

WHC 2005



**SITE ASSESSMENT AND
WILDLIFE MANAGEMENT
OPPORTUNITIES REPORT
FOR
EXELON CORPORATION'S
THREE MILE ISLAND
GENERATING STATION**

Report submitted to:

THREE MILE ISLAND GENERATING STATION
EXELON CORPORATION
Londonderry Township, Pennsylvania

Report submitted by:

WILDLIFE HABITAT COUNCIL
8737 Colesville Road, Suite 800
Silver Spring, Maryland 20910 USA
Phone: (301) 588-8994
Fax: (301) 588-4629
E-mail: whc@wildlifehc.org
Internet: www.wildlifehc.org

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*SITE ASSESSMENT AND WILDLIFE MANAGEMENT OPPORTUNITIES FOR EXELON CORPORATION'S THREE MILE
ISLAND GENERATING STATION*

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To assist in the development of a biodiversity assessment and wildlife habitat management plan, representatives from the Three Mile Island Generating Station invited a WHC biologist to visit the site on August 18, 2005. This report, *Site Assessment and Wildlife Management Opportunities for Exelon Corporation's Three Mile Island Generating Station*, was created with information compiled from the site visit, discussions with employees, and independent research. It is intended to present and outline historical and current information pertaining to the ecological communities at the Three Mile Island Generating Station, focusing on a review of critical habitats and species on site, while outlining opportunities for future enhancement recommendations that are designed to augment food, water, cover, and space resources – the four basic components species require from their habitat. The Wildlife Team may choose to implement some or all of these projects and is furthermore encouraged to explore additional habitat enhancement opportunities. Projects suggested for the Three Mile Island Station Wildlife Team members to consider in the future include:

- Identifying and managing any invasive, exotic species on site,
- Enhancing riparian buffer habitats for native wildlife species, especially migratory birds
- Erecting and monitoring nest boxes for cavity nesting avian and mammal species,
- Erecting additional perches on site for nesting osprey, peregrine falcons, and other birds of prey,
- Conducting surveys and necessary enhancements for native amphibian and reptile species that may utilize seasonal wetlands on site,
- Considering establishing native grassland and wildflower meadows just outside the gates, in old field habitats on site,
- Continuing efforts to improve habitat for fish and other aquatic organisms, and including more intensive monitoring and evaluation of efforts to improve the overall health of the Susquehanna River.

The Three Mile Island Generating Station will be eligible to apply for Habitat Program Certification with WHC once habitat enhancements have been implemented and monitored for at least one year. WHC's *Corporate Wildlife Habitat Certification/International Accreditation* program is designed to recognize exceptional corporate wildlife habitat programs and supply third-party credibility for environmental stewardship. As WHC certification review procedures are rigorous, the Three Mile Island Generating Station Wildlife Team is advised to keep textual and photographic documentation of site habitat enhancement projects and public outreach programs in order to increase the site's prospects for certification.

Wildlife habitat enhancement, employee participation, and public outreach are the primary objectives of the *Wildlife at Work* program. WHC is confident that employees at the Three Mile Island Generating Station can achieve these goals through the development of a wildlife habitat management plan and the implementation of the proposed enhancement projects.

The staff of the Wildlife Habitat Council commends employees at the Three Mile Island Generating Station for their demonstrated commitment to protecting biodiversity and improving site wildlife habitat through the implementation of a team-designed wildlife management plan and anticipates the formation of a sustained association with site participants. Please contact Sue Wolinsky or WHC staff with inquiries regarding the wildlife

1. OVERVIEW

WHC requires a site visit by a staff wildlife biologist prior to recommending a habitat management plan. The purpose of the site visit is to accurately assess the current habitat conditions of the site and to subsequently determine which habitat enhancement projects would be most appropriate for these particular conditions in accordance with management objectives. Therefore, it is standard procedure during the site visit that the visiting WHC biologist meets with company personnel to ascertain the objectives of the site's wildlife program and to present initial habitat enhancement opportunities. This overview contains the proceedings of the site visit, as well as a detailed site description and review of local area history. **Figure 1** provides a black and white aerial photograph of the island, which clearly outlines the facilities and development at Three Mile Island.

FIGURE 1. OVERVIEW OF THREE MILE ISLAND GENERATING STATION



Photo courtesy of USGS.

based events, including the Middletown Music Festival, Conoy Township Youth Athletic Association, Children's Miracle Network, Hershey Girls Softball, several area fire companies and emergency services departments, and the American Red Cross.

The plant's has two reactors, one that is not owned by Exelon Corporation, the infamous Unit 2, which suffered a partial meltdown in 1979, and the reactor that is owned by Exelon Corporation, Unit 1. Exelon Corporation owns all of the land surrounding the Unit 2 reactor, as well as some adjacent island property, although the exact acreage of ownership was not precisely known during the time of the visit. Unit 1 lies just north of Unit 2, which is non-operational. The Nuclear license for Unit 2 is held by the General Public Utilities Corporation, which is owned by First Energy Nuclear Company.

The site tour started just outside the cafeteria and office complex area, where the group viewed a basin that is used for dredge storage. The basin holds spoil that is removed from the intake canal, which is dredged every two to three years. The group then passed the intake structure, which is on the west side of the island. In addition, the group viewed old equipment storage areas, an administration building and an area near the gate that is the construction site of a new security checkpoint. The perimeter of the facility property is fenced, and the group's main focus was to view the undeveloped portions of the island, which are at the southern end of the site, outside of the fenced perimeter. The central portion of the island, where some operational facilities are located, is slightly above the site's ten-year floodplain, however, a majority of the southern portion of the island, where the undeveloped portions of the site are, are within the zone that would be inundated during a ten year storm event. Water levels surrounding the site, and within the island's wetlands, vary seasonally.

Outside of the gates, areas consisted mainly of open field habitat with foxtail grasses, which are bordered by tree and shrub bufferlands. Species noted in the area included blackberry, basswood, sycamore, sweetgum and locust trees. Another spoils area is adjacent to this open field and wooded buffer portion of the property. The group advanced on foot through this area, taking note of borrow pits, a wet meadow, and tree and shrub habitats, by way of an old road. The area receives little landscaping and/or regular maintenance, although roads are maintained and used

continued along gravel roads and on perimeter roads, all of which featured a combination of old field habitat, which has been left to the processes of natural succession, and woodland buffer areas that feature a diversity of trees and shrubs. There is a fish ladder monitoring facility behind a fence on one side of the island, which is typically staffed by state employees during the spawning season. The group also reviewed an old landfill that currently serves as meadow habitat and lies adjacent to the operating towers. Following a tour of the habitats on site and an outside view of the reactors and towers, the group met with a Pennsylvania Department of the Environment employee in front of the site, where he regularly monitors the activity of nesting osprey and/or peregrine falcons. After a quick view of the nesting spot on top of the tower, which can be seen in **Photo 2**, the group concluded the site tour and assessment meeting.

PHOTO 2. OSPREY NEST ON TOWER AT THREE MILE ISLAND

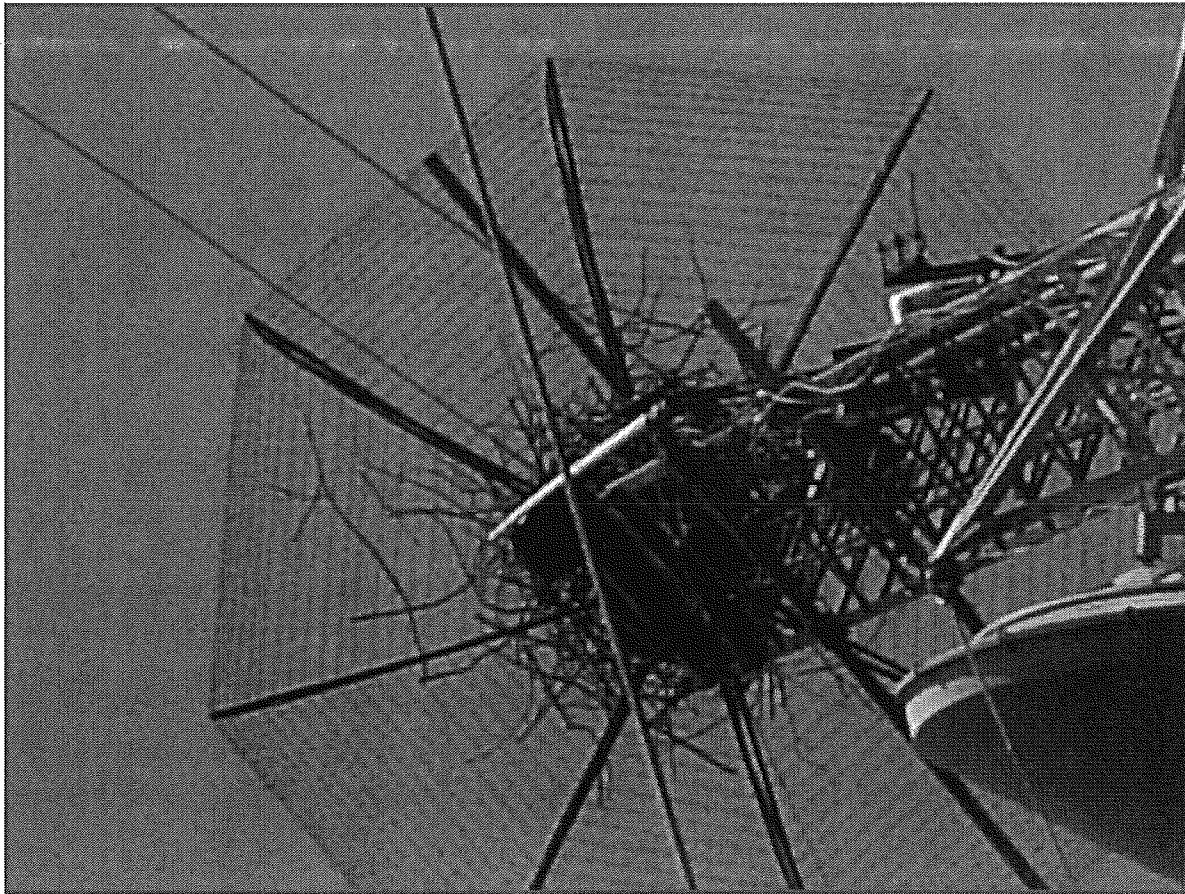
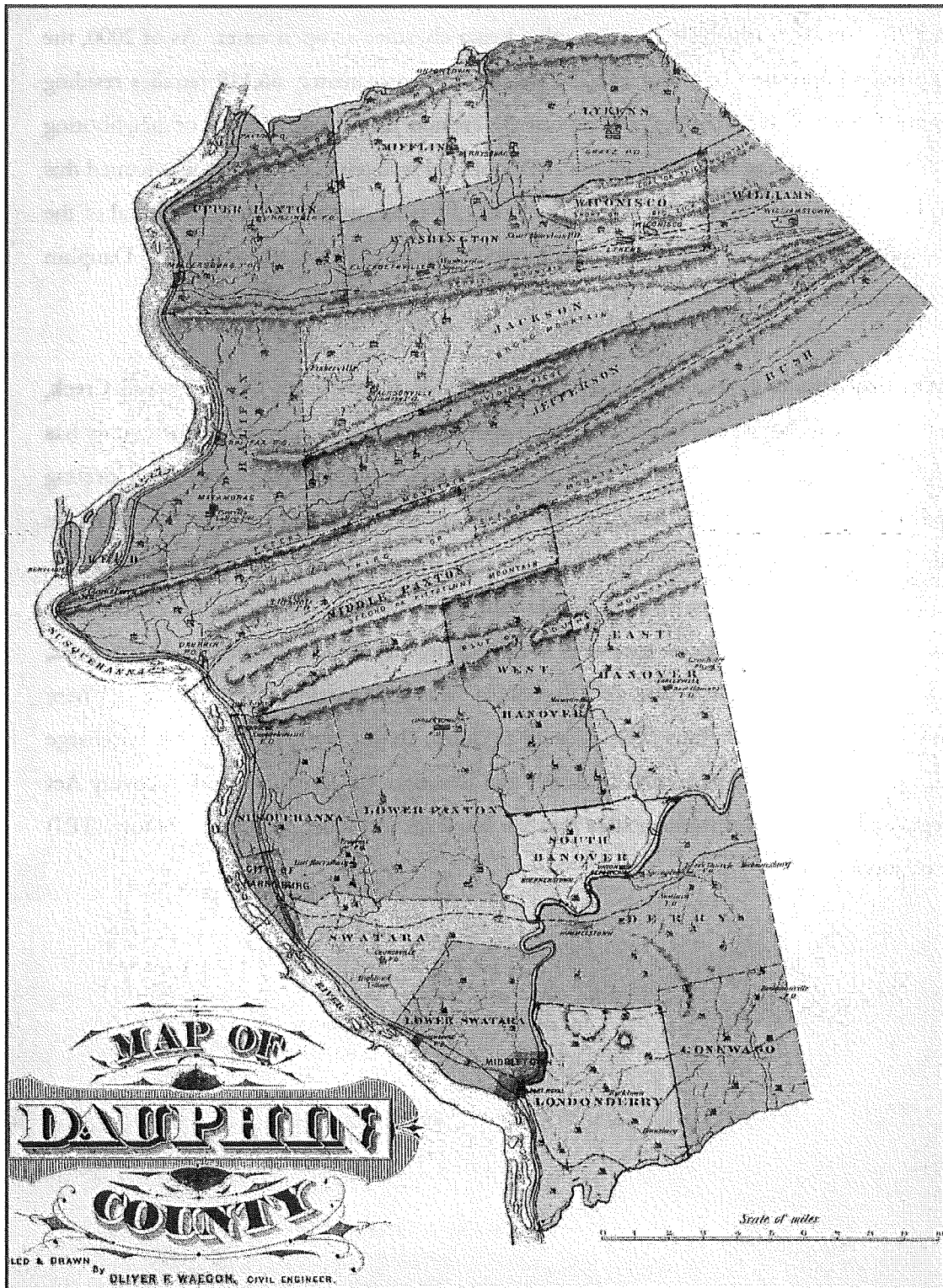


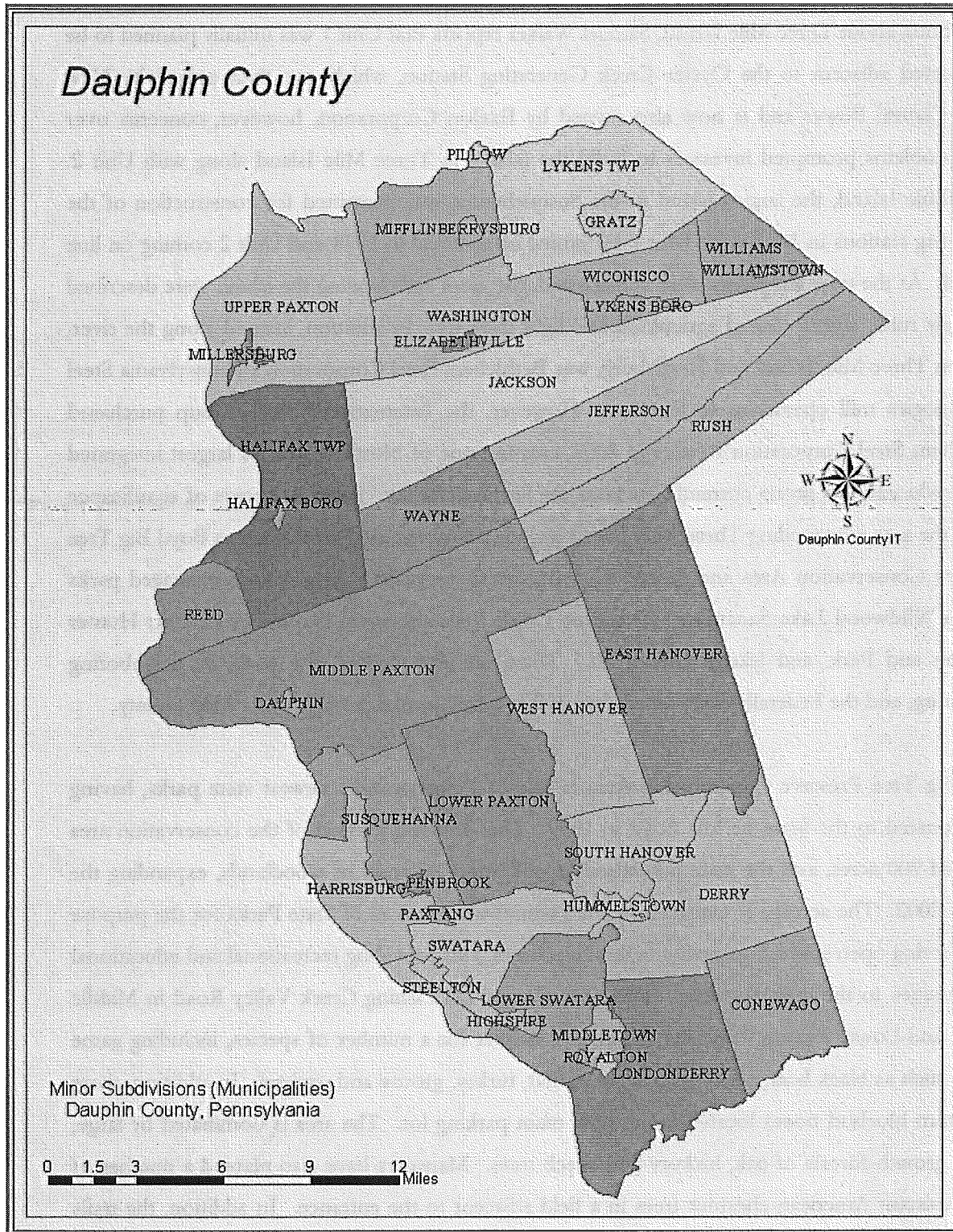
Photo courtesy of Sue Wolinsky, WHC Wildlife Biologist/Certification Program Manager.

