7. POQUESSING CREEK PARK MASTER PLAN

Fairmount Park System

Natural Lands Restoration

Master Plan

Main Stem of Poquessing Creek.

7.A. EXECUTIVE SUMMARY

Preparation of a natural lands restoration master plan for Poquessing Creek Park began in October 1997. As part of the planning, Natural Lands Restoration and Environmental Education Program (NLREEP) and ANSP staff conducted numerous site visits and meetings to obtain and solicit information from local residents, Fairmount Park Commission (FPC) staff, community members, Philadelphia Water Department (PWD) staff, and other environmental scientists and land managers. In particular, two community meetings were held to assess citizen attitudes and gather information on park use and conditions.

Restoration planning was guided by the project goals of the NLREEP program. The result of this planning is a group of general recommendations about natural land restoration in Poquessing Creek Park and a list of specific, high priority restoration projects. These recommendations could be implemented in several ways. Projects which would be appropriate for volunteer-based work and projects which require coordination with other groups are noted.

Poquessing Creek Park is part of District 5 of the Fairmount Park system. The park consists of a number of small parcels of land along Poquessing Creek from Trevose Road on the north to the mouth of the creek and along tributaries of the Poquessing (e.g., Byberry Creek). The John C. Byrne Golf Course is part of the park, and is included in the natural land planning, because of stream channels and riparian zones in the golf course and because of opportunities for combining restoration and recreational goals within the golf course. Fluehr Park, which is also in the Poquessing system, was not investigated since it is entirely designed landscape.

The Poquessing Valley shows the typical landscape progression from forested to agricultural to suburban and urban condition that occurred throughout the region (see Volume I, Section 4.B). It was first settled in the late 17th century, but the valley remained rural later than the other Philadelphia stream valleys. Small mills and mill dams were erected on the creek; a low dam is still present near the mouth above State Road. Extensive park lands were not set aside in the Poquessing area in the late 19th and early 20th centuries as in the other stream valleys, presumably because of the undeveloped nature of the area. Much of the development of the area, particularly in the upper valley, started in the building boom after World War II and development is still occurring. As a result, development includes a mix of relatively dense single-family homes, malls, and light industrial complexes. There are still large expanses of open space in the area. Unlike the conversion of tributaries to covered sewers which was extensive in the Cobbs and Tacony drainages, the tributary system of Poquessing Creek is still present, although affected by storm water outfalls. Most of the park parcels are strips of riparian zones left after development. Many of these parcels were separately deeded to the city, and in some cases it has not been clear whether land is private or public, or which public agency controls the land. In cooperation with the Survey Division of the Streets Department of the City of Philadelphia, a survey of public ownership of land in the Poquessing valley was used to identify Fairmount Park holdings. As a result, the maps for this plan provide the most accurate documentation of park areas.

ANSP conducted an extensive compilation of existing information and assessment of current conditions. The main results through the 1998 inventory are discussed in Chapter 4 of Volume I. The comparison of information among parks provides strong evidence for pervasive disturbance throughout the Fairmount Park system, as well as individual differences among parks. This section focuses on condition and disturbance of vegetation, fauna, and stream channels of the Poquessing Creek Park. This information formed the basis for selecting restoration sites and specifying restoration activities to be done at these sites.

Forty percent of the Poquessing Creek watershed lies outside of the city boundaries and sixty-seven percent of this watershed is classified as urban land cover. The park area only represents 2% of the watershed area. The Poquessing Creek and tributaries have highly urbanized watersheds. As a result, peak discharges and runoff volumes increase, while there is less water during low flow periods. Increased storm discharges promote channel erosion, which results in increased channel size and decreased channel roughness. As the stream incises, the floodplain becomes progressively more isolated, the water table is lowered and floodwaters are less able to interact with the riparian or streamside ecosystem. Scour also causes reduced development of pool/riffle topography that provides important habitat for aquatic organisms. These changes often lead to stream instability which is characterized by abrupt, episodic, and progressive changes in the stream geometry. Unstable channels can destroy property, damage structures, reduce water quality, diminish aquatic (and terrestrial) habitat, and degrade aesthetic quality.

Gullies form when stormwater channelizes and causes hillslopes to erode. In Poquessing Creek Park, stormwater runoff from street intersections and neighborhood runoff are contributing to the formation of gullies in several areas. These gullies carry large flows that are contributing significant amounts of sediments to Poquessing Creek and its tributaries. It is recommended that stormwater drains be checked at certain locations, as well as detaining and diverting storm runoff, to avoid further erosion and deepening of the gullies.

In addition to the physical, water quantity-related problems, parts of Poquessing Creek and its tributaries have severely degraded water quality. Although water quality is not specifically addressed by this restoration plan, it did arise as an issue for this park (and should be addressed by future studies).

A Stream Quality Index (SQI) was developed to reflect the condition of distinct stream reaches throughout the Fairmount Park system. The SQI is based on stream geomorphology, aquatic habitat and riparian (stream-side) condition. There are a total of 20 stream reaches in Poquessing Park. The majority of reaches (80%) is classified as impaired. The other 20% of reaches are either severely impaired or moderately impaired. A map of the SQI of the different reaches is presented.

The plan contains a detailed inventory of vegetation types and plant species observed in different park segments, along with maps showing vegetation types and disturbance levels, and habitat quality, based on species diversity and occurrence of significant taxa of different faunal groups. The vegetation observations document a variety of plant communities in the park, including:

Forested uplands and slopes. The narrowness of most of the park restricts the amount of this habitat. However, there are narrow strips of mature forest with a variety of native species (oaks, hickories, tulip poplar, etc) on slopes and edges. The largest patch is along the tributary above Knights Road (i.e., between Torrey, Medford, Academy and Nanton roads); this area is heavily affected by all-terrain vehicle (ATV) use, which has denuded the understory. Other patches are affected by slope erosion and by invasive species of plants. Mown lawns along the edges of many of the wooded areas impact these forests.

Riparian (stream-side) zones. Much of the park consists of narrow riparian forests along the Poquessing and tributaries. These contain typical native canopy species (sycamore, box elder, tulip poplar, etc.), but also have a number of exotic species. In particular, exotic vines, shrubs and herbs, such as Japanese honeysuckle, Oriental bittersweet, multiflora rose and Japanese knotweed are prevalent in many parts of the park. Some riparian areas, especially in the Byrne Golf Course, are frequently mowed, which adds to the degradation of the riparian habitat.

Wetlands. The Academy Road woods (between Decatur and Academy roads) contain several wetlands, including wet meadows and skunk-cabbage swamps. Intertidal wetlands are formed at the

mouth of the Poquessing and support an uncommon plant community, including at least one state-endangered plant species. A few other small wetland areas are present, although overall, wetlands have been severely affected by hydrological changes caused by development.

Meadows and old fields. Poquessing Creek Park has a greater proportion of land as early successional meadow and old fields than the other park segments. Many of these areas are continuous with similar habitat outside the park, increasing the effective size of these areas. The largest area is in the Mechanicsville parcel (north of Century Lane and south of Benjamin Rush State Park), but other small meadows are present near Trevose Road and along the lower creek below Frankford Avenue. These areas contain a mix of grasses, shrubs (e.g., blackberries and multiflora rose) and native and exotic herbs. Development of some of the contiguous non-park land threatens the integrity of this habitat type in the park.

The faunal assessments showed that the Poquessing supports a variety of native species, but these are mostly common and widespread species in urban parks. However, because of the presence of early successional vegetation, the park supports shrubland bird species which are local or rare in the park system. Assessments included the following groups of animals:

Birds. Forty-six indicator species and 34 probable breeding species of birds were recorded. Shrubland species were better represented at Poquessing, especially in the old fields around the Mechanicsville section (adjacent to Benjamin Rush State Park and PDIC land), than at any other segment in the Fairmount Park system. Because of development of adjacent land, the amount of this habitat is decreasing, and some of the birds may be relicts, so that these species may disappear. Species found here and in other edge habitat included Willow Flycatcher, Brown Thrasher, House Wren, Chestnut-sided Warbler, Common Yellow-throat, Yellow-breasted Chat, Red-winged Blackbird, Eastern Towhee, Orchard Oriole and Baltimore Oriole. Other birds included common, widespread suburban, edge and forest species.

Mollusks (land snails and slugs). Six native and two introduced species were recorded, which is typical of the park segments. No historical records of mollusks for the Poquessing Valley were located, but based on historical and current occurrence in other park segments, there has been a significant loss of native species.

Reptiles and amphibians. Only four species were recorded, all of which are widespread and common in the park. Additional species were recorded in the early 1980s. There is little historical information on the park, but it is likely that a number of species once occurred, based on regional occurrence and habitat types in the park.

Terrestrial insects. Limited sampling of craneflies was done in the park. This sampling documented the occurrence of one widespread rare species and two species which statewide are present only in southeastern portion of Pennsylvania.

Benthic invertebrates. A standard quantitative sample of invertebrates from Tributary 1 of Byberry Creek was taken. This site showed numerous indicators of an unhealthy benthic community, including very low species diversity, absence of sensitive species, presence of pollution-tolerant species, and dominance by collector-gathers, i.e., groups with generalized feeding habits.

Fish. Historical reports from before 1921 report 16 native species and one introduced species. Most of these are widespread native stream species. Studies from the 1980s and 1990s document 19 native species and 7 introduced species. Four of the species recorded historically have not been documented since; three of these are typical of submerged vegetation and two of these have declined throughout the region. One anadromous species was recorded; it may still occur near the mouth, from which there are no recent samples. It is likely that additional native species were present in

Poquessing Creek (which were extirpated before 1900 or missed in the early surveys) and in wetlands and ditches near the mouth of the Poquessing.

Park lands in the Poquessing are affected by a number of factors, including hydrologic change as mentioned above. Invasive and exotic plants affect native plant species in many of the park segments. All-terrain vehicle (ATV) and dirt bike use has created major erosion problems in several areas of the park. Dumping of automobiles and other large trash is also a problem in some areas. Because of the fragmented nature of open land in the Poquessing Valley and the likely development of parcels, coordination of open land management with various agencies is essential to long term protection of natural lands. Acquisition of land and/or land easements will also be important for long term protection. Some of these actions are being explored by NLREEP. There are major problems with lack of signage and developed trails on many of the park segments: many areas are nearly surrounded by private land, there are no signs marking park holdings, no developed trails, or no signage where trails do exist. The lack of marking and access encourage dumping and encroachment by neighboring landowners. Development of a linked trail through some of the land parcels is underway as part of NLREEP, and this would improve access.

Based on current conditions in Poquessing Creek Park, major objectives for restoration and tasks which will address these objectives are:

- Increase protected natural lands in the valley;
    - Acquire additional land;
    - Develop easements or other agreements for protection of adjacent land;
- Increase desired uses of the park and encourage park stewardship;
    - Develop a trail system linking park holdings and other natural areas;
    - Develop signage for park segments;
    - Control access to sensitive areas to decrease dumping and abusive vehicle use;
- Enhance woodlands in the park;
    - Control access to sensitive areas to decrease dumping and abusive vehicle use;
    - Control invasive and exotic species, and replant native species;
    - Improve wood edges by increasing wooded area or creating meadow buffer strips;
    - Remove trash from woods;
- Maintain and enhance meadows in the park;
    - Develop periodic mowing and/or tree-cutting program to maintain meadow vegetation;
    - Control invasive and exotic species, and replant native species;
    - Create and maintain meadow buffer strips;
- Enhance stream channels, wetlands, and aquatic fauna;
    - Improve water control structures, where feasible;
    - Coordinate with PWD and other agencies to develop plans for storm-water management headwater protection;
    - Repair gullies after controlling storm-water flows;
    - Improve riparian corridors, through the expansion of riparian woods or meadows;

- Control invasive and exotic species, and replant native species;
- Improve instream habitat, e.g., by adding large woody debris, and removing failed structures;
- Protect intertidal marshes at the mouth of Poquessing Creek.

A list of specific sites where restoration is recommended is presented, along with maps showing the location of each area. A description of each site and recommended activities for each site are presented in the appendix to the plan. The plan also contains an explanation of techniques and options for the various types of restoration activities (e.g., control of exotics, replanting, gully repair) that are identified. Restoration actions which are broadly applicable throughout the park are identified. These relate to overall operations in the park, particularly those involving management of the borders between the designed and natural lands. Some of these are outside the direct purview of NLREEP and should be implemented in cooperation with other groups.

- Damage done to the natural lands by trash dumping is a major problem. Exercising control, through methods such as passive blocking of access points as well as patrolling and/or enforcement of regulations, is necessary to minimize or eliminate the damage.
- Non-native plantings in landscaped areas are often a source of invasion by these plants. An increased use of native plants in landscape settings and avoidance of particularly invasive species, such as Norway maple, is recommended in order to avoid this infiltration of non-native landscapes.
- Decreasing the frequency of mowing can result in taller grass and other vegetation which increases water retention and provides better habitat. Implementation of a decreased mowing schedule in places where this does not interfere with other uses is recommended. However, monitoring of the areas of less frequent mowing should be done to ensure that they are not colonized by exotic plants.
- Exotic species occur in both landscaped areas and natural lands. However, exotic species are often patchy in occurrence and may be controlled if addressed early. Occurrence of the species should be monitored throughout the parks.
- Dumping of large quantities of logs, leaves and other horticultural waste is damaging and should be controlled. However, logs can be used in woods to increase soil fungus, decrease surface runoff, provide animal habitat and restrict access. Mulch can be used in restoration plantings to improve soil and decrease unwanted plants. Methods of making these materials available for restoration can improve the success of the restoration initiative, while reducing the storage needs for these materials.
- Poquessing Creek Park shows extensive damage from ATV and motorcycle use. Like trash dumping, control of access, patrolling and enforcement of laws will be necessary to prevent this damage. Such actions need to be done carefully, to avoid spreading the problem. Circumvention of barriers across roads and trails can increase damage to natural lands, and controlling vehicle use in one area may lead to switching vehicle use and damage to new areas.

7.B. POQUESSING ASSESSMENT AND RESTORATION PLANNING

7.B.1. Tasks Associated With Restoration Activities

7.B.1.1. Introduction

Preparation of a natural lands restoration master plan for Poquessing Creek Park began in October 1997. Numerous site visits were conducted in Poquessing Creek Park with the Fairmount Park Commission (FPC) District #5 Manager and staff, community members, Natural Lands Restoration and Environmental Education Program (NLREEP) and ANSP staff. Informal meetings at the Park's district office were held to solicit information and opinions, and ANSP participated in the NLREEP Technical Advisory Committee (TAC) meetings in March and October 1998. These meetings were used to solicit ideas and develop contacts with other environmental scientists and land managers. A meeting was also held with ANSP, NLREEP and FPC engineering staff to discuss completed and planned projects in, or affecting, the natural lands in Poquessing Creek Park. A variety of informal contacts provided additional input.

ANSP, NLREEP and the Philadelphia Water Department (PWD) set up a program of quarterly meetings to discuss various issues of joint interest. These meetings were valuable in obtaining information useful in planning restoration and in developing concepts for cooperative programs. As a result of these meetings, PWD staff reviewed the list of priority stream restoration sites proposed for the Poquessing Creek Park.

Creation of a trail system linking park lands in the Poquessing is one of the goals of the NLREEP program. As part of this planning, in 1997, A. Rhoads and T. Block conducted a survey of vegetation and access in the park lands along the Poquessing. Subsequently, more detailed trail planning was done by Andropogon Associates, and options for obtaining easements or acquisition of land were investigated by the Natural Lands Trust. While these efforts were distinct from the natural lands planning, the vegetation information was incorporated into our assessments. Several meetings were held with staff of Andropogon to discuss trail planning.

As discussed in the section on Restoration Goals (Volume I, Section 3), restoration planning was guided by the project goals of the NLREEP program. For example, we did not directly address water quality, since this is not part of the NLREEP program, except as it directly affects other types of restoration. However, we sought to provide a framework for future restoration activities in the parks. The result of this planning is a group of general recommendations about natural land restoration in the Poquessing Creek Park (summarized in Section 7.C.1) and a list of specific, high priority restoration projects. These recommendations could be implemented in several ways. Some projects can be done by organized volunteer groups, while others, such as those requiring significant construction or earth moving, would be appropriate for private contractors. Many projects require coordination with other groups, e.g., the PWD, and these have been noted. During the process of preparing these plans, it was decided that some volunteer-based restoration projects would be implemented under the current NLREEP project, but that major contractor-based restoration would not be started. It is anticipated that such projects could be done in the future under the auspices of other restoration programs or other agencies.

7.B.1.2. Community Meetings

As part of the planning process, NLREEP held two community meetings to solicit citizen attitudes and information on park use and conditions. ANSP participated in these activities and used information from them in planning restoration activities.

