



# **Rehabilitation of River Road**

## **Delaware Water Gap National Recreation Area**

***FINAL***

### ***Plant Survey Report***

December 10, 2004

Printed on recycled paper

## SUMMARY

The National Park Service is proposing to rehabilitate River Road within Delaware Water Gap National Recreation Area, Pennsylvania. To support the decision making process, NPS must complete an environmental assessment addressing these actions under the National Environmental Policy Act of 1969 (NEPA), associated regulations, and policies. A survey for targeted rare plants within the River Road project corridor was deemed necessary to document the potential occurrence and impact of the proposed project on rare plant populations.

## FINDINGS

The survey did not detect the presence of any of the target species within either segment of the survey area. Clinton's wood fern (*Dryopteris clintoniana*), a species for which rare status has not yet been determined, was thought present in several locations throughout the survey area. Samples were taken from two sites and sent to a professional botanist with The Nature Conservancy, Pennsylvania Science Office and a private consultant. Both botanists identified the plants as *Dryopteris marginalis*, or marginal woodfern, a common species.

Within the southwestern portion of Wetland 2 an extensive emergent marsh is present along side River Road. Wetland 3 is located southwest of Park Headquarters, and consists of a small vernal pool surrounded by forest. River Road and the entrance road to Park Headquarters border this wetland. These areas were specifically surveyed for the federally endangered Northeastern bulrush (*Scirpus ancistrochaetus*), due to the potential suitability of the habitat. Northeastern bulrush is typically associated with wetlands with fluctuating water tables, including vernal pools and beaver impoundments. Multiple bulrush plants were examined in the field to determine individual species. Each plant was identified as woolgrass (*Scirpus cyperinus*). No individuals of Northern bulrush were observed in the project area.

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## INTRODUCTION

On behalf of the National Park Service, the Louis Berger Group, Inc. (Berger) conducted field investigations for the presence of special concern plant species in the Delaware Water Gap National Recreation Area (NRA), Pennsylvania. The NPS is proposing to rehabilitate River Road within the park. To support the decision making process, NPS must complete an environmental assessment addressing this action under the National Environmental Policy Act of 1969 (NEPA), associated regulations, and policies. A survey for targeted rare plants within the River Road project corridor was determined necessary to document the potential occurrence and impact of the proposed project on rare plant populations.

The rehabilitation of River Road will be on the current road alignment and could include some widening. No construction is under way.

## SURVEY AREA

The project is located within the Delaware Water Gap National Recreation Area, on the Pennsylvania side of the Delaware River. Rehabilitation of River Road will extend approximately 6.6 miles along River Road, from the southern park entrance at the Hialeah Picnic Area to just northwest of Park Headquarters at the intersection with Community Drive.

The limits of the plant survey area were based on guidance provided by NPS staff (Exhibit 1). Based on guidance as to where the rehabilitation project was most likely to exceed the existing road corridor, the plant survey area was divided into two segments. Segment 1 started at the southern park boundary south of the Hialeah Picnic Area and continued northward for approximately 2.5 miles to the Smithfield Beach entrance. The survey area extended 50 feet beyond the roadway edge within Segment 1.

Segment 2 consisted of an approximately one mile length of River Road beginning at Freeman Tract Road at the southern end and continuing northward to the intersection with Community Drive. The survey area extended 100 feet beyond the roadway edge within this area.

## GENERAL GEO-PHYSICAL AND BOTANICAL DESCRIPTION OF SURVEY AREA

The segment of River Road between the Hialeah Picnic Area and the Smithfield Beach entrance is characterized by secondary growth forest dominated by sugar maple, beech and tulip poplar, cropland, and fallow fields. Much of this area had been used for agriculture and contained residences and farm structures in the recent past. This area contains a preponderance of non-native herbaceous plant species indicative of past disturbance for agriculture and proximity to a roadway. Several intermittent and perennial streams are present within this roadway segment.

The second segment of River Road between Freeman Tract Road and the intersection of River Road with Community Drive is characterized by steeper topography with upland forests generally dominated by mixed oaks, beech and hemlocks. Both forested and emergent wetlands are present within low lying depressions. The larger of these wetland areas has been identified in the *Wetland Assessment and Bog Turtle Habitat Report* (Draft 2004) as Wetland 2. This wetland surrounds Park Headquarters on its north, east, and south sides and contains both forested and emergent wetlands. The wetland has been altered (flooded) by beaver activity, resulting in the creation of an extensive marsh. Smaller portions of the survey area include cleared land associated with park buildings and access roads. This area generally has fewer non-native plant species within the survey limits.

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Exhibit 1. Survey Area

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## GEOLOGY AND GEOMORPHOLOGY

The Delaware Water Gap NRA is located along the contact between the Appalachian Plateau Physiographic Province to the west and the Ridge and Valley Physiographic Province to the east. The Pennsylvania side of the recreation area is in the Low Plateau section of the Appalachian Plateau Province. The Low Plateau section is underlain by sandstones, siltstones, shales, and limestone associated with rock formations of the Upper and Lower Devonian and Upper Silurian periods. The landscape on the Pennsylvania side of the recreation area is dominated by an escarpment that is the highly eroded, eastern most edge of the Appalachian Plateau. This area is characterized by enlarged stream valleys, rounded highlands, bedrock outcrops, and shale barrens. A thin layer of glacial till or fluvioglacial material covers the bedrock. Fluvioglacial outwash was deposited during glacial retreat as material was washed directly from melting ice sheets (NPS 2000). Elevations associated with the plateau in the area of River Road range from approximately 350 feet above mean sea level to the west of the road to near 1,150 feet above mean sea level in association with the ridge to the north and west of the road.

The Delaware River flows on the last valley of the Ridge and Valley Province. The landscape associated with the Ridge and Valley Province is characterized by gently rolling to steep river terraces and floodplains. The province in the vicinity of the Delaware River is characterized primarily by alluvial materials from the river that have been deposited over glacial outwash. The alluvial deposits are generally characterized by stratified clay, silt, sand, and gravel. Underlying glacial outwash is characterized by silt, sands, and gravels that were carried down by ice and glacial meltwaters. Kames and kame terraces occur intermittently at the base of valley walls. These glacial outwash features were formed as the ice front retreated to the north (NPS 2000). Elevations associated with the Ridge and Valley Province in the assessment area range from approximately 320 feet to 425 feet above mean sea level. Landforms associated with the Ridge and Valley Province in the project area occur primarily to the east of River Road.

## BOTANICAL RESOURCES

Dominant vegetative community types occurring in the Delaware Water Gap NRA include a mosaic of second/third growth forests, old fields and thickets, and croplands. Approximately half of the area between the Delaware River and River Road is in cropland use. The remaining area between the river and the road is comprised of old fields or maturing forested areas. Vegetative communities to the north and west of River Road and the area from the vicinity of the Turn Farm parking area north are characterized primarily by maturing forests.