FIGURE 2. HISTORICAL MAP OF TOWNSHIPS WITHIN DAUPHIN COUNTY, PA



Map courtesy of USGS.

FIGURE 3. CURRENT MAP OF DAUPHIN COUNTY, DELINEATING TOWNSHIPS



Map courtesy of USGS.

between October and December in this area. This conservation area also features over ten miles of trails, and an active environmental education and interpretation program.

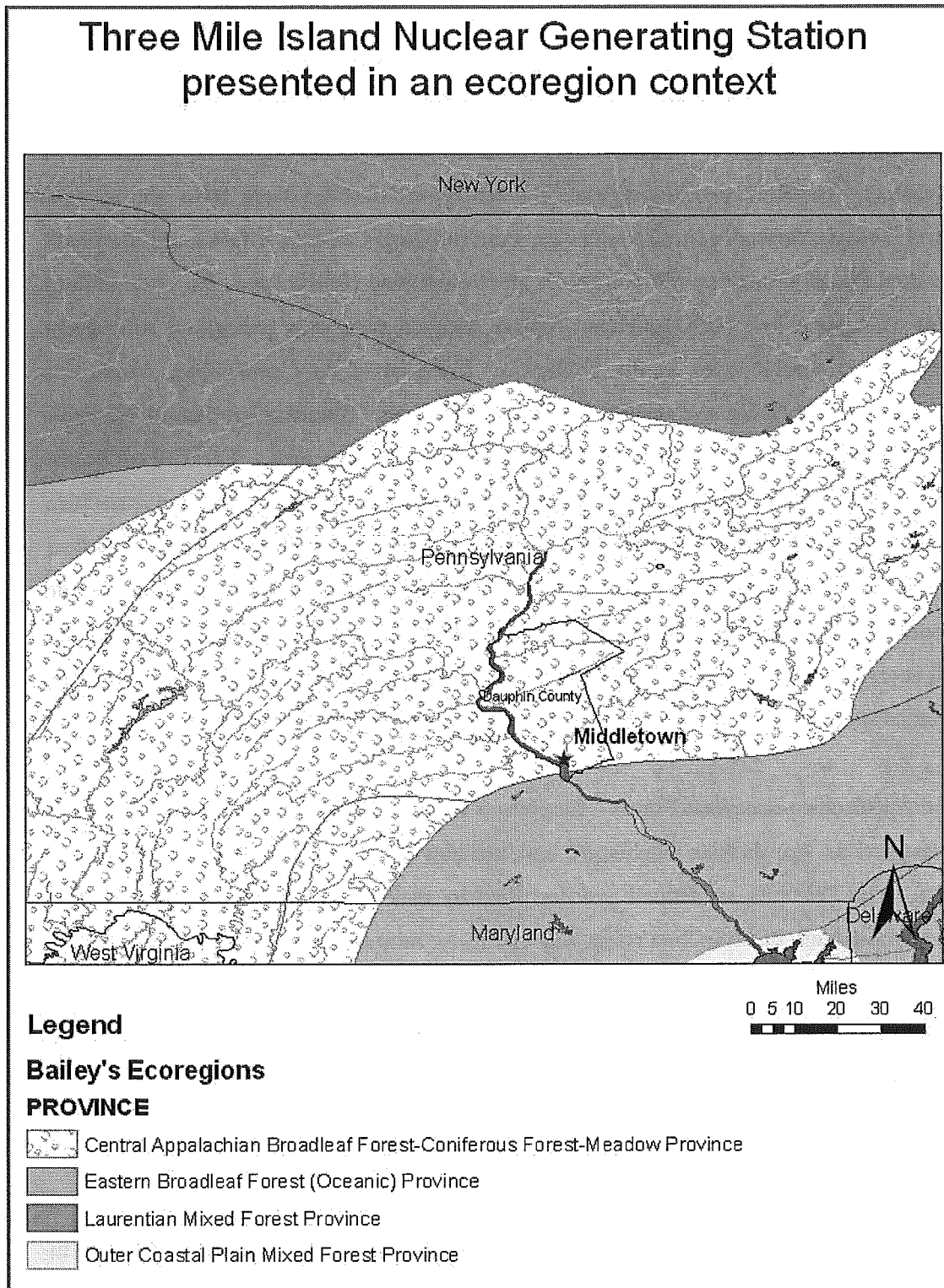
The Joseph E. Ibberson Conservation Area, the other local state-managed conservation area near Three Mile Island, consists of approximately 350 acres on Peters Mountain, near Matamoras, Pennsylvania. This conservation area was donated to the state in 1962, creating the state's first conservation area in the Pennsylvania Bureau of State Parks. This conservation area consists of hardwood forests that remain largely unfragmented, providing critical habitat for a variety of forest-dependant and associated species. In addition, this conservation area, like most in Pennsylvania, is open to hunting, and provides ideal habitat for a variety of game species. Trails in this park link to the section of the Appalachian Trail that runs through the county. Common species in the park, as reported by the PA Department of Conservation and Natural Resources (DCNR), include red, black and scarlet oaks, white and Virginia pine, tuliptree, eastern hemlock, basswood, black walnut, black locust, wild cherry, sassafras, beech and birch trees. This conservation area also features a wide variety of environmental education opportunities and interpretive programs.

PHOTO 3. YOUNG SASSAFRAS, A COMMON TREE IN PA FORESTS



Photo courtesy of Sue Wolinsky, WHC Wildlife Biologist/Certification Program Manager.

FIGURE 4. MAP DEPICTING RANGE OF ECOREGION AT THE THREE MILE ISLAND



Map courtesy of Josiane Bonneau, WHC Wildlife Biologist.

tuliptree, hemlock, pines, and basswood. American chestnuts, decimated by blight from an introduced fungus, were also common in this region. In addition, spruce-fir forests and meadows are on the high peaks of the Allegheny and Great Smokey Mountains. The distribution and density of vegetation through this Province depends ultimately on soils and elevation characteristics at the local level.

The ecoregion, coupled with the adjacent Eastern Broadleaf Forest Province, has relatively high species richness. Species richness throughout the region is further accentuated due to the presence of several regionally unique ecosystems, which are a function of elevation and soil condition. According to information available through the Island Press and World Wildlife Foundation, "a number of plants, invertebrates, salamanders, crayfish, freshwater mussels and fish are restricted to single watersheds or peaks due to millions of years of isolation and favorable conditions." There are over 158 tree species throughout the Province, placing the Appalachian-Blue Ridge Forests among the nation's most florally diverse ecoregions. The southern limit of many northern forest mammals occurs within this Province. There are over 225 terrestrial invertebrates within the ecoregion. In addition, the province has a high diversity and abundance of amphibians; there are over 30 different species of salamander living in the southern Appalachians, more than in any other part of North America. Breeding birds in the region are dominated by a variety of neo-tropical migratory species, which rely on varying stages of natural forest succession that characterize the area.

Unfortunately, scientists have reported that over 80 percent of the habitat throughout this ecoregion has been altered by development. The areas most heavily impacted by this development have been unique lowland and valley habitats, as many low-lying sites in the region were converted for agricultural purposes. Increases in urban and suburban development have also altered many of the lower lying portions of this ecoregion. Conversion of land to agricultural use is less common in areas of higher elevation, although many of the region's ridge top locations have been, and still are, actively logged. Only a few blocks and patches of unlogged forest habitat remain, although there are larger forested blocks in the Great Smoky Mountains. In addition, second growth forests that have recovered, or are protected, from logging provide habitat opportunities for native species in the region, though they often lack the structural and species diversity of the forests that characterize the region. One example of managed re-growth forests can be seen in the acreage

more intensively integrated into local management practices in order to protect the forests understory vegetation.

One example of regional restoration work can be found when examining the native species restoration programs that Exelon Corporation participates in along the Susquehanna River and Conowingo Pool. According to information available from the Susquehanna River Basin Commission, "American shad were once a thriving and vital resource in the Susquehanna River Basin. During their peak in the 1800s, they numbered up to several hundred thousand fish each year." American shad are an anadromous fish that begin life in the river and its many tributaries, and then migrate to spend their adult lives in the Atlantic Ocean. They then return to the rivers and streams in which they originated in order to spawn. Over time, the effects of water pollution and physical stream barriers impeded this natural migration process. In 2004 the Susquehanna River Basin Commission, an organization that has monitored and assessed the conditions of the river and tributaries in the basin since being established in the early 1970s, designed a program called the *Susquehanna Shad School: Connecting Students and Shad* "to educate teachers and students on the importance of restoring American shad and other migratory species to the Susquehanna River Basin."

Partners in the restoration program include the Commission, Maryland Department of Natural Resources, Maryland State Department of Education, Maryland Sea Grant Extension Program, U.S. Fish and Wildlife Service, the organization American Rivers and Exelon Corporation and one of its subsidiaries, Susquehanna Electric Company. As part of the program, students at two Maryland schools, North Harford High School and Perryville Middle School, will raise American shad in classroom aquariums from eggs to the fry stage. Then the juvenile shad will be released into local waterways, including Deer Creek. Additionally, as part of the program, students will study the shad lifecycle, tour fish passage operations and a spawning tank at the Conowingo Hydroelectric Dam, as well as visit a dam on Deer Creek that has been deemed fit for removal and learn about the benefits of dam removal to the shad lifecycle.

According to information from Exelon Corporation employees, the Conowingo Station has operated a fish lift to assist migratory species in their journeys upstream since the 1970s. "In 2003, Exelon celebrated the one-millionth American shad safely delivered into the Conowingo Pond

FIGURE 5. SUSQUEHANNA RIVER BASIN AND SUB-BASINS MAP

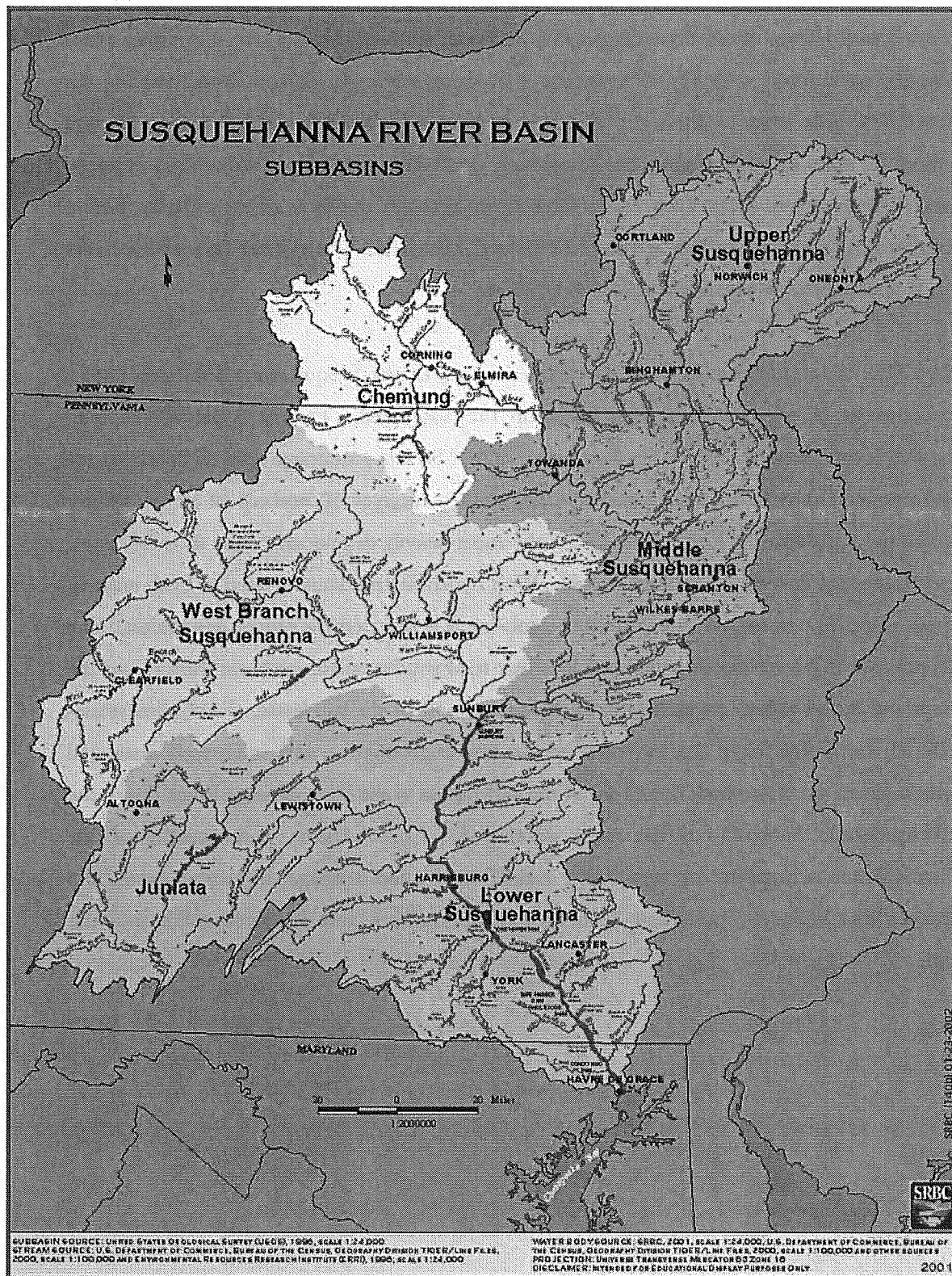
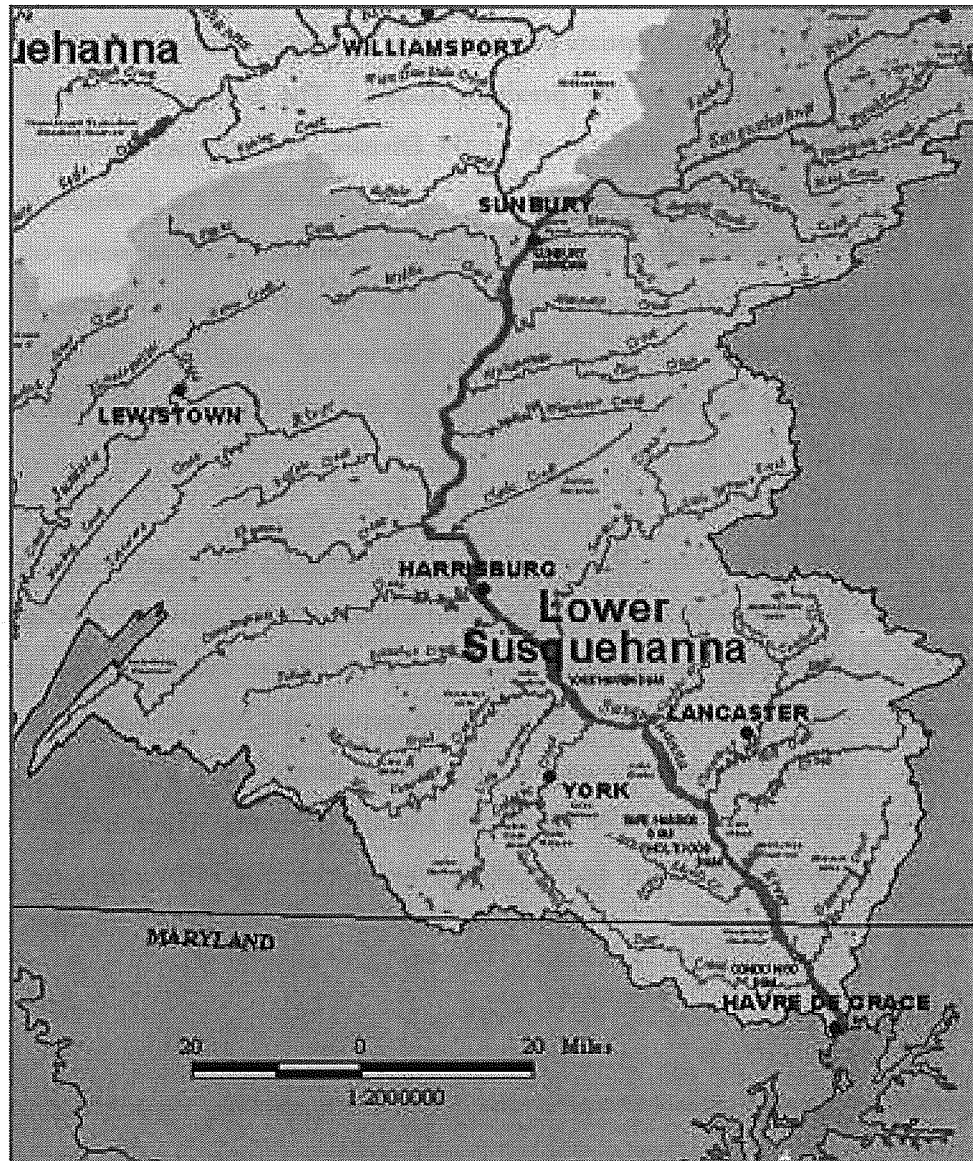


FIGURE 6. LOWER SUSQUEHANNA SUB-BASIN MAP



Map courtesy of the SRBC.