The first meeting on the restoration of the natural lands of Poquessing Creek Park, held on 4 October 2000, introduced interested community members to NLREEP and the project. The goals of

NLREEP were identified and the ANSP was introduced as the consulting team hired to assess the natural areas of the park and recommend areas to be restored. At this initial meeting, the existing conditions of the park were summarized, based on ANSP's year-long study of natural conditions. Slides of the fauna and flora were shown and natural areas of high quality were identified. Current environmental problems in the park were identified and explained, and the types of restoration activities which were being considered to address these were discussed. The initial list of proposed restoration activities and a draft map of restoration sites were distributed. The sites were categorized into habitat types and their function in the environment was explained to the public. After the ANSP presentation, ANSP team members met with residents to gain information about how they use the park, to obtain feedback on proposed restoration activities and to solicit suggestions for additional sites or activities. These comments from the participants were noted and used in the final nomination process.

The final meeting with community members concerned about the Poquessing Creek Park, held on 7 December 2000, focused on the recommended high priority restoration sites. The sites proposed for restoration were summarized, and pictures were shown depicting areas to receive restoration. The team also commented on what the sites might look like after the restoration work was completed. Slides of comparable restorations were shown. ANSP took the final comments from the public and reviewed the restoration site nomination list with respect to public comments. At this point the list was finalized and delivered to NLREEP.

7.B.2. Overview of Poquessing Creek Park

Poquessing Creek Park is part of District 5 of the Fairmount Park system, which also includes Pennypack Creek Park, Tacony Creek Park, and street trees in the northeastern part of the city. The park consists of a number of small parcels of land along Poquessing Creek from Trevose Road on the north to the mouth of the creek and along tributaries of the Poquessing (e.g., Byberry Creek). The John C. Byrne Golf Course is part of the park, and is included in the natural land planning, because of stream channels and riparian zones in the golf course and because of opportunities for combining restoration and recreational goals within the golf course. Fluehr Park, which is also in the Poquessing system, was not investigated, since it is entirely designed landscape. For convenience, the following grouping of parcels is used for this study:

1) Poquessing Creek Drive section (10s). This includes land on the west side of Poquessing Creek below Trevose Road downstream to the railroad bridge. Access to this section is from Poquessing Creek Drive.

2) Railroad to Roosevelt Boulevard (10s). This includes a small strip of land on the west side south of the railroad bridge. Some of the riparian area south of this, which is part of the Philadelphia State Hospital land, may be transferred to Fairmount Park.

3) Mechanicsville area (20s). This includes land on the west side from Richlieu Bridge almost to Century Lane, and a small parcel south of Century Lane. Access to this parcel is from Mechanicsville Road or Richlieu Road.

4) Nanton Road woods (50s). This includes park land on a small tributary (Tributary 3) of the Poquessing which joins the Poquessing above Knights Road. Park land starts above Belgreen Road and extends to the mouth, but the largest piece is bordered by Torrey, Medford, Academy and Nanton roads. The land along the Poquessing from Knights Road to the mouth of the tributary is also park land.

5) Academy Road woods (60s). This section is between Decatur and Academy Road and is along a tributary of Byberry Creek.

6) Lower Byberry Creek (70s). This includes John C. Byrne Golf Course and the section of land at the mouth of Byberry Creek (between Frankford Avenue, Red Lion Road and Knights Road).

7) Woodhaven Road section (80s). This section includes the west bank from Woodhaven Road downstream to near Crestmont. It includes a section of park land between Greenmount and Woodhaven roads. There is PWD right-of-way on parts of land along the creek.

8) Frankford Avenue to mouth (90s). This includes a strip of land on the west side south of Frankford Avenue and north of the end of Stevenson Road (parallel to Hegerman Road), a small piece on the east (Bucks County) side north of I-95, Glen Foerd, and the adjacent marsh at the mouth of the Poquessing.

The Poquessing Valley shows the typical landscape progression from forested to agricultural to suburban and urban that occurred throughout the region (see Volume I, Section 4.B). It was first settled in the late 17th century (Campbell 1942); the Byberry Meeting was established in 1689 (the meeting house wa erected in 1808 in the area west of the Mechanicsville section of the park). Frankford Pike was a major road from Philadelphia northeast to New York, and the Red Lion Tavern (built in 1730), located near the Poquessing in Bucks County, was a prominent stop (Campbell 1942). The area around Torresdale was originally owned by a Swede (Ollie Cockle) and later became a site of a ferry (Risdon's Ferry) across the Delaware. The town of Torresdale was laid out in 1850. Andalusia, across Poquessing Creek in Bucks County, was named for the home of Nicholas and Craig Biddle on the Delaware River.

The valley remained rural later than the other Philadelphia stream valleys. Small mills and mill dams were erected on the creek. A low dam is still present near the mouth, above State Road. A relatively large impoundment and mill race is shown on maps (Fig. 7.B.1). Currently, this dam is inundated on high tides; it is not known if the dam was once higher. Mechanicsville was the site of an early village, and there was a dam and mill at Richlieu Road. This section was referred to as the Black Lake section (Campbell 1942), presumably referring to a mill dam in this reach. Glen Foerd was built in 1805 at the mouth of the Poquessing and expanded to its present configuration in 1902-1903. Presumably, development of the mouth included much filling and draining of tidal wetlands. Maps (Fig. 7.B.1) show a large pond adjacent to the Poquessing at its mouth. Construction of the Philadelphia State Hospital (originally the Pennsylvania Hospital for the Insane) was begun in 1912.

Dam on Poquessing Creek.

Extensive park lands were not set aside in Poquessing in the late 19th and early 20th centuries as in the other stream valleys, presumably because of the undeveloped nature of the area. Much of the development of the area, particularly in the upper valley, started in the building boom after World War II, and development is still occurring. As a result, development includes a mix of relatively dense single-family homes, and light industrial complexes. Franklin Mills, one of the region's largest malls, was opened in the1980s. The area is mainly served by separate storm and sanitary sewer systems. Unlike the conversion of tributaries to covered sewers which was extensive in the Cobbs and Tacony drainages, the tributary system of the Poquessing is still present, although affected by storm water outfalls. Most of the park parcels are strips of riparian zones left after development, e.g., on wetlands which would be difficult or illegal to develop. There are still large areas of open space in the area, e.g., open land around light industry (as on the east side below Trevose Road), in the Northeast Philadelphia Airport, Benjamin Rush State Park, around Philadelphia Community College, and on Bucks County parkland.

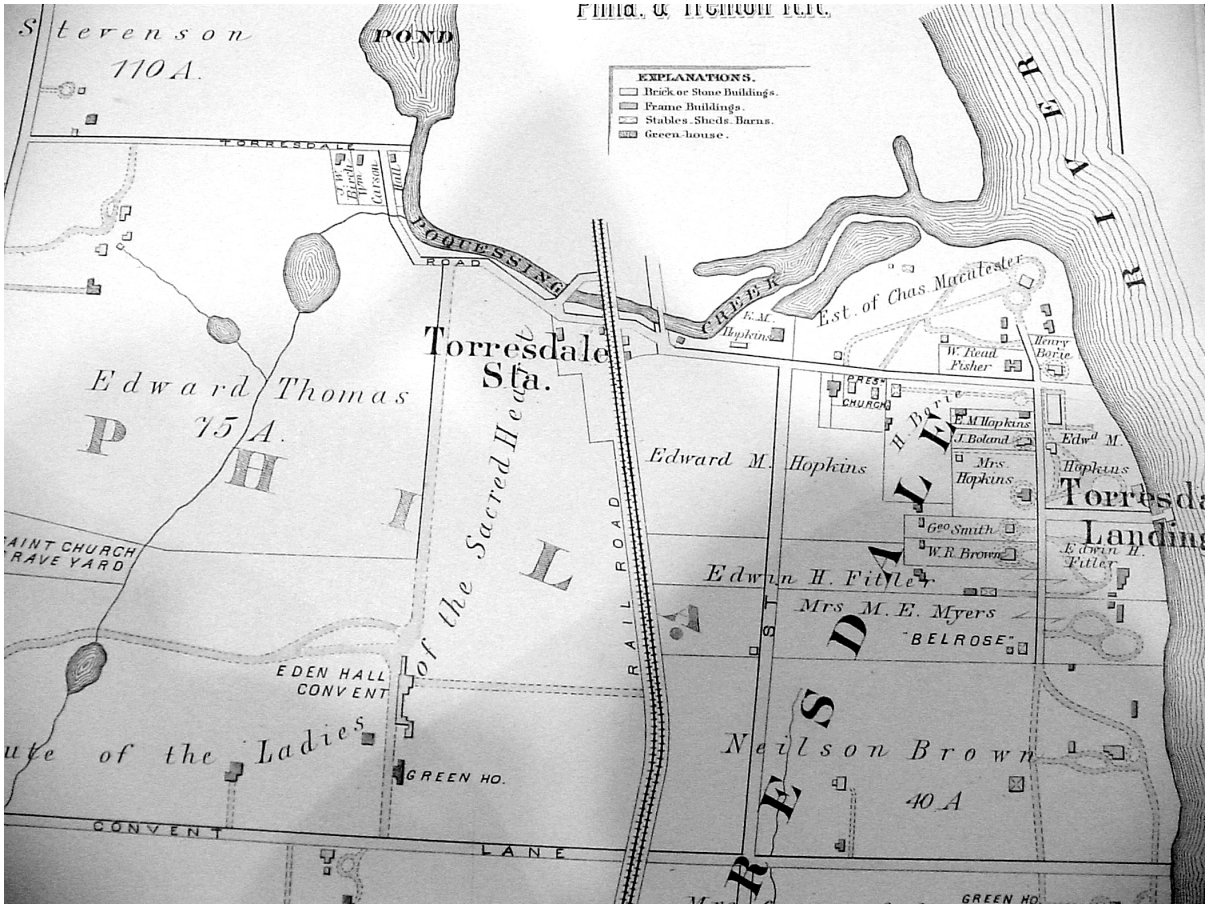

Figure 7.B.1. Map of Poquessing valley showing the presence of a dam near the mouth, above State Road, and a large pond adjacent to the Poquessing at it's mouth (1891 Atlas).

Many of these parcels were separately deeded to the city, and in some cases it has not been clear whether land is private or public, or which public agency controls the land. The PWD retained right-of-way in many areas. In some areas (e.g., below Woodhaven Road), these rights-of-way were maintained over Fairmount Park land, while in others, the PWD and FPC holdings are distinct. The Philadelphia Recreation Department has control of areas west of the creek above and below Dunks Ferry Road. This includes developed recreational fields (north of Dunks Ferry) and undeveloped land (south of Dunks Ferry). In cooperation with the Survey Division of the Streets Department of the City of Philadelphia, a survey of public ownership of land in the Poquessing Valley was undertaken. As part of the NLREEP trail, easement and restoration planning, Fairmount Park parcels were identified. The results of this survey were used in mapping and restoration planning in this document. Earlier documents or maps produced before completion of the ownership assessment may exclude some Fairmount holdings. For example, draft trail plans show only part of the Fairmount land in the Nanton Road woods section.

7.B.3. Existing Conditions Inventory and Assessment

7.B.3.1. Introduction

Existing and new information collected as part of the 1998 inventory are discussed in Chapter 4 of Volume I. The comparison of information among parks provides strong evidence for pervasive disturbance throughout the Fairmount Park system, as well as individual differences among parks. In this section, more site-specific information on conditions in Poquessing Creek Park is presented. This section focuses on condition and disturbance of vegetation of the park, faunal occurrence, and condition of stream channels as determined by the 1998 streamwalk and other studies. This information formed the basis for selecting restoration sites and specifying activities to be done at these sites.

7.B.3.2. Vegetation and Flora

In 1997, Ann Rhoads and Timothy Block conducted a survey of vegetation of both the Bucks County and Philadelphia County portions of the Poquessing valley (Rhoads and Block 1997). This study included most of the Fairmount Park lands along the Poquessing, although it did not cover some of the sites along tributaries. In 1997-1998, vegetation classification was done based on aerial photography. Poquessing Creek Park was surveyed as part of the 1998 assessment by the ANSP, with additional information provided by numerous site visits from 1998-2000. The results of these assessments, as well as suggested restoration activities for the natural lands based on existing conditions and land use history, are provided in the following text. Parts of the following text are taken from Rhoads and Block (1997), with permission of the authors. This information supplements the vegetation classification maps (Section 6.F.3) and list of plant species recorded in the park (Appendix A-1.1). Sites visited in Poquessing Creek Park represent a variety of habitat types, including forests, non-forested areas such as meadows and edges, wetlands, and riparian zones.

The Fairmount Park holdings in the Poquessing Valley comprise a number of disjunct parcels. The following sections describe the existing vegetation in these parcels from Trevose Road to the mouth. These sections are given numbers (listed at each section) to cross-reference with restoration site numbers. From its mouth upstream for 8.25 miles, the Poquessing Creek, a tributary of the Delaware River, forms the boundary between northeast Philadelphia and Bensalem Township, Bucks County. Open land in the valley has been fragmented by the construction of residential, commercial and industrial developments. However, there are still several large, undeveloped tracts bordering the stream valley. These include forested tracts in the vicinity of the railroad bridge (between Trevose Road and Roosevelt Boulevard), the more disturbed sites of the former Byberry State Hospital and Pennsylvania prison farm (now Benjamin Rush State Park), and narrow bands along much of the riparian zone of Poquessing Creek, Byberry Creek and tributaries. There is great opportunity to

acquire or otherwise preserve adjacent land in this section to ensure a more contiguous green space. Despite the fact the stream and its valley are littered with urban debris, including abandoned cars and the ubiquitous shopping cart, the valley also contains large trees, a diversity of birds and other wildlife and provides a visual refuge from the surrounding streets.

Within the study area, the Poquessing Creek and its tributaries have carved a valley through the surface sand and gravel deposits of the Pennsauken and Bridgeton Formations to expose the underlying mica schist of the Wissahickon Formation (Berg and Dodge 1981). Outcrops of Wissahickon schist are visible in the stream bed or along the bank just above State Road underneath the railroad and Interstate 95 bridges, below Frankford Avenue, behind the Woodhaven Mall, and just downstream from the Richlieu Road bridge. The elevation of the stream drops from approximately 120 ft above mean sea level at Trevose Road to approximately 20 ft above mean sea level where it enters the Delaware River. The stream is tidal only in its lowermost portion below Interstate 95.

Poquessing Creek Drive Woods (10s).

Railroad Bridge to Trevose Road:

The wooded stretch on the west side from the railroad bridge to Bernita Road contains mature native canopy trees including beech (*Fagus grandifolia*), flowering dogwood (*Cornus florida*), tuliptree (*Liriodendron tulipifera*), red maple (*Acer rubrum*), sycamore (*Platanus occidentalis*), a red oak (*Quercus rubra*) with two trunks of 12 inches dbh (diameter at breast height) each, and native herbaceous species including Jack-in-the-pulpit (*Arisaema triphyllum*), lady fern (*Athyrium filix-femina*), cinnamon fern (*Osmunda cinnamomea*), Christmas fern (*Polystichum acrostichoides*), hay-scented fern, (*Dennstaedtia punctilobula*) sensitive fern (*Onoclea sensibilis*), wreath goldenrod (*Solidago caesia*), jumpseed (*Polygonum virginianum*), skunk cabbage (*Symplocarpus foetidus*), wild yam (*Dioscorea villosa*), and white wood aster (*Aster divaricatus*). Virginia creeper (*Parthenocissus quinquefolia*), poison ivy (*Toxicodendron radicans*), arrowwood viburnum (*Viburnum dentatum*), blackberry (*Rubus allegheniensis*) and spicebush (*Lindera benzoin*) are also present along with abundant Japanese honeysuckle (*Lonicera japonica*) and multiflora rose (*Rosa multiflora*). The trail through this segment is not complete. These woods are opposite mature wood on a slope on the Bucks County side. The floodplain woods are bordered by a disturbed section of woods on the slope below the homes along Poquessing Creek Drive and Wayside Road.

Just north of the railroad bridge is a power line right-of-way with a dense stand of purple loosestrife (*Lythrum salicaria*), common reed (*Phragmites australis*) and other vigorous herbaceous species.

Upstream from Bernita Road a trail follows the creek, but eventually veers away and ends in an old field behind houses on Lukens Lane. This field contains a mixture of boneset (*Eupatorium* sp.) and goldenrod (*Solidago* spp.) species and appears to be maintained by the adjacent property owners. This site could serve as a meadow habitat if a maintenance schedule is coordinated with the community. The trail does not extend through to Trevose Road. From Trevose Road heading downstream, there are dense thickets of multiflora rose and Oriental bittersweet (*Celastrus orbiculatus*) along the creek.

