Brookhaven National Laboratory

NATURAL RESOURCE MANAGAMENT PLAN

ANNUAL REPORT

CALENDAR YEAR 2003

1.0 Introduction

This document summarizes activities carried out under Brookhaven National Laboratory's (BNL) Natural Resource Management Plan (NRMP) during calendar year 2003. All activities carried out under the NRMP during CY2003 will be discussed. The format will follow past reporting documents for the Wildlife Management Plan (WMP). This report will also facilitate development of summary information for the Site Environmental Report for 2003.

2.0 Comprehensive Natural Resource Management Plan

The Laboratory completed and issued the Comprehensive Natural Resource Management Plan in December 2003. The development of this plan was carried out over several years with the assistance of the Technical Advisory Group (TAG) that was established to provide input to the Natural Resource Program and the Upton Ecological and Research Reserve.

The second full draft of the NRMP was submitted to the TAG late in 2002 with comments requested for early 2003. Comments were address and the Draft NRMP was sent out to affected BNL groups during Fall 2003. With all comments addressed, the Final NRMP was submitted to the DOE in December 2003. This report discusses work related to the WMP and new actions established within the NRMP. The NRMP is a living document that is to change based on the concept of adaptive management. As new information is gained and the understanding of the ecological processes within the Pine Barrens ecosystem in which BNL is situated improves, changes to the NRMP will be made. Incremental changes will be incorporated annually with the completion of the required Annual Report. All incremental changes will be addressed during the 5-year re-write of the Plan.

To facilitate updating and changing actions, each Annual Report is submitted to the TAG for review and comment. Input from the TAG will be accepted and considered for incorporation into the action items list. Currently the Action Item list consists of 57 actions that will be discussed in this Annual Report.

3.0 Progress

3.1 Transition WMP Actions into NRMP

All applicable actions found within the former WMP were incorporated within the NRMP. Since all seventeen actions of the WMP had been implemented the implementation of those actions will continue under the new plan. Entire sections concerning threatened and endangered species were modified appropriately and included within the context of the NRMP.

3.2 Annual Summary Report

An annual summary report as required under the WMP and now the NRMP was written as part of the Internal Assessment program of the Environmental and Waste Management Services Division. The annual report for calendar year 2002 was completed by the March 31, 2003 deadline established in previous reports. The CY 2002 report was also submitted to the TAG for Review.

3.3 TAG Review of Annual Report

The CY2002 report on the WMP was submitted to the TAG for review during its spring meeting with a request for comments and suggestions. The TAG did not have any comments on the report. The current report will be sent to the TAG with a request for comment. Comments on annual reports are to facilitate changes in the program other than those that have been identified over the past year. In addition the TAG review may result in modification of changes suggested by the Natural Resource Manager during the writing of the Annual Report.

3.4 Adaptive Management Cycle

The current report is the first Annual Report in the Adaptive Management Cycle. It is not expected to result in a need for changes. This report discusses both actions from the WMP and new actions being implemented under the NRMP. As actions identified in the NRMP are implemented, monitored, and reported on in the future, the need for change will be identified.

3.5 Improve Decision Making through use of Innovative Tools

The use of global positioning systems (GPS) and geographic information systems (GIS) are an important tool for managing various aspects in Natural Resource Management. Several new or modified layers were added to the GIS during 2003. New layers included soils, bird transects, deer transects, deer density, invasive species, state wetlands, scenic rivers corridor, and trails. The tiger salamander breeding pond map was updated reflecting changes in nomenclature and status that were incorporated during the writing of the NRMP. In addition coverage layers for cultural resources were added to aid in coordinating between the natural resource program and cultural resource program.

The natural resource GIS analyst also developed and presented posters during a GIS fair held in the fall. GIS layers for deer, deer density, and invasive species were presented.

Interns utilize GPS and GIS during the development and reporting on projects. Data are maintained in a centralized location for future access. Projects using the GIS and/or GPS include tiger salamander larval and metamorph surveys, hognose snake radio telemetry surveys, invasive species surveys, and odonate (dragonfly and damselfly) surveys. General location data for reptiles and amphibians is also being entered into the GIS for future reference.

3.6 Maintain and Improve Relationships with Stakeholders

Through the TAG, Community Affairs, and other interactions BNL is maintaining a positive relationship with its stakeholders. The Natural Resource Manager for BNL participates with the Long Island Pine Barrens Joint Policy and Planning Commission (Pine Barrens Commission) committees to share knowledge and experience to assist in the sound management of the Pine Barrens. Working through the TAG several agencies or groups provide input to natural resources issues at BNL. Through presentations to the Citizens Advisory Council and the Brookhaven Executive Roundtable stakeholders are kept updated on plans and initiatives concerning natural resource management and are afforded an opportunity to provide input.

Through the Natural Resource Management Program, BNL has been made accessible for actions by NYSDEC including trapping of wild turkeys to establish new populations in eastern Long Island. Additionally the NYSDEC has conducted banding programs to identify Canada geese breeding at BNL. These actions and access have served to improve the relationship between NYSDEC and BNL.

The Upton Reserve serves to maintain relationships between BNL, DOE, and the U.S. Fish & Wildlife Service through continued cooperation in the management of the Upton Reserve and funded research.

3.7 Peconic River Flow Monitoring

Peconic river flow is measured at several locations including above the outfall (HE) at the Sewage Treatment Plant (STP), at the STP outfall (EA), down river at the East Firebreak (HMn), and near the boundary of the Laboratory (HQ). In addition flows from the central wetlands are monitored before they enter the Peconic River station at the East Firebreak (HMs). Flow data is presented in Figure 1. In 2003 the Peconic River had flows throughout the onsite stretch during most of the year. Cooler temperatures and higher than average precipitation resulted in sufficient groundwater to maintain river flows.

3.8 Water Quality Monitoring

Water quality is monitored as a requirement of BNL's State Pollutant Discharge and Elimination System (SPDES) permit. Water quality is measured at various outfalls including the STP discharge to the Peconic River and at several recharge basins that receive stormwater and/or once through cooling water. Results are reported to the NYSDEC on a monthly basis and summarized in the Site Environmental Report each

year. Sampling in 2003 did not indicate any concerns for threatened or endangered species within basins or the Peconic River.

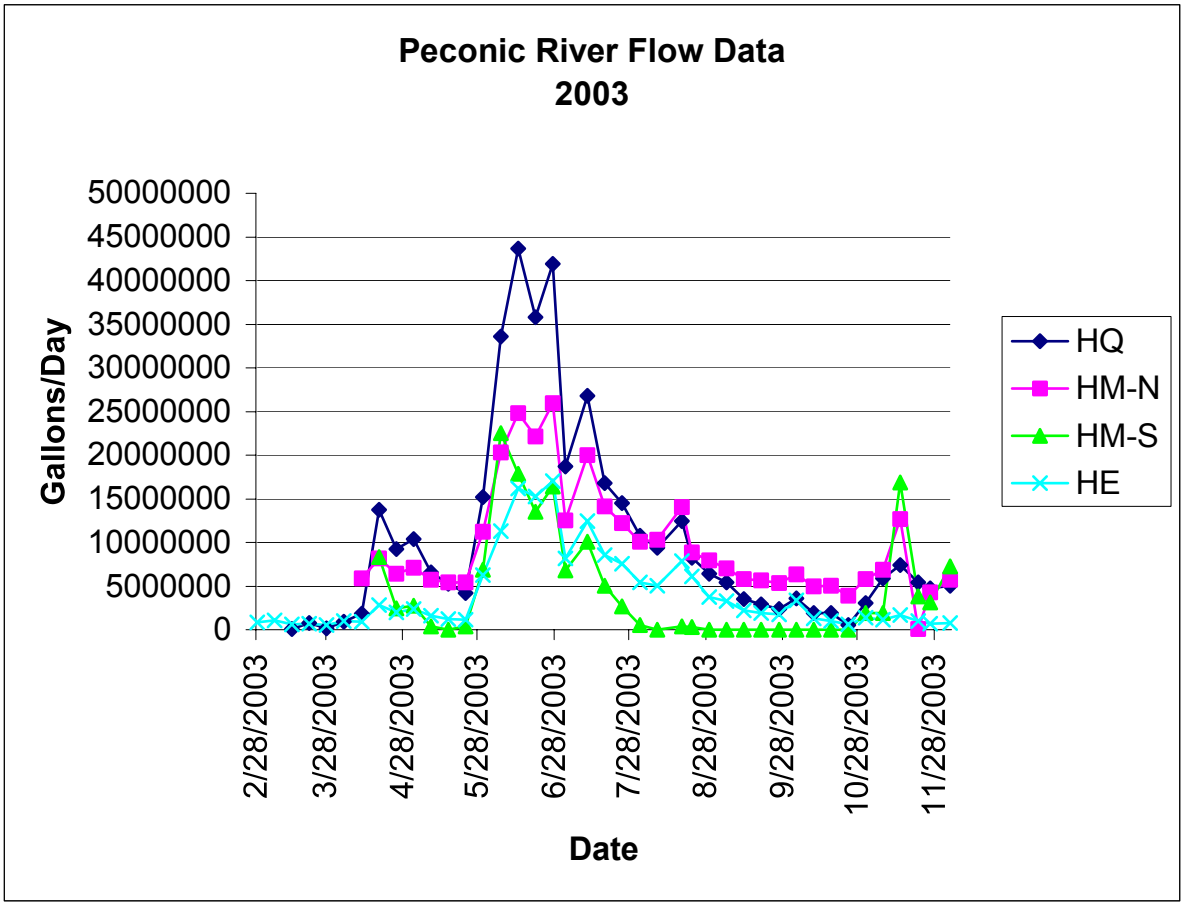

Figure 1. Peconic River flow data for 2003.