The overstory in forested areas along River Road is characterized primarily by combinations of white oak (*Quercus alba*), red oak (*Q. rubra*), scarlet oak (*Q. coccinea*), chestnut oak (*Q. prinus*), tulip poplar (*Liriodendron tulipifera*), various species of hickories (*Carya* spp.), red maple (*Acer rubrum*), sugar maple (*Acer saccharum*), black birch (*Betula lenta*), black cherry (*Prunus serotina*), eastern hemlock (*Tsuga canadensis*), sycamore (*Plantanus occidentalis*), and ironwood (*Carpinus caroliniana*). Examples of understory species identified in the wooded areas include spice bush (*Lindera benzoin*), blueberry (*Vaccinium* sp.), multiflora rose (*Rosa multiflora*), autumn olive (*Elaeagnus umbellata*), Japanese barberry (*Berberis thunbergii*), Virginia creeper (*Parthenocissus quinquefolia*), poison ivy (*Toxicodendron radicans*), Japanese honeysuckle (*Lonicera japonica*), hay scented fern (*Dennstaedtia punctilobula*), Christmas fern (*Polystichum acrostichoides*), white snakeroot (*Eupatorium rugosum*), partridge berry (*Mitchella repens*), garlic mustard (*Alliaria petiolata*), and stilt grass (*Microstegium vimineum*).

Old field areas represent communities that were developed as former croplands, pastures and home sites. The abandoned fields, over time, become pioneered by trees and shrubs as they return to forested areas. Examples of common vegetation occurring in these areas include tree species such as eastern red cedar

(*Juniperus virginiana*), white pine (*Pinus strobus*), gray birch (*Betula populifolia*), and tree-of-heaven (*Ailanthus altissima*). Shrubs and vines occurring in these areas typically include staghorn sumac (*Rhus typhina*), Allegheny blackberry (*Rubus allegheniensis*), black raspberry (*Rubus occidentalis*), autumn olive (*Elaeagnus umbellata*), Morrow's honeysuckle (*Lonicera morrowii*), Japanese honeysuckle (*Lonicera japonica*), and grapes (*Vitis* spp.). Examples of herbaceous vegetation occurring in these areas typically includes various goldenrods (*Solidago* spp.), asters (*Aster* spp.), wild bergamot (*Monarda fistulosa*), common milkweed (*Asclepias syriaca*), little bluestem (*Schizachyrium scoparium*), timothy (*Phleum pratense*), orchard grass (*Dactylis glomerata*), sweet vernal grass (*Anthoxanthum odoratum*), foxtail (*Setaria* sp.), Japanese stilt grass (*Microstegium vimineum*), Canada thistle (*Cirsium arvense*), and bull thistle (*Cirsium vulgare*) (NPS 2000).

Wetland vegetative communities along the River Road corridor are generally characterized by forested, scrub-shrub, and herbaceous habitats. Palustrine forested wetland habitats are typically dominated by red maple in the canopy with spice bush dominating the shrub layer, and jewelweed (*Impatiens capensis*), false nettle (*Boehmeria cylindrica*), and skunk cabbage (*Symplocarpus foetidus*) occurring as dominants the herbaceous layer. Examples of vegetation occurring in palustrine scrub-shrub habitats include spice bush, high bush blueberry (*Vaccinium* sp.), silky dogwood (*Cornus amomum*), and buttonbush (*Cephalanthus occidentalis*) in the shrub layer, with jewelweed, false nettle, water smartweed (*Polygonum punctatum*), arrow-leaved tearthumb (*Polygonum sagittatum*), goldenrod, and sensitive fern (*Onoclea sensibilis*) as examples of vegetation occurring in the herbaceous layer. Herbaceous wetland habitats are diverse and may include jewelweed, false nettle, water smartweed, arrow-leaved tearthumb, purple loosestrife (*Lythrum salicaria*), goldenrod, sensitive fern, reed canary grass (*Phalaris arundinacea*), wool grass (*Scirpus cyperinus*), dark green bulrush (*Scirpus georgianus*), and several species of sedges, some of which include, shallow sedge (*Carex lurida*), upright sedge (*Carex stricta*), and fringed sedge (*Carex crinita*).

### **Invasive Plant Species**

Most, if not all, of the park's plant communities have been invaded by one or more exotic invasive species as evidenced by the species lists provided above. These species can reduce biological diversity and affect ecological processes over the long-term. Exotic invasive tree species occurring in the recreation area include tree-of-heaven. Exotic invasive shrub species include multiflora rose, autumn olive, Japanese barberry, common privet (*Ligustrum vulgare*) and Morrow's honeysuckle. Invasive herbaceous species occurring in the recreation area include purple loosestrife, phragmites (*Phragmites australis*), Japanese knotweed (*Polygonum cuspidatum*), Japanese stilt grass, timothy, orchard grass, sweet vernal grass, Canada thistle, bull thistle, and garlic mustard. Many of these plants are opportunists and invade new areas following disturbance. They are especially noticeable along rights-of-way, along highways and in fields, but also occur in forest gaps and edges. Common non-native species found within the survey areas include barberry, privet, multiflora rose, garlic mustard, Nepalese browntop grass (*Microstegium vimineum*), and gill-over-ground.

## SURVEY METHODOLOGY

The Louis Berger Group, Inc. (Berger) consulted with park staff to identify specific areas to be surveyed. A list of target species was developed from the current list of rare species and natural communities of Pennsylvania provided by park staff (see appendix A). The list was honed further following consultation with park staff regarding probable habitat types in the survey area. Table 1 lists the 14 target species for which the survey was conducted and their federal and state status. Each of these plant species are typically associated with either wetland habitats or open water features.

**Table 1. List of rare plant species targeted for survey within the project area.**

| Scientific Name                                    | Common Name                   | Status                                  |
|----------------------------------------------------|-------------------------------|-----------------------------------------|
| <i>Carex disperma</i>                              | Soft-leaf sedge               | PA - Rare                               |
| <i>Carex lasiocarpa</i>                            | Woolly-fruit sedge            | PA - Rare                               |
| <i>Carex tetanica</i>                              | Rigid sedge                   | PA- Threatened                          |
| <i>Carex typhina</i>                               | Cat-tail sedge                | PA – Endangered                         |
| <i>Cypripedium calceolus</i> var. <i>pubescens</i> | Greater yellow lady's slipper | PA - Vulnerable                         |
| <i>Dryopteris clintoniana</i>                      | Clinton's wood fern           | N – not ranked                          |
| <i>Epilobium strictum</i>                          | Downy willowherb              | PA- Endangered                          |
| <i>Juncus brachycephalus</i>                       | Small-head rush               | PA- Threatened                          |
| <i>Lobelia kalmii</i>                              | Brook lobelia                 | PA- Endangered                          |
| <i>Menyanthes trifoliata</i>                       | Buck-bean                     | Not listed                              |
| <i>Parnassia glauca</i>                            | Fen grass-of-parnassus        | PA- Endangered                          |
| <i>Poa paludigena</i>                              | Bog blue grass                | PA- Threatened<br>FWS - Special Concern |
| <i>Potentilla fruticosa</i>                        | Golden hardhack               | PA- Endangered                          |
| <i>Scirpus ancistrochaetus</i>                     | Northern bulrush              | PA- Endangered<br>FWS - Endangered      |

The field surveys were conducted between July 16 and July 30, 2004; a follow-up visit was conducted October 21, 2004. Field staff conducted both wandering surveys for target species within the survey segments, and more detailed surveys within preferred habitats for individual target species. The 14 target species are generally associated with wetland and shallow open water habitats; therefore, additional effort was made to more closely survey these areas for the target species where the potential for occurrence was greatest. If plants were identified, the field methodology included documenting each individual occurrence by photographic representation and surveying each occurrence by global positioning system, or GPS. Berger staff trained in the use of the Trimble Pro XRS with Asset Surveyor software were on site to gather necessary data. The Trimble Pro XRS with Asset Surveyor software is capable of providing sub-meter accuracy for point locations.