Roosevelt Boulevard to the Railroad Bridge:

Currently, Fairmount Park lands include the section on the west side of the creek from the railroad bridge downstream to Carter Road. The riparian zone downstream from this parcel may be transferred to Fairmount Park as part of the disposition of the Byberry State Hospital lands, and a description of this area is included. Waterweed (*Elodea nuttallii)* and variable-leaf water starwort (*Callitriche heterophylla*) are present in the creek bed just above the Roosevelt Boulevard bridge. A

faint path extends along the creek as far as a small utility station where a dirt access road comes in from the left. The forest is quite disturbed but contains a few large trees, specifically a multi-stemmed silver maple (*Acer saccharinum*) 36 inches in diameter at the base, a pin oak (*Quercus palustris*) 18 inches dbh, a red maple 12 inches dbh, a silver maple 60 inches in diameter at the base, a beech 30 inches dbh, a white oak (*Quercus alba*) 30 inches dbh, a tuliptree 24 inches dbh, a red oak with a double trunk 48 inches' in diameter at the base and an American elm (*Ulmus americana*) 36 inches in diameter at the base surrounded by a dense grove of young elms. Other native trees include box elder (*Acer negundo*), black locust (*Robinia pseudoacacia*), black walnut (*Juglans nigra*), black cherry (*Prunus serotina*), American elm, and white ash. The shrub layer includes a few natives including: kinnikinik (*Cornus amomum*), poison ivy, Virginia creeper and spicebush. However, the shrub layer is dominated by non-natives: Japanese honeysuckle, obtuse-leaved privet (*Ligustrum obtusifolium*), winged euonymus (*Euonymus alatus*), multiflora rose, Siebold viburnum (*Viburnum sieboldii*) and Amur honeysuckle (*Lonicera maackii*). Herbaceous species include false nettle (*Boehmeria cylindrica*), common blue violet (*Viola sororia*), clearweed (*Pilea pumila*), orange daylily (*Hemerocallis fulva*), jumpseed, white avens (*Geum canadensis*) and garlic-mustard (*Alliaria petiolata*).

Further upstream along the creek after the path ends, there are several culverts apparently originating from the old Byberry Hospital grounds. Evidence of dumping exists, and irregular piles of dirt are common. Along the riparian zone in this area, behind the open fields of Byberry Hospital, there is an all-terrain vehicle (ATV) course, which is adding to soil erosion in the forest. At a bend in the creek the ground appears to be flood-scoured and free of herbaceous species and litter except for deposits of flood debris. A thicket of arrowwood viburnum and spicebush is prominent near the bank. Some viburnums appear to be browsed. Tubers of the invasive herb lesser celandine (*Ranunculus ficaria*) are conspicuous on the ground.

At a parking lot behind a building near Carter Road a trail re-enters the narrow wooded stream valley. Ballfields are present on the opposite bank. Trees include sycamore, one 30-inch dbh. Norway maple (*Acer platanoides*), red maple, American elm, white ash (*Fraxinus americana*), a black walnut 15 inches dbh, black cherry, box elder, black locust and ironwood (*Carpinus caroliniana*). Shrubs and vines include spicebush, poison ivy, Japanese honeysuckle; herbaceous species are jumpseed, common blue violet, and garlic-mustard. The area along the creek bank narrows at two culverts entering from the left, and there is a mature, relatively undisturbed wooded tract on the Bensalem Township side.

Mechanicsville Road Woods (20s).

With the exception of a small patch of Fairmount Park land below Dunks Ferry Road, the land adjacent to the creek valley between Century Lane and Dunks Ferry Road is managed by the Department of Recreation and contains playing fields along Mechanicsville Road.

Much of the land along the west side of the creek between Century Lane and Richlieu Road is part of Poquessing Creek Park. A gated asphalt road begins at Mechanicsville Road and heads upstream along the Poquessing. Old field conditions, including a sod farm and an abandoned and roofless stone barn to the left before the trail veers off to the right toward the stream valley exist along the length of this road. The old fields include part of the FPC lands, as well as adjacent nonpark lands (e.g., around the GSA Building). These old fields are identified as being important sites for field birds (see Section 7.B.3.3 below). The right fork leads to the wooded floodplain forest along the creek. Home owners along Mechanicsville Road before the gate own land down to the stream. The streambank at this site is overrun with Japanese knotweed. Yard waste dumping and general trash dumping are also a problem in this section of the woods.

The upstream segment toward Richlieu Road includes scenic outcrops of Wissahickon schist in and along the stream. The floodplain forest is fairly wide and includes native trees in the canopy: red maple (to 24 inches dbh), shagbark hickory, black walnut, black cherry, white ash, and black locust; the understory consists of multiflora rose, grape (*Vitis* spp.) and abundant Japanese knotweed along the stream bank. Stilt grass and jewelweed are abundant in the herb layer. Skunk cabbage and a few patches of New York fern (*Thelypteris noveboracensis*) are also noted. The trail is a wide, two-track dirt road for most of the way, with evidence of recent use by vehicles. Richlieu Road bridge is an old stone bridge which has been closed to vehicular traffic.

Richlieu Road to Roosevelt Boulevard (in Benjamin Rush State Park):

The trail, which begins at the Richlieu Road bridge, ends abruptly and pedestrian traffic is forced to exit the stream valley and follow the abandoned road which parallels the creek. The forest along this stretch is fairly young, and there is much evidence of earlier dumping and filling. Yard waste dumping and trash disposal still present a problem in this area. Canopy trees include white ash, sycamore, box elder and American elm. Along the abandoned paved road, paper mulberry (*Broussonetia papyrifera*) (naturalized and spreading), staghorn sumac (*Rhus typhina*), grape, sugar maple, black cherry, black locust, and black walnut are present. In some areas the road is overhung on both sides with dense walls of Japanese knotweed mixed with multiflora rose. Herbaceous species include white snakeroot (*Eupatorium rugosum*), late eupatorium (*Eupatorium serotinum*), jewelweed and a solid groundcover of ground ivy (*Glechoma hederacea*). The wooded strip along the creek is very narrow in some places.

The overflow from the Federal Archives Building detention basin seeps across the old road. A little further upstream the stream valley drops off steeply from the road down to a wetland area and dense thickets. Other species noted along the old road include Amur honeysuckle, garlic-mustard, white avens and eastern figwort (*Scrophularia marilandica*).

A path (formerly and still partially paved) to the right re-enters the wooded strip along the creek in a very disturbed and weedy area with abundant obtuse-leaved privet, wineberry (*Rubus phoenicolasius*), multiflora rose and Amur honeysuckle along with the native spicebush in the shrub layer. Trees include white mulberry (*Morus alba*), black locust, white ash, red maple, crabapple (*Malus* sp.), and a white oak approximately 40 inches dbh. A large black cherry was down across the creek. Herbaceous species include natives: tall tick-trefoil (*Desmodium glabellum*) a rare plant in the state, Canada goldenrod (*Solidago canadensis*), jewelweed (*Impatiens* sp.), white avens, jumpseed, giant ragweed (*Ambrosia trifida*), common ragweed (*Ambrosia artemisiifolia*), and white vervain (*Verbena urticifolia*). The non-native Indian strawberry (*Duchesnea indica)* is prominent as a groundcover and large stands of Japanese knotweed covered the creek bank. In a low area along the creek are clearweed (*Pilea pumila)*, dotted smartweed (*Polygonum punctatum)*, caespitose smartweed (*Polygonum caespitosum*), and water purslane (*Ludwigia palustris)*.

The paved path continues along an old chain-link fence and past the ruins of several buildings. Fill is present along the edge of the stream valley. The forest here is young, with white ash, red maple, Japanese honeysuckle, spicebush, garlic-mustard and jewelweed. Below, on unfilled portions of the stream valley, the trees are older and include white ash, tuliptree and sycamores, the latter two to 18 inches dbh. At the top of the slope, there is an old white ash approximately 36 inches dbh and the riparian zone community is comprised of sycamore, empress-tree (*Paulownia tomentosa*) and American elm.

The next stretch is characterized by a less disturbed forest including sweet-gum (*Liquidambar styraciflua*), white ash, tuliptree to 24 inches dbh and 80-ft tall, spicebush, elderberry *(Sambucus canadensis*), poison ivy and the non-native Norway maple. Herbaceous species include jumpseed, blue dayflower (*Commelina communis*), Jerusalem artichoke (*Helianthus tuberosus*), white

snakeroot, Solomon's seal (*Polygonatum biflorum*) and white wood aster. There is a very heavily used campsite near the Old Turnpike Bridge close to the creek bank.

The Old Turnpike Bridge is a two-arch stone bridge, closed to vehicles. Growing in the cracks of the masonry is purple cliff-brake (*Pellaea atropurpurea*), and along the edge of the bridge access are bur cucumber (*Sicyos angulatus*) and annual wormwood (*Artemisia annua*). In the streambed are large stands of waterweed (*Elodea nuttallii*), the first significant aquatic flora noted in the Poquessing Creek above its mouth.

Dunks Ferry Woods (30s).

Vinton Road near Teton Road to Dunks Ferry Road at Potters Field:

The access for the downstream section is along the tributary stream coming from the Nanton Road arm near the Medford Road crossing. At first, this appears to be a highly disturbed forest due to the proximity of Poquessing Creek to houses. However, there are mature, native canopy trees along the stream bank. These species include a white oak (42 inches dbh), red maple, box elder, shagbark (*Carya ovata*) and pignut (*Carya glabra*) hickories, and black cherry. Native shrubs such as spicebush and arrowwood viburnum, as well as the non-native multiflora rose, Amur and Japanese honeysuckle are also present in these woods. Herbaceous species include jumpseed, enchanter's nightshade, jewelweed, white avens, common blue violet, skunk cabbage; non-natives include stilt grass, garlic-mustard, and a ground cover of Indian strawberry and ground ivy. Where the path veers away from the creek and heads up-slope emerging at Potters Field along Dunks Ferry Road, the forest is younger and more severely disturbed, consisting mainly of white ash with a dense understory of Amur honeysuckle.

Torrey Road Woods (50s).

Knights Road to Dunks Ferry Road:

Tree cover extends from the Poquessing Creek west along an unnamed tributary stream (Tributary 1) to Academy Road, forming the "Nanton Road arm" of the Fairmount Park holdings. A fringe of dense Japanese knotweed extends along swales and the stream in low areas, and some Joe-pye-weed, jewelweed, and New York ironweed (*Vernonia noveboracensis*) are visible along a path leading into the interior. The interior of the section bounded by Nanton, Academy and Lester roads is hilly and is used very heavily by bikes, motorcycles and ATVs. Holes and mounds have been constructed to further enhance the bike courses resulting in large gullies along the right bank of the tributary. The forest retains an open canopy of mature red, black and white oaks and tuliptrees in 24-36 inch dbh size class and 80-100 ft tall. Beech is also present, but most have fire scars on the lower trunk and are in poor condition. In areas not denuded by bikes, excellent oak reproduction is occurring; shrubs include maple-leaf viburnum (*Viburnum acerfolium*) and flowering dogwood. Japanese stilt grass (*Microstegium vimineum*) is dense in this section of the woods. Schist outcrop at the surface along Academy Road in a mowed area is noted. At the intersection of Torrey and Academy roads is a dense stand of Japanese knotweed which should be controlled. There is a large mowed area along the northwest corner of this parcel (by Torrey and Lester roads). This area is mown down the slope to the tributary, with a narrow herbaceous strip along the creek. Swamp milkweed (*Asclepias incarnata*), an important butterfly food plant which has become uncommon in the park, is present in this strip.

Park holdings along this tributary start above Belgreen Road. In the uppermost section, there is no visible surface flow, and the park land is a mowed strip with scattered trees and shrubs between houses on either side. Below Dunks Ferry Road, there is a narrow riparian zone of trees and shrubs, with mowed areas on either side.

Academy Road Woods (Tributary 1 of Byberry Creek) (60s).

This is a large wooded area located behind an industrial park between Academy and Decatur roads. This parcel borders Tributary 1 of Byberry Creek and a small tributary of Tributary 1. Directly behind the paved driveway of the industrial park, the woods are severely disturbed with vines in the canopy along with eroded slopes and numerous gullies. The floodplain in this section of the woods is much less disturbed with tulip poplar dominating the canopy, red maple in the understory and spicebush dominating the shrub layer. Slopes on the east side of the parcel contain native canopy tree species, although parts of these slopes are affected by runoff from the adjacent industrial areas. There appear to be more deer in this section than in any other part of Poquessing Creek Park. In the area of the woods closest to the intersection of Decatur and Darnell streets, there are large wet meadows on the west side of the tributary, which currently host reed canary grass (*Phalaris arundinacea*), wood reedgrass (*Cinna arundinacea),* Japanese stilt grass, halberd-leaved tearthumb (*Polygonum arifolium*) and skunk cabbage. There is a large skunk cabbage wetland on the east side of the creek. Another large wetland exists south of Dutton Road, which is characterized by native vegetation such as skunk cabbage, arrowhead (*Sagittaria* sp.), and fringed loosestrife (*Lysimachia ciliata*) and the non-native mile-a-minute (*Polygonum perfoliatum*). Other species observed in these wetlands include rushes (*Scirpus hattorianus, S. cyperinus, Juncus effusus* and *J. tenuis*), sedges (*Carex swannii*, *C. lupulina* and *C. crinita*), and mad-dog skullcap (*Scutellaria lateriflora*). At the time of site visits, this section had a number of abandoned cars and other trash.

Byberry Creek and mid-Poquessing Creek (70s).

John C. Byrne Golf Course:

Byberry Creek and a right bank tributary of Byberry Creek run through the golf course. Several areas on the golf course currently being managed by mowing could be released to create tall grass/meadow buffer habitat. These pieces are not in the fairways and could be taken out of management. Japanese knotweed and multiflora are abundant along the banks of the small tributary which runs through the course. The right bank of the tributary abuts a chain link fence where a dirt bike trail has been created. Access to this site should be controlled to prevent further erosion and gullying of the streambank.

Frankford Avenue to Woodhaven Road (Triangular piece between Knights Road and Crestmont Avenue):

Byberry Creek enters Poquessing Creek just above Frankford Avenue, and there is a small area of parkland along Poquessing Creek from this junction north to the intersection of Red Lion and Knights Roads. On the Red Lion/Crestmont Road side of this triangular piece of land is a row of three large white ash which are 40+ inches dbh, which, along with several sugar maples which seem to line Crestmont Road, look like they may have been part of an earlier estate planting. Also present are a large beech measuring 36 inches dbh, and an extensive ground cover of English ivy. Otherwise, this area is characterized by a young, disturbed forest dominated by white ash with Norway maple invading rapidly. Other species include the native poison ivy, spicebush, and grape, and the non-native multiflora rose, garlic-mustard, Japanese honeysuckle, and wineberry. On Knights Road just above Frankford Avenue is a mowed field with recently planted trees.

There are several sugar maples, to 24-30 inches dbh and a small grove of Kentucky coffee-tree (*Gymnocladus dioica*) on the creek bank at the old three-arch stone bridge on Red Lion/Crestmont Road. Immediately below the bridge along the bank are the following native tree species: black walnut, box elder, white ash, black locust and pin oak. Along Red Lion/Crestmont Road are several other big trees including red oak, basswood and sugar maple in the 30-36 inch dbh category. Non-

natives present in this stretch include tree-of-heaven and Norway maple. The supporting structures of the bridge are being undermined by erosion in the stream bed.

Poquessing Creek below Woodhaven Road (80s).

DiMarco Drive to Woodhaven Road:

The next segment starts at a small tributary stream with an adjacent trail that enters Poquessing Creek between DiMarco Drive and Crestmont Road, and extends upstream to Woodhaven Road. A path also appears to extend downstream along the creek bank from DiMarco Drive, behind the private homes along Crestmont Avenue. Continuing upstream, there is a steep drop-off from street level to the wooded stream valley terrace, and evidence of fill having been pushed into the stream valley from above in the past. Ruins of bridge supports are visible along the bank in several places. Native trees include tuliptree (to 24 inches dbh), red and sugar maples, box elder, and black walnut. Weedy areas contain multiflora rose in abundance in the shrub layer. An area along the creek bank was planted at one time with conifers including Norway spruce (now in an advanced state of decline), Canadian hemlock, Scots pine, white pine, blue spruce, and a row of purple-leaved Norway maples. Also present are the native species: black walnut, sycamore measured at 44 inches dbh. (the biggest tree observed in the entire valley) and ironwood. Shrubs include the non-native obtuse-leaved privet and winged euonymus as well as native blackberry, arrowwood viburnum, and black-haw (*Viburnum prunifolium*). Herbaceous species include cut-leaved coneflower, wood nettle, bottlebrush grass (*Elymus hystrix*), Canada wild rye (*Elymus canadensis*), clearweed, jumpseed, white avens, jewelweed, common blue violet, skunk cabbage, and garlic-mustard. A big tuliptree had come down, creating a gap. A single sweet-gum exists along the path. Rock ballast has been placed along the creek, further upstream, just beyond a small floodplain area, where the valley narrowed so much that it is impossible to go any further, except by exiting up slope.