3.9 Fish Sampling Peconic River

Fish sampling under the Environmental Monitoring Plan was suspended beginning in 2001 to allow the fish population within the Peconic River to recover. Annual population monitoring has been completed since 2001 to document progress of the recovering population (Table 1). In general the population of the seven species sampled has not increased since destructive sample was stopped in 2001. In addition the average size of each species has decreased (Table 2) indicating that reproduction is occurring, but is limited. The decrease in population and average size is likely due, in part, to the severe drought that occurred during the spring through fall of 2002. Every waterbody on BNL, that is dependent on groundwater, dried up including large sections of the Peconic River. This along with the sediment trap placed just above the gauging station at the east boundary has limited the movement of fish upstream for re-colonization of the onsite stretches of the Peconic River. Because fish populations have not recovered and the clean up of the onsite portions of the river are scheduled for 2004, the moratorium on destructive sampling under the Environmental Monitoring Plan should be maintained for up to three more years.

Interestingly, chain pickerel have been found as far upstream as the wooded wetland next to the Current Landfill located in the east central section of the Lab. This area is connected to the Peconic River via a series of mosquito ditches that were created during WW I and/or WW II. The heavy flows from this area from spring through the fall of 2003 allowed sufficient access for the pickerel to swim up stream. The ponds may need to be treated to remove fish for the protection of the tiger salamander. In addition water control structures at strategic locations may need to be considered to prevent fish from entering tiger salamander habitat.

Table 1. Three year population assessment of Peconic River fish (2001 – 2003).

	Banded Sunfish			Brown Bullhead			Chain Pickerel			Creek Chubsucker		
Peconic River Location	Number of Fish in Each Section											
Year	**2001**	**2002**	**2003**	**2001**	**2002**	**2003**	**2001**	**2002**	**2003**	**2001**	**2002**	**2003**
Downstream of HMn*	4	1	1	7	1	4	7		11	26	1	9
HMn Flume	14						6		9	6		
Upstream of HMn				36	12	2	7	1	2	21	3	2
Total Counted	18	1	1	43	13	6	20	1	22	53	4	11
	Golden Shiner			Largemouth Bass			Pumpkinseed					
Downstream of HMn*		1	5	1			11	19	3			
HMn Flume							2		6			
Upstream of HMn	9	22	3				2	58	29			
Total Counted	9	23	8	1	0	0	15	77	38			
Note: * HMn is the name identifying the monitoring station located at the east firebreak.												

Table 2. Average size of fish sampled from the Peconic River (2001 – 2003)

	Banded Sunfish			Brown Bullhead			Chain Pickerel			Creek Chubsucker		
Peconic River Location	Average Length in Inches											
Year	**2001**	**2002**	**2003**	**2001**	**2002**	**2003**	**2001**	**2002**	**2003**	**2001**	**2002**	**2003**
Downstream of HMn*	2.63	2.13	1.50	4.36	4.00	3.12	6.68		6.93	4.30	2.25	2.23
HMn Flume	2.86						6.54		7.13	4.46		
Upstream of HMn				5.26	6.23	1.50	13.00	7.89	5.57	4.35	2.58	4.63
	Golden Shiner			Largemouth Bass			Pumpkinseed					
Downstream of HMn*		1.25	1.6	5.50			3.59	2.15	4.08			
HMn Flume							3.63		3.46			
Upstream of HMn	4.39	1.82	0.96				5.75	1.60	3.57			
Note: * HMn is the name identifying the monitoring station located at the east firebreak.												

3.10 Deer Management

The need for managing the deer population management continues to be an issue for BNL. Deer population levels, the number of deer – vehicle accidents, and damage to vegetation continued to increase during 2003. Discussions on various deer management issues are provided below.

3.10.1 Issue and Decision Paper on Deer Management

A Draft Issue and Decision paper addressing deer management on BNL property was submitted to Environmental and Waste Management Services Division management for review. The paper recommended establishing a hunting program for BNL and completion of an environmental assessment for deer management in order to determine impacts of deer management as well as selection of a preferred alternative. Cost of deer management for the highest cost alternative is estimated at roughly $250K over a five-year period with continued need for management for the foreseeable future after. The highest cost alternative involves the establishment of a hunting program on the BNL site followed by a culling operation to reduce the deer herd to acceptable levels, with periodic culling in the future as necessary.

The submittal of the Issue and Decision paper to upper management is delayed, to work on the issue of overpopulation on a Regional scale. The white-tailed deer population is high across Suffolk County and deer are beginning to expand their range into Nassau County as well. Addressing deer management on a regional basis is expected to be more beneficial to landowners, and make individual landowner management of deer more effective.

3.10.2 Environmental Assessment for Deer Management

The Environmental Assessment for deer management is dependent on the approval of the issue and decision paper. Once an issue and decision paper is finalized and approved, the EA process will be undertaken.

3.10.3 Implement Deer Management

Implementation of deer management is in part delayed by the need for an Environmental Assessment. However, establishment of deer hunting on site should not require an EA since hunting is an action governed by NYSDEC rules and regulations. Should BNL decide to establish a hunting program, work toward this end could begin almost immediately.

3.10.4 Deer Population Estimation

Deer population estimates were carried out in the spring and fall months of 2003. The population was estimated at ~1,202 deer in May 2003 prior to birthing. By Fall 2003 the population had risen to ~1,784. The 1,784 estimated is close to the previous high population that was estimated during the winter of 2000-2001 that was 1,942. The current estimated population indicates a rapid population growth from ~ 800 during the Fall of 2001 to its current estimate. Figure 2 is provide as a reference for population growth and decline over the past three years.

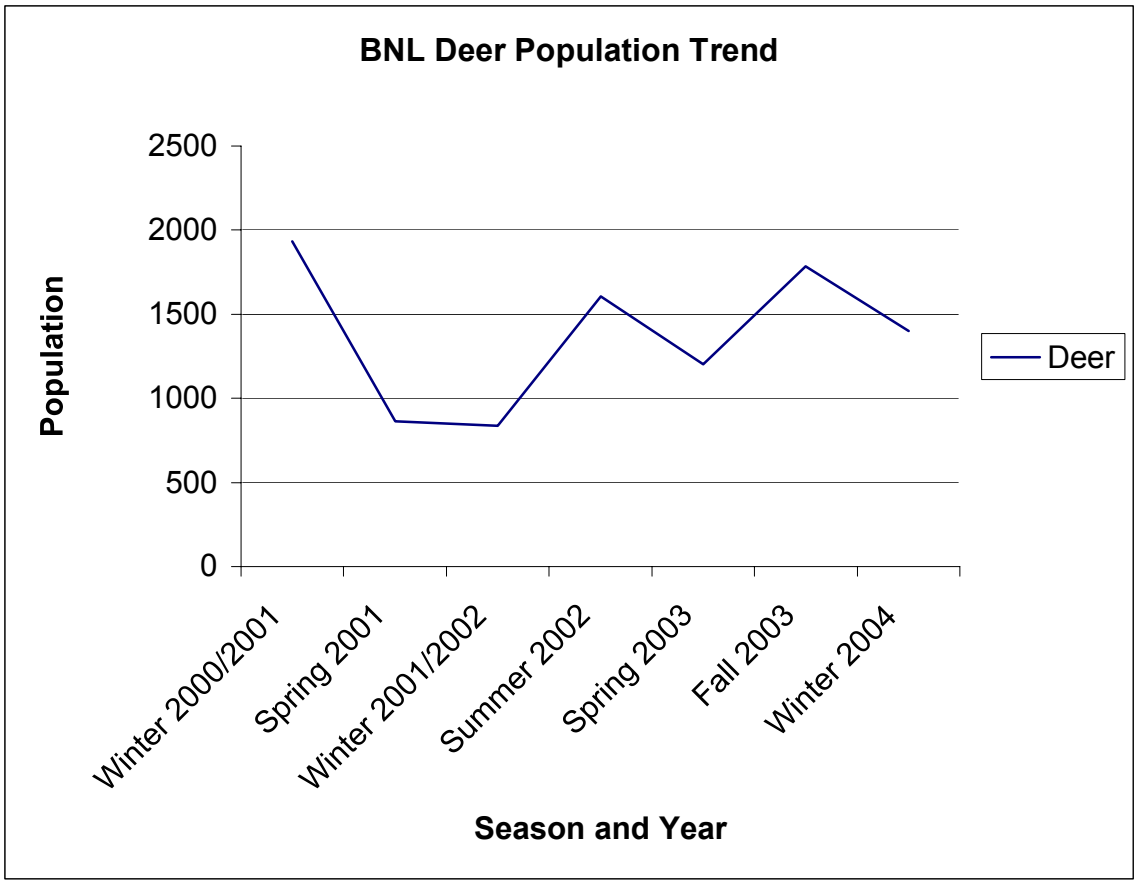

Figure 2. Population fluctuations in white-tailed deer between 2001 and 2004.

3.11 Special Status Species

BNL is home to a number of plants and animals that are considered special status species including the New York State endangered tiger salamander and Persius duskywing, and the state threatened banded sunfish, swamp darter, frosted elfin butterfly and northern harrier (Table 3). Endangered and threatened plants include the crested fringed orchid, stargrass, and stiff goldenrod. There is also a relatively long list of species of special concern, and rare or vulnerable plants. Under the NRMP the Lab is working to identify areas that may be suitable habitat for species on this list.