Protection of the Susquehanna River watershed has been a priority and concern to many citizens of Pennsylvania, New York and Maryland, including statewide and regional agencies, municipalities and local associations. The U.S. Army Corps of Engineers has been charged with the development of a comprehensive plan to incorporate interests and initiatives in the Lower Susquehanna River Basin. Phase I of studies required to develop the plan were initiated in 2000, and focuses on all or part of Perry, Dauphin, Lebanon, Cumberland, Franklin, Adams, York and

Average annual temperatures in this region reportedly range from below 50° Fahrenheit in the north and at higher elevations, to over 60° Fahrenheit in more southerly portions of the ecoregion. Precipitation in the province generally measures between 35 inches to over 80 inches in the highest mountain peaks, with there typically being regular, measurable precipitation year-round. Snowfall in Pennsylvania is regularly over 24 inches, and this figure increases southward along the ridge tops to a regular accumulation of over 30 inches in the Great Smoky Mountains. Southeast and southward facing slopes are generally warmer and drier than northwest and north-facing slopes.

2.1.4 Soil Conditions

There are eleven major soil groups recognized in the world soil classification system that are characterized, described and mapped based on the presence or absence of distinctive horizons, or layers, commonly present in the soil for any given location. Alfisols, ultisols and inceptisols are the two predominant soil orders common in the Appalachian-Blue Ridge Forest Ecoregion and Central Appalachian Broadleaf Forest – Coniferous Forest – Meadow Province. Alfisols are predominant beneath deciduous forests within the Humid Temperate Domain. In addition, alfisols reportedly make up approximately 13.4 percent of the land area within the United States and are most often found within croplands and forests in the region. Alfisols are common throughout the Midwest, in Ohio, Indiana, Wisconsin, Minnesota, and Michigan; however, they are also found in a narrow belt east of the Mississippi River, where they formed in loess, or silt. Alfisols are generally described as moderately weathered, with a medium to high base of soil saturation. Ultisols, characterized by the presence of an argillic or kandic horizon, are most extensive in warm, humid climates. Most of the ultisols in the United States had coniferous and/or hardwood forest vegetation at the time of settlement. Inceptisols are considered a more complex soil order, and have several varying diagnostic horizons. However, unlike ultisols, inceptisols do not have an argillic or kandic horizon. Inceptisols generally range from poorly drained to excessively drained, and often occur in proximity to mountain ranges. In addition to being located along the divisions of these major soil types, according to old soil surveys, Dauphin County bedrock materials are of the Triassic Age, Gettysburg Formation. This formation is underlain by red shales, silty mudstone and gray shales.

PHOTO 4. EASTERN BOX TURTLE



Photo courtesy of Sue Wolinsky, WHC Wildlife Biologist/Certification Program Manager.

2.1.5.1 Forested Riparian Buffer Habitats

Riparian areas are the transition zones between a creek, stream, or river and an upland, and are crucial to maintaining overall creek, stream, or river health. A well-vegetated stream bank will act as a buffer between the river and upland areas, decreasing both the velocity of floodwater, downstream flooding and peaks, and surface run-off. Wet-soil plants including grasses, shrubs, wildflowers, and trees act as vegetative buffer strips around water bodies. Plants function to stabilize the soil banks, allowing for less erosion and consequently, less water turbidity. Fast-growing species such as willows are especially effective for erosion control, and can have high wildlife value. Deep-rooting grasses contribute to the root mat and absorb nutrients; warm-season grasses in particular have very deep root systems that extend three to twelve feet below the surface. Additionally, vegetation slows overland runoff, buffering surface water pollution.

Riparian buffer areas are also important for both in-stream and terrestrial wildlife communities. A high-quality stream bank provides valuable habitat for a distinct community of species including a

the removal, transformation, and detention of various environmental pollutants, provide critical habitat to a variety of resident and migratory wildlife species, and wetlands often serve to connect various ecosystems. Even wetlands smaller than one acre in size have the ability to support an abundance of wildlife, particularly waterfowl, amphibian, and fish species. Wetland ecosystems also provide humans with educational and recreational opportunities, open space, and aesthetic enjoyment. Wetland communities identified at the Three Mile Island Generating Station include riparian forest buffers, which are described in the previous section, and seasonally wet areas.

Seasonally wet portions of the site, also termed ephemeral or vernal pools, are located in the southwestern portion of the island and in the commonly wet areas of the meadow, which served as a spoil-storage area. Vernal pools are depressions in the earth that fill with water in the spring or rainy season and dry out by summer's end (making them distinct from ponds, which remain full). These wetlands, referred to by some as ephemeral wetlands, are critical habitat for many aquatic macroinvertebrates, such as mosquito-controlling dragonflies, and amphibians. These species thrive in this environment largely because vernal pools are unable to support fish, which feed on the eggs and larvae of amphibians and invertebrates. Seasonally wet areas have, however, become a vanishing natural feature due to land development, thus contributing to the alarming decline of frog and salamander populations. WHC suggest that the managers at Three Mile Island monitor and protect the seasonal wetlands on site, adding basking structures and hibernacula as necessary.

2.1.5.3 Woodland Habitats

There are several portions of the Three Mile Island Generating Station property that feature tree and shrub habitats. Patches of woodland habitats help to provide habitat for a number of southeastern Pennsylvania's native wildlife species, especially when linked to existing conservation and natural areas. The wildlife species attracted to small segments of forest, tree and shrub thickets and scrubby woodland edge habitats have specific food, cover and vegetative species composition requirements that are different than those of large-tract forestland habitats, and different than those of grassland and wetland dependent species. In addition, these habitat "islands" of woods also provide habitat for migratory species when effectively linked to other forested corridors and stream courses.

In addition, avian species like eastern towhee and woodcock are in the decline due to the loss of shrub, thicket and scrub habitats and brushy wetland border habitats. According to the DCNR, "Pennsylvania is one of the most important states in the northeastern region in supporting large populations of forest species, including some that are undergoing region-wide declines." The Pennsylvania Bureau of Forestry, in cooperation with the PA DCNR and USDA, directs the Pennsylvania forest stewardship plan and incentive program, which is made possible through the Farm Bill. This program provides forest stewardship "information, education and technical assistance to encourage, assist and recognize private forest landowners who keep their lands and natural resources productive and healthy."

To participate in the program, interested land managers are encouraged to contact state Bureau of Forestry representatives to initiate a partnership. Practices encouraged through stewardship incentive programs include stewardship plan development, reforestation, forest improvement, soil and water resource protection and improvement, riparian and wetland protection and improvement, fisheries habitat enhancement, overall wildlife habitat enhancement and forest recreation enhancement. The following techniques have been approved for technical assistance and cost-share practices under the program, with relation to improvement of wildlife habitat; planting permanent cover with high wildlife value, creating forest openings, controlling undesirable plant species, thinning forested areas, establishing and improving water resources, constructing artificial cavities, nest boxes, roosting platforms or poles, creating snags, installing tree shelters, fertilizing, fencing and establishing, protecting or improving endangered or threatened species and their habitats. Contact information for the Pennsylvania Bureau of Forestry is provided in **Appendix III**.

GENERATING STATION

Common Name	Height/ Width	Conditions	Wildlife Value
Highbush blueberry	6-12'/8-12'	Moist, well-drained soil, sun-shade.	Used heavily by grouse /songbirds.
Mapleleaf viburnum	4-6'/3-4'	Range of soil and light conditions.	Used by birds, squirrel and deer.
Arrowwood virburnum	6-8'/6-15'	Well-drained soils, good hedge.	Used by birds, squirrel and deer.
Nannyberry	9-18'/6-10'	Wide range of conditions.	Used by birds, squirrel and deer.
Blackhaw viburnum	9-15'/8-12'	Many soil types, sun or shade.	Used by birds, squirrel and deer.
American cranberry	8-12'	Well-drained, moist soils.	Used by birds, squirrel and deer.
Eastern redbud	20-30'/25-25'	Moist, well-drained soils, sun.	Limited wildlife value.
White fringetree	12-10'	Moist, fertile soils, full sun.	Limited wildlife value.
Flowering dogwood	20'/15-20'	Well-drained soil, full sun to shade.	Important food for songbirds.
Franklin tree	10-20'/6-15'	Moist, acidic well-drained soils.	Limited wildlife value.
Carolina silverbell	30-40'/25-25'	Rich, moist, well-drained acid soils.	Limited value, seeds used by some birds.
Common witchhazel	15-20'	Moist soil, sun to partial shade.	Limited wildlife value.
American holly	15-30'/18-25'	Moist, well-drained soil, sun-shade.	Food/cover used extensively by songbirds.
Sourwood	25-30'/20'	Peat, moist, acidic, well-drained soils.	Limited wildlife value.
Mountain ash	10-30'/10-15'	Adaptable to many soil types.	Fruit valuable winter food for songbirds.
Mountain stewartia	10-15'	Moist, acidic soil, full sun to shade.	Limited wildlife value.
Red maple	40-60'	Slightly acidic, moist soil.	Flowers and buds food for mammals/birds
Silver maple	50-70'/40-50'	Tolerant of many soil types.	Flowers and buds food for mammals/birds
Sugar maple	60-70'/20-40'	Shade tolerant, moist soils.	Flowers and buds food for mammals/birds
Sweet birch	40-55'/35-45'	Deep, rich, acid, moist soils.	Foliage used by browsers, birds.
River birch	40-70'/40-60'	Moist soil conditions.	Foliage used by browsers, birds.
Shagbark hickory	60-80'/40-60'	Woodland border tree, varied soils.	Important food source for mammals and several kinds of birds.
Common hackberry	40-60'	Rich, moist soil; will tolerate dry.	Fruit important, especially for winter birds.
Persimmon	35-60'/20-35'	Rich, moist soil; will tolerate dry.	Fruit used by mammals and songbirds.
American beech	50-70'	Moist soil, full sun to part shade.	Nuts eaten by birds and mammals.

If left to follow the course of succession without the controlling forces of fire, mowing or other disturbance, it will take a meadow habitat approximately 150 years to progress into a mature forest. Grassland and meadow habitats in this region evolved as a result of routine intentional and accidental fires, which were common throughout the ecoregion. During springtime, the dominant meadow and grassland species in Pennsylvania are cool season grasses such as Timothy, fescue, orchardgrass, rye and bluegrass. These grasses are not native to the area, and have been historically planted by farmers and homeowners for a variety of reasons such as animal forage, aesthetics and for immediate erosion control. Cool season grasses are most prolific between April and June, and begin to die back in late June and early July.

Following the dieback of these non-natives, native warm season grasses and wildflowers are permitted to grow when present in the seed bank. Native warm season grasses such as Indian grass, broom sedge, switchgrass and bluestems dominate the landscape between July and late October. In addition, these bunch-forming grasses remain standing, providing cover resources, through the winter. Their deep-penetrating root systems, sometimes in excess of five feet, have immense soil holding capabilities. In addition, native warm season grasses increase soil fertility overtime due to their ability to regenerate root systems and contribute humus to the soil. Beside grasses, native wildflowers of varying heights, colors and densities experience active growing and blooming periods throughout the summer and fall seasons as well. Wildflowers common to southeastern Pennsylvania, and the Three Mile Island Generating site, include black-eyed Susan, goldenrod, sunflower and aster.

In addition to being beneficial to soil structure and aesthetically pleasing, native warm season grass and wildflower habitats provide significant wildlife benefits. Warm season grasses provide optimal habitat for grassland birds, especially when compared to the cover offered by cool season grasses. Many cool season grasses are sod forming, and therefore limit the ability of wildlife species to seek cover and food resources. Grassland nesting birds will utilize grassland, meadow and field habitats that offer native warm season grasses in the springtime for nesting and brood rearing activities. Young birds depend on the insect-attracting abilities of native grasses and wildflowers for food; during autumn, a diversity of wildlife rely on the seeds generated by these natives. During winter months, resident wildlife populations seek food and shelter in the cover offered by natives. In addition to food and cover benefits for native avian and small mammal species, these habitats

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Common Name	Height	Bloom Period and Color	Wildlife Values
Bee balm	2 to 5'	Jul-Aug / red	Important pollinator plant
Phlox	1 to 5'	May-Oct / purple, pink, blue	Important pollinator plant
May apple	1 to 2'	May / white	Ground cover, edible fruit
Solomon's seal	1 to 3'	Apr-Jun / yellow	Edible, blue berries, birds
Black eyed-Susan	2 to 3'	May-Sept / yellow, orange	Long bloom, insects
Golden ragwort	1 to 2'	May-Jul / yellow	Wetland plant, insects
Goldenrod	2 to 6'	Jul-Nov / yellow	Pollinators, other insects
New York ironweed	3 to 6'	Jul-Sept / purple, blue	Pollinators, other insects
Golden Alexanders	1 to 2'	Apr-Jun / gold	Pollinators, other insects
Big bluestem	3 to 5'	Jun-Sept	Clump forming, winter cover
Lurid sedge	1 to 2'	Jun-Oct	Wetland plant, seeds eaten
Bottlebrush grass	2 to 4'	Jun-Aug	Shade-tolerant native grass
Riverbank wild rye	3 to 5'	Jul-Sept	Stream side native grass
Virginia wild rye	2 to 4'	Jul-Sept	Grass tolerant of many soils
Switchgrass	3 to 6'	Aug-Sept	Erosion control benefits
Little bluestem	2 to 4'	Jul-Sept	Important winter cover
Indian grass	3 to 6'	Aug-Sept	Clump forming grass

2.1.6 Species to Consider Before Formulating Management Plans

2.1.6.1 Identify and Manage Non-Native, Exotic, Invasive and Nuisance Species

Invasive plant species are one of the greatest threats to the world's biodiversity, and the issue of controlling them has become a priority for the scientific community. Several federal acts, such as the Federal Noxious Weed Act of 1974 and the Alien Species Prevention and Enforcement Act of 1992, have been passed to direct the control of invasives. In 1999, President Clinton signed Executive Order 13112 to address the challenge that invasive species present to the nation's environment and economy, and to create an Invasive Species Council.