Access to the stream valley resumed at the Deerpath Road loop. The path follows what appears to be an overgrown right-of-way at first, but soon veers off to the right toward the creek. Native species present include kinnikinik, blackberry and swamp milkweed (*Asclepias incarnata*) found along the right-of-way. In the floodplain forest, silver maple and white mulberry are prominent in the canopy. A floodplain bar contains a thicket of Japanese hops and previously mentioned associates with the addition of wild chervil (*Cryptotaenia canadensis*) and strigose fleabane (*Erigeron strigosus*). A large, flat wooded stretch is dominated by sycamore, box elder, silver and red maples, white ash and pin oak. Herbs include cut-leaved coneflower, Canada goldenrod, summer phlox (*Phlox paniculata*) and tall meadow-rue (*Thalictrum pubescens*). On the opposite side, along the Poquessing bank, is a 30-ft high cliff with large native oaks above, apparently caused by an outcrop of Wissahickon schist on the Bucks County side. Striations on the rock face are barely visible under a surface layer of orange mud. A large oak is down in the creek at this site, trapping much debris behind it. The floodplain forest along this stretch is younger farther from the creek and dominated by ash, silver maple and box elder.

Away from the creek, an extension of park land running behind houses between Greenmount Road and the new development along Woodhaven Road consists of old hedgerow remnants and small woodlots. The northern part of this area is largely mowed with scattered trees and clumps of shrubs. Most of the rest of the area has extensive growth of Japanese honeysuckle and other exotic plants. The southeastern part of this area has old fields, containing the narrow-leaved mountain mint (*Pycnanthemum tenuifoloium*), which has become uncommon in the park. There is a large stand of plume grass in this area, as well.

Frankford Avenue to Mouth of the Poquessing (90s).

Interstate 95 to Frankford Avenue: Wooded Area Parallel to Hegerman Street:

The park land in this area consists of mown lawns to the edge of the slope, and a wooded strip along the slope and down to the side of the creek. There are several small herbaceous meadows at the edge of the lawn.

From Stevenson Lane to St. Denis Drive, Hegerman Street is a dirt track. From this trail, several access trails lead down to the creek, and there is a well-worn path parallel to the creek extending from the end of Stevenson Lane past the ruins of an old building near the creek bank, upstream to where the path emerges in a grassy field along Hegerman Street. The trail continues down the slope into the woods; the wooded strip narrows, at least partly due to earlier placement of fill, but a path is available nearly all the way to Frankford Avenue (to an old field/meadow next to the SEPTA loop).

In the downstream portion of this stretch, numerous large native trees are present including specimens of silver and red maple, white and pin oak, tuliptree, black cherry, and sycamore 30 to 40 inches dbh and as much as 100-ft tall. Understory trees include native ironwood and box elder. Non-native trees include a few Norway maple which seem to be in the early stages of invasion. Native shrubs and vines present in this section include black-haw, arrowwood viburnum, spicebush, elderberry, blackberry, grape, poison ivy, and Virginia creeper. Non-natives include multiflora rose, and Japanese honeysuckle. Japanese knotweed is abundant along the creek bank. Native herbaceous species include false Solomon's-seal, blue violet, false nettle, jumpseed, wood nettle, white avens, enchanter's nightshade, jewelweed; non-natives include garlic-mustard and a nearly continuous ground cover of Indian strawberry.

Further upstream toward Frankford Avenue the stream valley narrows, apparently due to the placement of fill along the edge of the higher, developed area. The forest is more disturbed, and a large culvert enters the stream valley at one point, where multiflora rose is abundant. In addition to those listed above, trees include native black oak and white ash and the non-native. In the vicinity of outcrops of Wissahickon schist along the base of the slope near the stream, big trees such as a red maple (36 inches dbh), a black oak (37 inches dbh), and a white oak (30-36 inches dbh) are found. The native wildflowers, white woodland aster and false Solomon's seal are also present.

A small floodplain bar in one location and a similar area that is actually an island are noted where the vegetation is mostly herbaceous and dominated by Japanese hops and Japanese knotweed with green foxtail grass (*Setaria faberi)*, barnyard grass (*Echinochloa crus-galli)*, biennial evening primrose (*Oenothera biennis*), burdock (*Arctium minus*), annual wormwood, jewelweed, carpetweed (*Mollugo verticillata*), low smartweed (*Polygonum caespitosum*), smartweed (*P. pensylvanicum*) and dotted smartweed (*P. punctatum*). In addition, there are some small willows and a few Carolina poplar (*Populus* x *canadensis*) and Honey-locust seedlings. One stretch of gravel bar is totally devoid of vegetation.

Between the wooded creek corridor and Hegerman Street is a mowed grassy strip. The upper edge of the stream corridor vegetation along this section is mainly black locust, box elder, white mulberry, and empress-tree. Mugwort (*Artemisia vulgaris*) and burdock form an herbaceous border. Adjacent to the creek valley just before Frankford Avenue, is a sloping old field or meadow containing blackberry, grass-leaved goldenrod, Canada goldenrod, swamp milkweed and dogbane. Weedy species include common reed in one lower corner, large patches of Canada thistle, purple loosestrife and several clumps of Japanese plumegrass. At Frankford Avenue, a parking lot is paved right up the creek bank, while the steep bank is wooded.

Interstate 95 to Frankford Avenue: Narrow Wooded Strips along Stevenson Lane and Mill Road:

There is no trail along the creek in this stretch, although Stevenson Lane has recently been closed to traffic at Grant Avenue and thus could serve as a place to walk. Japanese knotweed is abundant along the creek bank, and trees include Norway and silver maple, box elder, white mulberry, American ash, and sycamore. The native vines poison ivy and Virginia creeper are also present and abundant.

Vicinity of the Railroad and I-95 Bridges:

There is a low dam across Poquessing Creek just upstream from State Road (outside park boundaries). However, it appears that at high tide the water level is regularly above the level of the dam. This would imply that the creek is tidal to the outcrops of Wissahickon Schist in the creek bed between the railroad and Interstate 95 bridges. One individual multi-flowered mud-plantain (*Heteranthera multiflora*) (PA endangered) was observed on the creek margin just above the outcrops. The banks are overhung with Norway and silver maple, box elder, white mulberry, American ash and sycamore. The herbaceous species present include purple loosestrife, water purslane, terrestrial water-starwort (*Callitriche terrestris*) and smartweeds. No floodplain is preserved at this point, but people are using the creek bank for fishing and an informal trail exists behind the new homes on Grant Street. The creek bank in this area also contains ruins of a once elegant stone landing and abutments of an old bridge (where a large elevated pipe crosses the creek).

Below State Road (including Glen Foerd):

Glen Foerd is a landscaped estate, now part of Fairmount Park, with large trees including specimens of cucumber magnolia (*Magnolia acuminata*) and black oak to 36-40 inches dbh. Some portions of the garden contain escaped thickets of porcelain-berry.

Along the Poquessing Creek bank are portions of a low rock retaining wall overhung with a dense stand of Japanese knotweed and porcelain-berry. Below the wall is a fresh water tidal marsh dominated by spatterdock and arrow-arum. Under the spatterdock a few patches of subulate arrowhead (PA rare) and grass-leaved arrowhead are observable. Multi-flowered mud-plantain (PA endangered) is scattered throughout but severely browsed, presumably by geese, especially in the lower portions of the intertidal zone. Dotted smartweed and marsh purslane, both natives, are scattered throughout and Chinese lobelia (*Lobelia chinensis*), which has recently invaded the Delaware Estuary, is present. Other plants in the marsh include beggars-ticks (*Bidens frondosa)* and showy beggars-ticks (*B. laevis*), and sedges (*Cyperus* cf. *refractus* and *Cyperus engelmanni*). *C. refractus* is a species of special concern in Pennsylvania.

Ditch stonecrop (*Penthorum sedoides*) is growing among riprap on the east bank (outside park land). Water celery is present, washed up in the tidal marsh, presumably from nearby submergent beds in the Delaware River.

Along the Delaware River is a steep bank with large native trees at the top. The bank itself is mostly covered with a weedy, thicket containing invasive and native riparian vine species such as porcelain-berry, grape, greenbrier, Japanese honeysuckle, and poison ivy. At the bottom is a retaining wall. Toward the yacht club there is a stand of spatterdock suggesting a small remnant of tidal marsh vegetation.

7.B.3.3. **Fauna**

The following sections provide specific information on the fauna of Poquessing Creek Park, as indicated by the ANSP 1998 inventory and other sources of information. More information is presented in Volume I and Volume III, Appendix A. This information is important in determining

links between disturbance, vegetation, and fauna, which are used to select restoration sites and activities. Because of the relatively small size of park land in Poquessing Creek Park and limitations in total effort, relatively little sampling was done in the park. Sampling information was supplemented by data from other studies, providing substantial information for some taxonomic groups (e.g., fishes, reptiles and amphibians).

Birds. Poquessing Creek Park was censussed on 26 and 30 June 1998, indicating the presence of 46 indicator species. Additional observations were made during other site visits by ANSP personnel. The existing park is very narrow and broken into many segments, and recent developments right up against the creek in some areas (both in Philadelphia and Bucks County) have made the open lands even more narrow. The effects of this narrowness are apparent in the proliferation of multiflora rose throughout the understory and into the canopy.

However, the non-forested areas within the park and adjacent to it are what make the park so unique. Shrublands and open fields are extremely under-represented in the Fairmount Park system, and it is in the Poquessing where the best examples are found, even if they are degraded by exotics like multiflora rose. Only 34 probable breeding species were encountered during the two days visiting the park, although it is believed a number of other common species not recorded could also be found in the park with additional time.

Shrubland species were better represented in Poquessing than at any other segment in the Fairmount Park system. Many of these were found in an area located behind the recently constructed National Archives building (in and adjacent to the Mechanicsville Road segment of the park) and must have been much more productive prior to the construction of these sites. Indeed, many of the birds observed may be relicts - individuals that bred in previous years and returned to their territories this year only to find them turned into industrial centers. The remaining patches of adjacent land in the park may be close approximations, but are unlikely to represent habitat that will allow for populations to continue many years in the future. Species found here and in other edge habitat included Willow Flycatcher, Brown Thrasher, House Wren, Chestnut-sided Warbler, Common Yellow-throat, Yellow-breasted Chat, Red-winged Blackbird, Eastern Towhee, Orchard Oriole and Baltimore Oriole.

Of all park areas visited, Poquessing Creek Park was the most surprising because of the wealth of opportunities to conserve adjacent lands and to enhance the value of the park for wild bird life. Nothing was known about this park by the author or those local birdwatchers consulted for advice. The sheer abundance of lands (especially those that are in an early state of succession and are level grades) adjacent to the park that are abandoned or lightly developed are a perfect opportunity to expand the park (e.g., through acquisitions or easements) such that the small, existing core lands can be more easily maintained (i.e., fewer problems from exotics). The expansion of park land, and development and maintenance of trails and signs, will increase the opportunities for passive recreation, including bird watching.

Mollusks. No historical records of mollusks for the Poquessing Valley were located. Five native and 2 introduced species were recorded in the current assessment (see Vol. I, page I-64), compared with 3-5 native species in Cobbs, FDR, Fairmount (East/West) and Tacony Creek parks, 7 native species in Pennypack Creek Park, and 16 native species in Wissahickon Valley Park. An additional native species (family Polygyridae, *Mesodon* group) was collected in the Academy Road woods parcel in 2000 and is not listed in Volume I. The native species of land snails are mostly widespread species, which were recorded in the 1998 assessment in other parks. One species, *Zonitoides nitidus*, was not recorded in any other park in the 1998 assessment, although it is historically known from Fairmount (East/West) Park.

Herpetofauna. There is little historical information specifically relating to reptiles and amphibians of the Poquessing Valley. Fowler (1917) noted pickerel frog (*Rana palustris*) from Andalusia, in or adjacent to the lower Poquessing Creek. R. Horwitz made observations in the 1980s, mainly in the upper part of the park and adjacent non-park lands, between Trevose Road and Roosevelt Boulevard. He recorded four species of salamanders, four species of frogs and toads, four species of turtles and two species of snakes (Vol. I, Table 4.E.5). For the most part, these are the widespread species of the city. However, they include a single wood turtle (*Clemmys insculpta*), box turtle (*Terrapene carolina*, which was reported to be common by a local resident), American toad (*Bufo americanus*) and spring peeper (*Hyla crucifer*), and a single red salamander (*Pseudotriton ruber*). Based on the habitats present in the park, it is likely that most of the regional herpetofauna (Vol. I, Table 4.E.5) would have been present in park lands.

Relatively limited observations were made during the current assessment, including specific searches for reptiles and amphibians, and observations by other observers (Vol. I, Tables 4.E.3 and 4.E.4). Only four species were reported: redbacked salamander (*Plethodeon cinereus*), green frog (*Rana clamitans*), bullfrog (*R. catesbiana*), and Northern water snake (*Nerodia sipedon*). All four are widespread, common species. It is likely that other widespread species occur in the park, such as snapping and painted turtles (which would be expected near the mouth), twolined salamander, Eastern garter snake and brown snake.

Terrestrial Insects. Craneflies were sought by sweep sampling in the parcel between Trevose and Roosevelt Boulevard and in the Mechanicsville parcel (between Benjamin Rush State Park and Century Lane). One widespread rare species (*Dicranoptycha winnemana*) was collected, as were two of the southeastern Pennsylvania local species (*Dicranoptycha germana* and *Nephrotoma polymera*).

Benthic Invertebrates. Benthic macroinvertebrate communities in Poquessing Creek Park were assessed in two ways. During streamwalk a cursory examination of rocks was done. The results of this examination were incorporated into the Stream Quality Index (SQI). The second type was a detailed, quantitative examination of invertebrates dislodged from a known area of stream bottom. These results are presented in Volume I, Section 4.E.8 and Volume III, Appendix A-7 and are summarized here. Quantitative samples were taken at one site in the Tributary 1 of Byberry Creek (i.e., in the Academy Road section). The benthic macroinvertebrate data show the relationship between watershed disturbance, hydrology and biodiversity. The Poquessing site showed numerous indicators of an unhealthy benthic community. The total taxonomic richness (3) and Shannon-Wiener diversity (0.416) were the lowest of any of the 32 sampling sites in the Fairmount Park system (which are themselves low relative to more rural streams), the Hilsenhoff Biotic Index (6.21, an index of pollution tolerance, with higher scores indicating more tolerant species) was the highest of the 32 sites, the total abundance (218 individuals/m^2) was the third lowest, and only one EPT species (mayfly, stonefly and caddisfly) was collected. The sample was dominated by chironomids, which is typical of disturbed streams. The proportion of chironomids (87%) was higher than at all other sites.

The proportion of different feeding groups of macroinvertebrates was calculated. As noted in Volume I, these trophic structures indicate disturbance at sites throughout the Fair-mount Park system. Shredders, which shred leaves and other coarse material, were rare or absent at all sites. Since this group normally represents a major pathway of forest production into stream systems, this indicates a major shift in stream biological function. The rarity of this group probably reflects low retention time of leaves; i.e., leaves are carried downstream quickly by storm flows. Similarly, scrapers, which scrape algae and associated organic matter from rocks and logs, and predators were also rare or absent. Filterers were variable, but tended to be more abundant in some of the less disturbed streams. Gatherers and collectors, which are more generalized in feeding habits, dominated most samples. The proportion of gatherers tended to increase with disturbance. The single Poques-

sing Creek site showed the most extreme food web structure of the samples: 99% of individuals caught were collector-gatherers (i.e., generalist taxa), indicating the virtual absence of other groups.

Fish. There are several sources of information on fishes of Poquessing Creek Park. Henry Weed Fowler, a curator of fishes at the Academy of Natural Sciences of Philadelphia (ANSP) who lived in Holmesburg, collected fishes in the area in the period around 1898-1930. He (Fowler 1914) summarized fish occurrence in Poquessing Creek, and a summary of Bucks County fish (Fowler 1921) contains a few additional Poquessing records (Table 7.B.1). These include 16 native species and one introduced species. ANSP has specimens from 3 sites sampled by Fowler, although only 8 of the 17 species he reported from the Poquessing Creek are represented by specimens. Most of these are widespread native stream species. Three species (creek chubsucker, bridle shiner and golden shiner) are typical of vegetated streams. All of these have become less common in the region in recent years (Fairchild et al. 1998), although the golden shiner is still widespread. Fowler reported one anadromous species, the alewife (*Alosa pseudoharengus*), from the tidal parts of the creek. Adult alewife move up small streams and rivers in the spring to spawn, and then return to estuaries or the ocean during the remainder of the year.