## SURVEY FINDINGS

The survey did not detect the presence of any of the identified target species within either survey area. Clinton's wood fern (*Dryopteris clintoniana*), a species for which rare status has not yet been determined, was thought present in several locations throughout the survey area. Representative samples were taken from two sites during the October 2004 site visit and sent to professional botanists with The Nature Conservancy, Pennsylvania Science Office and a private consultant. Both botanists identified the plants as *Dryopteris marginalis*, or marginal woodfern, a common species (NPS, J. Shreiner, email, November 11, 2004).

An extensive emergent marsh is present near Park Headquarters along River Road. In addition, a small vernal pool surrounded by forest is located southwest of Park Headquarters. River Road and the entrance road to Park Headquarters border this wetland. These areas were specifically surveyed for the federally endangered Northeastern bulrush (*Scirpus ancistrochaetus*) due to the potential suitability of the habitat. Northeastern bulrush is typically associated with wetlands with fluctuating water tables, including vernal pools and beaver impoundments. Multiple bulrush plants were examined in the field to determine individual species. Each plant was identified as woolgrass (*Scirpus cyperinus*). No individuals of Northern bulrush were observed in the survey area.

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# **Appendix A**

## **NPS Database Search**









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**Appendix B**  
**List of Plant and Animal Species Observed**  
**in Survey Area**



| SCIENTIFIC NAME                    | COMMON NAME             | SCIENTIFIC NAME                 | COMMON NAME               |
|------------------------------------|-------------------------|---------------------------------|---------------------------|
| <b>Trees &amp; Shrubs*</b>         |                         |                                 |                           |
| <i>Acer negundo</i>                | Ash-leaf maple          | <i>Lonicera morrowi</i>         | Morrow honeysuckle        |
| <i>Acer platanoides</i>            | Norway maple            | <i>Ostrya virginiana</i>        | Hop hornbeam              |
| <i>Acer rubrum</i>                 | Red maple               | <i>Platanus occidentalis</i>    | Sycamore                  |
| <i>Acer saccharinum</i>            | Silver maple            | <i>Quercus alba</i>             | White oak                 |
| <i>Acer saccharum</i>              | Sugar maple             | <i>Quercus montanii</i>         | Chestnut oak              |
| <i>Alianthus altissima</i>         | Tree-of-heaven          | <i>Quercus rubra</i>            | Red oak                   |
| <i>Carya ovata</i>                 | Shagbark hickory        | <i>Salix</i> spp.               | Willow                    |
| <i>Cornus florida</i>              | Flowering dogwood       | <i>Tilia americana</i>          | Basswood                  |
| <i>Euyonimus americanus</i>        | Burning bush            | <i>Tsuga canadensis</i>         | Eastern hemlock           |
| <i>Fagus grandifolia</i>           | American beech          | <i>Ulmus rubra</i>              | Slippery elm              |
| <i>Fraxinus pennsylvanica</i>      | White ash               | <i>Vaccinium corymbosum</i>     | Highbush blueberry        |
| <i>Juglans nigra</i>               | Black walnut            | <i>Vibrunum alnifolium</i>      | Hobblebush                |
| <i>Larix laricina</i>              | Tamarack                | <i>Viburnum dentatum</i>        | Arrowwood                 |
| <i>Ligustrum vulgare</i>           | Common privet           | <i>Viburnum lentago</i>         | Nannyberry                |
| <i>Lindera benzoin</i>             | Spicebush               | <i>Viburnum prunifolium</i>     | Smooth blackhaw           |
| <i>Liriodendron tulipifera</i>     | Yellow poplar           |                                 |                           |
| <b>Vines*</b>                      |                         |                                 |                           |
| <i>Campsis radicans</i>            | Trumpet creeper         | <i>Rubus allegheniensis</i>     | Blackberry                |
| <i>Celastrus orbiculatus</i>       | Bittersweet             | <i>Toxicodendron radicans</i>   | Poison ivy                |
| <i>Lonicera japonica</i>           | Japanese honeysuckle    | <i>Vitis</i> spp.               | Grape                     |
| <i>Parthenocissus quinquefolia</i> | Virginia creeper        |                                 |                           |
| <b>Herbaceous Plants*</b>          |                         |                                 |                           |
| <i>Achillea millefolium</i>        | Yarrow                  | <i>Geum aleppicum</i>           | Yellow avens              |
| <i>Acorus calamus</i>              | Sweet-flag              | <i>Glechoma hederacea</i>       | Gill-over-the-ground      |
| <i>Alliaria petiolata</i>          | Garlic mustard          | <i>Gymnocarpium dryopteris</i>  | Oakfern                   |
| <i>Amphicarpa bracteata</i>        | Hog peanut              | <i>Hellerborine epipactis</i>   | Hellerborine              |
| <i>Apocynum cannabinum</i>         | Dogbane                 | <i>Hesperis matronalis</i>      | Dames rocket              |
| <i>Arabis glabra</i>               | Tower mustard           | <i>Hydrophyllum virginianum</i> | Broad Virginian waterleaf |
| <i>Aralia hispida</i>              | Spikenard               | <i>Impatiens campensis</i>      | Jewelweed                 |
| <i>Arisaema atrorubens</i>         | Jack-in-the-pulpit      | <i>Impatiens pallida</i>        | Jewelweed                 |
| <i>Asarum canadense</i>            | Wild ginger             | <i>Lapsana communis</i>         | Nipplewort                |
| <i>Asclepias syriaca</i>           | Common milkweed         | <i>Lepidium virginicum</i>      | Peppergrass               |
| <i>Asplenium platyneuron</i>       | Ebonyspleenwort         | <i>Linaria vulgaris</i>         | Butter and eggs           |
| <i>Aster</i> spp.                  | Asters                  | <i>Monarda fistulosa</i>        | Wild bergamot             |
| <i>Boehmeria cylindrica</i>        | Smallspike false nettle | <i>Monotropa uniflora</i>       | Indian pipes              |