In addition to the list in Table 3 species like the wild turkey and Canada goose are also of interest due to their noticeability and potential to interact with humans. Information on these species is maintained simply to be aware of potential issues that may arise.

3.11.1 Maintain Special Status Species List

Table 3 is the most recent update of the special status species list. The NYSDEC Natural Heritage program was contacted in October 2003 with a request to provide a list and locations of all natural heritage elements found on BNL. The response was sent on December 29, 2003. Based on the response, the list of special status species was updated. Table 3 contains all species identified onsite since the mid-1980s.

Table 3. New York State Threatened, Endangered, and Species of Special Concern.

Common Name	Scientific Name	State Status
Insects		
Frosted elfin	*Callophrys iris*	T
Mottled duskywing	*Erynnis martialis*	SC
Persius duskywing	*Erynnis persius persius*	E
Fish		
Banded sunfish	*Enniacanthus obesus*	T
Swamp Darter	*Etheostoma fusiforme*	T
Amphibians		
Eastern tiger salamander	*Ambystoma tigrinum tigrinum*	E
Marbled salamander	*Ambystoma opacum*	SC
Eastern spadefoot toad	*Scaphiopus holbrookii*	SC
Reptiles		
Spotted turtle	*Clemmys guttata*	SC
Eastern box turtle	*Terrapene carolina*	SC
Eastern hognose snake	*Heterodon platyrhinos*	SC
Birds (nesting or documented on site)		
Horned lark	*Eremophila alpestris*	SC
Whip-poor-will	*Caprimulgus vociferus*	SC
Vesper sparrow	*Pooecetes gramineus*	SC
Grasshopper sparrow	*Ammodramus savannarum*	SC
Northern harrier	*Circus cyaneus*	T
Cooper's hawk	*Accipiter cooperii*	SC
Plants		
Stargrass	*Aletris farinosa*	T
Butterfly weed	*Asclepias tuberosa*	V
Spotted wintergreen	*Chimaphila maculata*	V
Flowering dogwood	*Cornus florida*	V
Pink lady's slipper	*Cypripedium acaule*	V
Winterberry	*Ilex verticillata*	V
Sheep laurel	*Kalmia angustifolia*	V
Narrow-leafed bush clover	*Lespedeza augustifolia*	R
Ground pine	*Lycopodium obscurum*	V
Bayberry	*Myrica pensylvanica*	V
Cinnamon fern	*Osmunda cinnamomera*	V
Clayton's fern	*Osmunda claytoniana*	V
Royal fern	*Osmunda regalis*	V
Crested fringed orchid	*Plantathera cristata*	E
Swamp azalea	*Rhododendron viscosum*	V
Long-beaked bald-rush	*Rhynchospora scirpoides*	R
Stiff goldenrod	*Solidago rigida*	T
New York fern	*Thelypteris novaboracensis*	V
Marsh fern	*Thelypteris palustris*	V
Virginia chain-fern	*Woodwardia virginica*	V

Notes: Information is based on 6 NYCRR Part 182, 6 NYCRR Part 193, NY Heritage and BNL survey data.
No federally listed threatened or endangered species are known to occur at BNL.
E = endangered, T = threatened, SC = species of special concern, R = rare, T = threatened, SC = species of special concern, R= rare, V = exploitably vulnerable.

Two species last identified in 1919 and 1929 were left off the list but will be looked for and included if found. One the dwarf huckleberry (*Gaylussacia dumosa var. bigeloviana*) was identified southwest of the apartment complex in 1919. The second was the Virginia ground-cherry (*Physalis virginiana*) last seen in the area of the ballfields

in 1929. Both areas have had other disturbances since their report dates and the two species may no longer occur on site.

3.11.2 Identify Habitats of Special Status Species

When special status species are identified as being present on the BNL site, their habitats are also identified. If applicable, surveys for the correct habitat take place with surveys for the species in question occurring within the appropriate habitat. Currently surveys for four species take place at least annually, they are the tiger salamander, banded sunfish, swamp darter, and frosted elfin.

3.11.3 Tiger Salamander

The eastern tiger salamander, a New York endangered species, is locally abundant on the BNL site. This species has been documented using at least 17 of the 27 ponds or pond systems on site. During the development of the NRMP pond designations were modified to lessen the confusion between confirmed (TS) and unconfirmed (ts) habitat.

3.11.3.1 Tiger Salamander Annual Egg Mass Surveys

Annual egg mass surveys were conducted between January and mid-April each year. During 2003 egg mass surveys ponds TS-1, TS-2, TS-5, TS-6, TS-7, TS-9, TS-10, and TS-A7 had egg masses documented. While historically more ponds have egg masses documented, weather conditions were instrumental in limiting access to many of the ponds during egg mass surveys. The late winter/early spring was wetter and cooler than normal. High water levels and rain increase the difficulty for surveying ponds. Simply because egg masses were not found in a known pond does not imply that reproduction did not take place.

3.11.3.2 Tiger Salamander Larval Surveys

Larval surveys are conducted at ponds that have egg mass production during the spring breeding season. Of the ponds listed above larvae were identified at TS-5, TS-6, TS-9, TS-10, and TS-A7. In addition to these ponds larvae were also identified at TS-4 (formerly ts-A4, also known as Zeke's Pond) and TS-W6b.

Zeke's pond nearly dried up during the drought that occurred in 2002. This severe drying resulted in the removal of predatory fish. During reintroduction of banded sunfish in May 2003 several tiger salamander larvae were identified. Repeated trapping during summer 2003 resulted in five additional larvae. In discussions with NYSDEC, it was recommended that Zeke's pond be managed for threatened and endangered species and that banded sunfish, swamp darter, and tiger salamanders could likely co-exist.

3.11.3.3 New Pond at RHIC

A new pond was constructed in the RHIC ring between August and December 2002. Under the wetlands permit for this pond the northern end is to be maintained as tiger salamander habitat. The pond edges were planted with native grasses during the summer

of 2003 and wetland vegetation is supposed to be established in 2004. Larval surveys of this pond during summer 2003 did not identify tiger salamanders. The pond will continue to be surveyed for both egg masses and larvae.

3.11.3.4 Cover Board Surveys on one TS Pond

Cover boards were placed around TS-7 and TS-10 during the summer of 2001 and have been monitored periodically since. There has been limited use of the coverboards. New data from summer research suggest that drift fencing is a more effective method of monitoring emergence. In comparison between the coverboard surveys conducted in 2001 to drift fence surveys in 2003, the drift fences resulted in more captures of new metamorph tiger salamanders than did the coverboards.

It is recommended that cover board surveys be discontinued, but some coverboards may be left as artificial hides around the two ponds where they were used. The coverboards that are removed may be utilized for hides elsewhere on the Lab site for herpetological studies.

3.11.3.5 TS-A7 Lining of pool ER Program

The Environmental Restoration Program initiated the remedial action for the Meadow Marsh (TS-A7 ponds) in 2003. This action resulted in the construction of a single pond in the area of the two lined ponds of the Meadow Marsh project, and the removal of the shallow overland flow structures to the west of the two lined ponds. The new pond was designed to hold water for longer periods of time and at greater depths. The margins of the pond were planted with native sedges and emergent vegetation to serve as egg mass attachment points. The area surrounding the pond and the area to the west of the pond were planted with native grasses. Construction and revegetation of the area was completed in late October 2003. All work conducted to remove the old ponds and install the new pond was conducted under a wetlands equivalency permit issued by NYSDEC. The reconstructed pond and area surrounding the pond is not expected to be heavily used during the first season after construction. The bare conditions will likely prevent adult tiger salamanders from making it to the pond. As the grasses and other vegetation establish, suitable cover will be present allowing migration to occur without disruption.

The pond will be monitored for use by tiger salamanders over the next several years and the success or lack of success will be documented for future actions that may occur elsewhere on Long Island.

3.11.3.6 TS-W6b Pond Remediation ER Program

The TS-W6B Pond is located on the northwest edge of the Former Hazardous Waste Management Facility (FHWMF). The clean up of this facility under the Environmental Restoration Program is an ongoing process. The clean up and restoration of the wetland is expected to occur during CY 2004. The amount of clean up that is required to meet a 67 pCi/g residual of Cesium-137 has reduced the area that is likely to be disturbed. This along with restoration of the disturbed areas will not likely disturb reproduction cycles of the tiger salamander. All work for the restoration effort will be conducted between

August and December to minimize impacts on the tiger salamander and will be carried out under a wetlands equivalency permit issued by the NYSDEC.

3.11.4 Banded Sunfish

The banded sunfish (*Enneacanthus obesus*) is a New York threatened species that inhabits backwater areas of the Peconic River and Zeke's Pond. During fish surveys of the Peconic River during Summer 2003 only one individual banded sunfish was documented. As mentioned above, Zeke's Pond nearly dried up in 2002. A rescue effort at that time resulted in approximately a dozen banded sunfish being saved through seining a small depression in the pond bottom. The fish were maintained in aquariums at Cold Spring Harbor Fish Hatchery and were released to Zeke's pond in May 2003. Mid-summer tiger salamander surveys of Zeke's Pond identified a healthy population of banded sunfish in the pond suggesting that some fish survived the drought conditions.

3.11.4.1 Peconic River Flow Monitoring HMn

As mentioned above in section 3.7 Peconic River flows are recorded at numerous locations including at HMn. Flow is important for the survival of the banded sunfish in the Peconic River system.