While native species are those that have naturally and historically been found in a particular locale, Executive Order 13112 defines invasive species as those species not native, or exotic, to a particular ecosystem that, upon introduction, are "likely to cause economic or environmental harm or harm to human health". Species are introduced in a variety of ways to areas in which they do not historically occur. Some have been introduced intentionally for ornamental or commercial use; others have been accidentally brought from foreign countries because they were mistaken for native plants that are similar in appearance. The vast majority of plant species introduced from

TABLE 3. INVASIVE PLANT SPECIES IN PENNSYLVANIA

THREAT LEVEL	COMMON NAME	SCIENTIFIC NAME
Moderate	Goutweed	<i>Aegopodium podagraria</i>
	Fiveleaf akebia	<i>Akebia quinata</i>
	Porcelain-berry	<i>Ampelopsis brevipedunculata</i>
	Japanese barberry	<i>Berberis thunbergii</i>
	European barberry	<i>Berberis vulgaris</i>
	Cheatgrass	<i>Bromus tectorum</i>
	Russian olive	<i>Elaeagnus angustifolia</i>
	Dame's rocket	<i>Hesperis matronalis</i>
Moderate	Border privet	<i>Ligustrum obtusifolium</i>
	Common privet	<i>Ligustrum vulgare</i>
	Bell's honeysuckle	<i>Lonicera morrowii</i> ssp. <i>tatarica</i>
	Eurasian water-milfoil	<i>Myriophyllum spicatum</i>
	Star-of-Bethlehem	<i>Omithogallum nutans</i>
	Wild parsnip	<i>Pastinaca sativa</i>
	Beefsteak plant	<i>Perilla frutescens</i>
	Reed canary grass	<i>Phalaris arundinacea</i>
	Lesser celandine	<i>Ranunculus ficaria</i>
	Common buckthorn	<i>Rhamnus catharticus</i>
	Glossy buckthorn	<i>Rhamnus frangula</i>
	Wineberry	<i>Rubus phoenicolasius</i>
	Siberian elm	<i>Ulmus pumila</i>
Serious	Norway maple	<i>Acer platanoides</i>
	Tree-of-heaven	<i>Ailanthus altissima</i>
	Garlic mustard	<i>Alliaria petiolata</i>
	Musk thistle	<i>Carduus nutans</i>
	Oriental bittersweet	<i>Celastrus orbiculatus</i>
	Canada thistle	<i>Cirsium arvense</i>
	Bull thistle	<i>Cirsium vulgare</i>
	Jimsonweed	<i>Datura stramonium</i>
	Autumn olive	<i>Elaeagnus umbellata</i>
	Goatsrue	<i>Galega officinalis</i>
	Giant hogweed	<i>Heracleum mantegazzianum</i>
	Japanese honeysuckle	<i>Lonicera japonica</i>
	Amur honeysuckle	<i>Lonicera maackii</i>
	Morrow's honeysuckle	<i>Lonicera morrowii</i>
	Standish honeysuckle	<i>Lonicera standishii</i>
	Tartarian honeysuckle	<i>Lonicera tartarica</i>
	Purple loosestrife	<i>Lythrum salicaria virgatum</i>
	Japanese stilt grass	<i>Microstegium viminem</i>
	Common reed	<i>Phragmites australis</i>
	Japanese knotweed	<i>Polygonum cuspidatum</i>
	Mile-a-minute vine	<i>Polygonum perfoliatum</i>
	Kudzu	<i>Pueraria lobata</i>

shrub species. The most important objective when employing physical removal methods to remove individual invasives species is to remove as much of the root structure as possible, as remaining material may allow the individual invasive to re-establish. Therefore, the degree of measurable success in invasives control, when using the pulling or digging method, will depend on the thoroughness of individual plant removal.

Other physical control methods, such as cutting and mowing, can also be effective in limiting the growing space and resources available to invasive plants. These methods impose limited success in controlling invasives because the act of cutting and/or mowing will effectively remove the food-producing portion of individual plants, thereby limiting their ability to take over an area. However, because root and stem portions of the plant remain, invasives will likely resprout and continue to spread with time. Therefore, cutting and mowing are most effective as control techniques when coupled with selectively applied chemical controls.

Cutting may be more effective because managers can selectively target invasive plants, while mowing will reduce the growing ability of all plants in an area. Cutting is reportedly most effective when attempting to control invasives in moderately to heavily wooded areas. This is because the surrounding woodland vegetation will assist control efforts by reducing the amount of resources available to the cut invasive. The cut plant will therefore need to rely on resources stored in the roots for repair and refoliation efforts, significantly weakening the plants ability to effectively spread for a period of time. Cutting is reportedly less effective in controlling invasives in open areas and edge habitats, where repeated cutting would be required to obtain minimal controls. Cutting is most effective when performed in late fall and winter months. When including cutting as part of an invasive species management plan, managers are advised to plan on re-evaluating cut areas annually to assess the need for repeated control efforts.

Mowing is less selective, and will effectively put all plants in an area on an equal basis to compete for sunlight, water and other essential resources. The effectiveness of mowing is difficult to assess because individual plant species have differing growth rates and responses to disturbance. Therefore, mowing will favor those species that are most prolific in refoliating and spreading quickly, which includes many invasive plants. Mowing can be an effective control, particularly when coupled with chemical controls, in open areas where manual plant removal is not an option.

and used in conjunction with other physical or biological control methods, herbicides can be an essential component to an invasive species management plan.

To safely administer herbicides in an infested area, it is recommended that personnel first remove as much of the aboveground plant material as possible before applying chemicals, unless the targeted species dictates a foliar application. To control small invasive trees, shrubs, and vines, first cut stems and after about two weeks, apply an herbicide with glyphosate directly to the re-sprouting stems and/or stumps and monitor plants in the weeks to come. To eradicate individual, mature trees, cut the tree in the fall or winter and apply herbicide, such as RoundUp® or Garlon®, directly to the fresh cut stump. For control of invasive vegetation in larger, open areas, moderate infestations may be controlled through use of a broadleaf herbicide, such as Banvel® or 2-4-D®. Severe large-scale infestations may require mowing coupled with herbicide application followed with plowing and discing and an additional herbicide application. If this intensive method is required to remove invasive plants, it will be important to quickly establish desirable, native plants following the last discing of the site in order to reduce the likelihood that invasives will successfully reestablish.

2.1.6.1.1.3 Biological Controls

Biological controls involve the use of other living organisms to control invasive species, such as planting and interseeding native plants, or introducing biological control agents, such as insect pests, in an effort to control and manage invasive species for the long-term. For example, the planting of trees and shrubs to further vegetate wooded areas may help to effectively limit the availability of resources to invasive species in the area. In addition, the interseeding of meadows and fields with native grasses and wildflowers can help to out-compete the establishment and further spread of invasive vegetation. It is likely that this method, coupled with long term monitoring, cutting and mowing, can severely limit the impact of a moderate invasive species invasion over a few years time.

Furthermore, the immediate establishment of native plants immediately after physical or chemical removal methods will significantly reduce the ability of an invasive species to resprout. Evergreen trees are reportedly especially effective in producing fast shade to reduce the ability of invasive plants to reestablish, particularly when planted along south and westward facing forest edges

extensive destruction to wetland ecosystems and to the native wading and nesting birds that they displace.

In Pennsylvania, the largest issue responsible for the decline of bird populations is extensive habitat loss and fragmentation, particularly within wetland habitats. According to research published by the Pennsylvania Biological Survey, since 1790, the state has lost 56 percent of all wetlands, leading to significant decreases in the abundance and diversity of wetland birds throughout the state. Emergent wetlands, such as marshes, bogs, are of particular importance to both migratory and resident avian species as foraging habitat. Species of special concern in the region include black-crowned night heron, bald eagle, yellow-bellied flycatcher, which all rely on a mix of forested and wetland habitats. Black-crowned night herons nest in trees on islands along lowland, bottomland streams and rivers. Bald eagles, which have been spotted on adjacent properties, prefer large-scale rivers and forested habitat with isolated tree cover and available snags. For more information on bald eagle habitat preservation and enhancement possibilities, see **section 2.1.6.2.3.1.**

2.1.6.2.1 Wetland Bird Habitat Enhancement and Conservation Options

“Wetland birds provide us with some of nature’s most wonderful sights, from vast flocks wheeling overhead to newly hatched chicks drying in the sun. Apart from their beauty and recreational and economic importance, these birds are excellent indicators of water quality and measures of biodiversity.” – Milton W. Weller *Wetland Birds*

Wetland habitat use is widespread among various types of wildlife, with some species exclusively utilizing wet areas and others preferring to frequent wetlands for water resources, feeding and/or nesting activities. There is a wide range of wetland adaptations present in each of the various wetland bird species that frequent areas adjacent to and likely within the Three Mile Island Generating Station property. For example, wetland bird species have developed specialized bills, feet, legs, feathers, nesting and roosting strategies and dietary requirements that allow them to thrive in aquatic or semi-aquatic environments. It should be noted however that there is considerable variation between wetland bird species. For example, many birds that are typically associated with wetlands, such as sandhill cranes, have also adapted to spend a great amount of

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TYPE OF BIRD	COMMON NAME	SCIENTIFIC NAME
Swan (Cygninae)	Tundra swan	<i>Cygnus columbianus</i>
Heron/Bittern (Ardeidae)	American bittern Black-crowned night heron Cattle egret Great blue heron Great egret Green-backed heron Least bittern Little blue heron Snowy egret Yellow-crowned night heron	<i>Botaurus lentiginosus</i> <i>Nycticorax nycticorax</i> <i>Bubulcus ibis</i> <i>Ardea herodias</i> <i>Ardea alba</i> <i>Butorides striatus</i> <i>Ixobrychus exilis</i> <i>Egretta caerulea</i> <i>Egretta thula</i> <i>Nyctanassa violacea</i>
Plover (Charadriidae)	American golden plover Black-bellied plover Killdeer Semipalmated plover	<i>Pluvialis dominica</i> <i>Pluvialis squatarola</i> <i>Charadrius vociferous</i> <i>Charadrius semipalmatus</i>
Rail (Rallidae)	American coot Common moorhen Sora Virginia rail	<i>Fulica Americana</i> <i>Gallinula chloropus</i> <i>Porzana Carolina</i> <i>Rallus limicola</i>
Sandpiper (Scolopacidae)	American woodcock Baird's sandpiper Buff-breasted sandpiper Common snipe Dunlin Greater yellowlegs Least sandpiper Lesser yellowlegs Pectoral sandpiper Ruddy turnstone Sanderling Semipalmated sandpiper Short-billed dowitcher Solitary sandpiper Spotted sandpiper Stilt sandpiper Upland sandpiper Western sandpiper White-rumped sandpiper	<i>Scolopax minor</i> <i>Calidris bairdii</i> <i>Tryngites subruficollis</i> <i>Gallinago gallinago</i> <i>Calidris alpina</i> <i>Tringa melanolenca</i> <i>Calidris minutilla</i> <i>Tringa flavipes</i> <i>Caladris melanotos</i> <i>Arenaria interpres</i> <i>Calidris alba</i> <i>Calidris pusilla</i> <i>Limnodromus griseus</i> <i>Tringa solitaria</i> <i>Actitis macularia</i> <i>Calidris himantopus</i> <i>Bartramia longicauda</i> <i>Calidris mauri</i> <i>Calidris fuscicollis</i>

The Three Mile Island Generating Station has the potential to support a diversity of wetland and terrestrial avian species that may include, osprey, cormorants, rails, coots, ducks, geese, egrets and herons. Several factors must be managed to ensure adequate habitat availability for these magnificent birds. Habitat needs for all birds include water for drinking and bathing, protective

cattle egrets will forage on the dry ground for grasshoppers and insects. For this reason it is important to maintain a diversity of water depths and vegetation zones in order to support nesting bird colonies. Federal and state laws regarding avian conservation protect Herons and other wetland birds; however, all remain threatened by the loss of quality habitat. WHC suggests inventorying bird species at the site during breeding and nesting seasons and evaluating the diversity of vegetation, water depths and prey in order to maintain optimal conditions for wetland birds at the Three Mile Island Generating Station.

2.1.6.2.1.1.1 Great Blue Heron

The great blue heron is the largest of the dark herons and can reach over 38 inches long with a wingspan of 70 inches. Great blue herons nest throughout most of North America and winter in the south on in northern South America. This great blue heron is a year-round resident that has become increasingly common in southeastern Pennsylvania. The great blue heron often nests in colonies of other herons and wading birds such as egrets. Great blue herons are wading birds that exploit a variety of wetland and even upland habitats and their statewide distribution is heavily dependent upon the availability of suitable habitat. Their diets include fish, insects, amphibians, snakes, small birds and rodents, although both seem to prefer feeding on large fish. These herons hunt in both saltwater and freshwater environments by taking slow and deliberate steps through shallow water, or standing in wait, with their heads hunched and beaks poised for catching prey.

TABLE 5. GREAT BLUE HERON HABITAT PREFERENCES

EXAMPLES OF PREFERRED PREY	PREFERRED ROOSTING AND SHELTER TREES
Bluegill	American sycamore
Yellow perch	Black willow
Bullfrog	Common cattail
Creek chub	White oak
Meadow vole	Sweetgum
Five-lined skink	Tuliptree
Northern water snake	Pickerelweed
Wood frog	Common reed
Channel catfish	Marsh bulrush
Largemouth bass	
Eastern lamp mussel	
Crayfish	
Eastern mosquitofish	

2.1.6.2.1.1.2 Great Egret

Egrets, which are diverse members of the heron family that are a common site throughout the Susquehanna River Basin, include snowy egrets, cattle egrets and great egrets. The word *egret* comes from the word *aigrette*, which is a French word referring to the downy, white breeding plumes of six species of white heron. These plumes were especially popular for decorating elegant hats during the late nineteenth and early twentieth centuries. The demand for the feathers was so high that at one point the feathers from four birds would be worth twice the same weight in gold. This, coupled with the long felt effects of DDT, contributed to a serious decline in egret populations until strict conservation measures were enforced. Because egrets are in the same family as the dark herons discussed above, it is not surprising that they share a great deal of the same characteristics and adaptations.

heron, ibises and anhingas. Their diets consist mainly of fish and other aquatic organisms; however, if fish are not available they may hunt in upland areas for amphibians, reptiles and small mammals. The great egret may also inhabit deeper water habitats that offer ample food resources.

Great egrets typically begin nesting in southeast Pennsylvania during mid spring, and typically construct nests in the joints of tree branches or on platforms that occur about ten feet above the ground or water. While that is the average height of nest construction, individual nests may be constructed within a range of five to over 40- feet above the ground or water. Great egrets normally lay between three and four light blue or green eggs, although they may lay as many as six eggs that require about a month to incubate. Young great egrets are prepared to leave the nest after about two months.

2.1.6.2.2 Considerations for Forest-Dwelling and Cavity-Nesting Birds

In Pennsylvania, birds associated with deciduous forest habitats and shrub lands are considered to be in relatively stable populations, as least when compared to the practices of massive deforestation that were common in the 19th Century. However, birds associated with conifer forests and associated peat and swamplands have suffered serious declines. There have been some efforts towards the recovery of bird species common in conifer and peatland habitat types, although they have not been as successful as those undertaken in deciduous habitat areas. However, ongoing forest management practices will likely continue to favor species of early successional forests rather than those sensitive species that require more mature, old growth forests.

Changes in land management objectives will continue to shape the landscape, and therefore influence avian species populations and the diversity that each habitat can support. Exelon's Three Mile Island Generating Station can help preserve, protect and enhance avian species and the resources that they depend on in a variety of ways, including through the placement of artificial nesting structures, roosting platforms, perches and poles, establishment of native vegetation with high wildlife values, improvement of water resources on site and through continued education regarding avian species habitat requirements and individual importance. If employees at the Three Mile Island Generating Station opt to establish and monitor nest boxes at the site, WHC

2.1.6.2.2.1 Potential Wood Duck Management Options

A favorite among bird watchers, wood ducks (*Aix sponsa*) are found throughout the eastern half of the United States, as well as along the Pacific coast and in southern Canada. While their numbers are now increasing due to habitat protection and restoration activities, unregulated hunting and the loss of their preferred woodland and wetland habitat decimated wood duck populations in the early 1900s.

WHC recommends that the Three Mile Island Generating Station wildlife team consider erecting wood duck nesting boxes in the wooded riparian areas on site in the future. Nest boxes should be placed at least 600 feet apart and out of the direct sight of other wood duck boxes, as seeing another wood duck entering or leaving a nest may stimulate a female wood duck to lay eggs in the other female's already full nest. Consequently, some of the eggs may fail to hatch, or worse, the incubating female may abandon the nest altogether. Boxes should be mounted 12 to 20 feet above ground and 30 to 150 feet from the shoreline. Installing conical predator guards 6 to 12 inches from the bottom of each duck box will help prevent predation.

Wood duck boxes should be monitored once a month during the breeding season, to document any evidence of predation and presence of nestlings. Boxes may remain out during the winter season to provide winter cover sites for other animals, but should be cleaned out prior to the start of the nesting season. More information on wood ducks, how to build wood duck nest boxes, and predator guards can be found in the *Wood Duck* leaflet in **Appendix V** of this report.