| SCIENTIFIC NAME                | COMMON NAME               | SCIENTIFIC NAME                   | COMMON NAME            |
|--------------------------------|---------------------------|-----------------------------------|------------------------|
| <i>Carex</i> spp.              | Sedges                    | <i>Nicotiana quadrivalvis</i>     | Indian tobacco         |
| <i>Carex crinita</i>           | Fringed sedge             | <i>Onoclea sensibilis</i>         | Sensitive fern         |
| <i>Carex lurida</i>            | Shallow sedge             | <i>Osmunda cinnamomea</i>         | Cinnamon fern          |
| <i>Carex stricta</i>           | Upright sedge             | <i>Oxalis montana</i>             | Common wood sorrel     |
| <i>Chimaphila maculata</i>     | Spotted wintergreen       | <i>Panicum clandestinum</i>       | Deer-tongue grass      |
| <i>Chrysanthemum</i> spp.      | Common daisy              | <i>Phleum pratense</i>            | Timothy                |
| <i>Cirsium arvense</i>         | Canada thistle            | <i>Podophyllum peltatum</i>       | May apple              |
| <i>Clinopodium vulgare</i>     | Wild basil                | <i>Polygonum cespitosum</i>       | Cepitose knotweed      |
| <i>Commelina communis</i>      | Asiatic dayflower         | <i>Polygonum virginianum</i>      | Virginia knotweed      |
| <i>Cuscuta gronovii</i>        | Common dodder             | <i>Polystichum acrostichoides</i> | Christmas fern         |
| <i>Dactylis glomerata</i>      | Orchard grass             | <i>Ranunculus ficaria</i>         | Lesser celadine        |
| <i>Daucus carota</i>           | Queen Anne's lace         | <i>Rosa multiflora</i>            | Multiflora rose        |
| <i>Desmodium glutinosum</i>    | Pointedleaf ticktrefoil   | <i>Rudbeckia hirta</i>            | Black-eyed susan       |
| <i>Dryopteris carthusiana</i>  | Spinulose wood fern       | <i>Rumex crispus</i>              | Curly dock             |
| <i>Dryopteris marginalis</i>   | Marginal wood fern        | <i>Setaria glauca</i>             | Foxtail                |
| <i>Eleocharis</i> spp.         | Spike rushes              | <i>Solidago rugosa</i>            | Rough-leaved goldenrod |
| <i>Erechtites hieracifolia</i> | Fireweed                  | <i>Solidago</i> spp.              | Goldenrods             |
| <i>Erigeron annuus</i>         | Daisy fleabane            | <i>Symplocarpus foetidus</i>      | Skunk cabbage          |
| <i>Eupatorium rugosum</i>      | White snakeroot           | <i>Thalictrum polygamum</i>       | Tall meadow rue        |
| <i>Forsythia</i> spp.          | Forsythia                 | <i>Thelypteris noveboracensis</i> | New York fern          |
| <i>Galium lanceolatum</i>      | Wild licorice             | <i>Trifolium pratense</i>         | Red clover             |
| <i>Gaultheria procumbens</i>   | Wintergreen               | <i>Verbena urticifolia</i>        | White vervain          |
| <i>Geranium pusillum</i>       | Small-flowered cranesbill | <i>Zia mays</i>                   | Corn                   |
| <b>Wildlife</b>                |                           |                                   |                        |
| <i>Agelaius phoeniceus</i>     | Red-winged blackbird      | <i>Hyla chrysoscelis</i>          | Gray treefrog          |
| <i>Ardea herodias</i>          | Great blue heron          | <i>Meleagris gallopavo</i>        | Wild turkey            |
| <i>Aix sponsa</i>              | Wood duck                 | <i>Notophthalmus viridescens</i>  | Red spotted newt       |
| <i>Branta canadensis</i>       | Canada goose              | <i>Odcoileus virginianus</i>      | White-tailed deer      |
| <i>Buteo jamaicensis</i>       | Red-tailed hawk           | <i>Picoides villosus</i>          | Hairy woodpecker       |
| <i>Butorides striatus</i>      | Green backed heron        | <i>Pseudacris crucifer</i>        | Spring peeper          |
| <i>Castor canadensis</i>       | Beaver                    | <i>Rana catesbeiana</i>           | Bull frog              |
| <i>Cathartes aura</i>          | Turkey vulture            | <i>Rana clamitans</i>             | Green frog             |
| <i>Ceryle alcyon</i>           | Kingfisher                | <i>Rana palustris</i>             | Pickereel frog         |
| <i>Cyanocitta cristata</i>     | Blue jay                  | <i>Rana sylvatica</i>             | Wood frog              |
| <i>Dryocopus pileatus</i>      | Pileated woodpecker       | <i>Vulpes vulpes</i>              | Red fox                |
| <i>Dumetella carolinensis</i>  | Gray catbird              |                                   |                        |

\*Taxonomic references followed Gleason and Cronquist, 1989.

# **Appendix C**

## **Qualifications of Principal Investigator**



**EDWARD SAMANNS, PWS***Principal Environmental Scientist***EDUCATION**

M.S., Geography, Rutgers University, 1991

B.S., Biology, Slippery Rock University, 1985

**PROFESSIONAL TRAINING**

Planning Hydrology for Wetland Construction, Rutgers University

Restoration of Disturbed Areas Workshop, Rutgers University

Wetland Construction Technique Workshop, Rutgers University

Wetland Jurisdictional Determination Seminar, USACE, Philadelphia District

Understanding Hydric Soil Conditions of Wetlands Workshop, Rutgers University

Vernal Pool Identification-NJDEP, 2002

Stream Restoration, Rutgers University, 2002

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**PROFESSIONAL CERTIFICATION**

Professional Wetland Scientist #000402

**PROFESSIONAL AFFILIATIONS**

American Water Resources Association

Society of Wetlands Scientists

Society for Ecological Restoration

**PROFESSIONAL EXPERIENCE**

Mr. Samanns is a Wetland/Wildlife Biologist with over sixteen years of experience conducting wetland and wildlife-related studies and assessments. In this role, Mr. Samanns has prepared and implemented wetland restoration designs, prepared wetland design specifications, and has managed wetland monitoring activities in accordance with regulatory permit conditions. Mr. Samanns has also conducted over 100 wetland delineations/assessments in tidal and inland environments that have consistently obtained agency approval. He has also conducted and prepared fishery, wildlife, vegetation and special-status species investigations for numerous federal- and state-mandated environmental impact statements (EISs), natural resource technical reports, and natural resource management plans. Relevant project experience includes the following:

- **Threatened/Endangered Species Surveys and Wetland Jurisdictional Determination, Northumberland County, PA.** *Project Manager* responsible for overseeing the preparation and

acquisition of a USACE Jurisdictional Determination for a 400-acre parcel. Also provided oversight of field surveys for the Federally and State endangered Indiana bat and State-threatened timber rattlesnake. *Client: Federal Bureau of Prisons.*

- **Stewart Airport Access Improvement, Wetland and Vernal Pool Mitigation Site Selection and Design.** *Project Manager* responsible for conducting a site selection and design study for the creation of 1.5 acres of vernal pool habitats within forested uplands to compensate for wetland habitat losses as requested by the NYSDEC. Evaluated physical features within project area leading to the identification of potential sites. Developed concept plans for each vernal pool site. Also responsible for the design of 15 acres of forested, scrub shrub and emergent wetlands at an off-site location. Prepared full plans and specifications to support bid documents. *Client: New York Thruway Authority and New York State Department of Transportation.*
- **Wetland Delineations, Functional Assessments, Mitigation Design and Monitoring, Water Resource Studies, and Training for New York State Department of Transportation.** *Project Manager* responsible for managing two four-year on-call services term agreement to provide wetland and water services to NYSDOT Regions 8, 10 and 11, and other upstate regions. Services performed include the delineation of state and federal regulated wetlands, wetland functional assessments using best-professional judgement, wetland permitting support under the New York State Freshwater Wetlands Act and Section 404 of the Clean Water Act, stream assessments and restoration design, water quality assessments and modeling, and training workshops. Additional services include providing training to NYSDOT staff, evaluating alternative alignments to avoid, minimize and reduce wetland impacts, evaluate wetland mitigation sites, and conducting and preparing wetland mitigation monitoring reports for submission to USACE/NYSDEC. Over twenty-eight task orders have been or are near completion. *Client: New York State Department of Transportation.*
- **Wetland Delineation Training Workshop Using the 1987 Corps Methodology, Albany, NY.** *Project Manager* responsible for preparing and presenting a five-day course on the 1987 Corps three-parameter wetland delineation manual. The course included both lectures and field application of the methodology. Thirty (30) individuals from NYSDOT regional offices and other State agencies participated in the workshop. *Client: New York State Department of Transportation.*
- **NJDOT On-Call Statewide Term Agreement for Wetland Delineation, Permit Preparation and Wetland Mitigation Design.** *Project Manager* responsible for managing a two-year on-call services term agreement to provide wetland delineation, permitting, and wetland mitigation design services to NJDOT. *Client: New Jersey Department of Transportation*
- **NEPA EA/EIS Preparation for Proposed Federal Correctional Facilities Nationwide.** *Team Leader* conducting wetland delineations, wetland assessments, biological inventories, and impact assessments for multiple EAs and EISs for proposed federal prison facilities. Also performed Section 404/State 401 permitting and mitigation site selection and design for several of the projects. Managed staff, subconsultants, and report preparation to complete tasks on time and on budget. Projects are located in over fifteen states and have required interaction with state regulatory agencies and USFWS. *Client: Federal Bureau of Prisons*
- **Engineering Specifications for Wetland Vegetation Establishment and Subgrade Preparation, USACE's Technical Report.** Provided technical assistance in the preparation of the USACE's Engineering Manual for wetland restoration and creation as it relates to the development of engineering specifications and the preparation of engineering bid packages. This segment of the Wetland Engineering Manual contains detailed technical guidance for wetland restoration and establishment for use by biologists, hydrologists and engineers. Included in the manual is guidance on the development of engineering bid packages for vegetation establishment, subgrade preparation and soil handling. A segment of the manual describes the protocols for developing engineering bid packages, plan sheet sets and complete specifications. *Client: U.S. Army Corps of Engineers, Waterways Experimental Station.*
- **Route 183 Wetland Permitting and Mitigation Studies, Sussex County, New Jersey.** *Task Manager* for the preparation of an individual freshwater wetland permit application and wetland