More recent records come from the Pennsylvania Fish Commission and others (Table 7.B.2); these range from the mouth of the river (a few samples) to the edge of the park at Trevose Road. No collecting was done specifically for the 1998 assessment. There is a general trend to decreasing species richness in the more downstream reaches (Table 7.B.2). This is partly due to the high species richness at Trevose Road, which reflects much more intensive collecting than at the other sites. The sampling indicates the presence of typical Piedmont stream fish in the creek. No rare species were encountered, although the comely shiner is rather local in the region. Three of the species reported by Fowler have not been found more recently. These include the bridle shiner and creek chubsucker, two vegetation-associated species which have become rare throughout the region, and the alewife, which could still occur near the mouth of the Poquessing. A number of introduced species were recorded. These include bowfin; one large individual was collected, which may represent an introduced individual fish rather than an established population. Otherwise, the introduced species represent typical pond and stream species. The less tolerant sport species (e.g., rock bass and smallmouth bass) were not recorded.

No collecting was done right at the mouth of Poquessing Creek. This tidal reach contains intertidal marsh, and may support additional species of riverine fish, such as alewife (see above), blueback herring, white perch, striped bass and Eastern silvery minnow. Fowler noted the presence of several other species in the ditches near the Delaware River around the mouth of Pennypack Creek (Fowler 1917; see Volume II, Chapter 5). Some of these species may have present around the mouth of the Poquessing at one time. Currently, there is little or none of this wetland/ditch habitat around the mouth of the Poquessing.

7.B.3.5. Stormwater/Streams

Forty percent of the Poquessing Creek watershed lies outside of the city boundaries and sixty-seven percent of this watershed is classified as urban land cover. The park area represents only 2% of the watershed area.

Riparian zone along Poquessing Creek.

The Poquessing Creek and tributaries have highly urbanized watersheds. When a watershed is developed or urbanized, the supply of water and sediment to stream channels changes dramatically. Peak discharges and runoff volumes increase as water

Table 7.B.1. Records of fish from the Poquessing Drainage prior to 1930. Sources include Fowler's list of Poquessing fishes (Fowler 1914), and Poquessing entries from Fowler's list of Bucks County Fishes (Fowler 1921).

Common Name	Species	Notes	Literature	Specimen Records*		
NATIVE:				**A**	**B**	**C**
Alewife	*Alosa pseudoharengus*	Tidal (Torresdale)	Fowler (1914)			
American eel	*Anguilla rostrata*	Torresdale	Fowler (1914)			
Blacknose dace	*Rhinichthys atratulus*	Very abundant	Fowler (1914, 1921)	1		1
Creek chub	*Semotilus atromaculatus*	Andalusia	Fowler (1921)			
Fallfish	*Semotilus corporalis*	Common	Fowler (1914, 1921)	1		1
Golden shiner	*Notemigonus crysoleucas*	Torresdale	Fowler (1914, 1921)			
Satinfin shiner	*Cyprinella analostana*	Common	Fowler (1914, 1921)		1	
Common shiner	*Luxilus cornutus*	Common	Fowler (1914, 1921)	1		2
Spottail shiner	*Notropis hudsonius*	Andalusia	Fowler (1921)			
Bridle shiner	*Notropis bifrenatus*	Andalusia and Torresdale	Fowler (1914, 1921)		1	
White sucker	*Catostomus commersoni*	Abundant	Fowler (1914, 1921)	1		1
Creek chubsucker	*Erimyzon oblongus*	Torresdale	Fowler (1914)			
Banded killifish	*Fundulus diaphanus*	Torresdale and Red Lion	Fowler (1914)			
Redbreast sunfish	*Lepomis auritus*	Byberry Creek and Torresdale	Fowler (1914)	1		
Pumpkinseed	*Lepomis gibbosus*		Fowler (1921)			
Tessellated darter	*Etheostoma olmstedi*	Common	Fowler (1914, 1921)	1		1
INTRODUCED:						
Common carp	*Cyprinus carpio*	Torresdale				

*Specimen Record Codes are A (Byberry Creek); B (Poquessing Creek above Torresdale); C (Walton Run).

Table 7.B.2. Records of fish from the Poquessing Creek drainage after 1930.

		Poquessing Creek						Trib Byberry		Byberry
		A*	B*	C*	D*	E*	F*	G*	H*	I*
Common Name	Species	Trevose	RR	Dunk's F	Gravel H	Woodh	State			
NATIVE:										
American eel	*Anguilla rostrata*	X	X	X	X	X	X		X	
Blacknose dace	*Rhinichthys atratulus*	X	X	X	X	X		X	X	X
Longnose dace	*Rhinichthys cataractae*	X	X	X	X	X	X			
Creek chub	*Semotilus atromaculatus*	X	X						X	
Fallfish	*Semotilus corporalis*	X	X							
Golden shiner	*Notemigonus crysoleucas*	X	X	X	X	X				
Common shiner	*Luxilus cornutus*	X	X	X	X	X	X			
Satinfin shiner	*Cyprinella analostana*	X	X	X	X	X	X			X
Spotfin shiner	*Cyprinella spiloptera*	X	X	X	X	X	X			X
Comely shiner	*Notropis amoenus*	X								
Spottail shiner	*Notropis hudsonius*	X	X	X	X	X				
Swallowtail shiner	*Notropis procne*	X	X	X	X	X				X
White sucker	*Catostomus commersoni*	X	X	X	X	X	X		X	X
Brown bullhead	*Ameiurus nebulosus*	X	X			X	X			
Banded killifish	*Fundulus diaphanus*	X	X	X	X	X	X		X	X
Mummichog	*Fundulus heteroclitus*	X	X			X	X			
Redbreast sunfish	*Lepomis auritus*	X	X	X	X		X			
Pumpkinseed	*Lepomis gibbosus*	X	X	X	X	X	X			
Tessellated darter	*Etheostoma olmstedi*	X	X	X	X	X	X	X	X	
INTRODUCED:										
Bowfin	*Amia calva*		X							
Goldfish	*Carassius auratus*	X			X		X			
Common carp	*Cyprinus carpio*	X	X							
Green sunfish	*Lepomis cyanellus*	X	X	X	X	X	X		X	
Bluegill	*Lepomis macrochirus*	X		X						
Largemouth bass	*Micropterus salmoides*			X						
Black crappie	*Pomoxis nigromaculatus*					X	X			
NO. OF NATIVE SPP.		19	18	14	14	15	12	2	6	6
NO. OF SPECIES		23	21	17	16	17	15	2	7	6

*Key to Column Designations:

Location	Collector	Year	Column
Poquessing Creek below Trevose Road	Horwitz	1980-1986	A
Poquessing Rt. 1 to RR	Horwitz	1981	B
Poquessing Creek, river mile 4.79 (nr Dunks Ferry Rd)	PFBC	1983	C
Poquessing Creek, below Gravel Hill Road (above Woodhaven Rd)	Horwitz	1981	D
Poquessing Creek, river mile 2.66 (nr Woodhaven Rd)	PFBC	1983	E
Poquessing Creek, river mile 0.38 (nr State Rd)	PFBC	1983	F
Trib Byberry/Poquessing above Byberry Road	PADEP	1995	G
Trib Byberry/Poquessing below Byberry Road	PADEP	1995	H
Byberry Creek, Golf Course to Chesterfield Drive	Horwitz	1979	I

quickly runs off of paved surfaces. Less water infiltrates into the ground, and so less water reaches the stream through the groundwater, thus reducing the amount of water during low flow periods. Stream channels in suburban and urban areas respond to these changes in several ways. Increased storm discharges promote channel erosion, which results in increased channel size and decreased channel roughness (see Appendix B-5; Pizzuto et al., 2000). As the stream incises, the floodplain becomes progressively more isolated, the water table is lowered and flood waters are less able to interact with the riparian or streamside ecosystem.

Scour also causes reduced development of pool/riffle topography that provides important habitat for aquatic organisms. These changes often lead to stream instability which is characterized by abrupt, episodic, and progressive changes in the stream geometry. Unstable channels can destroy property, damage structures, reduce water quality, diminish aquatic (and terrestrial) habitat, and degrade aesthetic quality.

Gullies form when stormwater channelizes and causes hillslopes to erode. In Poquessing Creek Park, stormwater runoff from street intersections and neighborhood runoff are contributing to the formation of gullies in several areas. These gullies carry large flows that are contributing significant amounts of sediments to Poquessing Creek and its tributaries. It is recommended that the stormwater drains be checked at certain locations, as well as detaining and diverting storm runoff to avoid further erosion and deepening of the gullies.

In addition to the physical, water quantity-related problems, parts of Poquessing Creek and its tributaries have severely degraded water quality. Although water quality is not specifically addressed by this restoration plan, it did arise as an issue for this park. A known source of pollution comes from sanitary-storm sewer cross connections, and from sanitary sewer overflows (SOs). Undoubtedly, other impairments to Poquessing Creek's water quality include "typical" urban pollutants such as vehicle fluids (oils, antifreeze) and household and lawn chemicals (detergents, fertilizers, pesticides). Still other impacts to some streams are the effects of the Byrne Golf Course. Those streams running through and adjacent to the golf course are at a high risk of having water quality and quantity related problems. Pesticides and fertilizers used on the course may be running off into the streams causing poor water quality. Furthermore, many streams on the golf course lack a forested riparian buffer, and in some cases the maintained grass is mowed to the edge of the streambank. This practice does not allow any stream-side vegetation to take root and consequently streambanks can be very unstable.

A Stream Quality Index (SQI) was developed to reflect the condition of distinct stream reaches throughout the Fairmount Park system. The SQI is based on three important characteristics: 1) stream geomorphology; 2) aquatic habitat; and 3) riparian or stream-side condition. A detailed methodology is provided in Section 5.C.4.1 of Volume I.

The resulting index allows for a comparison of the condition of any stream in the Fairmount Park system. Stream geomorphology, aquatic habitat, and riparian condition were weighted evenly and the final scores ranged from 0 to 300 representing impaired to healthy, respectively. The resulting scores were divided into equal categories representing stream quality (Table 7.B.3). In addition, the resulting SQIs for Poquessing Creek Park stream reaches are presented visually in Steam Quality maps in Volume II, Section 7.F.

There are a total of 20 reaches in Poquessing Creek Park. The majority of reaches (80%) is classified as impaired. The other 20% of reaches are either severely impaired or moderately impaired. The following section describes each of the tributaries in the Poquessing Creek Park with restoration recommendations.

Table 7.B.3. Stream Quality Index categories and results.*

Stream Quality	Stream Quality Index Range	Number and % of Reaches - Fairmount Park System	Number and % of Reaches - Poquessing Creek Park
Severely Impaired	0 to 75	24 (6%)	1 (5%)
Impaired	76 to 150	155 (36%)	16 (80%)
Moderately Impaired	151 to 225	239 (56%)	3 (15%)
Slightly or Non-impaired	226 to 300	8 (2%)	0 (0%)
Totals	0 to 300	426 (100%)	20 (100%)

* This index and the number of stream reaches does not include FDR Park. Totals for the entire park have been updated from previous master plans to reflect updated fieldwork.

Near Intersection of Academy and Outlook St. (Tributary 1 of 1 of Byberry Creek [Tributary 2]). A very short stretch of this small stream exists in the golf course. It is basically a storm drainage ditch. There are no recommendations for restoration activities.

Between Grant and Academy, Totally Within the Golf Course Boundaries (Tributary 1 of Byberry Creek [Tributary 2]). This tributary starts near the Academy Road and Linden Avenue intersection. Within the park it runs along the border of the golf course in a thin strip of trees for about half its length. The bottom half crosses three fairways until it joins Tributary 1 within the golf course. The stream has undergone major downcutting and looks as though it may have been channelized or straightened in the past.

1. Gully Repair and Prevention (S70.02): Where Pearson Avenue dead-ends next to the stream it appears that storm runoff is missing the storm drain. This is causing a large gully to form and destabilizing the fence as well as the stream bank. The Philadelphia Streets Department should be contacted to correct this. The gully can then be filled and planted.
2. Gully Repair and Prevention (S70.01): Just upstream on the left bank (looking downstream) of where Pearson Avenue dead-ends at the stream, there is a large gully forming from golf course runoff. Runoff should be controlled from the golf course by preventing the concentration of flow at this point. This could be done by putting in a small berm to act as a level spreader or a larger buffer area with native planting could be installed. Once the flows are controlled the gully can be repaired by filling. If flows are not controlled, the gully will continue to migrate back toward the golf course and could become a health hazard.
3. Structural Improvement to Stream Channels OR Daylighting (S70.03): Where Pearson Avenue apparently used to cross the golf course, there is a very large concrete culvert within the stream. This does not appear to be in use and should be removed. This could be called a Structural Improvement or a very short Daylighting.
4. Gully Repair and Prevention AND Structural Improvement (S70.04): Just downstream of Pearson Avenue, there is a gully on the right bank due to a stormwater outfall. The outfall has deteriorated – there is no concrete pad and the pipe has collapsed. The pipe should be

repaired and a suitable outlet structure should be installed with wing walls and a pad. Energy dissipation to prevent further gullying should be an integral part of the outlet structure design.

5. Structural Improvement to Stream Channels (S70.05): The stream crossing for the first fairway (going downstream) consists of a double culvert. This double culvert causes aggrading (deposition) of the stream channel behind the crossing and scouring below. In addition, double culverts have the tendency to clog with debris and streams will try to cut around them during storms. This culvert should be removed and replaced with a spanning walkway (like the others just downstream).
6. Trash Removal (S70.06): Throughout this whole stretch of stream concrete rubble has been dumped in an attempt to stabilize the stream banks. This debris should be removed and the banks planted with native grasses and sedges.
7. Bank Stabilization/Regrade/Riparian (S70.07): Where the stream crosses the third fairway (going downstream), just before it enters the woods again, there is an opportunity to do a bank regrading, stabilization (with fiber mats and logs) and planting of native grasses, sedges and low-growing shrubs on the left bank (looking downstream).

SW of Grant Avenue, Within the Golf Course (Byberry Creek [Tributary 2]). Bank Stabilization/Regrade/ Riparian (S70.08): The entire stretch from the confluence with Tributary 1 of Tributary 2 down to Grant Avenue has sporadically dumped concrete debris and several areas of mowed grass and large cut banks. Throughout this stretch, the rubble could be removed, the riparian forest could be expanded where possible (or no mow zones should be established), and stretches where steep eroded banks have formed could be stabilized using regrading, bioengineering techniques, and native plantings. Ecological benefit would be minimal.

A Small Stretch Just Before Joining Poquessing Creek, Downstream of Knight Rd. (Byberry Creek [Tributary 2]). No recommendation. This short stretch of stream is channelized and downcut. There would be no social or ecological benefit to restoration here.

Where Red Lion Road Crosses (Mainstem). Trash Removal (S70.09): There is a huge debris dam upstream of the bridge where Red Lion Road crosses Poquessing Creek. This may or may not be the responsibility of the Fairmount Park Commission— regardless, it should be removed before it causes major bank failures, road collapse, or bridge failure.

South of Frankford Avenue, along Hegerman Street (Mainstem). No recommendations. The stream is large at this point and only the bank on one side is within the park.

Between Decatur and Academy Roads (Tributary 1). This tributary is heavily impacted by urban runoff; it has downcut over the years, it has a wide, shallow bed, and the banks are high, vertical and eroding. In addition, the woods around the stream are filled with poison ivy. This portion of the park is little used and is actually difficult to move around in for lack of trails, the steep banks, and poison ivy. However, it has a high density of frogs and some large, vernal pools in its floodplain. In addition, while portions of the stream were classified as impaired, others were classified as moderately impaired. The difference between the impaired and moderately impaired reaches of this stream seem to be directly related to the amount of large woody debris (LWD)— the more LWD, the better the condition of the stream.

1. Structural Improvement to Stream Channels (S60.05): The culvert from David Michael's parking lot could use some large rocks at the outlet to dissipate energy and prevent further scouring and erosion of the bed and banks.