3.11.4.2 OU V Peconic River Remediation Program

The Peconic River is scheduled for clean up during CY 2004. Actions in 2003 on this project included surveying, sampling, and analysis of samples. To facilitate the surveying of the river, an access path was cut through the forest near the river. Later in the year this path was converted into a haul road for the clean up action. The development of the haul road was completed through a consultation process with local environmental groups, the Pine Barrens Commission, and the U.S. Fish & Wildlife Service. The road was constructed in such a way as to minimize impacts to the forest and a silt fence was installed along the road to minimize impacts to the river.

3.11.5 Frosted Elfin

The frosted elfin (*Callophrys iridis*) is a small orange-brown butterfly that is dependent on wild lupine. Historically, the frosted elfin was found along the south boundary and LIRR right of way at the south east corner of the Lab. This area is typified by soil disturbance that enhances habitat for wild lupine that in turn provides habitat for the butterfly.

3.11.5.1 Confirm Presence/Absence of Frosted Elfin

The NYSDEC and the NY Heritage program has sent a field biologist to Long Island each of the past two years. The historic area of occurrence has been surveyed each year. In 2002 the area had a healthy population of wild lupine but no evidence of the frosted elfin. In 2003 cooler temperatures in May and June resulted in poor production of flowers in the Lupine. No evidence of the butterfly was seen.

3.11.5.2 Establish Monitoring Protocols for Frosted Elfin

BNL has participated with the NYSDEC and NY Heritage during their surveys, but should develop monitoring protocols for onsite use. A better understanding of the life history of this butterfly is needed in order to establish effective protocols.

3.11.5.3 Maintain and Enhance Habitat for Frosted Elfin

Wild lupine likes disturbed soil areas as is found along the south firebreak at the southeast corner of the Lab. This area was partially scraped during the first few months of 2003 as part of security enhancements along the BNL property line. The effects of scraping will likely benefit the wild lupine in the area. In addition 5 pounds of lupine seed was purchased as part of the revegetation efforts of BNL. Some of the seed was spread along the disturbed areas of the RHIC ring and seeds were spread along bare areas of the east firebreak in an effort to establish broader habitat for the frosted elfin.

3.11.5.4 Habitat assessment for Lupine

Areas that were planted with wild lupine in Spring 2003 were evaluated later in the year. New plants were noticed in several areas of the RHIC ring. However, few if any were seen along the east fire break. Additional assessment of establishment should be conducted in 2004.

3.12 Habitat Enhancement other species

Several species of birds have been targeted for improvements in nesting habitat. These include the eastern blue bird, kestrel, and wood duck. As information is gained on other species of special interest, habitat improvement needs will be identified and implemented as necessary

3.12.1 Bird nests/boxes

Nest boxes are important for many species of birds because of the lack of proper habitat. This is particularly true of birds that utilize cavities for nesting. The eastern bluebird is one of the better know birds for which nest boxes are important. BNL currently has 46 boxes distributed across the site in appropriate habitat (open fields near forested areas). Each year over the past three years at least 19 of the 46 boxes have been used by the eastern bluebird. This amount of usage is above average compared to other areas on Long Island that are being monitored. Due to the success of nest box programs for the eastern bluebird across the state it has been taken off of the NY State list of special concern species. House wrens, tree swallows, chickadees, and tufted titmouse also use the bluebird boxes (Table 4).

Through Eagle Scout projects nest boxes for kestrels and wood ducks have been constructed. Ten kestrel boxes were installed along the east firebreak in 2002, but were positioned too close together. A second project moved the kestrel boxes to a more appropriate spacing along the firebreak. In addition wood duck boxes were constructed late in 2003 for installation during Spring 2004.

Table 4 Results of Bluebird Nest Box Monitoring 2001 - 2003

Summary of Nesting Success							
Year	# of Boxes	Empty/other	Bluebird	House Wren	Tree Swallow	Chickadee	Tufted Titmouse
2001	37	17	19	6	1		
2002	46	19	19	6	6	2	
2003	46	27	21	2	4		2

Monitoring of kestrel and wood duck nest boxes must be initiated. The NYSDEC has indicated some interest in monitoring wood duck boxes once they have been installed. Kestrel boxes should be monitored annually to determine use and nesting success.

3.12.2 Surveys and Monitoring

Conducting surveys and routine monitoring allows BNL to identify, track, and trend population status for a number of species. New surveys for reptiles and amphibians, Odonata (damselflies and dragonflies), and incidental reporting of other species during routine activities results in a better understanding of which species are present. The following discussions will touch on the results of various surveys and monitoring in 2003.

3.12.3 Develop Survey Methodology to document all Biota on BNL

A full set of monitoring and survey protocols are still needed. During meetings of the TAG during Fall 2003, discussions centered on the need for a database of all ecological research available on the Pine Barrens and the development of monitoring protocols for the Pine Barrens. Monitoring protocols developed for the Pine Barrens would be applicable to the Natural Resource Management program at BNL. Toward the end of 2003 a request for proposals for the research database and monitoring protocols was sent to potential contractors.

3.12.3.1 Reptiles and Amphibians

Beginning in January 2003 U.S. Fish & Wildlife personnel managing the Upton Reserve began random surveys of the BNL site with a goal to identify all species of reptiles and amphibians (herpetiles) expected on site. The result of these extensive surveys has increased the total number of herpetiles from 25 to 28 (Table 5). Two additional species the eastern worm snake (*Carphophis amoenus amoenus*) and the smooth green snake (*Opheodrys vernalis*) may also be present onsite, but have not been documented to date.

The northern red-bellied snake was found on site in October 2003 and was reported in Newsday in one of the Long Island "Our Natural World" articles. This report was the first documented report of the northern red-bellied snake on Long Island in forty years.

Other interesting work on reptiles and amphibians included radio telemetry tracking of eastern hognose snakes (*Heterodon platyrhinos*) and initiation of radio telemetry work with spotted turtles (*Clemmys guttata*).

Beginning in May 2003 the FWS began work on tracking the eastern hognose snake on site. The project emerged from the identification of a local population of this once plentiful snake. In 2002 five different sightings of this snake indicated that there was at least a small population still in existence on Long Island. A researcher from Hofstra University that had attempted to find the snake two years previous provided implantable radio transmitters for use by the FWS and BNL. With assistance from Lab employees, five snakes were captured and implanted with the transmitters. The transmitters were implanted by a veterinarian from the Wildlife Conservation Society (Bronx Zoo). The snakes were released at the point of capture, then tracked on a daily basis for several weeks, then weekly until they went into hibernation. Early on in the project, radio contact with two snakes was lost. The loss was likely due to failed transmitters, but predation could not be ruled out. This project will continue in 2004 when the remaining three snakes are recaptured and new transmitters implanted. In addition, up to five new snakes will be implanted with transmitters.

In October 2003 the Cold Spring Fish Hatchery and Museum provided sixteen spotted turtles for release on site. Six of the largest turtles were outfitted with transmitters. All sixteen turtles were shell notched and released. The six turtles with transmitters were followed every few days until they went into hibernation. A weekly radio fix was obtained to determine if there was any movement during the winter. Once the turtles come out of hibernation in 2004 they will be tracked on a routine basis to determine patterns of movement and habitat use.

An undergraduate intern also initiated long-term tracking of box turtles during summer 2003. All eastern box turtles found by interns were shell notched and a database of marked turtles was started. In the future if a turtle is captured it will be inspected for shell notches. If a notch pattern is identified, the turtle's location will be documented in a database. If there is no pattern, the shell will be notched and an initial entry will be made in the database for future tracking. Assistance from Lab employees must be developed to further the success of this program.

Larger snakes like eastern hognose and black racers are injected with a Passively Induced Transponder (PIT) tag. PITs provide a unique identifier and will allow long-term tracking of individuals. Using a specialized tag reader to access the identification number held in the PIT circuitry identifies an individual snake with a PIT. When a PIT carrying snake is identified the information on capture location is recorded. Repeated captures will allow analysis of age and movement over long periods of time.

Table 5. Amphibians and Reptiles documented at BNL.

Amphibians and Reptiles of BNL			
Amphibians	*Scientific Name*	**Reptiles**	*Scientific Name*
Frogs/Toads		**Turtles**	
Spring peeper	*Hyla crucifer*	Eastern box turtle	*Terrapene carolina carolina*
Northern gray treefrog	*Hyla versicolor*	Snapping turtle	*Chelydra serpentina*
Bull frog	*Rana catesbeiana*	Northern painted turtle	*Chrysemys picta picta*
Green frog	*Rana clamitans*	Spotted turtle	*Clemmys guttata*
Pickerel frog	*Rana palustris*	Musk turtle	*Sternotherus odoratus*
Wood frog	*Rana sylvatica*	**Snakes**	
Fowler's toad	*Bufo woodhousei fowleri*	Eastern ribbon snake	*Thamnophis sauritus sauritus*
Eastern spadefoot toad	*Scaphiophus holbrooki*	Eastern hognose snake	*Heterodon platyrhinos*
Salamanders		Northern ring-necked snake	*Diadophis punctatus edwardsi*
Four-toed salamander	*Hemidactylium scutatum*	Brown snake	*Storeria dekayi dekayi*
Redbacked salamander	*Plethodon cinereus*	Northern black racer	*Coluber constrictor constrictor*
Red-spotted newt	*Notophthalmus viridescens*	Northern water snake	*Nerodia sipedon sipedon*
Marbled salamander	*Ambystom opacum*	Eastern garter snake	*Thamnophis sirtalis sirtalis*
Eastern tiger salamander	*Ambystoma tigrinum tigrinum*	Northern red-bellied snake	*Storeria occipitomaculata*
Spotted salamander	*Ambystoma maculatum*	Eastern milk snake	*Lampropeltis triangulum triangulum*

3.12.3.2 Monitor Canada Goose & Wild Turkey Populations

The Canada goose population on site is currently estimated to be between 80 and 120 birds. A standardize protocol must still be developed to make a more accurate estimate. In June 2003 the NYSDEC requested permission to band Canada geese on site. Twenty-one geese were banded. A second attempt to band additional geese was made but was unsuccessful. Banding allows researchers and waterfowl biologists opportunities for information gathering. During future efforts, banded geese will be recorded which allows estimates of age to be made. If a goose is shot by hunters or found dead the information from the band is sent to the FWS where information on banded birds is maintained. Through nationwide efforts the banding information leads to a better understanding of the larger population of geese in the Northeast.