mitigation site selection study. Conducted secondary data source review and field investigations to identify, rank and prioritize wetland mitigation sites based on an established set of site suitability criteria. Assisted in the development of a conceptual mitigation design, design plans and details. Also responsible for preparing planting design and material specifications. Currently working with Byram Township school officials to develop a Nature Trail around the mitigation site for use in outdoor education classes. Managed wetland delineation for the project, synthesized purpose and need and alternatives analysis, and conducted wetland impact assessment as part of the permit preparation. *Client: New Jersey Department of Transportation.*

- **Woodbury Creek Wetland Mitigation Bank, Planting Plan and Invasive Species Management Plan, West Deptford, NJ.** *Project Manager* responsible for the preparation of an integrated planting plan and invasive species management plan for an existing wetland mitigation bank. The project consisted of several tasks including the acquisition of existing tree and shrub density estimates and composition for different planting areas. An assessment of the type and extent of invasive species present and effectiveness of existing management and control efforts was also performed. The management plan integrated recommended planting efforts to attain planting density targets with recommended invasive species control strategies. *Client: U.S. Wetland Services, L.P.*
- **Wetland Mitigation Design and PAmHEP Habitat Assessment for the Greenbrook Flood Control Project, Somerville, NJ.** *Project Task Manager* responsible for feasibility studies and conceptual designs for the restoration of a floodplain forest community on the 50-acre Finderne site along the Raritan River. The projects include the design of forested and emergent wetlands to provide compensatory mitigation for the proposed flood control project. Currently developing Habitat Suitability Units for 10 species of wildlife for baseline and 5 additional target years using PAmHEP methodology. Analysis will be used to maximize the habitat units derived from the restoration concepts to offset losses due to implementation of the flood control project. *Client: U.S. Army Corps of Engineers, New York District.*
- **Two Bridges Road Bridge Over Pompton River and West Belt Extension, Passaic, Morris and Essex Counties, New Jersey.** *Task Manager* responsible for overseeing the completion of a wetland delineation and NJDEP Letter of Interpretation application for a study area of approximately 165 acres located at the confluence of the Passaic and Pompton Rivers. Wetlands located within the study area are classified by the EPA as priority wetlands. Project also includes the development of an ecological and environmental constraints analysis and elements of an Environmental Assessment document. *Client: Passaic County*
- **Atlantic City Expressway Widening, M.P. 0.0 to M.P. 2.8, Atlantic County, NJ.** *Task Manager* for the preparation of CARFRA EIS and acquisition of NJDEP and U.S. Army Corps tidal and freshwater wetland permits for the proposed widening of the Atlantic City Expressway. This fast track project received a Joint CAFRA, Waterfront Development, Freshwater Wetlands and Tidal Wetlands permit from NJDEP in advance of the schedule. Obtained Corps Section 10/404 permits and negotiated a Wetland Mitigation Plan with regulatory agencies resulting in a combination of wetland restoration and wetland/upland habitat preservation. Additional tasks included preparation of a detailed wetland mitigation site selection study and tidal wetland mitigation design and specifications. *Client: South Jersey Transportation Authority.*
- **EFH Assessment: Basilone Memorial Bridge, Raritan River, Middlesex County, New Jersey.** *Project Manager* responsible for managing the preparation of an Essential Fish Habitat (EFH) Assessment for proposed modifications to the fender system of the Basilone Memorial Bridge located 10.2 miles from the mouth of the Raritan River. Water quality surveys were conducted to determine the extent of salt-water intrusion in order to determine the possible seasonal presence of juvenile federally managed species. The assessment provided a discussion on the likelihood of the presence of targeted fish species being present within the work area, potential impacts to these species, and efforts to minimize those impacts. *Client: New Jersey Turnpike Authority.*
- **Transportation Research Board, National Cooperative Highway Research Program 31-12 Ecological Mitigation.** *Project Manager* for the preparation of a synthesis document on

transportation agency roles in conducting ecological mitigation of transportation project impacts to natural resources. The project involved preparing and conducting a survey of transportation agencies in all 50 states, evaluation survey results, conducting a literature search, and preparing the draft and final report. As part this process, conferred with topic panel members to address information needs and direction of report. The final report was published by the National Academies Press in May 2002. *Client: Transportation Research Board.*

- **Edison Bridge Rehabilitation Project, Sayreville, New Jersey.** *Project Manager* responsible for overseeing the preparation of application for Individual Freshwater Wetlands and Open Water Fill, Tidal Wetlands (1970), and Waterfront Development Permits, as well as Water Quality Certification from NJDEP. Also responsible for acquisition of Department of the Army, New York District Nationwide Permit No. 23. *Client: NJ Department of Transportation.*
- **Victory Circle Elimination Project, Sayreville, New Jersey.** *Project Manager* responsible for overseeing the preparation of application for Individual Freshwater Wetlands and Open Water Fill, Tidal Wetlands (1970), and Waterfront Development Permits, as well as Water Quality Certification from NJDEP. Also responsible for acquisition of a Department of the Army, New York District Nationwide Permit No. 23. *Client: NJ Department of Transportation.*
- **Route 322 Corridor Environmental Constraints Analysis, Gloucester County, New Jersey.** *Task Manager* responsible for overseeing the preparation of an assessment of potential environmental constraints for roadway improvements to Route 322 in Gloucester County, New Jersey. Information was compiled on wetlands, flood plains, and threatened and endangered species and was incorporated into GIS mapping that also included information on cultural resources and contaminated sites. *Client: NJ Department of Transportation.*
- **New Jersey Turnpike Interchange 12 Wetland Impact Comparative Analysis, Middlesex County, New Jersey.** *Task Manager* responsible for completing a comparative analysis of potential impacts to wetland resources for three potential alternative alignments for a new feeder road that would connect to the New Jersey Turnpike Interchange 12 Toll Plaza. Also responsible for assessing potential permitting and mitigation issues affecting each of three potential alternative alignments. In addition, potential wetland impacts associated with three construction alternatives for each alignment alternative were analyzed to assist the NJTA in the selection of the most feasible alignment and construction alternative. *Client: New Jersey Turnpike Authority.*
- **U.S. Army, Picatinny Arsenal Endangered Species Management Plan and Environmental Assessment for the Bog Turtle, Rockaway Twp., NJ.** *Project Manager* responsible for the preparation of a management plan for the Federal and State Endangered Bog Turtle. The management plan includes an assessment of potential actions to enhance existing and degraded habitat for this species. The management plan is based on field surveys conducted for this species. A NEPA Environmental Assessment was also prepared to address the potential impacts from implementation of the management plan. *Client: Department of the Army, Office of Environmental Affairs and Office of Natural Resources Management.*
- **US Route 20 Improvements, Jo Daviess and Stephenson Counties, Illinois.** *Task Manager* responsible for the biotic resources assessments of the Ecological Resources Technical Report prepared to support the findings of an EIS for proposed highway improvements within a 50 mile project corridor. The technical studies addressed the impacts and constraints from the proposed roadway on wildlife habitat, wildlife corridors, aquatic resources and threatened and endangered species. The completed baseline report has identified surface important wildlife and plant community resource areas within the project study area. The impact assessment for this project addresses the potential effects of the roadway on these resource areas. *Client: Illinois Department of Transportation.*
- **Wyckoff's Mills Wetland Mitigation Bank.** *Assisted Task Manager* in revising the design, completed by other consulting firm, of the 161-acre Wyckoffs Mills Wetland Mitigation Bank to optimize creation success and minimize costs. Responsible for revising the planting plan and design of habitat components based on fundamental design and construction experience with similar wetland