2.1.6.2.2.2 Potential Eastern Bluebird Management Options

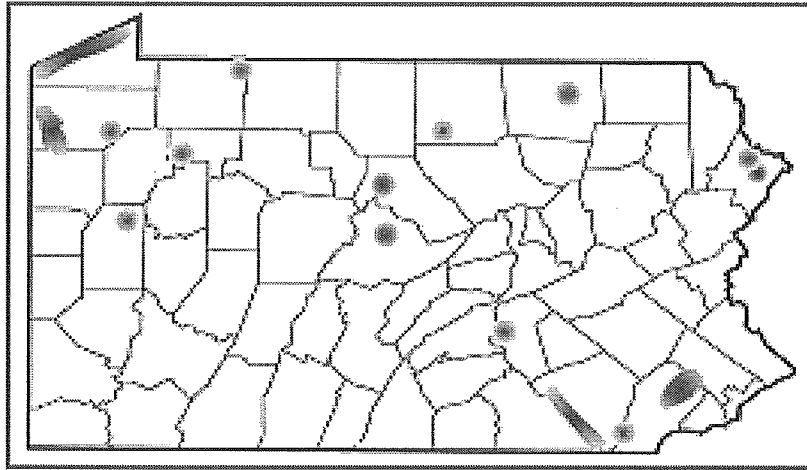
The distinctive eastern bluebird (*Sialia sialis*) is a common species of the eastern United States. Bluebird nests are typically built in natural cavities, but competitive pressure from aggressive avian species, including non-native English house sparrows and European starlings, has reduced nest site availability. Habitat destruction, particularly the removal of snags has also negatively impacted bluebird populations. The Three Mile Island Generating Station can participate in restoring local eastern bluebird populations by constructing nest boxes on site. The placement and maintenance of bluebird boxes is a relatively simple, hands-on project that contributes to the conservation of a native species and improves the aesthetic merit of the site.

restoration projects. A list of native Pennsylvania birds of prey is provided in **Table X**, and should be consulted when developing considerations for potential target species in habitat enhancement efforts on site. Representatives at the Three Mile Island Generating Station can conserve habitat for raptors by protecting early successional, wooded and wetland habitats on site; furthermore, placing artificial nesting structures and brush piles may lead to habitat enhancements for raptors. Please contact WHC for more information about raptor habitat enhancements.

TABLE 7. COMMON BIRDS OF PREY IN PENNSYLVANIA

TYPE	COMMON NAME	SCIENTIFIC NAME
Falcon (Falconidae)	American kestrel	<i>Falco sparverius</i>
	Merlin	<i>Falco columbarius</i>
Hawk/Eagle (Accipitridae)	Broad-winged hawk	<i>Buteo platypterus</i>
	Cooper's hawk	<i>Accipiter cooperii</i>
	Golden eagle	<i>Aquila chrysaetos</i>
	Northern goshawk	<i>Accipiter gentiles</i>
	Northern harrier	<i>Circus cyaneus</i>
	Red-shouldered hawk	<i>Buteo lineatus</i>
	Red-tailed hawk	<i>Buteo jamaicensis</i>
	Rough-legged hawk	<i>Buteo lagopus</i>
	Sharp-shinned hawk	<i>Accipiter striatus</i>
Osprey (Pandionidae)	Osprey	<i>Pandion haliaetus</i>
Owl (Tytonidae)	Barn owl	<i>Tyto alba</i>
Owl (Strigidae)	Northern saw-whet owl	<i>Aegolius acadicus</i>
	Short-eared owl	<i>Asio flammeus</i>
	Long-eared owl	<i>Asio otus</i>
	Snowy owl	<i>Bubo scandiacus</i>
	Great horned owl	<i>Bubo virginianus</i>
	Eastern screech owl	<i>Otus asio</i>
	Barred owl	<i>Strix varia</i>
Vulture (Cathartidae)	Black vulture	<i>Coragyps atratus</i>
	Turkey vulture	<i>Cathartes aura</i>

FIGURE 7. BALD EAGLE DISTRIBUTION WITHIN PENNSYLVANIA



Map courtesy of PA DCNR.

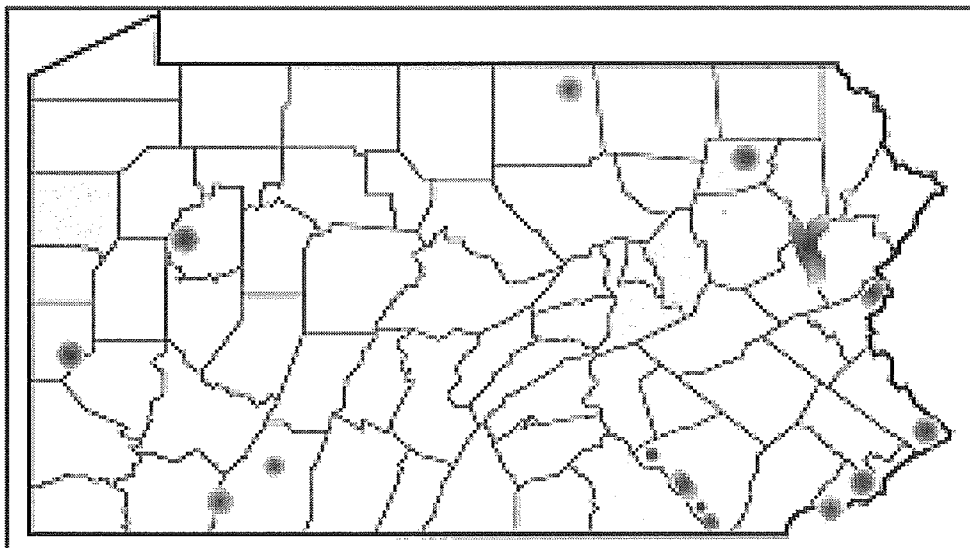
The preservation of old pines is critical in order to provide quality nesting and roosting sites for bald eagles. By allowing trees to grow to maturity and leaving very tall trees (supercanopy or overstory trees) in the buffer area, employees and volunteers at Three Mile Island Generating Station will be creating ideal future roosting sites for bald eagles and other birds of prey. Suitable perches include slash pine, oak, or any tall snag within 50 feet of the shoreline. Snags are used by bald eagles for perching, but these birds do prefer overhead cover at the nesting site. Ideally, these perches should have large, open branches that hang over the water and there should be a minimum of two to three snags or dead trees within $\frac{1}{4}$ mile of a nest. The Three Mile Island Generating Station wildlife team can keep these requirements in mind when making management decisions in the buffer area. These decisions would include identifying potential mature-canopy trees and developing a plan to enhance and preserve them. In order to provide beneficial habitat for bald eagles, such as canopy oaks and white pines, the team can plan to remove surrounding weed trees or species with poor health or growth patterns. This thinning and selective cutting process reduces competition for resources within that area of the woodlot for the larger trees, thereby allowing the oaks and pines greater growth rates. Over the long term, this strategy would provide the canopy trees that in turn attract bald eagles.

PHOTO 8. OSPREY NEST



Photo courtesy of Sue Wolinsky, WHC Wildlife Biologist/Certification Program Manager.

FIGURE 8. OSPREY DISTRIBUTION WITHIN PENNSYLVANIA

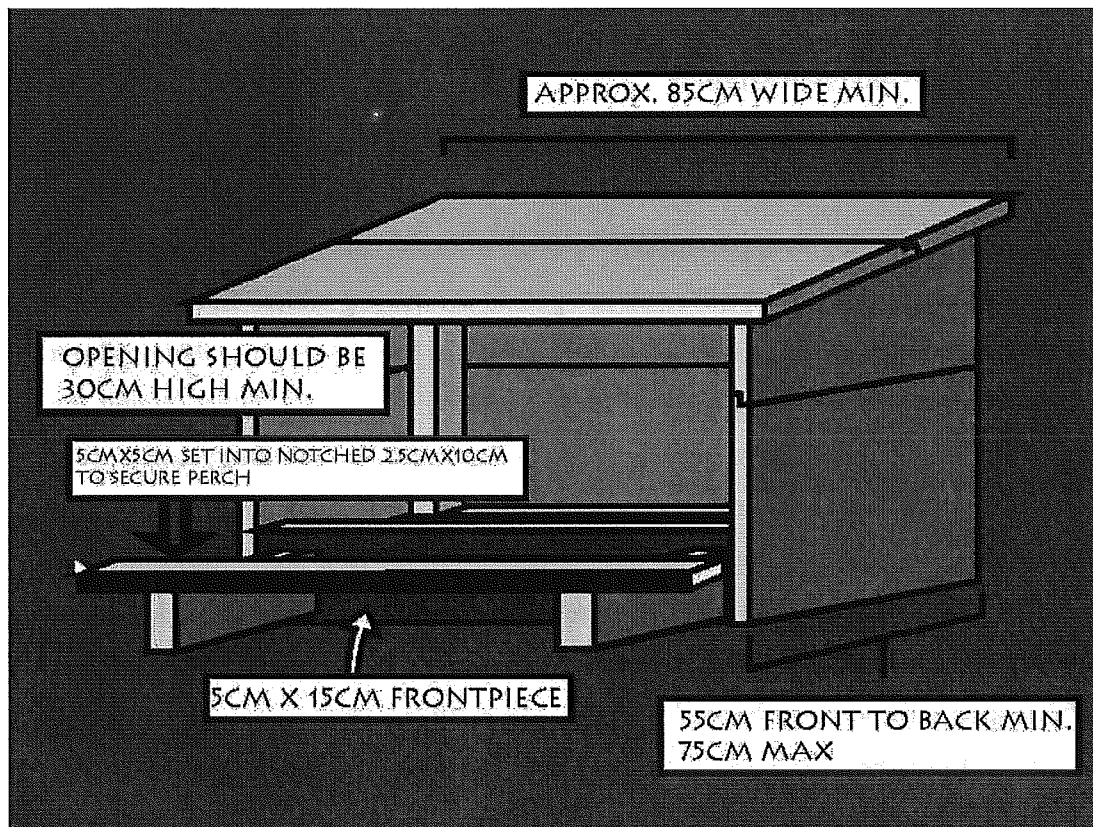


Map courtesy of PA DCNR.

wildlife team should also fill the nest box with three to four inches of small, rounded pea gravel for nesting substrate.

Peregrine nesting patterns seem to habitually follow the 'migratory corridor', reflecting the geographical preference of migrating songbirds, their main prey item. These sites are often in great demand by nesting birds, for the obvious reason that nesting success is increased where prey is more abundant, and are often the subject of ardent competition. In undeveloped areas, preferred sites include ledges on cliffs and rocky outcrops, usually at an elevation of 15 to 60 meters, with a southerly exposure, some vegetation present on the ledge, and a protective overhang above. However, these are relatively generic qualifications, and individuals can vary greatly in their choice of nesting sites (referred to as eyries).

FIGURE 9. PEREGRINE FALCON NEST BOX DIAGRAM



only two to four inches in length with average wingspans of up to twelve inches and often weigh less than one ounce.

In spite of their beneficial and relatively innocuous nature, over half of the bat species in America are considered to be endangered or in rapid decline. Pesticide use, habitat destruction, and disturbance of colonies during hibernation and breeding are among the biggest threats to these populations. Placing and monitoring artificial roosting structures are steps that the Three Mile Island Generating Station can take to support bat populations and to help slow or even reverse, their downward population trend.

TABLE 8. BATS COMMON IN PENNSYLVANIA

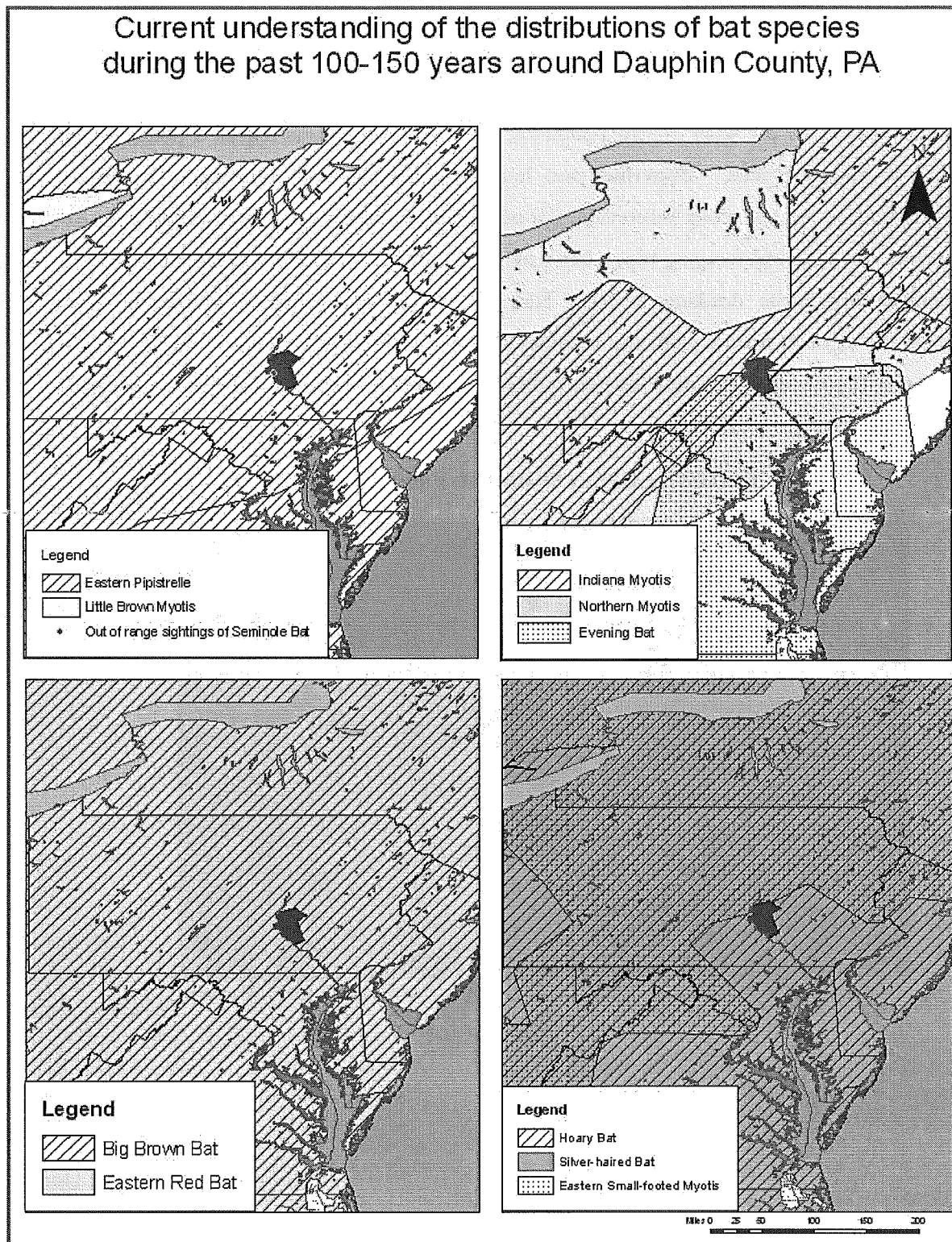
COMMON NAME	SCIENTIFIC NAME
**Big brown bat	<i>Eptesicus fuscus</i>
**Little brown bat	<i>Myotis lucifugus</i>
Indiana bat	<i>Myotis sodalis</i>
Hoary bat	<i>Lasiurus cinereus</i>
Silver-haired bat	<i>Lasionycteris noctivagans</i>
Northern long ear bat	<i>Myotis septentrionalis</i>
Red bat	<i>Lasiurus borealis</i>
Small footed bat	<i>Myotis leibii</i>
Eastern pipistrelle	<i>Pipistrellus subflavus</i>
*Seminole bat	<i>Lasiurus semionoles</i>
*Evening bat	<i>Nycticeius humeralis</i>

* Species has been documented in Pennsylvania, but is not considered a regular resident.

**Species have been documented using bat houses.

Boxes may be used for establishment of nursery colonies during the summer months, for roosting or for hibernating. Once a location is established, bat populations will generally return to the same bat box every year. The bats can be monitored by looking up into the box during the day with a flashlight to count the number of occupants, and by counting the number of bats that emerge in the evening. To count pups, wait until the adults have emerged in the evening, and then use a flashlight to attempt to count the pups remaining. Each breeding female usually has one pup per year. The pups are born hairless and unable to fly, and are dependent on the mother for protection and milk. The mother will leave the pup alone in the colony at night to feed, but will return to nurse. The young will begin to leave the colony for short flights when six to eight weeks old, usually in late July.