3.12.3.3 Turkey Sighting Reports to NYSDEC

The NYSDEC gathers information on wild turkeys during August each year. In 2003, BNL began sending NYSDEC reporting cards for turkey observations at BNL. This is different from past practices where verbal or e-mail reports of population status were utilized. The new reporting method is followed up with verbal and written communications. A standardized mechanism for estimating the turkey population needs to be developed. The current population estimate of wild turkey went from approximately 175 birds in January and February 2003 to well over 300 birds by September. Sightings of poults (hatchlings) indicated at least two separate broods occurred in 2003. The latest sighting of poults occurred during the first week in September. The age of the poults was estimated to only be a few weeks based on size.

The BNL turkey population is sufficiently large that NYSDEC requested permission to trap birds on site for transfer to the Easthampton area on eastern Long Island. In February and March 2003 several attempts at capturing the birds resulted in four males being transferred. Plans were being made in December 2003 for trapping in 2004. The larger population resulting from successful breeding in 2003 should facilitate improved capture rates.

3.12.3.4 Song Bird Surveys

Songbird surveys have been carried out since May 2000. Initially, five routes were established that went through varying habitats on site. A sixth route (Z-Path) along the eastern boundary of the Lab was added in 2002. Monitoring involves acquisition of ambient weather information at the beginning and end of each route, and counting the number of individuals of each species heard or seen during a five minute period at each point on the route. Points are spaced approximately 300 meters (Fig. 3) apart to prevent overlap of counts from point to point. During the first three years monitoring occurred from March through October each year. After review of the first three year's worth of data the March and October surveys resulted in detection of birds that primarily over winter. Therefore, beginning in 2003 monitoring was shortened to occur only from April through September of each year to monitor breeding birds.

Songbird monitoring, over extended periods, can provide some indication of ecosystem health. Breeding songbirds rely on suitable habitat for nesting and foraging. Declining populations of songbirds may indicate declining forest health. Care must be used when interpreting information as the majority of songbirds are migratory and populations may be affected by conditions in their winter habitat. If declines are seen, then research on wintering habitat conditions must be made to determine which area is having an affect on the population.

The current results of monitoring are provided in Table 6 below. Over the past four years the average number of birds detected on all survey routes is 73 species. In 2003, 79 species of birds were detected. Routes next to wetlands (Peconic River and Biology Field routes) continue to have the highest number of species detected. This is likely due to higher biodiversity in these habitats that support a greater variety of nesting sites and foraging opportunities. Results along the Z-Path route are also beginning to indicate high number of species, likely due to the variability of habitats along this route. The Z-Path route goes through the most diverse habitats, ranging from pine forest, to wetlands, to mixed forest.

Over all, songbird surveys have resulted in the detection of 109 species of birds over the past four years. Most species detected have been breeding songbirds. However several species like herring gulls, double crested cormorants, and other sea birds were detected as they flew over the site.

As data is collected comparisons need to be made with breeding bird surveys (BBS) that have been occurring each year since 1966. Data on these surveys is available from the Patuxent River Research Center in Maryland. Long-term surveys like the BBS have

indicated a decline in most songbird species. The intent of comparing BNL data to BBS data would be to document health of the local bird populations.

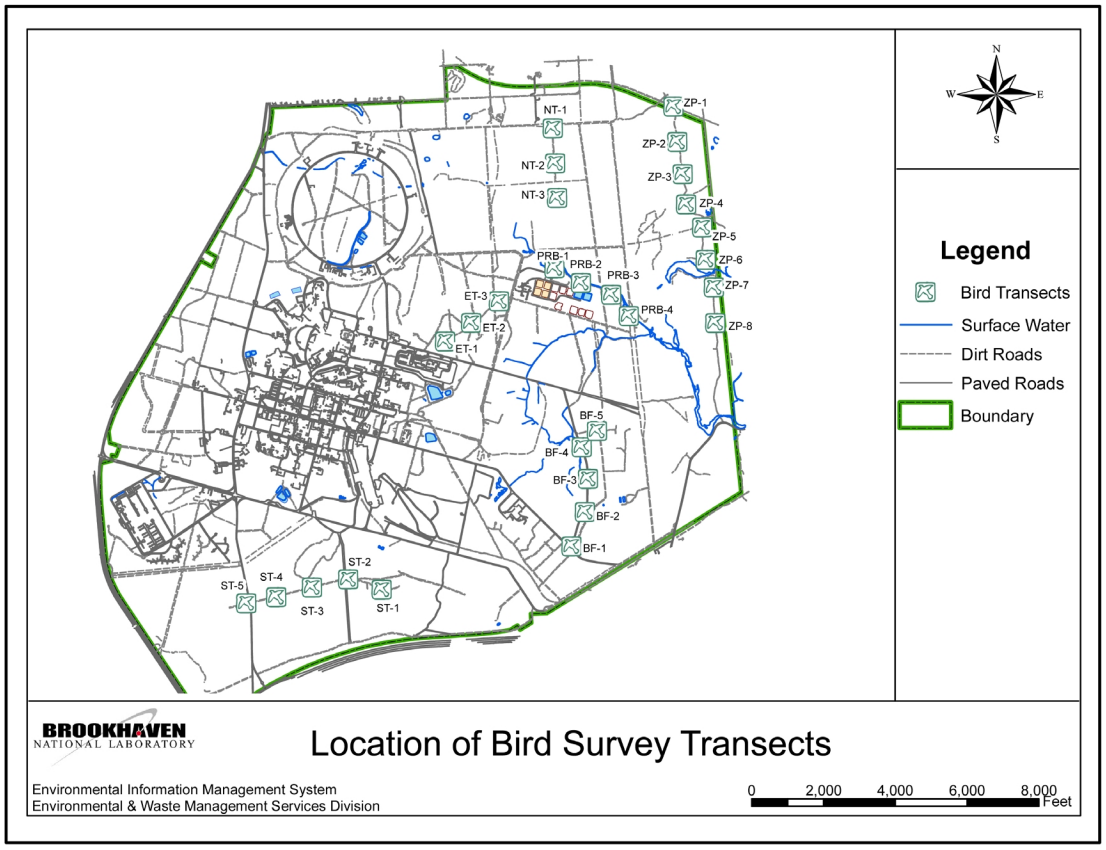

Figure 3. Songbird survey routes.

Table 6. Results of Bird Surveys

Bird Survey Results 2000 - 2003									
Year	# of Species Identified	# New Species Identified	Total # of Species	# of Species Biology Fields	# of Species East Trenches	# of Species North Transect	# of Species Peconic River	# of Species South Transect	# of Species Z-Path
2000	73		73	50	31	23	48	32	
2001	73	20	93	53	32	34	45	39	
2002	73	7	100	54	29	30	46	29	47
2003	79	6	106	49	27	31	47	33	44

3.12.3.5 Odonate Surveys

Surveys of Odonata (dragonflies and damselflies) were started in June 2003. Two undergraduate interns working through the Education Programs Office carried out this work. A total of 22 species of dragonflies and 10 species of damselflies were identified from ten locations on site. Where possible both larval and adult forms were identified. The project was to initially look at only three ponds, but was expanded as the interns

became more proficient at capture and identification. The project is to be continued in 2004 with an expansion to other ponds and locations at BNL.

Odonata being aquatic predatory insects and relatively easy to capture and identify, may be useful indicators of wetland health. Damselflies are highly specific egg layers only laying eggs on or in the tissues of certain plants. In general the more diverse the damselfly population is, the higher the diversity of aquatic plants in a specific wetland. With appropriate training and familiarity with dragonflies and dragonflies a relatively quick assessment of a wetland's health may be made.

Table 7. Dragonfly and damselfly species identified during surveys at BNL.