design/build projects in similar environments as well as our understanding of wetland plant physiology and regulatory compliance issues. Conducted weekly construction monitoring of planting program. *Client: U.S. Wetland Services, L.P.*

- **Harbison-Walker Landfill Restoration, Cape May, New Jersey.** *Task Manager* responsible for managing a biological evaluation of a 126 acre former magnesite processing plant and landfill site located adjacent to Delaware Bay and state parkland. Investigations included performing a wetland and upland habitat assessment, wildlife species inventory, and aquatic organism sampling. Based on soil sampling analysis and plant community assessment, prepared a restoration plan to reclaim the landfill and establish a native grassland/shrub community. *Client: NJ Department of Environmental Protection.*
- **SIRTOA Fencing Project, Wetland and Stream Restoration Project, Staten Island, NY.** *Project Manager* responsible for conducting an evaluation of impacts to wetlands and streams and designing corrective actions along an 8,000-ft. right-of-way corridor. Field inspection identified areas of stream bank erosion/destabilization and debris accumulation due to fencing across streambeds. Restoration plans were developed that included measures to stabilize stream banks, re-route fencing, and restore stream bed conditions. Future actions include overseeing restoration actions. *Client: New York City Transit Authority.*
- **Occum Hydroelectric Project, Draft and Final EAs, Norwich, Connecticut.** *Task Manager* responsible for overseeing the evaluation and preparation of the terrestrial ecology sections of a NEPA Environmental Assessment prepared for FERC. Analysis addressed both direct and cumulative impacts. Also assisted in the preparation of draft licensing articles. *Client: Federal Energy Regulatory Commission.*
- **Belleville Hydroelectric Project Transmission Facility EA, Jackson, Ohio.** *Task Manager* responsible for assessing the potential impacts to wetlands, aquatic resources, wildlife and special status species along a proposed 26-mile-long transmission line Right-of-Way within the Ohio River Valley. The assessment included evaluations of three alternative alignments and the identification of mitigative measures to minimize potential impacts. *Client: Federal Regulatory Energy Commission.*
- **Upper and Lower Collinsville Hydroelectric Projects, Draft and Final EAs, Farmington River, Connecticut.** *Task Manager* for the evaluation and preparation of the terrestrial ecology portions of a NEPA Environmental Assessment prepared for FERC. Analysis addressed both direct and cumulative impacts. Also assisted in the preparation of licensing articles. *Client: Federal Energy Regulatory Commission.*
- **Middlebury Lower and Weybridge Hydroelectric Projects, EA for Relicensing, Otter Creek, Vermont.** *Task Manager* responsible for overseeing the analysis and preparation of the terrestrial ecology sections (wetlands and wildlife) of a draft NEPA Environmental Assessment for two hydroelectric projects. Analysis addressed both direct and cumulative impacts. *Client: Federal Regulatory Energy Commission.*
- **Bellmans Creek Site Assessment for Potential Mitigation Bank, Ridgefield, New Jersey.** *Task Manager* responsible for conducting a baseline and post-enhancement assessment of a 90-acre wetland within the Hackensack Meadowlands utilizing the HMDC's Indicator Value Assessment (IVA) method. Various scenarios were examined to developed the highest potential enhancement scores as part of the effort to determine the feasibility of utilizing the site as a future wetland mitigation bank.
- **Bog Brook Wetlands Enhancement Bank Monitoring Program, East Brunswick, New Jersey.** *Project Manager* responsible for conducting the monitoring of a forested wetland enhancement project for the Bog Brook Wetland Enhancement Bank. Monitoring methods include conducting point-quarter analysis of woody plants to determine stem density of sampled planted and volunteer trees and shrubs, and line-intercept to determine the percent cover provided by combined and individual woody plant species. Observations of herbaceous cover, wetland hydrology and wildlife utilization are also recorded. *Client: Transco*
- **Design/Build Services for Marsh Resources Wetland Mitigation Bank.** *Task Manager* for the

Indicator Value Analysis (IVA) assessment of mitigated wetlands within the bank using the conceptual design. Information developed as part of this analysis was used to guide design decisions and was used in the development of the banking agreement with the Meadowlands Interagency Mitigation Advisory Committee. Also assisted in developing various aspects of the mitigation design including plant species selection, successful plant establishment and herbivory controls. Responsible for re-evaluating wetland functions of both phases of the bank utilizing the updated version of the IVA and providing a comparative analysis with the results of the previous IVA version. Assisted in the development of scientific studies to address questions regarding planting establishment successes, including conducting an on-site *Spartina* test seeding program. *Client: Marsh Resources Inc.*