FIGURE 10. BAT SPECIES DISTRIBUTION AROUND DAUPHIN COUNTY



Maps courtesy of Josiane Bonneau, WHC Wildlife Biologist.

PHOTO 11. APPALACHIAN BROWN

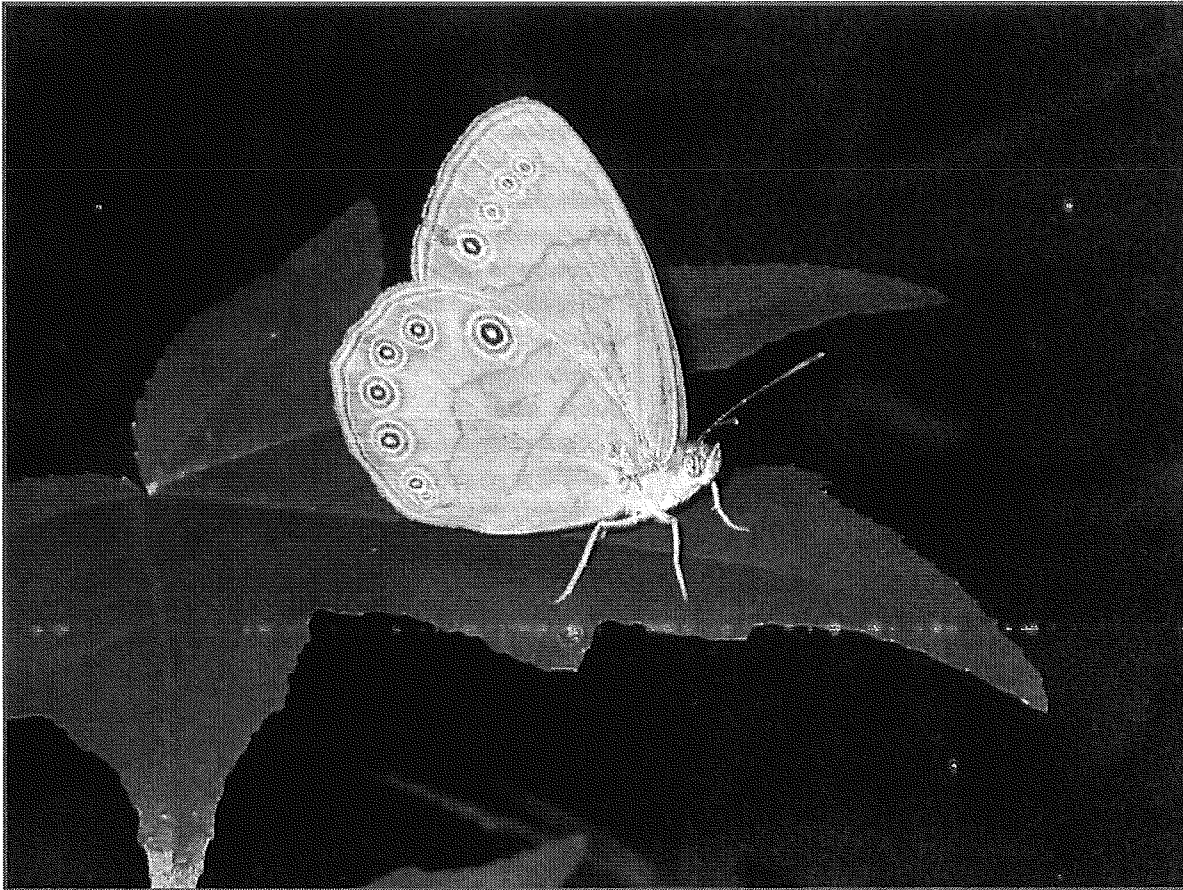


Photo courtesy of Sue Wolinsky, WHC Wildlife Biologist/Certification Program Manager.

Loss of nesting habitat and nectar sources, combined with widespread pesticide use has lead to a decline in bees and other pollinators that has caused alarm amongst the scientific community. The drastic decline in domestic honeybees in the last few years due to the mite parasitism has lead to further cause for concern in protecting native bee populations. There are over 3500 species of bees native to North America and over 50 different species of butterfly and moth have been identified in Dauphin County alone.

GENERATING STATION

COMMON NAME	SCIENTIFIC NAME
Compton tortoiseshell	<i>Nymphalis vanalbum</i>
Ocola skipper	<i>Panoquina ocola</i>
Eastern tiger swallowtail	<i>Papilio glaucus</i>
Black swallowtail	<i>Papilio polyxenes</i>
Spicebush swallowtail	<i>Papilio Troilus</i>
White hairstreak	<i>Parrhasius m-album</i>
Common sootywing	<i>Pholisora catullus</i>
Tawny crescent	<i>Phyciodes batesii</i>
Pearl crescent	<i>Phyciodes tharos</i>
Cabbage white	<i>Pieris rapae</i>
West Virginia white	<i>Pieris virginensis</i>
Hobomok skipper	<i>Poanes hobomonke</i>
Long dash	<i>Polites mystic</i>
Peck's skipper	<i>Polites peckius</i>
Tawny edged skipper	<i>Polites themistocles</i>
Eastern comma	<i>Polygonia comma</i>
Question mark	<i>Polygonia interrogationis</i>
Gray comma	<i>Polygonia progne</i>
Little glassywing	<i>Pompeius verna</i>
Checkered white	<i>Pontia protodice</i>
Grizzled skipper	<i>Pyrgus centaureae</i>
Common checkered skipper	<i>Pyrgus communis</i>
Banded hairstreak	<i>Satyrium calanus</i>
Striped hairstreak	<i>Satyrium liparops</i>
Appalachian brown	<i>Satyrodes Appalachia</i>
Aphrodite fritillary	<i>Speyeria aphrodite</i>
Great spangled fritillary	<i>Speyeria cybele</i>
Atlantis fritillary	<i>Speyeria idalia</i>
Regal fritillary	<i>Speyeria idalia</i>
Gray hairstreak	<i>Strymon melinus</i>
Southern cloudywing	<i>Thorybes bathyllus</i>
Northern cloudywing	<i>Thorybes pylades</i>
European skipper	<i>Thymelicus lineola</i>
Red admiral	<i>Vanessa atalanta</i>
Painted lady	<i>Vanessa cardui</i>
American lady	<i>Vanessa virginensis</i>
Northern broken dash	<i>Wallengrenia egeremet</i>

The majority of North American bees are solitary and should not to be confused with honeybees, which nest in colonies and were introduced into the U.S. The distinction between native, solitary bees and introduced, social bees is important for public awareness of bee conservation because only social bees swarm to protect their hive; native pollen bees on the other hand rarely ever sting and when they do, the sting tends to be mild. Native bees can generally be categorized as either

GENERATING STATION

COMMON NAME	CATERPILLAR HOSTS	ADULT FOOD
Variegated fritillary	Maypops, may apple, violet	Milkweed, red clover, sunflower
Sleepy orange	<i>Cassia</i> species in the pea family	Shepherd's needle
Zebra swallowtail	<i>Asimina</i> (pawpaw)	Blueberry, blackberry, lilac
Harvester	Insects on ash, beech, alders	Aphid honeydew
Eastern tailed blue	Alfalfa, wild pea, bush clover	Winter cress, cinquefoils, asters
Leonard's skipper	Little bluestem, blue grama	Blazing star, thistles, asters
Indian skipper	Little bluestem, panic grass	Blackberry, phlox, bugloss
Common buckeye	Snapdragon, toadflax	Aster, chicory, knapweed
Viceroy	Willow, poplar, cottonwood	Dung, fungi, goldenrod, thistle
Red spotted purple	Wild cherry, aspen, poplar	Sap, rotting fruit, dung, privet
American copper	Sheep sorrel, curled dock	Buttercup, white clover, yarrow
Little wood satyr	Orchard and centipede grasses	Sap, aphid honeydew
Mourning cloak	Willows, American elm	Oak sap, rotting fruit
Compton tortoiseshell	Aspen, cottonwood, birch	Sap, rotting fruit, nectar
Ocola skipper	Rice, sugarcane, trompetilla	Lantana, milkweed, buttonbush
Eastern tiger swallowtail	Cottonwood, tuliptree, ash	Wild cherry, lilac
Black swallowtail	Wild carrot, celery and dill	Red clover, milkweed, thistle
Spicebush swallowtail	Spicebush, sassafras tree	Jewelweed, thistle, azalea
White hairstreak	Live oak, other oaks	Viburnum, sumac, sourwood
Common sootywing	Lambsquarters, amaranths	Dogbane, white clover, oxalis
Tawny crescent	Wavyleaved aster, true asters	Flower nectar
Pearl crescent	Smooth-leaved true asters	Dogbane, shepherd's needle,
Cabbage white	Mustard and caper family	Mustards, dandelion, red clover
West Virginia white	Mustard family	Toothwort, spring beauty, violet
Hobomok skipper	Panic grass, bluegrasses	Milkweed, henbit, blackberry
Long dash	Bluegrasses	Milkweed, selfheal, laurel
Peck's skipper	Rice cutgrass, bluegrass	red clover, purple vetch, thistles
Tawny edged skipper	Panic grass, slender crabgrass	Alfalfa, dogbane, coneflower
Eastern comma	Elm and nettle families	Rotting fruit, tree sap
Question mark	Elms, hackberry, nettles	Rotting fruit, sap, dung, fungi
Gray comma	Gooseberry, azalea	Sap, rarely flower nectar
Little glassywing	Purpletop	Dogbane, milkweed, joe-pye weed
Checkered white	Mustard and caper family	Mustards, alfalfa, spiraea
Grizzled skipper	Wild strawberry, rose family	Blueberry, wild strawberry
Common checkered skipper	Mallow family species	Shepherd's needles, fleabane,
Banded hairstreak	Oak, walnut, hickory	Dogbane, milkweed, NJ Tea
Striped hairstreak	Plum, hornbeam, oak, willow	Goldenrod, meadowsweet
Appalachian brown	Giant sedge, sedges	Sap, non-floral resources
Aphrodite fritillary	Various violet species	Milkweed, viper's bugloss
Great spangled fritillary	Various violet species	Milkweed, thistle, ironweed
Atlantis fritillary	Violets	Mint, mountain laurel,
Regal fritillary	Violets, bird's foot violet	Milkweed, thistle, red clover
Gray hairstreak	Pea and mallow families	Dogbane, milkweed, mint
Southern cloudywing	Bush clover, clover, fuzzybean	Dogbane, selfheal, thistle
Northern cloudywing	Beggar's ticks, bushclover,	Dogbane, selfheal, thistles
European skipper	Timothy, other grasses	Hawkweed, thistle, oxeye daisy

FIGURE 11. TURTLES USING BASKING LOG



Photo courtesy of Sue Wolinsky, WHC Wildlife Biologist/Certification Program Manager.

Reptiles, the other component of the term “herptile,” are often separated into four main categories for study: crocodiles, lizards, snakes and turtles. Reptile development and overall lifecycles are very different than those common among amphibians; reptiles generally spend their lives in terrestrial environments and young do not go through an extended metamorphosis, rather they are born as miniature versions of adults. The crocodile category of reptiles includes the American alligator; while the “lizard” classification includes iguanas, geckos, skinks and chameleons. Snakes, which are further described as legless reptiles that live in the ground, trees or water, include earth snakes, common garter snakes, and copperheads. Turtle, which are the only reptile species with an external shell, include bog turtles, bog turtles, painted turtles, map turtles and stinkpots. Now only a remnant of a formerly large group, reptile’s today number just about 6,000 species worldwide, much less than during the time when reptiles dominated life on this planet. Of the major groups of reptiles worldwide, only turtles, lizards and snakes are represented in Pennsylvania. In Pennsylvania, there are 38 different reptiles, which are divided among eight families and 28 genera.

GENERATING STATION

TYPE	COMMON NAME	SCIENTIFIC NAME
Amphibian	Mud salamander	<i>Pseudotriton montanus</i>
	Red salamander	<i>Pseudotriton ruber</i>
	Mudpuppy	<i>Necturus maculosus</i>
	Eastern newt	<i>Notophthalmus viridescens</i>
	American toad	<i>Bufo americanus</i>
	Fowler's toad	<i>Bufo fowleri</i>
	Northern cricket frog	<i>Acris crepitans</i>
	Gray treefrog	<i>Hyla versicolor</i>
	Mountain chorus frog	<i>Pseudacris brachyphona</i>
	Striped chorus frog	<i>Pseudacris triseriata</i>
	New Jersey chorus frog	<i>Pseudacris triseriata kalmi</i>
	Spring peeper	<i>Hyla crucifer</i>
	Eastern spadefoot	<i>Scaphiopus holbrookii</i>
	Bullfrog	<i>Rana catesbeiana</i>
	Green frog	<i>Rana clamitans</i>
	Pickerel frog	<i>Rana palustris</i>
	Northern leopard frog	<i>Rana pipens</i>
	Wood frog	<i>Rana sylvatica</i>
	Coastal plain leopard frog	<i>Rana sphenoccephala</i>
Reptile	Snapping turtle	<i>Chelydra serpentina</i>
	Northern painted turtle	<i>Chrysemys picta</i>
	Spotted turtle	<i>Clemmys guttata</i>
	Wood turtle	<i>Glyptemys insculpta</i>
	Bog turtle	<i>Glyptemys mublenbergii</i>
	Blanding's turtle	<i>Emys blandingii</i>
	Map turtle	<i>Graptemys geographica</i>
	Redbelly turtle	<i>Pseudemys rubriventris</i>
	Eastern box turtle	<i>Terrapene carolina</i>
	Eastern mud turtle	<i>Kinosternon subrubrum</i>
	Stinkpot	<i>Sternotherus odoratus</i>
	Smooth softshell	<i>Apalone mutica</i>
	Spiny softshell	<i>Apalone spinifera</i>
	Eastern fence lizard	<i>Sceloporus undulatus</i>
	Coal skink	<i>Eumeces anthracinus</i>
	Five-lined skink	<i>Eumeces fasciatus</i>
	Broadhead skink	<i>Eumeces laticeps</i>
	Worm snake	<i>Carphophis amoenus</i>
	Kirtland's snake	<i>Clonophis kirtlandii</i>
	Black racer	<i>Coluber constrictor</i>
	Ringneck snake	<i>Diadophis punctatus</i>
	Rat snake	<i>Elaphe obsoleta</i>
	Eastern hognose	<i>Heterodon platirhinos</i>
	Common kingsnake	<i>Lampropeltis getula</i>
	Milk snake	<i>Lampropeltis triangulum</i>
	Northern water snake	<i>Nerodia sipedon</i>

Although spotted turtles occupy a wide variety of habitats across their range, they are most frequently found residing in shallow, well vegetated wetlands, mainly vernal pools, swamps, streams and drainage ditches. They are reliant on these aquatic habitats for foraging, aestivation, basking, courtship, and in winter, hibernation. As diurnal reptiles, active only during the day, spotted turtles will often retreat to low-lying areas at night to seek cover or burrow into soft mud. During early spring, typically March through May, spotted turtles will occupy open, wet areas in ponds or wooded marshes, but will migrate to more vegetative areas for early summer. Throughout the hottest summer months, mid-July until mid August, the turtles will aestivate, remain inactive, by burrowing in soft substrate or under vegetation. Again in the winter, typically near October, spotted turtles will undergo a similar period of inactivity, hibernation. During hibernation, turtles will lower their metabolism to a very low rate in order to conserve energy through these cold winter months.

Shortly after emerging from hibernation in early March, spotted turtles begin displaying courtship behaviors such as anxiously chasing a female. Once the quest is complete, the male and female will mate in the water. Then, in mid-June the female will travel, often a lengthy distance, to a suitable nesting site of sandy sod or tufts of grass to dig her nest. The female will alternate her hind feet to dig a shallow, flask-shaped nest approximately two inches deep. Typically spotted turtles lay three to seven soft, white, oval-shaped eggs. The eggs will then incubate in the nest for approximately 60 to 80 days, however, depending on weather condition, may over-winter in the nest and emerge in the spring.

2.2 PLANTS AND WILDLIFE IDENTIFIED AT THE THREE MILE ISLAND GENERATING STATION

Table 12 lists some of the wildlife species that have been observed at the Three Mile Island Generating Station. Comprised of species directly observed by the visiting WHC biologist as well as those identified previously by site and contract employees, the list is intended to be used as a foundation for the development of a comprehensive inventory of plants and animals at the site. To facilitate the development of a species inventory, a sample list of species characteristic to the ecoregion in which the Three Mile Island Generating Station is situated is provided alphabetically by scientific name in **Appendix II** of this report.