2. Structural Improvement to Stream Channels (S60.04): This culvert dumps storm flows about 5 ft above the stream bed and is causing the formation of a gully and erosion of the stream banks. The outlet structure is failing. A drop structure should be designed and installed to drop the storm flows down to the elevation of the stream and to dissipate energy.
3. Trash Removal (S60.03): The car that has been dumped into the stream should be removed (there are several more in Tributary 1's tributaries, as well, see below).
4. Modify Channel and/or Bank Stabilization/Regrade/Riparian (S60.02): As mentioned above, the stretches of this stream having LWD tend to be more stable, have more riffle/pool morphology, and provide better habitat. Since the stream has an incredible population of frogs, any restoration should have a significant ecological benefit even though the stream is heavily impacted. We recommend the addition of LWD along the entire length of Tributary 1 within the park. This could include some bank regrading and stabilization with bioengineering techniques. Another option is to have a new natural channel designed, similar to the restoration of Saddle River in Baltimore, MD. The Saddle River restoration involved a redesigning of the stream channel to create a more sinuous channel, a well defined low-flow channel, and a larger channel with inset floodplains to allow for large stormflows to pass. The banks were also stabilized with bioengineering techniques.

Tributary 1 of Tributary 1. This is one of the most degraded streams in the park. It is heavily impacted by urban stormwater runoff. The only recommendation is to remove a car that currently is in the stream channel.

1. Trash Removal (S60.01): The car in the channel should be removed.

Tributary 2 of Tributary 1 (and Trib 1 of 2 of 1). This is another highly degraded stream with heavy urban runoff impacts. The only recommendation is to remove vehicles in and around the stream.

1. Trash Removal (S60.06): Remove the cars in and around the stream.

Tributary 3 of Tributary 1. No recommendations.

Between Torrey and Medford Road (Tributary 3). The main tributary above confluence with Trib 1 of Trib 3 is dry. The stream has all the typical characteristics of urban streams: low or no flow during dry periods, rectangular channel, steep eroded banks, and no defined thalweg or low-flow channel. There is evidence of ATVs actually driving within the stream channel.

1. Bank Stabilization/Regrade/Riparian (S50.01): A stretch of the stream on the right bank just down from Nanton Road has very little riparian forest. Planting of native trees and shrubs is recommended.
2. Bank Stabilization/Regrade/Riparian (50.02): Just downstream of this open area is a large eroding bank on the right. This could be stabilized using root wads.
3. Structural Improvement to Stream Channels (S50.03): The large culvert has an obvious sewage leak (PWD should be notified). Also, the fence around the culvert should be replaced because it is a very serious safety hazard.
4. Bank Stabilization/Regrade/Riparian (S50.04): Bank erosion is an issue where the trail and stream run adjacent to each other. The bank should be stabilized and planted with shrubs/grasses and the trail should be moved back from the stream.

7.C. APPLICATION OF RESTORATION GOALS

7.C.1. Overview

Fairmount Park Commission (FPC) holdings in Poquessing Creek Park consist of a number of isolated pieces, including small parcels in Bucks County. Land ownership along Poquessing Creek and its tributaries has been unclear in some cases, because parcels were deeded to the city at various times and the controlling agency within the city has not always been clear. In particular, in some areas (e.g., below Woodhaven Road), the PWD retained right-of-way on Fairmount Park land, while in other areas (e.g., north of Dunks Ferry Road), lands with PWD right-of-way have been distinguished from adjacent land deeded to FPC.

The aggregate amount of natural land along Poquessing Creek and its tributaries is larger and more continuous than the small, isolated FPC holdings. Much of the riparian area of Poquessing Creek, Byberry Creek and Tributary 1 of Byberry Creek (which joins Byberry Creek between Comly Street and Chalfont Drive) contains a narrow strip of riparian woods. Adjacent open lands are owned or managed by the Northeast Philadelphia Airport (headwaters of tributary 1 of Byberry Creek), the State of Pennsylvania (Benjamin Rush State Park and grounds of the now-closed Philadelphia State Hospital), the Byberry Industrial Park, the U.S. General Services Administration (adjacent to Benjamin Rush State Park and the Mechanicsville section of FPC land), Philadelphia Recreation Department (north and south of Dunks Ferry Road), Philadelphia Community College (adjoining park land on a small tributary of the Poquessing), and parks and open land on the Bucks County side.

Some adjacent areas may be developed soon, and there may be other changes in land ownership and management. For example, there have been plans for development of the former Philadelphia State Hospital, with possible transfer of the riparian zone to FPC. This development may also involve land swaps with current lands in Benjamin Rush State Park. There have been proposals to develop portions of the Northeast Philadelphia Airport, and continued development in Byberry Industrial Park may occur.

Because of the fragmented nature of open land in the Poquessing valley and the likely development of parcels, coordination of open land management with various agencies is essential to long term protection of natural lands. Acquisition of land and/or land easements will also be important for long-term protection. Some of these actions are being explored in other components of the NLREEP program.

There are no Fairmount Park signs on many park holdings, and access to many sites is poor. Many sites are nearly surrounded by private land, with no trails in many areas, or lack of marking where trails do exist. The lack of marking and access encourage dumping and encroachment by neighboring landowners. Development of a linked trail through some of the land parcels is underway as part of NLREEP, and this would improve access.

The recent development of parts of the Poquessing watershed have led to typical urban changes in hydrology, with increases in storm flow and decreases in base flows, and consequent channel erosion and floodplain degradation. For example, photographs of the creek below Trevose Road taken from 1980-2000 (Fig. 7.B.2) show progressive bank erosion, and undermining and toppling of riparian trees. There are also some water quality problems in the park; “gray water” was seen at some storm sewer outfalls. Because of the limited land holdings of FPC along the creek, the park has relatively little opportunity for storm water management. However, co-ordination with PWD and other agencies should be done to explore how to improve hydrology and water quality. The presence of open land within the drainage may provide opportunities for storm water retention which are less available in other, more developed drainages. Mowing or trampling of riparian vegetation is

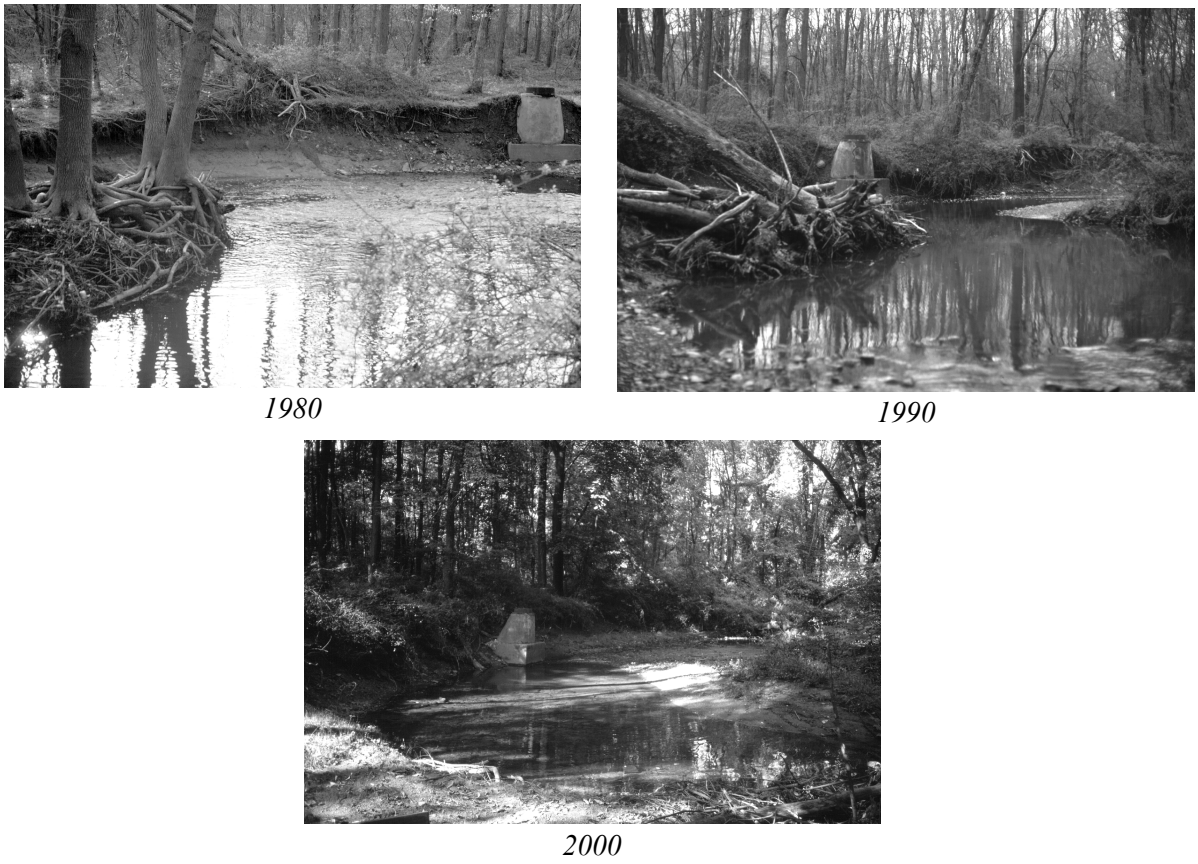

Figure 7.B.2. Change in a stretch of the Poquessing Creek over a 20-year period.

a problem in some areas, such as the Byrne Golf Course. Creation of riparian vegetation will enhance these sites.

The park holdings in the Poquessing valley are primarily floodplain forests (e.g., with box elder, tulip poplar, and ash as common canopy trees), with smaller amounts of oak-beech-tulip poplar woods, typically on slopes. The Poquessing also has a number of old fields; since much old field habitat in the city has been developed or has become forest, this is an increasingly uncommon habitat, which is important for a variety of biological groups. The Poquessing also has wetland areas, including intertidal wetland at the mouth, which support state-endangered plant species. Parts of the park lands are mowed, often at the edges. Natural habitat would be improved by mowing less area, and either creating meadow strips along the edges, or letting part of the formerly mown area revert to woods. These new natural areas would decrease effects of storm water runoff from adjacent urban and mowed areas, as well as providing additional habitat for plants and animals.

Park lands in the Poquessing are affected by a number of factors, including hydrologic change mentioned above. Invasive and exotic plants affect native plant species in many of the park segments. All-terrain vehichle (ATV) and dirt bike use has created major erosion problems in several areas of the park. Dumping of automobiles, and other large trash is also a problem in some areas.

Based on current conditions in the Poquessing, major objectives for restoration and tasks which will address these objectives are:

- Increase protected natural lands in the valley;
  - Acquire additional land;
  - Develop easements or other agreements for protection of adjacent land
- Increase desired uses of the park and encourage park stewardship;
  - Develop a trail system linking park holdings and other natural areas;
  - Develop signage for park segments;
  - Control access to sensitive areas to decrease dumping and abusive motor vehicle use;
- Enhance woodlands in the park;
  - Control access to sensitive areas to decrease dumping and abusive motor vehicle use;
  - Control invasive and exotic species, and replant native species;
  - Increase wooded area or provide meadow buffer strips along woods;
  - Remove trash from woods;
- Maintain and enhance meadows in the park;
  - Develop periodic mowing and/or tree-cutting program to maintain meadow vegetation;
  - Control invasive and exotic species, and replant native species;
  - Create and maintain meadow buffer strips;
- Enhance stream channels, wetlands, and aquatic fauna;
  - Improve water control structures, where feasible;
  - Coordinate with PWD and other agencies to develop storm-water management plans and to protect headwater areas;
  - Improve riparian corridors, e.g., by expanding riparian woods or meadows;
  - Control invasive and exotic species, and replant native species;
  - Protect intertidal marshes at the mouth of the Poquessing Creek.

7.C.2. General Restoration Activities

7.C.2.1. Exotic Control

A habitat type that is becoming increasingly common in the Fairmount Park system is the exotic-dominated forest, shrubland and riparian zone. Exotic species are defined as those species which have been intentionally or accidentally introduced into an area outside its natural range. These species are most frequently found in open areas—forest edges, canopy gaps, along streambanks and riparian zones—but also occur in the herbaceous and shrub layer in forests with native canopy species and on disturbed slopes. Exotic species that were found invading natural lands in Poquessing Creek Park during the 1998 survey are included in Appendix A-1.1 in Volume III. Exotic species of concern out-compete native plants for resources and can become very aggressive. The control of these species applies to all areas of the park system, since exotic species are well established in each of the parks surveyed. The control of exotic species can be labor-intensive, and volunteer help can be effective. However, volunteer control may not be effective at some sites, such as those with poor

access, or those requiring techniques such as herbicide application. The method of control is dependent upon the species involved and can include cutting, burning, herbiciding and/or covering the area with plastic (DeLoach 1997). Replanting of native species is highly recommended in areas where exotic removal has taken place, in order to increase shade and decrease reestablishment of exotics. However, exotic control is valuable even where planting is not feasible immediately, to prevent further spread into adjacent areas. This is particularly important around areas with restoration plantings. In the list of restoration activities, exotic/invasive control refers to control without planting.

Sites where exotic control has been initiated must be monitored following control. New shoots of exotic growth should be pulled to prevent further invasion. Due to the aggressive nature of most exotic species, it is essential that monitoring activities be well-planned and followed. Repeated application of control measures may be necessary for some species.

7.C.2.2. **Planting**

Planting of native trees, shrubs or herbaceous species is a primary restoration technique for different habitats throughout Poquessing Creek Park. While natural regeneration can provide new growth in many situations, planting can provide more rapid development of shade to reduce growth of exotics, more rapid cover to reduce erosion, and provide species which are unable to colonize the site. Typically, planting is done in sites that have been cleared of exotics. In the classification of restoration activities, it is assumed that control of exotics will be necessary prior to planting in most cases. Planting is also recommended to restore vegetation as part of erosion control on slopes (see Section 7.C.3.3), to counteract browsing damage by deer, and following control of other disturbances.

Selection of plants should be based on the habitat conditions of the site. A list of native species which are suitable for the Fairmount Park system and the habitat requirements and resource demands for each are given in Appendix C-1 in Volume III. Selection of the type of stock to use (e.g., seeds, plugs, size of tree, bare root or balled root) will depend on the species to be planted, site conditions (e.g., risk of deer damage), site access and other logistical issues (Sauer 1998). Soil preparation such as tilling and mulching, may be desirable to improve planting success and reduce weeds. Follow-up maintenance, such as watering and weeding, can also increase planting success.

In the categorization of restoration activities, planting is designated where it is the primary restoration activity. Planting is also routinely part of other restoration activities, such as gully repair and wetland creation. *Forest planting* involves planting a mix of trees, shrubs and herbaceous plants and is appropriate on newly cleared areas. *Tree planting* is recommended to increase representation of specific tree species in existing forests or canopy gaps in forests, to establish riparian woods on unforested floodplains, to provide shade and cover to control exotics to and reduce erosion. *Shrub planting* may be done to improve understory conditions and introduce specific species of shrubs. *Herbaceous planting* is recommended for establishment of meadows and to improve understory diversity in areas where herbaceous diversity has been reduced.

7.C.2.3. **Trash**

In the Fairmount Park system, trash includes a wide and varied array of items. It can range from litter in the form of garbage to dumping of used automobiles and large appliances. There are established dump sites within the natural lands of Poquessing Creek Park, such as within the parcel between the Northeast Philadelphia Airport and Academy Road. If an area appears to be a dump, it will seem an acceptable place to dispose of unwanted household appliances, yard waste and vehicles and the boundaries of these sites will eventually expand into natural lands. Piling of waste is not only unsightly, but it also compromises ecosystem integrity. Soils will become covered and/or

compacted in the area, which will prevent growth of vegetation. Canopy gaps are also created which opens the area to sunlight, providing sites for exotic plant species which thrive in disturbed soils and full sun. Yard waste, containing seeds and root fragments of invasive plants, also adds to the presence of exotic species. Trash points typically occur along road sides (small trash) or along dead end roads into secluded park areas. Single or periodic cleanups of small accumulations may be sufficient in some cases, but prevention of repeat dumping is usually necessary. The first step in this activity is to block access to such sites, such as by controlling access with permanent structures at points of entry. Cleanup can be an opportunity for volunteer groups, if the cleanup does not require heavy machinery or dangerous equipment. Removal of all debris from the site and proper disposal off site is required. Since the area will most likely be inundated with exotic species, replanting of natives should not begin until the exotics are removed and disposed of off site. Tilling the soil should not be done since an exotic seed bank will be present and this could cause regrowth of exotic species. The soil should not be left exposed or unplanted as this provides aggressive species with the opportunity to invade the area. The site should be replanted with native species that are appropriate for the habitat type which would have naturally occurred in the area. This type of restoration, as with other heavily disturbed areas, needs to be monitored consistently. Any exotics that may grow back must be killed in order to ensure the success of the native plantings.

7.C.3. Habitat-Specific Restoration Activities

7.C.3.1. Forested Uplands

Forested uplands have been fragmented in recent years by adjacent construction activities, overall development and park landscaping. Forest regrowth is occurring on some formerly cleared or mowed areas. These sites may show long term effects of the earlier disturbance, and they may be vulnerable to exotic species. Not only does the forested upland habitat type support plants and animals, it also acts as a buffer for storm water runoff and prevents slope erosion. Because of the narrowness of the Poquessing Creek Park segments, relatively little upland forest habitat is preserved. There are a few patches, e.g., at the top of the slopes by Knights Road, and narrow strips in the Mechanicsville and lower park segments.