- **Rutland Bypass Wetland Delineation and Impact Assessment, Vermont Agency of Transportation.** *Project Manager* responsible for managing a wetland delineation and impact assessment for three alternative alignments of a proposed roadway north of the City of Rutland. The wetlands within the study area were delineated in accordance with the USACE 1987 Wetland Delineation Methodology and surveyed utilizing Trimble GPS units. Information gathered as part of the project was used to assess potential impacts and integrated into a LEDPA document prepared by Berger and presented to VAOT and regulatory agencies. *Client: Vermont Agency of Transportation.*
- **Wetland Delineations, Delaware Department of Transportation, New Castle County, Delaware.** *Task Manager* responsible for conducting wetland delineations for several proposed road improvements under an IQC agreement with DelDOT in accordance with the 1987 USACE Methodology. Wetland delineations were conducted for Sections I and II of Naamans Road, Valley Road and proposed improvements to Route 7/Churchmans Road. Also prepared delineation letter reports in accordance with DelDOT standards documenting the methodology, findings and supporting material. Coordinated the survey of the wetland delineation lines with surveyors and verified survey map accuracy. *Client: Delaware Department of Transportation.*
- **Delaware Turnpike Improvements Project, Wilmington, Delaware.** *Team Leader/Task Manager* responsible for conducting a wetland delineation along an 11-mile corridor of the Delaware Turnpike that resulted in the delineation of over 90 wetland areas. Prepared a wetland delineation report for submission to the Philadelphia District of the USACE and obtained a jurisdictional determination for project area wetlands. The investigation included the classification of wetlands according to the USFWS system, an inventory of vegetative species, and the mapping and description of vegetative communities and wildlife habitats and preparation of a technical report. Also conducted and interpreted a pre- and post-construction WET-2.0 analysis for 66 tidal and nontidal wetland areas. *Client: Delaware Department of Transportation.*
- **United States Penitentiary, USFWS Biological Assessment and USACE Nationwide Permit, Atwater, California.** Responsible for the preparation of a Biological Assessment in accordance with Section 7 of the Endangered Species Act for the construction of a proposed federal penitentiary and the remediation of two landfills under a CERCLA action at a 648-acre site. The Biological Assessment included a discussion concerning the ecology of four listed vernal pool fairy shrimp and two special status plant species, on-site survey methods, presence/absence of these species, and an assessment of potential impacts and mitigative measures. Also assisted in obtaining a US Army Corps of Engineers Nationwide Permit, the preparation of design plans and construction of 2.6 acres of wetland/vernal pools, and managing an ongoing monitoring program. Also prepared an Ecological Assessment for the remediation of two landfills on the site. *Client: Federal Bureau of Prisons.*
- **U.S. Route 206 Wetland Mitigation Study, Somerset County, New Jersey.** *Task Manager* for the wetland mitigation site selection study of more than 60 square miles of the Raritan River watershed. Analysis included investigations by multi-disciplinary teams charged with gathering available secondary data as well as field surveys to identify, rank and prioritize wetland mitigation sites based on an established set of site suitability criteria developed by Berger in consultation with NJDOT. Land use, soil, hydrology and geologic data was reviewed and analyzed to identify more than 25 candidate mitigation sites within the study area. These sites were subjected to successive tiers of increasingly detailed analysis to efficiently determine the most suitable sites for wetland mitigation

design capable of meeting NJDOT's needs. The final analysis resulted in the selection of the 3 most suitable sites for providing in-kind wetland mitigation within the same watershed of the proposed project. Currently serving as the Task Manager for the development of the conceptual design of a 40-acre mitigation site along the Raritan River. *Client: New Jersey Department of Transportation.*

- **NJ Route 120 Relocation, Wetland Impact and Mitigation Assessment, East Rutherford, New Jersey.** *Task Manager* responsible for applying the Hackensack Meadowlands Development Commission's Indicator Value Assessment (IVA) methodology to the proposed wetland mitigation site at the HMDC's Mill Creek Mitigation Bank for baseline and post-construction conditions. Applied this information to the proposed impacts to determine the wetland mitigation ratio for the project. IVA assessment results and wetland mitigation ratio were approved by regulatory agencies and incorporated into permit conditions. *Client: New Jersey Department of Transportation.*
- **Wetland Delineation, Permitting and Wetland Mitigation Site Selection and Conceptual Designs for Hightstown Bypass.** *Environmental Scientist.* Assisted in the delineation of 12 miles of wetland boundary within a four-mile study corridor in accordance with the U.S. EPA Methodology and the New Jersey Freshwater Wetlands Act. Prepared vegetation and wildlife sections of an E.O. 215 EIS and assisted with the preparation of an Individual Freshwater Wetlands Permit. Assisted in the selection of 33 potential wetland mitigation sites. As Task Leader, conducted field investigations at each site and prepared a report detailing site selection methodologies and analyses resulting in the development of conceptual wetland mitigation designs at preferred sites, and final construction plans at the selected mitigation site. *Client: New Jersey Department of Transportation.*
- **Teterboro Airport Wetland Restoration/Reforestation Project, Bergen County, New Jersey.** *Project Manager* conducting an examination and evaluation of a forest restoration effort within a seven-acre wetland restoration site located in the Hackensack Meadowlands. Previous evaluations include a randomized density survey of planted saplings and colonizing woody shrubs and trees, calculations of census statistics, and an evaluation of vegetation and successional patterns within the site. Using this data, landscape plans and specifications for a *Phragmites* Eradication Program for 3.5 acres of the site were developed and implemented in Spring 1994. The remaining 3.5 acres were planted with 540 bare root pin oak saplings and protected with tree tubes. The *Phragmites* Control Area was planted with over 1200 pin oaks and other hardwoods in the Spring and Fall of 1999 following the eradication of *Phragmites*. *Client: Johnson Controls Services Inc.*
- **Hess Wetland Mitigation Site Monitoring, New Jersey Turnpike Widening.** Responsible for conducting a three-year monitoring program for a 12-acre freshwater marsh. Monitoring activities were initiated in June 1994 and include statistical analysis of vegetative cover, hydrology, wildlife influences and soil characteristics. Also provided technical support regarding the management of the marsh and attended field meeting with USACE representatives. *Client: New Jersey Turnpike Authority.*
- **Environmental Assessment (EA) for a Wetland Mitigation Sedimentation Basin, Great Swamp National Wildlife Refuge, Morris County, New Jersey.** Responsible for preparing an NEPA EA for the U.S. Fish and Wildlife Service (USFWS) to assess a proposed wetland mitigation project. The EA addressed baseline conditions and potential impacts of temporary construction activities, changes in hydrology and aquatic habitat, and conversion of forested/emergent wetland habitat to open water habitat. Of particular concern were the potential impacts to threatened and endangered species within the project area and a nearby heron rookery. Several procedures were presented to mitigate potential impacts to sensitive resources, including restricting the timing and staging of the construction. An engineering feasibility report was included in the EA that addressed hydrological and hydraulic analyses, soil cover and basin sediment yield analyses, and a comparison of alternative construction designs. *Client: New Jersey Department of Transportation.*
- **New Jersey Turnpike Interchange 1 Relocation, Salem County, New Jersey.** *Task Leader* responsible for field verification of wetland areas and preparation of ecology portions of a state Executive Order 215 EIS. Prepared wetland documentation for a Letter of Interpretation from NJDEP for the project. Assisted in the preparation of an extensive alternatives analysis for the project and

prepared and obtained a Freshwater Wetlands Individual Permit from NJDEP. Conducted wetland mitigation site selection program and worked as a team member in developing design plans for 10 acres of constructed wetland mitigation. Currently serving as the Project Manager to oversee Berger's construction support services for the construction of the mitigation site and implementation of a five-year monitoring program. *Client: New Jersey Turnpike Authority.*