Dragonflies and Damselflies of BNL				
Family	Common Name	*Scientific Name*	Adult	Larvae
Dragonflies				
Aeshnidae	Shadow Darner	*Aeshna umbrosa*	X	X
	Common Green Darner	*Anax junius*	X	X
	Comet Darner	*Anax longipes*	X	X
	Swamp Darner	*Epiaeschna heros*	X	
Corduliidae	Eastern Pondhawk	*Erythemis simplicicollis*	X	
Gomphidae	Unicorn Clubtail	*Arigomphus villosipes*	X	
Libellulidae	Setwing	*Dythemis sp.*		X
	Blue Corporal	*Libellula deplanta*	X	
	Slaty Skimmer	*Libellula incesta*	X	
	Widow Skimmer	*Libellula luctuosa*	X	
	Common Whitetail	*Libellula lydia*	X	
	Twelve Spotted Skimmer	*Libellula pulchella*	X	
	Painted Skimmer	*Libellua semifasciata*		X
	Blue Dasher	*Pachydiplax longipennis*	X	X
	Wandering Glider	*Pantala flavescens*	X	
	Spot-winged Glider	*Pantala hymenea*		X
	Eastern Amberwing	*Perithemis tenera*	X	
	Williamson's Emerald	*Somatochlora williamsoni*		X
	Cherry-Faced Meadowhawk	*Sympetrum internum*	X	X
	White-faced Meadowhawk	*Sympetrum obtrusum*	X	
	Carolina Saddlebags	*Tramea carolina*	X	
	Black Saddlebags	*Tramea lacerata*	X	
Damselflies				
Calopterygidae	Ebony Jewelwing	*Calopteryx maculata*	X	
Coenagrionidae	Variable Dancer	*Argia fumipennis violacea*	X	
	Northern Bluet	*Enallagma cyathigerum*	X	
	Big Bluet	*Enallagma durum*		X
	Eastern Forktail	*Ischnura verticalis*	X	
	Rambur's Forktail	*Ischnura ramburii*	X	
	Eastern Forktail	*Ischnura verticalis*	X	
Lestidae	Amber-winged Spreadwing	*Lestes eurinus*		X
	Slender Spreadwing	*Lestes rectangularis*	X	
	Lyre-tipped Spreadwing	*Lestes unguicuilatus*	X	X

3.12.4 Population Management

There are currently four species on site whose populations either do or may require management in the near future. These are the white-tailed deer (discussed above), Canada geese, wild turkey, and feral cats.

3.12.4.1 Manage Canada Goose Population

As mentioned above the Canada goose population is currently estimated at between 80 and 120 birds living year round on the BNL site. Should the nuisance situations caused by resident Canada geese increase to an unacceptable level the appropriate permits from NYSDEC and FWS would be obtained. In addition appropriate public dialog would also take place prior to any actions. As stated above better monitoring to give a better population estimate must be developed.

3.12.4.2 Manage Wild Turkey Population

As the wild turkey population continues to grow, the likelihood of nuisance situations and over population may come about. The NYSDEC currently does not allow hunting of wild turkey on Long Island. Should the population reach levels requiring control, special permits and arrangements would need to be made with NYSDEC. As with any population management appropriate public dialog would occur prior to actions. With the turkey population being estimated at around 300 birds, no complaints about them, and no evidence or suggestion of ecological damage, management of the population is not expected for some time. BNL will manage the population, in part, through continued cooperation with NYSDEC to transfer and establish the wild turkey elsewhere on Long Island.

3.12.4.3 Feral Animals

Feral animals are considered to be domestic animals that have been released to the wild and have lost their basic domestication. Examples of typical feral animals are wild and free roaming dogs and cats. Currently, there is no indication of wild and free roaming dogs at BNL. However, there is an estimated 30 – 50 feral cats of which approximately 35 are managed in three cat colonies by an ad hoc group of Laboratory employees, who are working to humanely reduce the population onsite.

3.12.4.3.1 Establish BNL Policy on feral animals

Because feral animals disturb native animals primarily through predation, the Laboratory needs a Policy on maintaining pets on site. Long-term and sometimes short-term residents using the Lab Apartments may have pets. On occasion it is likely that some of these pets were simply abandoned when the residents left the Laboratory. In order to prevent such actions a Policy on having pets, the appropriate care and disposition of these animals needs to be adopted.

3.12.4.3.2 Protocols for monitoring and managing feral cats

A concern of the Natural Resource Management program with regard to the feral cat colonies on site is whether or not they are actually being reduced in size over time. Research in other parts of the country indicates that managed colonies may have significant impact on local wildlife populations and the simple act of managing the colony does not reduce the population. Therefore, a monitoring protocol is currently being developed to identify individual cats in each colony in order to track the population.

Beginning in November 2003 the three cat colonies have been surveyed to begin trying to estimate the actual population. Digital photographs of cats have been taken and markings that will facilitate the identification of individuals are being sought. By the end of 2003 more than 20 cats have been identified based on unique coloration and markings. Several cats appear to be so closely related that individuals cannot be distinguished. Monitoring methods will continue to be investigated for applicability to this problem.

3.13 Vegetation Management

The NRMP provides for managing vegetation at BNL. Three key aspects of vegetation management are addressed: the vegetation within the local ecosystem, use of native vegetation in landscaping and restoration activities, and management of invasive plant species.

3.13.1 Native Vegetation

Native vegetation is considered to be plants (trees, shrubs, grasses, etc.) that are from the Long Island area and not introduced species. Management of native vegetation involves both forest management of the Pine Barrens and management of landscaping, which is carried out primarily by Plant Engineering Grounds Maintenance crews.

3.13.1.1 Establish Protocol for Use of Native Vegetation

Over the past several years BNL has been using native vegetation for various projects. The most work has been carried out at the RHIC ring with lesser amount of work being conducted between restoration work and planting areas left bare after demolition of obsolete buildings. While the NRMP stresses use of native vegetation there is no procedure built into design work requiring use of native vegetation. Development of a protocol must still be developed.

3.13.1.2 Use Native Vegetation on Restoration and new Construction Projects

In 2003 native grasses, shrubs, and trees were used for restoration work completed under the Environmental Restoration program, and on construction projects carried out by Plant Engineering. Restoration program projects included the Ash Pit cover, 650 Sump outfall, and the Meadow Marsh project. Construction projects utilizing native vegetation included building 426 warehouse area that was planted using BNL's standard turf grasses, but also used native shrubs and trees, the demolition of buildings 89, 90, and 91

which were planted with native flowers. In addition planning for the construction of the Functional Center for Nanomaterials included use of native plants in the landscape design.

3.13.1.3 RHIC Revegetation

The RHIC Revegetation project was in its second year during 2003. Pitch pine seedlings planted between 6 O'clock and 8 O'clock positions in 2002 survived the drought and appear to be growing. Grasses planted in all remain bare areas except between 2 and 4 O'clock were growing in 2003. Additional grass seed and wild flower seeds were planted in the bare areas between 2 and 4 O'clock and south of the 10 O'clock area. In addition wild lupine seed was spread in much of the area in an attempt to establish this plant, increasing habitat for rare butterflies. By the end of the summer 2003 grasses were better established than after the 2002 drought. The area and grass establishment will continue to be monitored over the next 3 years of the project.

3.13.1.4 Establish Policy and procedure for cutting trees

A policy and procedure for tree cutting still needs to be developed.

Over the past several years issues related to forest clearing, tree maintenance, and tree cutting have raised concern over how decisions for these actions are made. Currently an informal process is used in which the Assistant Laboratory Director for Facilities and Operations makes a decision based on input from Plant Engineering and the Natural Resource Manager. This process should be formalized with the potential for decisions being made below the Assistant Laboratory Director level.

3.13.2 Invasive Species

Invasive plants and animals have the potential to severely disrupt native ecosystem functions. In order to understand invasive species and manage them on Long Island a number of agencies and land owners joined together in 2002 to create the Long Island Weed Management Area (LIWMA). The group is lead and coordination provided by The Long Island Chapter of The Nature Conservancy. BNL is a participant in this project supporting efforts through implementation of programs at the Lab.

3.13.2.1 Identify and monitor Distribution of Invasive Species

An invasive species mapping project was started in 2003. A summer intern began mapping all invasive plants found at BNL. This project mapped a little over 50% of the land area on site (Figure 4). Most of the invasive species found were located along roads, firebreaks, and trails. This distribution is indicative of transport of species by anthropogenic forces (seeds on vehicles, bicycles, shoes, etc.) The map that was developed is now included in the GIS as a layer for use in planning control and tracking progress of invasive species management. The map will continue to be updated through the volunteer efforts of the BNL Weed Watchers group.

3.13.2.2 Establish Volunteer "Weed Watchers" group

A volunteer group called the BNL Weed Watchers was established in April 2003. This group is an offshoot of the LIWMA Weed Watchers group that identifies invasive species across Long Island. Since BNL has limited access, there was a need for a BNL based group. The BNL Weed Watchers will continue mapping invasive species on site and will eventually assist in some of the control efforts. A web site has been developed to facilitate the mapping and reporting of invasive species at BNL. The page is accessible at http://www.bnl.gov/esd/wildlife/weed_watchers.htm. Activities of the BNL Weed Watchers is managed by a volunteer coordinator who works to get the group appropriate training, assists with reporting, and brings in speakers to keep the group up to date with activities of the LIWMA Weed Watchers.

3.13.2.3 Removal or Control of Invasive Plants

This action must still be planned. Some control and removal of invasive plants will likely happen in 2004. Several areas containing small infestations of highly invasive plants were identified in 2003. The plants in these areas will hopefully be removed.