Both natural and anthropogenic influences on forested uplands have affected the stability of the Poquessing Creek Park woods. In areas where trash dumping and encroachment of recreational activities are issues, the wooded areas become fragmented, creating open habitat for exotic, aggressive plants, including trees such as Norway maple and vines. Although the canopy in these areas may persist, there will not be any regrowth of the understory and herbaceous layer once exotic species become established. Mowed lawns at the edges of the upland woods also compromise upland wooded patches. Vehicle use (e.g., in the Knights Road section) has destroyed understory vegetation, compacted soil, and led to gully formation.

Restoration in forested uplands is recommended to increase biodiversity of forested flora and fauna. In addition to exotic control, replanting and trash removal, the following activities can be included as restoration actions in the forested upland habitat: protection of high quality areas, controlling vehicular access to woods, repairing gullies and increasing forest area by decreasing the area that is currently mowed or managed, and replanting.

Repairing gullies, which are usually caused by storm water runoff and vehicle damage, helps to protect the forest from further erosion and allows native plants to regenerate. Control of the source of erosion will be necessary, followed by filling the gully with clean soil and replanting with native tree saplings and shrubs. This soil should not be obtained from another site within the park because it may contain root fragments and seeds of non-native species. Stabilizing slopes by regrading or placing berms at the top to control storm water runoff is usually necessary. Gullies are present in many places in Poquessing Creek Park.

Releasing mowed areas can be done simply by mowing the area less frequently. This creates a tall grass buffer adjacent to forested areas, which aids in erosion control. Over time, if exotics are controlled, succession will occur and a forested area will be present in an area that was formerly turf grass. For example, restoration sites V90.03 and V90.04, located between Woodhaven Road and I-95, are maintained lawns which should be released from maintenance. Releasing the areas would help control slope erosion as well as adding natural lands to the park.

The benefits of restoration in forested areas include creating habitat and increasing biodiversity, since small patches of woods do not provide suitable habitat for many animal species. Replanting or removal of exotics in any area requires monitoring of the site. Restoration areas should be protected from vandalism by barriers and community members should be made aware of the restoration and the expected outcomes so they can participate in the monitoring efforts.

7.C.3.2. **Non-forested Uplands/Meadows**

Non-forested uplands restoration includes lands which are not wetlands, forests or riparian zones. More specifically, non-forested uplands includes edges of forests, where invasive and exotic plants can dominate, meadow habitats, where herbaceous plants and forbs are dominant, and managed (e.g., mowed) lands which are no longer actively used.

Many yards back up to the park.

Forest edges in Poquessing Creek Park, such as those located parallel to Hegerman Street and along the "Nanton Road woods," are often highly disturbed, as they are typically small and linear and are adjacent to lawns, highways and structures which are often targets for trash dumping and vandalism. These areas are susceptible to invasion by exotic species, which are able to thrive in a broad range of habitat types with varying environmental conditions, especially in unshaded areas. Edges are examples of places where exotics can outcompete native species for available resources, since natives are less tolerant of disturbances. If the perimeter of the woods hosts exotics and fragmentation of wooded areas continues, the interior of the forest will be negatively impacted, as the seed source for exotics is present. However, if the edge is managed effectively, it can serve as a first line of defense against disturbance in healthy stands of forest. Well-managed edge habitats can also provide foraging areas for some woodland species (e.g., butterflies feeding on flowers) and habitat for a variety of species. Common species presently found along the edge of wooded areas in Poquessing Creek Park include non-natives such as tree-of-heaven (*Ailanthus altissima*), princess tree (*Paulownia tomentosa*), Norway maple (*Acer platanoides*), multiflora rose (*Rosa multiflora*), wineberry (*Rubus phoenicolasius*), Japanese stilt grass *(Microstegium vimineum*), Japanese honeysuckle (*Lonicera japonica*), Oriental bittersweet (*Celastrus orbiculatus*), and natives such as box elder (*Acer negundo*), grape vines (*Vitis* spp.) and poison ivy (*Toxicodendron radicans*). The exotic invasive vine, mile-a-minute (*Polygonum perfoliatum*), is spreading within the Fairmount Park system, mainly along edges.

Meadows are an under-represented habitat type in the Philadelphia area. Where present, they can support a wide variety of bird species and invertebrates which may otherwise be absent from an urban setting. These sites are open and are often located near major roads or trails making them accessible to vandals. In order to preserve this habitat type in the landscape, an active policy of maintaining lands as open meadows and preventing them from succeeding into wooded areas or

being destroyed by vandalism is needed. Poquessing Creek Park has a higher proportion of meadows than other parks, with meadows important in the Mechanicsville section, the Woodhaven Road section and south of Trevose Road. Most meadows in Poquessing Creek Park are old fields with a mix of herbs such as goldenrods and asters and shrubs such as blackberries and multiflora rose, with grasses (e.g., bluestem) present in some areas.

In an undisturbed area, succession is a natural process in which one group of species replaces another group over a given period of time, following fire or some other natural disaster, which acts as a catalyst. Following the disturbance, grasses, along with annual and some perennial herbaceous plants, will typically be the first community type to become reestablished in the landscape. Perennial herbaceous species will increase over time, followed by replacement woody species such as shrubs and small trees. These, in turn, will be replaced by large trees, including large specimens of some mid-successional species such as tulip poplar, plus late successional species. Eventually, if no other disturbance occurs, a closed canopy will result. In areas of disturbance, where land was used for agriculture or development and where fire has been suppressed, the natural process of succession has been interrupted and exotic plants have outcompeted native species. Exotic species occur frequently in areas of high soil fertility, such as abandoned agricultural fields and disturbed areas. The vegetative community composition is dependent upon the level of disturbance and the length of time that the area has lacked a management regime. It is currently not known whether these exotic-dominated old fields will eventually be replaced by late successional stages with more native species, or whether the exotics can arrest or greatly delay successional patterns.

Non-native forbs such as goutweed (*Aegopodium pedagraria*), garlic-mustard (*Alliaria petiolata*), Canada thistle (*Cirsium arvense)*, purple loosestrife (*Lythrum salicaria*) and lesser celandine (*Ranunculus ficaria*), as well as non-native grasses such as Japanese stilt grass (*Microstegium vimineum*) and Kentucky bluegrass (*Poa pratensis*) take advantage of these open habitats and will outcompete native mustards, milkweed (*Asclepias syriaca*), butterflyweed (*Aeslepias tuberosa*), composites (asters, goldenrods, etc.), and native grasses such as bluestems, rushes, and sedges.

Areas which are not presently used for recreation, but are being mowed, could be managed as meadows by mowing infrequently and possibly burning the area to promote plant diversity. Replanting of these areas is also recommended to establish native species and deter exotic species.

Restoration Activities. The actions recommended as part of the restoration plans for non-forested uplands are grouped and described according in the following paragraphs to their functions.

Protection of natural lands is the first step in restoring and maintaining native biodiversity. High quality meadows and forest edges need to be protected from exotic invasion and should also be monitored to ensure against future disturbance. Other types of activities include control of invasive plants, replanting, management to maintain meadows (prevent forest succession), trash removal, control of access, and storm water management. Activities which are similar to those in other habitats are discussed elsewhere in this document.

Protection:

Protect/Monitor- This action is recommended for meadows and edges that presently support native plant and animal species and do not appear to be disturbed. These sites are shown on the Restoration Sites Map in Section 7.F and should be protected from any human impact. They should also be monitored for human disturbance and invasion by exotic species.

Active Management:

Edge Management-The recommendation for edges is to remove the exotic vegetation and replant the area with more appropriate native species. It is also recommended that trash be removed from these areas and gullies be repaired. Gullies lead to erosion and create niches which can be more suitable for exotics. Because edges are located next to roads and developments, gullies caused by storm water runoff are frequent in these areas. It is recommended that the basic storm water runoff issue be addressed and the gullies repaired, as they will have an effect on the interior of the forest if left alone. Conifers (e.g., red-cedar) and broad-leaved evergreens (e.g., mountain laurel or *Rhododendron*) may be planted along edges to shade the forest.

Release/Widen-This action is recommended for lands that are currently mowed, but are not actively being used for recreational purposes. Depending on the adjacent land uses, and visual aesthetics, different management regimes may be used for released areas. Infrequent mowing of an area will promote the growth of native plant species and prevent succession by trees and shrubs. Any decrease in the frequency of mowing can increase the height and diversity of vegetation and increase water retention. Mowing only once a year will suppress trees, but allow herbaceous cover. These areas can act as buffers to woods, wetlands and riparian zones. Alternately, mowing may be stopped and the area may be planted with trees or shrubs or allowed to revert to forest. Monitoring for invasion by exotic species should be done in release areas. Planting release sites is advisable to reduce open space for exotics. Once areas are released, management options are similar to those for the following activity, meadow management.

Meadow Management-This is recommended to maintain existing meadow sites. It promotes the protection of established meadows by seasonal mowing, burning, or tree removal. Meadow management encompasses the removal of exotics and the replanting of natives and managed mowing to be performed once a year. Trees can be hand-cut or girdled to prevent forest succession. This can be done by volunteers and in areas inaccessible to mowers. While prescribed burning (preferably in the spring) can be the most effective means of maintaining meadows, the small size of most meadows in the Poquessing, the proximity to houses and other buildings, and difficulties obtaining permits would make burning difficult. Managed meadows will provide habitat for native fauna and will help protect adjacent slopes and forests from the negative impacts of storm water runoff. A management plan for maintaining an area as a meadow must be drafted and followed or the area will once again become inundated with exotic species and trash. Barriers and signs should be place around the restored area to make community members and users of the park aware of the many benefits of open meadow habitats and to avoid the perception that these areas have been abandoned.

Replanting and Exotics Control:

Invasive/Exotic Control-This action is recommended in those areas where there are local invasive/exotic issues, the removal of which would promote native vegetation regrowth. This does not include any replanting. For example, this is recommended to reduce the spread of mile-a-minute. Invasive/exotic control in sites adjacent to planted restoration sites may help reduce the spread of invasives into the planted sites.

Remove Exotics/Replant Natives (forest, trees, shrubs or herbs)-This action implies that once the exotic plants are removed from an area, the area be planted with appropriate native species. This differs from the *invasive/exotic* control action as it includes replanting of native as part of the activity. Herbaceous plants can be established by seeding or transplanting plugs. While the former may be less expensive, the latter is apt to be more successful, especially when competing with exotics species. In general, replanting following invasive control is preferable to simple control, if there are sufficient resources for purchase, planting and maintenance of plantings.

Remove Structure/Replant Natives-Where an obsolete manmade structure is impeding the growth of native species, it is suggested that this structure be removed and native plants be established in its place.

Storm Water:

Gully Repair-Concentrated storm water runoff leads to erosion, which in turn can lead to gullies. Meadows and herbaceous borders can slow down storm water runoff and increase infiltration, reducing storm water problems. Thus, meadow management can be an important part of storm water management, especially in landscaped areas where woods are not desired. It is recommended that the storm water be redirected into a wetland or a tall grass buffer to prevent gullying of the landscape. The gully should then be filled in with soil and replanted with native vegetation to stabilize the soil.

7.C.3.3. **Slopes**

Much of Poquessing Creek Park consists of riparian zones of Poquessing Creek and its tributaries. However, slopes are important habitats in several park segments, such as the section on the Byberry tributary north of Academy Road, along the Poquessing tributary above Knights Road, and along the mainstem Poquessing below Woodhaven Road. Sections of these slopes in Poquessing Creek Park and the other park sections have been severely eroded due to overuse by trail users (including hikers, mountain bikes, and motorized vehicles), trash dumping and storm water runoff from adjacent lawns, streets, and commercial sites. Activities which disturb the soil aid in eroding the slopes, which will make them unstable and unable to support vegetation. The lack of cover further increases erosion. Storm water runoff exacerbates the problem and creates gullies along the slopes, which serve as obstacle courses for all terrain vehicles (ATVs). Even where slopes are not denuded, the sequence of intermittent storm water runoff and drying may favor invasive species such as Japanese knotweed and common reed (*Phragmites australis*).

As part of the restoration recommendations for slopes, activities include dissipating water flows at slope edges, regrading some of the highly impacted slopes, replanting with native species, repairing gullies, controlling erosion, and removing trash and exotics. For example, control of flow, replanting and erosion control would be beneficial for the slopes located behind commercial sites on the east side of the Academy Road parcel (V60.07). Planting a native meadow (e.g., a meadow buffer strip) at the top of the slope to help control water runoff during storm events, as was described previously, is also recommended. Some of the release/widen recommendations for mowed lawns along Poquessing Creek between Red Lion Road and I-95 (V90.03 and V90.04) would improve conditions on the adjacent slopes. Placing berms at the top of the slope will also aid in decreasing the velocity of the storm water which flows down the slopes toward the stream. This will not only prevent further erosion of the slopes but will decrease the amount of silt that reaches the creek and tributaries. Slope erosion can be prevented by brush bundles, logs, and water bars, which slow, pond and disperse concentrated downslope flows. These can be implemented by volunteers in sites where mechanical access would create further problems. Since some types may attract use (e.g., waterbars used as trails, logs used for sitting) and exacerbate slope erosion, these should be designed to be unobtrusive. Where erosion is caused by vehicle use, such as ATVs and motorcycles as at the Knights Road tributary (V50.02 and V50.08), control of vehicle use and subsequent slope repair would be necessary.

7.C.3.4. **Riparian Zones**

Riparian zones are areas adjacent to a body of water which are influenced at least periodically by flooding (Mitsch and Gosselink 1993). They serve as ecotones between aquatic and terrestrial communities and are important areas for animal refuge and migration. Plant communities of riparian

zones are usually diverse due to the gradients in moisture. Riparian areas are valuable to people because they can slow the flow of water during a storm event and help stabilize banks. Riparian vegetation can also intercept nutrients from adjacent areas, reducing stream inputs. Riparian vegetation, especially trees, provide shading and cover for the stream channel, improving habitat for aquatic organisms.

Much of Poquessing Creek Park consists of riparian bands along the main stem Poquessing, Byberry and tributaries of these streams. Most of these areas have a network of unmaintained trails and paths. Creation and maintenance of a path within and between the various parcels is planned. In many areas, the riparian zone is forested, but open riparian areas are presents in places, especially within the Byrne Golf Course, where banks are mowed. Mowing along the riparian zone is also important along the tributary of the Poquessing above Knights Road. Invasive species are also a problem in riparian areas, especially where wide riparian forest has been lost. Appropriate restoration activities for riparian zones in this project include removing invasive species, regrading the banks where necessary and replanting with native forest corridors at least 35 ft in width (if feasible) to serve as a functional riparian zone.

Riparian zones have also been affected by historical and ongoing development of the watershed, leading to deposition in the floodplain, channel widening and channel incision. This has changed the pattern of flooding and altered the natural vegetation of these riparian zones. Riparian forests were probably extensively cut and increased bank erosion rates undermine and topple riparian trees. As a result, longevity of trees in impacted riparian forests is typically reduced. In addition to affecting forest dynamics, this reduces the supply of large logs, which are important in floodplain and stream channels. Thus, many aspects of riparian zone degradation are tied to hydrology and long term site history and would be best addressed by watershed management. Despite these problems with riparian forests, reforestation of open riparian zones will still improve riparian systems.

7.C.3.5. **Wetlands**

Wetlands are defined as transitional lands between aquatic and terrestrial habitats where saturation with water leads to characteristic soil types and plant and animal communities. Wetlands are biologically rich, and development and potential impacts on wetlands are regulated by the Federal government under the Clean Water Act. According to the U.S. Fish and Wildlife Service (USFWS), the following three criteria must be met in order for an area to be considered a wetland for regulatory purposes: 1) the land must be dominated by hydrophytic vegetation; 2) the soils must be categorized as hydric; and 3) the land must be saturated with water for some time during the growing season. There are other biological, physical and chemical factors such as light, temperature, and man-induced disturbances which alter the community composition and overall biodiversity of wetlands.

Heteranthera multiflora, *mouth of Poquessing Creek.*

Wetlands are classified into the following five systems by the USFWS; Marine, Estuarine, Lacustrine, Riverine and Palustrine. These systems are partly distinguished from one another based on their level of tidal influence and also the amount of salinity present from the ocean. Marine systems have saltwater, tidal flows. Estuarine systems are tidal systems with a mix of fresh water and oceanic water producing brackish

conditions (this definition is more restrictive than the standard ecological definition, which considers freshwater tidal systems as estuarine as well). Lacustrine wetland systems are defined as permanently flooded lakes, ponds and reservoirs. These areas may be deep and may experience considerable wave action. Riverine systems are defined as wetlands which are contained within a natural or manmade channel. Palustrine systems are defined as vegetated wetlands less than two meters deep which have no tidal influence.