- **Integrated Natural Resource Management Plan, Fort Riley Military Reservation, Manhattan, Kansas.** *Senior Environmental Scientist.* Assisted in the development of a four-part natural resource management plan for a 105,000-acre site. The project involved updating and integrating existing management plans and objectives for improved grounds, range, forestry, and fish and wildlife resources. Primary responsibility was the revision and updating of the fish and wildlife management plan, and the integration of this plan with other plans to avoid and resolve conflicting objectives and management strategies. *Client: U.S. Army Corps of Engineers (USACE), Kansas City District.*
- **Resolution Trust Corporation Special Resources Studies, Colorado, Connecticut, Florida, Georgia and New Jersey.** *Project Manager* responsible for preparation of special resource reports for 22 sites within five states. The reports evaluated the presence of wetlands, floodplains, sole source aquifers, coastal dunes and beaches, wild and scenic rivers, designated natural landmarks, recreational use, potential habitat for threatened and endangered species, critical or unique habitats, archaeological resources and historic structures. The reports also evaluated federal, state and local regulations which may restrict use of the property and the development potential of the site. *Client: Resolution Trust Corporation.*
- **Environmental Screening Study for the Route 9A Bypass, Westchester County, New York.** *Environmental Scientist* responsible for identifying potential environmental and regulatory constraints including wetlands and sensitive wildlife habitats associated with a proposed 2.5-mile road. *Client: New York State Department of Transportation.*
- **High Rock Park Schematic Design, Staten Island, New York.** *Environmental Scientist* responsible for conducting a natural resource inventory and water quality assessment as part of an analysis of existing conditions and constraints for the design of a new master plan and education center. Natural resource features examined included vegetation patterns, wildlife, special status species, surface and groundwater hydrology and quality, wetlands and geology. *Client: New York City Department of Parks and Recreation.*
- **Proposed Federal Correctional Institution, Allenwood, Pennsylvania.** *Environmental Scientist.* Team Leader for wetland delineation on a 480-acre site of a proposed federal prison complex. Also conducted a field investigation to assess potential impacts to existing wetlands, vegetation and wildlife for a proposed sewage treatment plant and sewerline ROW. *Client: Federal Bureau of Prisons.*
- **Wetland Determination Studies, USACE, Philadelphia District.** *Environmental Scientist.* Responsible for conducting field inspections of sites for areas considered waters of the United States, verifying previously delineated wetland boundaries or primary delineation of the wetland boundaries, and preparing wetland determination reports that the USACE have used to make their jurisdictional decisions. Sites were located within the Pinelands and coastal areas of NJ, southeastern PA and northern DE. Delineations used the three-parameter methodology of the USACE. *Client: U.S. Army Corps of Engineers, Philadelphia District.*
- **Bog Brook Stream Encroachment Permit, New Jersey Turnpike.** *Environmental Scientist.* Conducted a wetland delineation and completed a wetland remediation report as part of the permit requirements. *Client: New Jersey Turnpike Authority.*
- **Environmental Planning Study for the Restoration and Protection of Richmond Creek, Staten Island, New York.** *Environmental Scientist.* Conducted field analysis of an urban watershed to identify and inventory existing wetland and riparian communities, land use, point and nonpoint pollution sources, and stream channel constrictions that were contributing to water quality and wetland habitat degradation. Also assisted in formulating structural and nonstructural recommendations to alleviate problem areas. *Client: New York Department of City Planning.*

- **Delaware River Comprehensive Navigation Study, New Jersey.** *Environmental Scientist.* Processed sediment core samples in the laboratory for subsequent chemical and geotechnical analysis. *Client: U.S. Army Corps of Engineers, Philadelphia District.*
- **Resolution Trust Corporation (RTC) Special Resources Studies, California Properties.** *Project Manager.* Conducted site examinations of 18 RTC parcels in the vicinity of San Diego and Los Angeles, California. Sites were investigated following RTC checklists for the presence of wetlands, floodplains, sole source aquifers, coastal dunes and beaches, wild and scenic rivers, designated natural landmarks, recreational use, potential habitat for threatened and endangered species, critical and unique habitats, archaeological resources and historic structures. *Client: Resolution Trust Corporation.*
- **Integrated Natural Resource Management Plans, Fishers Island Annex, Southold, New York.** *Senior Environmental Scientist.* Responsible for preparing a baseline assessment of the fish and wildlife species known and expected to occur within the grounds of the Annex, including threatened and endangered species. As part of the management plan, recommended management strategies were developed to maintain and manage important wildlife habitats. A review of federal and state regulations was performed to inform resource managers of critical issues relating to the management of on-site resources and the potential effects of these regulations on future projects. *Client: Naval Underwater Warfare Center. NUWCDIV, Newport.*
- **Integrated Natural Resource Management Plan, Detachment Seneca Lake, New York.** *Senior Environmental Scientist.* Responsible for the preparation of an integrated natural resource management plan to provide for the cooperative management of land, fish and wildlife resources at the base while also maintaining the military mission of the base. Management plans addressed fish and wildlife resources, land resources, forest management, outdoor recreation and environmental restoration of degraded sites. *Client: Naval Underwater Warfare Center., NUWCDIV, Newport.*

## PUBLICATIONS

Katz, Harvey M., Anne Harris Katz and Edward Samanns, 1986. *Sediment Accumulation and Dynamics in an Urbanizing Area.* In: Second Colloquium in Biological Sciences, Eds. C.D. Burrell and F.L. Strand, Annals of the New York Academy of Sciences, Vol. 463:186-189.

Samanns, Edward, Kenneth P. Dunne, Lewis O. Morgan, And Mahendra Rodrigo. 1996. *Wetland Creation Using a Precipitation Based Design.* Society for Ecological Restoration, 1996 International Conference, New Brunswick, New Jersey.

Samanns, Edward, Jeremy Feinburg and Sebastian Zacharias. 2002. *Design Considerations for Vernal Pools in Southern New York State.* Society of Wetland Scientists, 23<sup>rd</sup> Annual Conference, June. Lake Placid, New York.

## PRESENTATIONS

New York State Department of Transportation. *Identification and Delineation of Jurisdictional Wetlands Using the 1987 Corps of Engineers Wetland Delineation Manual.* October 7 through October 11, 2002. Prepared and presented a five-day course on wetland identification and delineation techniques to a class of 30 members from NYSDOT, NYSDEC and NYSDOS.

Katz, Harvey M., Lisa M. Gonzalez and Edward Samanns, 1986. *Distribution of Trout in a Non-Trout Classified Stream.* (Poster). 42nd Annual Northeast Fish and Wildlife Conference, Hershey, PA, April 27-30, 1986.

Samanns, E., K. Dunne, L. Morgan and M. Rodrigo. 1996. *Wetland Creation Using a Precipitation Based Design*. Society for Ecological Restoration: International Conference 1996. New Brunswick, New Jersey.

Samanns, E. 2000. *Cost-Effective Monitoring Strategies to Meet Regulatory Goals for Wetland Mitigation Banks in the Northeast*. Terrene Institute 3<sup>rd</sup> National Mitigation Banking Conference. May 17-19, Denver, CO.

Samanns, E. and J. Feinberg. 2002. *Design Considerations for Vernal Pool Mitigation at Stewart International Airport, Newburg, NY*. New York State Department of Transportation, Annual Environmental Branch Meeting, March 5 and 6, 2002. Saratoga Springs, NY.

Samanns, Edward, Jeremy Feinburg and Sebastian Zacharias. 2002. *Design Considerations for Vernal Pools in Southern New York State*. Society of Wetland Scientists, 23<sup>rd</sup> Annual Conference, June. Lake Placid, New York.

## TECHNICAL REPORTS

Katz, H.M., E. Samanns, L.M. Gonzalez and A.H. Katz, 1987. *An Analysis of the Ecodynamics of the Rockaway River: Investigation of its Trout Supporting Capability*. Technical Report for the Upper Rockaway River Watershed Association, Denville, New Jersey, pp. 228.

Dunne, Kenneth, A. Mahendra Rodrigo, and Edward Samanns. *Engineering Specifications for Vegetation Establishment and Subgrade Preparation*. U.S. Army Corps of Engineers, Waterways Experiment Station. (Appendix Volume to *Handbook of Wetland Technology, Volume III: Engineering for Wetlands, Restoration and Creation*). Published February 1998.

Samanns, Edward. 2002. *Mitigation of Ecological Impacts: A Synthesis of Highway Practice*. NCHRP Synthesis 302. Transportation Research Board, National Research Council, Washington, D.C.



As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historic places, and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people. The department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The department also has major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.