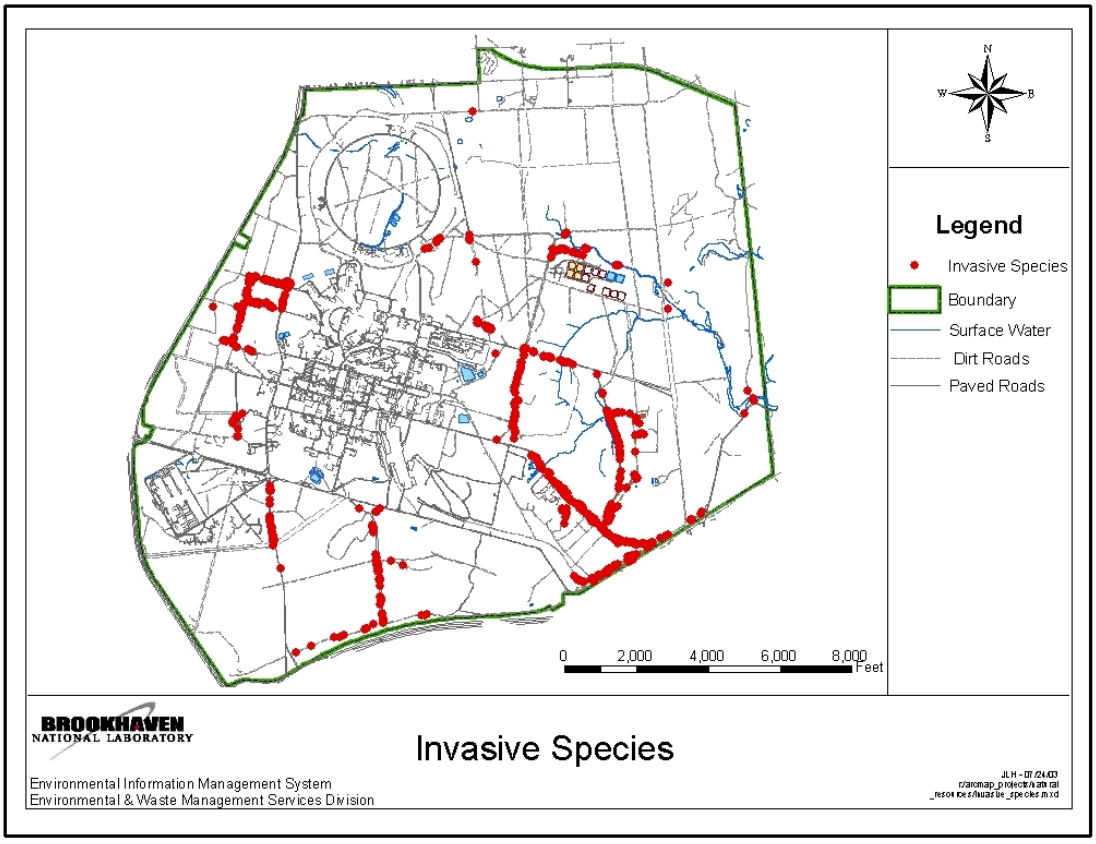

Figure 4. Distribution of invasive plant species on BNL.

3.13.2.4 Identify Funding Sources

One of the major issues for invasive species management is funding. In order to protect weed free areas, weeds that can be controlled need to be removed or controlled. Control often means removal and destruction of invasive plants using mechanical or chemical means. Both mechanisms can be expensive. The Natural Resource Management program is requesting budget increases and looking for other funding mechanisms.

3.14 Ecosystem Monitoring & Management

The Natural Resource Management program must still develop many of the monitoring protocols necessary for gathering information concerning the various habitats at BNL. With proper monitoring protocols decisions for management can be made and evaluation of management actions will allow changes to be made.

Late in 2003 the TAG, working with BNL and FWS, developed a recommendation that a contract for monitoring be put together. A call for proposals was submitted to potential contractors and proposals received. In 2004 it is expected that a contract for developing monitoring protocols for the entire Pine Barrens will be issued and many of these protocols would likely be adopted for use in the Natural Resource Program.

3.14.1 Wetland Health Monitoring

There are over 26 coastal plain ponds, numerous vernal wetlands, large areas of red maple wetlands, and the Peconic River on site. Currently there are no protocols for obtaining standard information for most of these areas. Limited information is available and is collected on tiger salamander habitat, but more needs to be collected and a monitoring routine established so that the health of the BNL wetlands can be determined.

3.14.1.1 Determine Functionality of BNL Central Wetlands

The large central wetlands at BNL are drained by a series of canals installed during WW I and WW II for mosquito control. The affect of this drainage may have resulted in less functional wetlands. Surveys and documentation on forest composition still need to be completed to determine if the wetlands are functioning like similar ones on Long Island.

3.14.1.2 Maintain or improve wetland functions

This action cannot be undertaken until wetland health monitoring and a determination on functionality is completed. Once the previous two actions are completed then plans for management of the wetlands can be made.

3.14.2 Forest Health Monitoring

Forest health monitoring was initiated in 2002 with the establishment of several deer exclosures in the Upton Reserve. These were visited in 2003 and had photo points established in order to track vegetation growth. Repeated entry into the exclosures was thought to cause structural damage to some of the vegetation due to trampling.

Establishment of photo points allows documentation without trampling. Additional locations outside of the Upton Reserve need to be established to have sufficient documentation of all forest types at BNL.

3.14.2.1 Develop Criteria

Forest health criteria other than that developed for the deer exclosures must still be developed. The contract being set up by the Upton Reserve for development of monitoring protocols will result in a set of protocols that can be adopted by BNL for its monitoring purposes.

3.14.2.2 Establish Forest Health Monitoring locations

Monitoring locations cannot be established until the criteria are developed. Once criteria are developed and protocols established then appropriate areas on site will be selected for permanent monitoring.

3.15 Security

Several security issues were identified in the NRMP that need to be addressed. Most notably is the illegal use of ATVs and motorcycles on site, followed by other trespass issues regarding foot, bicycle, and horse traffic. While foot, bicycle, and horse traffic is illegal it generally does not result in significant damage to the ecosystem.

3.15.1 Illegal Use of ATVs

The northern and eastern most areas of the Laboratory including the Upton Reserve are subject to illegal trespass by individuals using ATVs and motorcycles. The historic use of these vehicles has resulted in areas of significant damage to both forest and wetlands.

In 2003, trees removed for the installation of a new rail spur were moved to the north firebreak and installed in areas subject to trespass access. The trees were effective at minimizing access for a short period of time, after which the trespassers developed detours to get around the blocked trails.

Safeguards and Security continue to support “sting” operations by the Suffolk County Parks Police, but these are few and far between. Additional measures and solutions to this problem must be developed.

3.15.2 Other Trespass issues

Control of other trespass issues concerning foot, bicycle, and horse access must be addressed in the future.

3.16 Pesticide Use

Pesticide use on site is currently managed by Plant Engineering and Biology using state requirements for application. The need for an SBMS Subject Area and discussions on appropriate use for natural resource management must still be completed.

3.16.1 SBMS Subject Area

This action, if deemed necessary, must still be initiated. Current practices follow all required regulations. If a subject area is needed, its development must be placed on the SBMS master schedule.

3.16.2 Use in Natural Resource Management

In the future the use of pesticides, primarily herbicides, will be necessary for control of invasive plants. Protocols for use and approvals must be developed.

3.17 Wildland Fire Management

BNL approved the Wildland Fire Management Plan for BNL in September 2003. This stand-alone plan is referenced in the NRMP since wildland fire and prescribed fire may have significant roles in natural resource management.

3.17.1 Implement Wildland Fire Management Plan

With the approval of the Wildland Fire Management Plan, its implementation began through development of a prescribed fire management plan for CY 2004. The draft prescribed fire plan must be approved prior to the implementation of prescribed fire. In addition readiness and coordination for wild fire was documented. Preparedness and planning were in place and routinely practiced prior to formalization in the Wildland Fire Management Plan.

3.17.2 Implement use of prescribed fire

As mentioned above the first prescribed fire plan was written for CY 2004. The first prescribed fire is planned to occur either in the spring or fall of 2004.

3.18 Integration of Cultural Resources

Since BNL is on the site of WW I and WW II Camp Upton and the Depression Era Upton National Forest, several historic features are likely to exist. Work on the Cultural Resource Management Plan (CRMP) has identified some of the potential cultural resources that could be affected by natural resource management actions.

3.18.1 Identify Cultural resources and develop GIS layers

In 2003, several GIS layers concerning cultural resources have been developed including creating maps of both WWI and WWII Camp Upton. The WWI map is particularly

important, as cultural resource surveys have indicated the presence of foundations in several locations onsite. The WWI map layer has been matched up with existing roads and foundations locations are now known. Also included as new layers in the GIS are locations of WWI trenches and 1850s homesteads. As additional work on the CRMP continues, new layers will be developed and referenced prior to making management decisions for natural resources.

3.19 GIS and GPS

The Natural Resource Management program has integrated GIS and GPS into much of its management. GPS is routinely used to obtain location information of species, habitats and most recently the movement of species including eastern hognose snakes and spotted turtles. GPS information is entered into the GIS and new layers developed as necessary.

3.19.1 Develop Natural Resource data layers for GIS

New GIS layers for deer and bird survey routes have been developed. Layers for soils, state and federal jurisdictional wetlands have been obtained. Population density maps for deer have been developed, location of Natural Heritage elements are now within the GIS, and layers for trails, vegetation, and other resources continue to be developed.

3.19.2 Plan Trails and paths that limit impact

The Lab is crisscrossed with deer trails, footpaths, and firebreaks. Many of the deer trails on the eastern edge of the Lab, in the Upton Reserve, are utilized for mountain biking, running, and hiking. Some of the paths are not suitable for some or all of these activities. Some of the trails have been mapped while others still need to be mapped. Once the trails have been mapped and evaluated, a plan for appropriate use must be developed. Mapping of additional trails is planned for CY 2004.

3.19.3 Fill data gaps concerning flora and fauna

Work to fill data gaps concerning flora and fauna found on the BNL site is a continual process. Through the efforts of Upton Reserve staff, interns, and BNL staff documentation for several species has taken place in 2003. Filling data gaps is documented throughout this annual report in earlier sections concerning endangered, threatened, and species of special concern, reptile and amphibian studies, and Odonate studies as examples.