**SITE ASSESSMENT AND WILDLIFE MANAGEMENT OPPORTUNITIES FOR EXELON CORPORATION'S THREE MILE ISLAND
GENERATING STATION**

TYPE	COMMON NAME	SCIENTIFIC NAME
Birds	Ring billed gull	<i>Larus delawarensis</i>
	Mallard	<i>Anas platyrhynchos</i>
	Great blue heron	<i>Ardea herodias</i>
	Canada goose	<i>Branta Canadensis</i>
	Turkey vulture	<i>Cathartes aura</i>
	Rock dove	<i>Columba livia</i>
	Peregrine falcon	<i>Falco peregrinus</i>
	Barn swallow	<i>Hirundo rustica</i>
	Mockingbird	<i>Mimus polyglottos</i>
	Osprey	<i>Pandion heliaetus</i>
	Ring-necked pheasant*	<i>Phasianus colchicus</i>
	Eastern bluebird	<i>Sialia sialis</i>
	Tree swallow	<i>Tachycineta bicolor</i>
	Mourning dove	<i>Zenaida macroura</i>
Fish	American shad	<i>Alosa sapidissima</i>
	Sunfish	<i>Enneacanthus</i> or <i>Lepomis</i> spp.
	Carp	<i>Cyprinus carpio</i>
	Smallmouth bass	<i>Micropterus dolomieu</i>
	Largemouth bass	<i>Micropterus salmoides</i>
	Striped bass	<i>Morone saxatilis</i>
Insect	Cabbage white	<i>Pieris rapae</i>
	Eastern tiger swallowtail	<i>Papilio glaucus</i>

2.3 THREATENED AND ENDANGERED SPECIES

Including invertebrates and plants, there are approximately 740 species that have been listed as endangered or threatened within the state of Pennsylvania. One example of animals that were once common in Pennsylvania that have gone extinct is the passenger pigeon. Of the total number of endangered and threatened species designated in the state, 382 are vascular plants, 282 are invertebrates, 43 are fish, five are reptiles, five are amphibians, 16 are avian species, and nine are mammals. The two most common causes of the species decline that ultimately leads to state and federally listing species are habitat degradation and habitat loss. **Table 13** provides a summary of the types of species that are considered to be threatened and endangered in Pennsylvania while **Table 14** lists Pennsylvania State listed threatened and/or endangered species that may have populations within Dauphin County. More information is available about these species, and the

SITE ASSESSMENT AND WILDLIFE MANAGEMENT OPPORTUNITIES FOR EXELON CORPORATION'S THREE MILE ISLAND

GENERATING STATION

TYPE	COMMON NAME	SCIENTIFIC NAME	STATUS
Fish	Mountain brook lamprey	<i>Ichthyomyzon greeleyi</i>	State Threatened
	Smallmouth buffalo	<i>Ictiobus bubalus</i>	State Threatened
	Bigmouth buffalo	<i>Ictiobus cyprinellus</i>	State Endangered
	Spotted gar	<i>Lepisosteus oculatus</i>	State Endangered
	Warmouth	<i>Lepomis gulosus</i>	State Endangered
	Longear sunfish	<i>Lepomis megalotis</i>	State Endangered
	Burbot	<i>Lota lota</i>	State Endangered
	Redfin shiner	<i>Lythrurus umbratilis</i>	State Endangered
	Silver chub	<i>Macrhybopsis storeriana</i>	State Endangered
	Spotted sucker	<i>Minytrema melanops</i>	State Threatened
	Bridle shiner	<i>Notropis bifrenatus</i>	State Endangered
	River shiner	<i>Notropis blennioides</i>	State Endangered
	Ghost shiner	<i>Notropis burchanani</i>	State Endangered
	Ironcolor shiner	<i>Notropis chalybaeus</i>	State Endangered
	Bigmouth shiner	<i>Notropis dorsalis</i>	State Threatened
	Blackchin shiner	<i>Notropis heterodon</i>	State Endangered
	Mountain madtom	<i>Noturus eleutherus</i>	State Endangered
	Tadpole madtom	<i>Noturus gyrinus</i>	State Endangered
	Brindled madtom	<i>Noturus miurus</i>	State Threatened
	Northern madtom	<i>Noturus stigmosus</i>	State Endangered
	Channel darter	<i>Percina copelandii</i>	State Threatened
	Gilt darter	<i>Percina eides</i>	State Threatened
	Longhead darter	<i>Percina macrocephala</i>	State Threatened
	Southern redbelly dace	<i>Phoxinus erythrogaster</i>	State Threatened
Reptile/Amphibian	Green salamander	<i>Aneides aeneus</i>	State Threatened
	Red-bellied turtle	<i>Pseudemys rubriventris</i>	State Threatened
	Rough green snake	<i>Opheodrys aestivus</i>	State Threatened
	**Bog turtle	<i>Clemmys muhlenbergii</i>	State Endangered
	Massasauga rattlesnake	<i>Sistrurus catenatus</i>	State Endangered
	Kirtland's snake	<i>Clonophis kirtlandii</i>	State Endangered
	New Jersey chorus frog	<i>Pseudacris triseriata kalmi</i>	State Endangered
	Coastal plain leopard frog	<i>Rana utricularia</i>	State Endangered
	Eastern mud salamander	<i>Pseudotriton m. montanus</i>	State Endangered
Invertebrate	*Northern riffleshell mussel	<i>Epioblasma torulosa rangiana</i>	State Endangered
	Clubshell mussel	<i>Pleurobema clava</i>	State Endangered
	*Dwarf wedgemussel	<i>Alasmidonta heterodon</i>	State Endangered
	*Northern riffleshell	<i>Epioblasma torulosa rangiana</i>	Special Concern
	Regal Fritillary	<i>Speyeria idalia</i>	Special Concern
Bird	American bittern	<i>Botaurus lentiginosus</i>	State Endangered
	**Bald eagle	<i>Haliaeetus leucocephalus</i>	State Endangered
	Black tern	<i>Chlidonias niger</i>	State Endangered
	Great egret	<i>Casmerodius albus</i>	State Endangered
	King rail	<i>Rallus elegans</i>	State Endangered

2.3.1 Identify Endangered, Threatened, and Candidate Species

Corporations play a fundamental role in determining the fate of America's endangered species. One study, conducted by the Association for Biodiversity Information (now NatureServe) and The Nature Conservancy in 1993, found that half of the species listed under the Endangered Species Act (ESA) have 80 percent or more of their habitat on private lands. Exelon Corporation's Three Mile Island Generating Station facility may provide habitat that supports state and/or federal listed species, although none have been documented.

According to research compiled by the PA Department of Conservation and Natural Resources regarding the distribution of state listed threatened and endangered species, there may potentially be at least three state listed threatened and/or endangered species in Dauphin County. The list includes the bald eagle, which is federally threatened particularly with regard to wintering habitat, and both osprey and peregrine falcons, which are known to inhabit areas on and adjacent to Three Mile Island. **Table 15** lists the state listed threatened and endangered species, and their habitat requirements, that occur in Dauphin County. In addition, there are additional state threatened and/or endangered species that occur in neighboring counties, and may find suitable habitat in proximity to the Three Mile Island Generating Station location. These species, which occur in neighboring counties, include reptile species such as the bog turtle, red-bellied turtle, and rough green snakes, and insects such as the regal fritillary.

**TABLE 15. DAUPHIN COUNTY POTENTIAL OCCURRENCES OF STATE LISTED THREATENED
AND ENDANGERED SPECIES**

COMMON NAME	SCIENTIFIC NAME	HABITAT TYPE
Bald eagle	<i>Haliaeetus leucocephalus</i>	Along river and stream corridors with mature forest.
Osprey	<i>Pandion haliaetus</i>	Around open water habitats.
Peregrine falcon	<i>Falco peregrinus</i>	High cliffs overlooking river systems.

2.3.2 Develop Agreements for Listed or Candidate Species if Identified On Site

Many private landowners are concerned that identifying endangered or threatened species on their property will result in heavy land use restrictions being imposed upon them, and therefore avoid

costs and restrictions to landowners resulting from that status. Candidate Conservation Agreements for the Three Mile Island Generating Station would be made between the U.S. FWS and Exelon Corporation. The U.S. FWS would provide technical assistance in developing the agreements, which would outline specific actions that Exelon Corporation is voluntarily willing to commit to that which will eliminate or reduce the threats to candidate and proposed species. These actions must, however, contribute significantly to removing the need to list the species.

As with Safe Harbor Agreements, landowners that commit to Candidate Conservation Agreements are provided assurances that no additional restrictions will be imposed above those outlined in the agreement. Section 10(a)(1)(A) of the ESA allows landowners complying with Candidate Conservation Agreements to incidentally take individuals or alter habitat in order to return the land to the conditions outlined in the agreement, provided that the overall goal of precluding the need to list species is adhered to. The U.S. FWS can provide further information on these programs. Contact information is provided in **Appendix III**.

3. USING WHC'S TEAM KIT TO DEVELOP A COMPREHENSIVE HABITAT ENHANCEMENT PROGRAM

The Three Mile Island Generating Station may wish to purchase a WHC Team Kit to assist with the development of a comprehensive, employee-based habitat enhancement program. Information regarding volunteer recruitment tools, outreach ideas, guidance on writing a wildlife management plan, and WHC programs such as the *Corporate Wildlife Habitat Certification/International Accreditation Program* are included with the WHC Team Kit.

3.1 BUILD A WILDLIFE TEAM

Creating a Wildlife Team is an important part of a successful habitat enhancement program. Employee participation increases interest and enthusiasm among workers and strengthens extended commitment to the enhancement program through the expansion of a sense of

the site locale. This list is not intended to be definitive, but rather it should be used as an indicator of the types of species that participants in the site inventory may encounter.

Resources the Three Mile Island Generating Station Wildlife Team may find useful in conducting a site inventory include knowledgeable employees, local natural resource professionals, and conservation organizations. The Wildlife Team or WHC can contact outside organizations, such as the Natural Resources Conservation Service (NRCS), for possible assistance with inventories. Contact information for organizations that may provide assistance is included in **Appendix III** of this report. Ensure that external experts assisting in species inventories understand the importance of providing educational experiences for employees new to wildlife identification concepts. Additional information on conducting a site inventory is included in the *Site Inventory* leaflet in **Appendix V**.

3.3 WRITE THE SITE WILDLIFE HABITAT MANAGEMENT AND BIODIVERSITY PROTECTION PLAN

The probability of success for any habitat enhancement program is largely dependent on the formation of a comprehensive strategy; as such, the development of a wildlife habitat management and biodiversity protection plan (in conjunction with the site inventory) should be the most fundamental task of the Three Mile Island Generating Station Wildlife Team. The wildlife habitat management plan outlines the goals of the wildlife habitat program, describes projects to achieve these goals, makes provisions for monitoring projects, and presents implementation and review schedules. WHC recommends that the wildlife management and biodiversity protection plan be holistic in scope by encompassing the entirety of the site. Although the primary goal of the wildlife habitat program is to enhance wildlife habitat, WHC further recommends that additional goals, such as the implementation of an education component or achieving WHC certification, as well as all projects associated with each goal, be included in the wildlife management and biodiversity protection plan.

WHC recommends that the Wildlife Team begin by identifying site habitat and biodiversity program objectives and setting target dates for achievements. In addition, the team should outline how program success will be measured and how performance will be assessed. Habitat projects

4. RECOMMENDED WILDLIFE HABITAT ENHANCEMENT PROJECTS

The individual habitat enhancement projects recommended in this section are provided as a resource for developing the wildlife management plan and were chosen based upon the criteria of ease of implementation, high visibility, and relative likelihood of success. The Wildlife Team may choose to implement some or all of these projects and is furthermore encouraged to explore additional habitat enhancement opportunities. Projects suggested for the Three Mile Island Generating Station Wildlife Team members to consider in the future include:

- Identifying and managing any invasive, exotic species on site,
- Enhancing riparian buffer habitats for native wildlife species, especially migratory birds
- Erecting and monitoring nest boxes for cavity nesting avian and mammal species,
- Erecting additional perches on site for nesting osprey, peregrine falcons, and other birds of prey,
- Conducting surveys and necessary enhancements for native amphibian and reptile species that may utilize seasonal wetlands on site,
- Considering establishing native grassland and wildflower meadows just outside the gates, in old field habitats on site,
- Continuing efforts to improve habitat for fish and other aquatic organisms, and including more intensive monitoring and evaluation of efforts to improve the overall health of the Susquehanna River.

As the wildlife program develops and interest among employees – participant and non-participant alike - increases, WHC recommends that the Three Mile Island Generating Station pursue additional projects to maintain momentum and continue expanding the program, thereby producing additional opportunities for wildlife habitat enhancement on the site facility, which in turn will further generate exposure and attention to the program. WHC encourages employee and managers associated with the Three Mile Island Generating Station to give these initiatives careful consideration as they arise.

In addition to unforeseen opportunities for employees to contribute positively to wildlife conservation within wildlife management areas, WHC recommends exploring additional areas of

6. WHC'S CORPORATE HABITAT CERTIFICATION/INTERNATIONAL ACCREDITATION PROGRAM

WHC's *Corporate Wildlife Habitat Certification/International Accreditation Program* is designed to provide recognition to corporate entities for the successful implementation of substantial wildlife habitat management programs. Sites that demonstrate a long-term commitment to managing habitat for wildlife are bestowed with WHC certification in recognition of such efforts. Awardees are also distinguished through the publication of habitat enhancement program descriptions on WHC's web site, and through the dissemination of site-approved press releases to local and national news sources. Sites certified by WHC also receive an award plaque and are honored at WHC's annual symposium.

The Three Mile Island Generating Station could be eligible to apply for WHC certification in 2007 if site habitat enhancement projects are implemented prior to July 31, 2006. Habitat enhancement projects must be implemented, documented, monitored, and maintained for a minimum of one year prior to eligibility. Furthermore, WHC requires the submission of appropriate documentation relating to habitat enhancement projects conducted on-site in order for the site to be considered for certification. Additional factors, such as employee participation in the program and community outreach activities, are also reviewed and greatly reinforce the application. Overall, the Three Mile Island Generating Station wildlife management program is judged for WHC certification on the basis of a demonstrated commitment to responsible corporate environmental stewardship. A panel of independent wildlife biologists will review submitted documentation to determine if the program meets the criteria of WHC certification.

As outlined on the certification application form included in **Appendix IV** of this report, the following items should be included for submission:

- An inventory of the animal and plant species found on the site;
- The Wildlife Team's wildlife habitat management plan;

7. ADDITIONAL OPPORTUNITIES FOR PROGRAM DEVELOPMENT

The success of the Three Mile Island Generating Station *Wildlife at Work* program depends in large part upon the levels of expertise, labor, and funding available for projects. Thus the potential for success of the site's *Wildlife at Work* program will be significantly increased through the formation of partnerships with an assortment of specialized organizations that may assist in the provision of such factors. Collaborations with local, regional, and national organizations, including non-profits, community groups, schools, youth groups, private landowners, and government agencies, may prove beneficial for the realization of program implementation.

Effective programs for the Wildlife Team to meet conservation and environmental education objectives through partnerships include:

- The Corporate Campaign for Migratory Bird Conservation
- The North American Bird Conservation Initiative (NABCI)
- The North American Pollinator Protection Campaign
- WHC's *Corporate Lands for Learning (CLL)* Program
- The U.S. Fish and Wildlife Service's Joint Ventures Program
- The Five-Star Restoration Program

7.1 PARTNERSHIP DEVELOPMENT

The survival of many species, in particular those with extended ranges or that exhibit migratory behavior, depends on coordinated conservation efforts among a number of stakeholder entities. As a result, functional collaboration among various groups is becoming increasingly common as a way of dealing with environmental issues. Such stakeholder affiliations address pressing conservation issues on a landscape scale while allowing individual partner groups to continue working at the local level. As such, individual site programs such as that instituted at the Three Mile Island Generating Station are generally more effective when partnered with organizations working for conservation at broader scales.

7.3 THE NORTH AMERICAN BIRD CONSERVATION INITIATIVE

Many migratory bird species of North America must cross international political boundaries during their bi-annual journey. As such, countries with incongruent environmental, biological, and conservation legislation and practices must therefore formulate a standard medium with which to facilitate cooperation for attaining the common goal of bird conservation in order to overcome such disparities in national conservation regulations and programs.

The North American Bird Conservation Initiative (NABCI) was formed to facilitate coordination and cooperation among Canada, the United States, and Mexico in order to address the conservation of migratory bird species that span the continent. Formally,

“...NABCI is a statement of principles and approaches shared by individuals, organizations, agencies, and programs working for the conservation of birds and their habitats in Canada, the United States, and Mexico.”

