff and their interns have completed throughout the year at the Upton Reserve.

Staff Training:

Maintain NY State Wildfire and Incident Management Certification. This training allows the Upton Reserve staff to participate in all controlled-burn activities throughout Long Island and to provide Natural Resource advice to BNL’s fire department when wildfires occur. Because of the many different agencies involved, it allows Reserve staff to develop new relations with other local Natural Resource managers.

Attend career development workshops, meetings, and training sessions when appropriate opportunities are available that will enhance staff knowledge of ecological principals, monitoring, and research skills.