3.20 Education Programs

In 2003, the Natural Resource Management program and the Upton Reserve hosted four undergraduate research interns, and a student volunteer. These students completed work on invasive species, tiger and marbled salamanders, radio telemetry work on hognose snake, turtle inventory, and inventory of Odonate species from selected habitats onsite.

Each student was responsible for their own research as well as assisting each other in the collection of data. Results of the research were presented in a poster session sponsored

the Office of Education Programs, and the research was also presented during a mini-symposium held during the afternoon session of the Pine Barrens Research Forum.

The five students and BNL staff participated in the BNL Science Museum's Summer Camp program. Each week, camp participants met on Thursday at the Weaver Rd. pond to learn about aquatic ecology, reptiles and amphibians, and invasive plants. The lessons introduced students in grades 4 –6 to the above topics, and gave the student interns an opportunity to learn teaching skills.

3.21 Research

Research carried out in 2003 through funding from the Upton Reserve included: Use of prescribed fire on control of the orange-striped oakmoth; Nutrient cycling after prescribed fire; Effects of prescribed fire on myccorhizal assemblages in pine barrens habitats; Invasive woody vines and questions on effects of herbivory; and Factors affecting success invasive plants in the pine barrens. Much of this research is complete and reports or publications are being developed for submittal to the Upton Reserve.

3.21.1 Identify, attract, and support ecological research to BNL

Through the Upton Reserve researchers at Binghamton University contacted BNL to discuss potential tiger salamander research. During December 2003 discussions on the type and scope of research were being planned and a funding source was being sought. It is likely that this research will be initiated in 2004 pending funding.

The Foundation for Ecological Research in the Northeast is also looking into funding mechanisms for research that would largely occur at BNL for the foreseeable future. FERN submitted a grant to the Aid to State Wildlife program for work on determining the biodiversity of the Peconic and Carmans Rivers and revisiting work done on rare moths of the dwarf pine plains. Some of the work for the grant would occur at BNL.

3.22 NRMP Plan Update

Since the NRMP was completed in December 2003 it will not require a complete update until 2008 (five years). However, in the preparation of this report Appendix C of the NRMP was rearranged to facilitate reporting requirements. The modified version of Appendix C is attached. In addition, if new actions are identified they will be appended to the Appendix C Actions table in the future.

This report once completed will be provided to the TAG for review and any suggestions or new actions arising from that review will be incorporated into the Actions table.

APPENDIX C

NATURAL RESOURCE MANAGEMENT PLAN – ACTION ITEMS

Action Item	Site ID	Action	Planned Date	Action Taken
1	*Site-wide	Transition WMP Action into NRMP	December 2003	Complete
2	Site-wide	Annual Summary Report	Annual by March 31	Ongoing
3	Site-wide*	TAG Review of Annual Report	Annual by May	
4	Site-wide*	Adapt Management based on new information	As Required	1st annual report 3/31/04
5	Site-wide*	Improve decision making through use of innovative tools	As Necessary	Implemented 2003
6	Site-wide*	Maintain and Improve relationships with stakeholders	Continual	Ongoing
Peconic River/Basins				
7	Peconic River Station HMn	Monitoring for flow: water quality	Monthly sampling SPDES Program	Ongoing
8	Fish Sampling Peconic River	Fish sampling with NYSDEC/Cold Spring Harbor: population assessment of banded sunfish and swamp darter	Annual Spring/Summer	Ongoing
9	TS-7	Monitoring for water quality	Monthly sampling SPDES Program	Ongoing
Deer Management				
10	*Site-wide	Issue and Discussion Paper on deer management by Natural Resource Manager	Fall 2003	In process, delayed for regional approach
11	*Site-wide	Environmental Assessment under NEPA for deer management		Delayed for regional approach
12	*Site-wide	Implement Deer Management		
13	Site-wide	Deer population estimation	Nov-Jan May-June	Routine estimates made twice a year
Special Status Species				
14	*Site-wide	Maintain Special-status species list	Annual Review	Ongoing
15	*Site-wide	Identify habitats of special-status species	Continual	Ongoing
Tiger Salamander				
16	Site-wide	TS annual egg mass surveys at breeding ponds	Feb-April 2003	Ongoing
17	Site-wide	TS Larval Survey	Annual June-July	Ongoing
18	Education	Provide educational material or opportunities to BNL staff and public on environmental issues	Continual	Ongoing
19	*RHIC	New pond being added at RHIC	Summer 2004	Planting native vegetation to be completed
20	Tiger salamander	Set up cover boards around one breeding site (as a test case)	Summer	Summer 2001 & 2002, completed

APPENDIX C

NATURAL RESOURCE MANAGEMENT PLAN - ACTION ITEMS

(continued)

Action Item	Site ID	Action	Planned Date	Action Taken
21	TS-A7	Lining of pool ER program	Aug 2003	In progress
22	TS-W6b	Pond Remediation ER program	2004-2005	
Banded Sunfish				
23	OU V	Peconic River Remediation Program	Spring 2004	Planning in progress
Frosted Elfin				
24	*Habitat Specific	Confirm presence/absence of Frosted Elfin	May-June Annually	Ongoing
25	*Habitat Specific	Establish standard monitoring protocols for the Frosted Elfin		
26	*Species Specific	Maintain and Enhance habitat for the Frosted Elfin	Continual	Ongoing
27	*Site-wide	Habitat assessment for lupine	Spring 2004	
Habitat Enhancement/ other species				
28	Site-wide	Bird nests/boxes	Ongoing	Routine monitoring and maintenance of bluebird, kestrel, wood duck nest boxes
29	*Site-wide	Develop survey methodology to document all biota on BNL	2004	Contract through Upton Reserve
30	Site-wide	Monitor Canada Goose and Wild Turkey populations	Ongoing	
31	Site-wide	Turkey sighting reports to NYSDEC	Ongoing	Reports sent annually in September
32	Site-wide	Song bird surveys	April – Sept.	Continuing
33	*Site-wide	Odonata Surveys	Summers	Initiated 2003
34	*Site-wide	Reptiles and amphibian Surveys	Ongoing	Reptiles & Amphibians started 2003
Population Management				
35	*Site-wide	Manage Canada Goose population	As necessary	
36	*Site-wide	Manage Wild Turkey population	As necessary	
37	*Site-wide	Establish BNL policy on feral animals		
38	*Site-wide	Establish monitoring and management protocols for feral animals	Fall 2003	Initiated
Vegetation Management				
39	*Site-wide	Establish protocol for use of native vegetation		
40	*Site-wide	Use native vegetation on restorations and new construction landscaping	As necessary and applicable	Initiated 2003
41	RHIC Revegetation	Implement Revegetation	Ongoing	Grasses planted 2002 and 2003

APPENDIX C

NATURAL RESOURCE MANAGEMENT PLAN - ACTION ITEMS

(continued)

Action Item	Site ID	Action	Planned Date	Action Taken
42	*Site-wide	Establish policy and procedure for cutting trees		
Invasive Species				
43	*Site-wide	Identify and monitor distribution of invasive species.	Ongoing	Mapping started Summer 2003
44	*Site-wide	Establish volunteer "Weed Watchers" group	Ongoing	Group formed May 2003
45	*Site-wide	Removal or control of invasive plants where possible.	As necessary	
46	*Site-wide	Identify funding for removal or control of invasive plants where possible.	As necessary	
Ecosystem Monitoring and Management				
47	*Site-wide	Develop criteria to monitor wetland health		
48	*Site-wide	Determine functionality of BNL Central wetlands		
49	*Site-wide	Maintain or improve wetland functions		
50	*Site-wide	Develop criteria to monitor forest health		
51	*Site-wide	Establish forest health monitoring locations		
Security				
52	*Site-wide	Coordinate with Security to reduce illegal use of ATVs	Continual	Ongoing
53	*Site-wide	Other trespass Issues		
Pesticide Use				
54	*Site-wide	Determine need for a SBMS subject area on pesticides	As necessary	
55	*Site-wide	Pesticide use for natural resource management		
Wildland Fire Management				
56	*Site-wide	Implement Fire Management Plan	Sept. 2003	Plan Approved September 2003
57	*Site-wide	Implement use of prescribed fire and mechanical fuel reduction	March 2003	
Cultural Resource Management				
58	*Site-wide	Identify cultural resources and develop into GIS layers	Ongoing	
GIS and GPS				
59	*Site-wide	Develop natural resource data layers of GIS	Ongoing	
60	*Site-wide	Plan trails and paths that limit impact on the environment while introducing employees to forest diversity.		

APPENDIX C

NATURAL RESOURCE MANAGEMENT PLAN - ACTION ITEMS

(continued)

Action Item	Site ID	Action	Planned Date	Action Taken
61	*Site-wide	Fill data gaps concerning all flora and fauna, including the following: terrestrial and aquatic invertebrates, Lepidoptera, wild flowers, and grasses.		
62	Site-wide	Education Programs	Ongoing	Utilize Office of Education Programs Interns, etc.
	Research			
63	Site-wide	Cooperate with Upton Reserve, support and conduct research as needed	Ongoing	Assisting Upton Reserve in coordinating research programs
64	*Site-wide	Identify, attract, and support ecological research at BNL		
65	Site-wide	NRMP Plan Update	Every 5 years	---

Notes: * New initiative

ER – Environmental Restoration
GIS – Geographical Information System
NEPA – National Environmental Policy Act
NYSDEC - New York State Department of Environmental Conservation
NRMP – Natural Resource Management Plan
OU V – Operable Unit V
RHIC - Relativistic Heavy Ion Collider
TS – Tiger Salamander