- NABCI website.

NABCI is not a regulatory instrument, but rather acts as a forum designed to facilitate the flow of ideas and information among concerned organizations and to provide a mechanism for the dissemination of information to a non-specialized audience.

7.4 NORTH AMERICAN POLLINATOR PROTECTION CAMPAIGN

According to the eighty partners working together in the North American Pollinator Protection Campaign (NAPPC), pollinating species such as native and managed bees, beetles, butterflies, moths, bats, and birds ensure productive harvests and seed set for many important food, oil, and fiber crops throughout the world. In the U.S alone, the USDA estimates that pollinators are responsible for providing reproduction services to \$40 billion worth of agricultural products each year.

Pollinators are also essential for maintaining healthy, natural ecosystems by pollinating native plants important to many species of insects, wildlife, and fish. For example, approximately 25 percent of all songbirds include fruit or seeds as a major part of their diet, while other animals eat the leaves, roots, nuts, pollen, and/or nectar of pollinated plants. Additionally, many species of

The NAPPCC Pollinator Friendly Practices guidelines consider six different areas of land use management: Foraging Habitat, Reproduction, Shelter, Invasive/Exotic Species, Chemical Use, and Monitoring. For each topic, there is a central question to be addressed, followed by a detailed approach to the subject. The complete guidelines, as well as a program registration form, are included in **Appendix IV**. For more information, please contact Marcia Maslonek, WHC Director of Biodiversity and Technical Programs, at (412) 777-2464.

7.5 CORPORATE LANDS FOR LEARNING (CLL)

The Wildlife Habitat Council and the National Environmental Education and Training Foundation (NEETF) co-developed the *Corporate Lands for Learning (CLL)* program to facilitate the coordination of corporate resources with local schools to form functional partnerships based on the foundation of environmental education and outreach. The goal of the program is to maximize the use of human and natural resources of the corporate site to benefit the educational needs of the local schools. An environmental education program would allow students from the local community to use the Three Mile Island Generating Station as an outdoor classroom for practical and applied experience in environmental issues. *CLL* offers the opportunity to create a nationally recognized environmental education partnership between corporations and the communities in which they exist.

The first steps in initiating an environmental education program are to evaluate the needs of the local community and the resources available at the site. Site representatives then meet with representative individuals from local schools and environmental education groups in the community to identify constraints and opportunities. Following these two steps, WHC will provide the site with a report that outlines the types of activities possible, recommendations for implementation, an overview of state mandates, and a suggested curriculum that can be accomplished on the site to meet these mandates. WHC will then develop and deliver a two-day training workshop designed to teach and train employees, educators, and others how to build partnerships and use the provided educational programs and curriculum.

wildlife habitat but also enhance natural resource quality, such as reducing soil erosion and flood potential and filtering pollutants in ground water.

7.6.1 Additional Information and Assistance

More information about the Corporate Campaign for Migratory Birds, regional Joint Ventures, Management Boards, projects, goals, and corporate benefits can be found on-line at www.wildlifehc.org/managementtools/waterfowl.cfm or by contacting David Wesley, WHC Migratory Bird Coordinator, at dwesley@montana.com.

7.7 FIVE-STAR RESTORATION PROGRAM

The Three Mile Island Generating Station can further demonstrate its commitment to watershed protection by participating in the Five-Star Restoration Program. The Five-Star challenge grant program – a partnership between WHC, the U.S. Environmental Protection Agency, the National Fish and Wildlife Federation, the National Association of Counties, and the National Oceanic and Atmospheric Administration – focuses on community-based watershed restoration projects. Each year, approximately \$500,000 is given in grant awards to 70 projects, which are typically matched five-fold by the partners in each project. Since the program's inception in 1998, 70 miles of stream buffers have been planted, 7,000 acres of wetlands have been restored and over 10,000 volunteers have participated. Five-Star is a unique opportunity that allows corporations to reach out to their communities and involve local governments, non-profit organizations, small businesses and a wide range of citizen groups. Each organization contributes cash or services and becomes a "partner" who makes a permanent commitment to maintain the restored or enhanced waterway.

WHC is pleased to promote corporate participation in Five-Star, and we spotlight their work on the WHC web site, in our quarterly newsletters, and at our annual Symposium. So far, 19 WHC members have been involved with Five-Star by organizing their own projects on corporate land or making in-kind and cash donations to support projects in their neighborhoods. Further information about the Five-Star Restoration Program can be found on-line at <http://www.wildlifehc.org/fivestar>.

available to participate in team meetings, species inventories, special events, and strategic planning of the program.

WHC is pleased to have been given the opportunity to assist employees at the Three Mile Island Generating Station in the development and implementation of a long-term wildlife habitat management program and encourages Exelon Corporation to continue its leadership in this pursuit.

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Recommended Field Guides

- Boyd, Howard P. 1991. *A Field Guide to the Pine Barrens of New Jersey*. Plexus Publishing, Inc., Bedford, New Jersey. 423pp.
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- Burr, Brooks M., Lawrence M. Page, and Tory Peterson. 1998. *A Field Guide to Freshwater Fishes: North America North of Mexico* (Peterson Field Guides). Houghton Mifflin Company, Boston, Massachusetts. 541pp.
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White, Richard E., and Donald J. Borror. 1998. *A Peterson Field Guide to Insects: America North of Mexico*. Houghton Mifflin Company, Boston, Massachusetts. 448pp.

Williamson, Sheri L. 2002. *A Peterson Field Guide to the Hummingbirds of North American*. Houghton Mifflin Company, Boston, Massachusetts. 275pp.

TYPE	COMMON NAME	SCIENTIFIC NAME
	Blue jay	<i>Cyanocitta cristata</i>
	Tundra swan	<i>Cygnus columbianus</i>
	Peregrine falcon	<i>Falco peregrinus</i>
	American kestrel	<i>Falco sparverius</i>
	Wilson's snipe	<i>Gallinago delicata</i>
	Common loon	<i>Gavia immer</i>
	Bald eagle	<i>Haliaeetus leucocephalus</i>
	Herring gull	<i>Larus argentatus</i>
	Hooded merganser	<i>Lophodytes cucullatus</i>
	Red-bellied woodpecker	<i>Melanerpes carolinus</i>
	Wild turkey	<i>Meleagris gallopavo</i>
	Osprey	<i>Pandion haliaetus</i>
	Double-crested cormorant	<i>Phalacrocorax auritus</i>
	Ringed-necked pheasant	<i>Phasianus colchicus</i>
	American golden-plover	<i>Pluvialis dominica</i>
	Black-capped chickadee	<i>Poecile atricapilla</i>
	Eastern bluebird	<i>Sialia sialis</i>
	Tree swallow	<i>Tachycineta bicolor</i>
	American robin	<i>Turdus migratorius</i>
	Canada warbler	<i>Wilsonia canadensis</i>
	Northern cricket frog	<i>Acris crepitans</i>
Amphibians & Reptiles	Spotted salamander	<i>Ambystoma maculatum</i>
	American toad	<i>Bufo americanus</i>
	Snapping turtle	<i>Chelydra serpentina</i>
	Painted turtle	<i>Chrysemys picta</i>
	Eastern rat snake	<i>Elaphe obsoleta</i>
	Five-lined skink	<i>Eumeces fasciatus</i>
	Gray treefrog	<i>Hyla versicolor</i>
	Milk snake	<i>Lampropeltis triangulum</i>
	Mudpuppy	<i>Necturus maculosus</i>
	Common water snake	<i>Nerodia sipedon sipedon</i>
Butterflies	Eastern newt	<i>Notophthalmus viridescens</i>
	Lesser siren	<i>Siren intermedia</i>
	Eastern massasauga	<i>Sistrurus catenatus catenatus</i>
	Tawny emperor	<i>Asterocampa chyton</i>
	Io moth	<i>Automeris io</i>
	Meadow fritillary	<i>Boloria bellona</i>
	Monarch	<i>Danans plexippus</i>
	Silver-spotted skipper	<i>Epargyreus clarus</i>
	Eastern tailed-blue	<i>Everes comyntas</i>
	Giant swallowtail	<i>Papilio cresphontes</i>
	Cabbage white	<i>Pieris rapae</i>

TYPE	COMMON NAME	SCIENTIFIC NAME
	Water pennywort	<i>Hydrocotyle americana</i>
	Orange jewelweed	<i>Impatiens capensis</i>
	American water-willow	<i>Justicia americana</i>
	Oxeye daisy	<i>Leucanthemum vulgare</i>
	Honesty	<i>Lunaria annua</i>
	Whorled loosestrife	<i>Lysimachia quadrifolia</i>
	Common moonseed	<i>Menispermum canadense</i>
	Tall bluebells	<i>Mertensia paniculata</i>
	Wall lettuce	<i>Mycelis muralis</i>
	True forget-me-not	<i>Myosotis scorpioides</i>
	Common evening-primrose	<i>Oenothera biennis</i>
	Devil's tongue	<i>Opuntia humifusa</i>
	Sweet Cicely	<i>Osmorhiza claytonii</i>
	Wild ginseng	<i>Panax quinquefolius</i>
	Downy phlox	<i>Phlox pilosa</i>
	Common plantain	<i>Plantago major</i>
	Saltmarsh fleabane	<i>Pluchea odorata</i>
	May-apple	<i>Podophyllum peltatum</i>
	Swamp smartweed	<i>Polygonum hydropiperoides</i>
	Common buttercup	<i>Ranunculus acris</i>
	Black-eyed Susan	<i>Rudbeckia triloba</i>
	Fringe-leaf wild petunia	<i>Ruellia humilis</i>
	Slender glasswort	<i>Salicornia maritima</i>
	Northern pitcher plant	<i>Sarracenia purpurea</i>
	Starry Campion	<i>Silene stellata</i>
	Canada goldenrod	<i>Solidago canadensis</i>
	Wood poppy	<i>Stylophorum diphyllum</i>
	Skunk cabbage	<i>Symplocarpus foetidus</i>
	Yellow goatsbeard	<i>Tragopogon dubius</i>
	Red clover	<i>Trifolium pratense</i>
	Coltsfoot	<i>Tussilago farfara</i>
	Stinging nettle	<i>Urtica dioica</i>
	Blue vervain	<i>Verbena hastata</i>
	Tall ironweed	<i>Vernonia gigantea</i>
	Periwinkle	<i>Vinca minor</i>
	Sand violet	<i>Viola affinis</i>
	White mule's-ear	<i>Xanthium strumarium</i>
	Adam's needle	<i>Yucca filamentosa</i>
	Meadow zizia	<i>Zizia aptera</i>
Trees	Balsam fir	<i>Abies balsamea</i>
	Black maple	<i>Acer nigrum</i>
	Horse-chestnut	<i>Aesculus hippocastanum</i>
	Bog rosemary	<i>Andromeda polifolia</i>

APPENDIX III
CONTACT INFORMATION

FEDERAL GOVERNMENT RESOURCES

Natural Resource Conservation Service (NRCS)

Natural Resources Conservation Service
Attn: Conservation Communications Staff
P.O. Box 2890
Washington, DC 20013

NRCS PA Offices

York County Field Office

District Conservationist
William Clifton
Phone: 717-755-2966, ext 104
Email: william.clifton@pa.usda.gov

NRCS PA Offices

York County Field Office

Natural Resource Specialist
Jennifer Cook
Phone: 717-755-2966, ext 105
Email: jennifer.cook@pa.usda.gov

NRCS PA Offices

York County Field Office

Biologist
James Gillis
Phone: 717-755-2966, ext 108
Email: james.gillis@pa.usda.gov

Environmental Protection Agency (EPA)

Ariel Rios Building
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460
(202) 272-0167

EPA Region 3 (DC, DE, MD, PA, VA, WV)

Environmental Protection Agency
1650 Arch Street
Philadelphia, PA 19103-2029
<http://www.epa.gov/region03/>
Phone: (215) 814-5000
Fax: (215) 814-5103
Toll free: (800) 438-2474
Email: r3public@epa.gov

USGS PA Field Office

USGS Pennsylvania Cooperative Fish and Wildlife Research Unit

Email: 1-coopunit@lists.psu.edu

113 Merkle Building

Pennsylvania State University

University Park, PA 16802

Phone: 814-865-4511

Fax: 814-863-4710

US Forest Service

USDA Forest Service

1400 Independence Ave., SW

Washington, D.C. 20250-0003

(202) 205-8333

US Forest Service, Region 9 Offices

626 East Wisconsin Ave.

Milwaukee, WI 53202

Phone: (414) 297-3600

FAX: (414) 297-3808

TTY: (414) 297-3507

Federal Energy Regulatory Commission

888 First Street, NE

Washington, DC 20426

US Army Corps of Engineers

North Atlantic Division

302 General Lee Avenue

Brooklyn, New York 11252

Phone: 718 765-7018

Fax: 718 765-7170

ORGANIZATION AND ACADEMIC RESOURCES

Hawk Mountain Sanctuary Association

1700 Hawk Mountain Road
Kempton, PA 19529
Phone: 610-756-6961
Fax: 610-756-4468
Email: info@hawkmountain.org
Web site: <http://www.hawkmountain.org/default.shtml>

Ducks Unlimited

Mid-Atlantic Field Office
34 Defense St., Suite 200
Annapolis, MD 21401
Phone: 1-800-45DUCKS
Web site: <http://www.ducks.org/conservation/Projects/GreatLakesAtlantic/ChesapeakeBAy/index.asp>

National Wild Turkey Federation

Post Office Box 530
Edgefield, SC 29824-0530
Phone: 1-800-THE-NWTF
Web site: <http://www.nwtf.org/>

Bat Conservation International

Bat Conservation International
P.O. Box 162603
Austin, TX 78716
Phone: (512) 327-9721
Fax: (512) 327-9724
Web site: <http://www.batcon.org/home/default.asp>

Cornell Lab of Ornithology

Attn: Communications
159 Sapsucker Woods Rd.
Ithaca, NY 14850
Phone: 1-800-843-2473
Email: cornellbirds@cornell.edu
Web site: <http://www.birds.cornell.edu/>

North American Pollinator Protection Campaign

c/o Coevolution Institute
423 Washington St, 5th Fl
San Francisco, CA 94111-2339
Phone: (415) 362-1137
Fax: (415) 362-3070
Web site: <http://www.nappc.org/>

PA Resources Council

Philadelphia Office
3606 Providence Rd.
Newtown Square, PA 19073
Phone: 610-353-1555
Web site: <http://www.prc.org/>

PA Association of Wildlife Rehabilitators

Web site: <http://pawr.com/>

Wildlife Rescue of PA

P.O. Box 71
Friendsville, PA 18818
Phone: 570)553-2499
Email: director@wildliferescue-pa.com
Web site: <http://www.wildliferescue-pa.com/>

York College

York, PA 17405-7199
Phone: 717) 846-7788
Web site: <http://www.ycp.edu/>

Pennsylvania State University-York

1031 Edgecomb Avenue
York, PA 17403-3398
Phone: 717-771-4000
Web site: <http://www.yk.psu.edu/contactus.htm>

York Technical Institute

1405 Williams Rd.
York, PA 17402
Phone: 1-800-227-9675
Web site: <http://www.yti.edu/>

Millersville University

PO Box 1002
1 South George St
Millersville, PA 17551
Phone: 717-872-3011
Web site: <http://muweb.millersville.edu/index.php>

Harrisburg Area Community College

One HACC Drive
Harrisburg, PA 17110-2999
Phone: (717) 780-2300
or (800) ABC-HACC
Email: pr@hacc.edu

Quarry Road
Yardley, PA 19067
Phone: 215-968-6141

Buddies Nursery
PO Box 14
Birdsboro, PA 19508
Phone: 610-582-2410

Hansen Nursery
PO Box 8
Sassamsville, PA 19472
Phone: 215-754-7843

Brandywine Conservancy
Box 141
Chadds Ford, PA 19317
Phone: 610-388-2700

Prairie Nursery
PO Box 306
Westfield, WI 53964
Phone: 608-296-3679

Applewood Seed Company
5380 Vivian Street
Arvado, CO 80002
Phone: 303-431-6283

Ernst Crownvetch Farms
R.D. 5, Box 806, Mercer Pike
Meadville, PA 16335
Phone: 814-425-7276

Native Plants and Aquatic Nursery
Sandy Wilson
834 Church Road
Harleysville, PA 19438
Phone: 610-584-6302

Pennsylvania Nurserymen's Association, Inc.
Guide to Pennsylvania Nursery Stock
1924 North Second Street
Harrisburg, PA 17102

National Wildflower Research Center
2600 FM 973