Wetlands can be broadly categorized as seeps, swamps, marshes, or open water areas. Several skunk-cabbage wetlands are found in Poquessing Creek Park in the area between Academy and Decatur roads between two industrial parks. Wetlands that have been filled or altered as a result of urbanization are found throughout Poquessing Creek Park. Some areas with wetland hydrology are currently being maintained as lawns by mowing. Examples of this type of disturbed wetlands can be found on the Byrne Golf Course. These wetlands were found to have hydrology and supported wetland vegetation in the small areas that were not completely mowed. If left out of the maintenance schedule, they would benefit the golf course and the park system both ecologically and aesthetically. Larger wetlands in the park (apparent on the aerial photographs used to develop the vegetation maps) are identified on the Vegetation Classification maps. Seeps generally occur along the slopes in shaded areas where skunk cabbage tends to be the dominant plant. Swamps are defined as areas with a woody canopy, while marshes are unshaded and dominated by herbaceous vegetation. These types may be further categorized on the basis of vegetation cover, which is strongly controlled by the depth and frequency of inundation with water. Marshes are categorized as cattail (*Typha* sp.) marsh, Common reed *(Phragmites australis)* marsh, intertidal marsh, sedge/rush/grass marshes, and wet meadows. These types roughly follow a gradient from deeper and more frequent inundation to less frequent inundation. Tidal marshes are present at the mouth of the Poquessing Creek. The multi-flowered mud-plantain (*Heteranthera multiflora*) (PA endangered) was identified in these tidal marshes. Other species that have been found in intertidal marshes in the city are listed in Table 7.C.1. Common reed and cattail marshes are not common in the Poquessing. Table 7.C.2 illustrates the types of wetlands in the park, the functions of such a habitat type, the restoration recommendations, and the benefits of restoration.

It is especially important to promote and highlight the ecological importance of wetlands in urban settings. Wetlands can provide a number of environmental benefits, including reduction of storm flows by water storage, supply of water during low flow conditions, purification of water by storage or removal of nutrients and other substances, and support of a variety of plants and animals. The small tributaries in the Poquessing which feed into larger creeks could benefit from the water purification function that wetlands provide. Wetlands also support numerous plant and animal species that may otherwise be absent from an urban setting. Riparian forests exist along the floodplains of the main creeks and some of the small tributaries. Depending on hydrology, some of these floodplain forests could be classed as wetlands, depending on their soils and degree of inundation. Because of the gradation in these characters, the vegetation survey did not distinguish wetland and non-wetland floodplain forests, except where there were marked differences in vegetation, such as the presence of herbaceous wetland plants and/or standing water.

Hydrology. This factor is often the most difficult to quantify in the field. However, it is the most critical since the presence or absence of water determines whether soils will be hydric and vegetation hydrophytic. Water can originate from various sources including, but not limited to storm water runoff, precipitation, headwater or backwater flooding, tidal influence and groundwater. These sources can operate independently, but in many cases wetlands are controlled by a combination of hydrologic factors. Topography, soil type and vegetative cover are all factors that have been shown to affect the hydrology of a wetland. The frequency and length of time of saturation or flooding is highly dependent upon the position of the wetland in the landscape and the land use history of the

Table 7.C.1. Potential flora of intertidal Philadelphia wetlands based on historic records and the present flora of other tidal habitats in the Delaware Estuary. Species recorded during the 1998-1999 assessment period are noted with an *.

Submerged and Floating Aquatics

Elodea nuttallii (Nuttall's Waterweed)
Callitriche heterophylla (Water Starwort)
Najas flexilis (Northern Water-Nymph)
Najas gracillima (Slender Water-Nymph)
Potamogeton epihydrus (Ribbonleaf Pondweed)
Potamogeton natans (Floating Pondweed)
Potamogeton pectinatus (Sago Pondweed)
Potamogeton perfoliatus (Redhead Pondweed)
Potamogeton pusillus (Small Pondweed)
Potamogeton spirillus (Snailseed Pondweed)
Ranunculus longirostris (Beaked White Water Crowfoot)
Vallisneria americana (Wild Celery)

Herbaceous Emergents of Tidal Shores (S) and Marshes (M)

Acorus calamus (Sweet Flag)—M
Aeschynomene virginica (Sensitive Joint-vetch)—S
Amaranthus cannabinus (Water Hemp)—M
Alisma subcordatum (Southern Water-Plantain)—M
Ambrosia trifida (Giant Ragweed)—M
Asclepias incarnata (Swamp Milkweed)—M*
Aster lanceolatus (Eastern Lined Aster)—M
Aster puniceus (Bristly Aster)—M
Bidens bidentoides (Southern Estuarine Beggar-ticks)—S
Bidens coronata (Tickseed Sunflower)—M
Bidens frondosa (Beggar-ticks)—S,M
Bidens laevis (Bur Marigold)—S,M
Cardamine pensylvanica (Pennsylvania Bittercress)—S
Carex hyalinolepis (Shore-Line Sedge)—S
Cyperus engelmannii (Engelmann's Flatsedge)—S,M
Cyperus bipartitus (River-Shore Umbrella Sedge)—S
Cyperus brevifolioides (Umbrella Sedge)—S
Cyperus polystachyos (Many-Spiked Flatsedge)—S,M
Cyperus odoratus (Flatsedge)—S,M*
Echinochloa walteri(Walter's Barnyard Grass)—S*
Elatine americana (Waterwort)—S
Eleocharis erythropoda (Red-Based Spike-Rush)—S
Eleocharis obtusa (Obtuse Spike-Rush)—S

Table 7.C.1 (continued). Potential flora of intertidal Philadelphia wetlands based on historic records and the present flora of other tidal habitats in the Delaware Estuary. Species recorded during the 1998-1999 assessment period are noted with an *.

Herbaceous Emergents of Tidal Shores (S) and Marshes (M)

Eleocharis palustris (Creeping Spike-Rush)—S,M
Eleocharis quadrangulata (Four-Angled Spike-Rush)—S
Eriocaulon parkeri (Parker's Pipewort)—S
Eryngium aquaticum (Marsh Eryngo)—M
Gratiola neglecta (Hedge-Hyssop)—S
Helenium autumnale (Common Sneezeweed)—S
Heteranthera multiflora (Multiflowered Mud-Plantain)—S,M*
Heteranthera reniformis (Common Mud-Plantain)—S,M
Hibiscus moscheutos (Rose Mallow)—M*
Impatiens capensis (Jewelweed)—M*
Isoetes riparia (Riverbank Quillwort)—S
Juncus acuminatus (Sharp-Fruited Rush)—S
Leersia oryzoides (Rice Cutgrass)—M*
Limosella australis (Awl-Shaped Mudwort)—S
Lindernia dubia (False Pimpernel)—S
Lobelia cardinalis (Cardinal Flower)—M
Ludwigia palustris (Common Water-Purslane)—S
Lycopus americanus (Water Horehound)—S,M
Mikania scandens (Climbing Hempweed)—M
Nelumbo lutea (American Lotus)—S
Nuphar lutea (Spatterdock)—S,M*
Orontium aquaticum (Goldenclub)—S
Peltandra virginica (Arrow Arum)—S,M
Pilea pumila (Clearweed)—M
Polygonum amphibium (Water Smartweed)—S
Polygonum arifolium (Halberd-Leaved Tearthumb)—M
Polygonum punctatum (Dotted Smartweed)—S,M
Polygonum sagittatum (Arrow-Leaved Tearthumb)—M
Pontederia cordata (Pickerel-weed)—S,M
Rorippa palustris (Yellow Watercress)—S
Rumex altissimus (Tall Dock)—S
Sagittaria calycina (Hooded Arrowhead)—S
Sagittaria graminea (Grass-Leaved Arrowhead)—S
Sagittaria latifolia (Common Arrowhead)—S,M
Sagittaria rigida (Sessile-Fruited Arrowhead)—S
Sagittaria subulata (Subulate-Leaved Arrowhead)—S
Schoenoplectus fluviatilis (River Bulrush)—S,M
Schoenoplectus pungens (Common Threesquare)—S*

Table 7.C.1 (continued). Potential flora of intertidal Philadelphia wetlands based on historic records and the present flora of other tidal habitats in the Delaware Estuary. Species recorded during the 1998-1999 assessment period are noted with an *.

Herbaceous Emergents of Tidal Shores (S) and Marshes (M)
Schoenoplectus smithii (Smith's Bulrush)—S
Schoenoplectus tabernaemontani (Softstem Bulrush)—S,M
Sium suave (Water Parsnip)—M
Sparganium eurycarpum (Giant Bur Reed)—M
Typha angustifolia (Narrowleaf Cattail)—M
Typha x *glauca* (Hybrid Cattail)—M
Typha latifolia (Common Cattail)—M*
Zizania aquatica (Southern Wild Rice)—S,M

area. If a wetland is located in a floodplain area or riparian zone, it may stay wet for a longer period of time than a wetland whose elevation is far above the floodplain. Manmade structures, such as dams and natural obstacles can also alter the water holding capacity of a wetland. Soils and vegetation in turn also affect the amount of water that can be held by a wetland. Clay soils, for example, hold water for a much longer period of time than do sandy or loamy soils, due to the fact that they absorb and release water at a much slower rate. In general, more densely vegetated wetlands are able to hold more water because plant cover slows water flow. Some of the most common field indicators of hydrology include the following: recorded data (i.e., USGS gage data), water marks on vegetation, sediment marks on vegetation, standing water, drift lines, hummocking, which is indicated by the ground having a series of small elevated areas which are often vegetated with mosses or sedges, and visual observation of ground saturation, which can be observed by digging a pit in the soil.

The natural hydrology of the Poquessing Creek has been severely altered by development in the watershed and the construction of roads, dams, railroads, and other manmade structures in the channel and floodplain. Historically, the source of water for many wetlands in the park was storm runoff, subsurface flows associated with creeks or rivers, or flows from springs. Development has altered hydrology by increasing the magnitude of peak flows and decreasing base flows.

Sedimentation and incision in floodplains and channels of many of these creeks, and decreases in base flows and groundwater flows, have severely decreased sources of water for adjacent wetlands. Smaller tributaries which have not been as severely affected by urbanization are capable of providing water to sustain wetlands. Tidal flow as well as the flow of springs, lakes and channels are also factors that influence or drive hydrology of the wetlands found within the park.

Structure/Type of Wetland. Wetlands not only depend on the presence of water, but are also affected by the amount and periodicity of wetting, which is important to consider in regard to restoration and planning activities. The amount of water will determine the floral and faunal composition on the site and the overall functioning of the wetland. Water flow data can usually be obtained by a gage station or by placing monitoring wells in the area. Classification criteria for hydrologic zones, based on the frequency and duration of inundation or saturation of the soil during the growing season, have been developed by federal agencies and implemented by wetlands scientists. Classifications range from zone 1, areas which are labeled "permanently inundated" to zone 6, which are "intermittently or never inundated." Table 7.C.3 presents a classification system for non-tidal areas.

Table 7.C.2. Classification of wetland types in the Fairmount Park system, with relative importance of various types of benefits and major restoration activities.

	Type and Vegetation	Hydrology	Functions					Potential Restoration Activities	Abundance in FPC
			Storm water Retention	Source at Base Flow	Water Quality	Floral Biodiversity	Faunal Biodiversity		
Open Water									
	Permanent pond	Permanent standing water	Depends on basin capacity	Yes	Yes	Submerged macrophytes, algae	Important to fish and other groups.	Enlargement, habitat improvement, dredging, nutrient control; faunal or floral reintroduction	Small, artificial ponds
	Vernal pond	Seasonal standing water	Variable	Late winter and spring	Variable	Variable	Spawning sites for some reptiles, amphibians, and other groups	Controlling hydrology to produce specific requirements; faunal or floral reintroduction	Rare or absent
Marsh									
	Intertidal	Fluctuating saturation	Little	No	Yes	Variable; supports regionally rare species	Important for fish, birds, other groups	Controlling hydrology	Local
	Phragmites	Variable	Tolerant of occasional inundation	No	?	Low	?	Invasive control and replanting	Fairly common
	Cattail	Permanent, shallow standing water	Tolerant of occasional inundation	Yes	Yes	Low-moderate	Important for some groups	Enlargement, habitat enhancement, exotic control	Fairly common

Table 7.C.2 (continued). Classification of wetland types in the Fairmount Park system, with relative importance of various types of benefits and major restoration activities.

	Type and Vegetation	Hydrology	Functions					Potential Restoration Activities	Abundance in FPC
			Storm water Retention	Source at Base Flow	Water Quality	Floral Biodiversity	Faunal Biodiversity		
	Sedge-Grass-Rush	Seasonally saturated soil	Intolerant of long periods of standing water; locally small sites with little storage capacity	Yes	Yes	High	Important for some habitat specialists	Enlargement, habitat enhancement, exotic control, floral reintroduction	Some very small patches
	Exotic (Japanese knotweed, lesser celandine)	Variable	Variable	Variable	?	Low	Probably low	Exotic control and replanting	Common
Swamp or Marsh									
	Skunk cabbage	Permanently wet soil	Intolerant of long periods of standing water and storm flows	Yes	Yes	Moderate	Important for some habitat specialists	Maintain hydrology, promote forest cover	Common, mostly small seeps

Table 7.C.2 (continued). Classification of wetland types in the Fairmount Park system, with relative importance of various types of benefits and major restoration activities.

	Type and Vegetation	Hydrology	Functions					Potential Restoration Activities	Abundance in FPC
			Storm water Retention	Source at Base Flow	Water Quality	Floral Biodiversity	Faunal Biodiversity		
Swamp									
	Large tree dominated: Silver maple, red maple sycamore, box elder, ash, etc.	Intermittently wet soil	Tolerant of short periods of inundation	Yes	Yes	Moderate-High	Important for many groups; depends on amount of standing water, etc.	Maintain hydrology, exotic control and replanting, control erosion, sedimentation	Common on floodplains; gradation with non wetland floodplain forests
	Shrub dominated: alder, buttonbush	Intermittently wet soil	Tolerant of short periods of inundation	Yes	Yes	Can support uncommon species	Important for some habitat specialists	Maintain hydrology, exotic control and replanting, control erosion, sedimentation	Absent?
	Misc.: e.g., lizardtail	Intermittently wet soil	Tolerant of short periods of inundation	Yes	Yes	Can support uncommon species	Important for some habitat specialists	Maintain hydrology, exotic control and replanting, control erosion, sedimentation	Rare (e.g., Rhawn Street wetland)

Table 7.C.3. USFWS Classification of wetland types on the basis of frequency of inundation.

Zone	Classification	Duration	Comments
1	Permanently inundated	100%	Inundation <6.6. ft. mean water depth
2	Semipermanently to nearly permanently inundated or saturated	>75%-<100%	Inundation ≤ 6.6 ft mean water depth
3	Regularly inundated or saturated	>25%-75%	
4	Seasonally inundated or saturated	>12.5%-25%	
5	Irregularly inundated or saturated	≥5%-12.5%	Many areas with this characteristic are not wetlands
6	Intermittently or never inundated or saturated		Areas with this characteristic are not wetlands.

U.S. Army Corps of Engineers, Wetland Delineation Manual, 1987.

Soil Chemistry and Composition. Soil composition and chemistry strongly affect the types of flora and fauna that can be found in a wetland. Hydric soils are defined as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, July 13, 1994). Anaerobic conditions refer to the effect of microbial activity in wet soils which causes a depletion of oxygen. Decomposition is generally slow in these oxygen-depleted areas, and partially decomposed plant materials tend to accumulate in areas of little water movement. Soils that result from this process are called histosols. In areas of rapid or frequent water movement, the organic layer of the soil is washed away, leaving behind sand, silt and clay. The effects of anaerobic conditions include the accumulation of organic matter, the accumulation or loss of iron, manganese, sulfur, or carbon compounds. Hydric soils can be identified in both wet or dry times of the year based on the characteristic morphologies of the above processes, such as oxidized root channels. Another indicator of a hydric soil is the strong odor of hydrogen sulfide gas. However, this indicator cannot be depended upon for all areas, as it only occurs in very wet sites which contain sulfur.

Wetland Chemistry. The community composition of wetland vegetation is strongly affected by pH and associated chemical variables. Acid wetlands created by microbial processes affecting plant decomposition, are described as having a pH of less than 5.5. Circumneutral wetlands are defined as those with a pH ranging from 5.5-7.4, and alkaline sites, which are generally created by limestone or similar rock in the drainage or groundwater, have a pH of 7.4 or greater. Based on historical plant occurrence, some acidic wetlands may have occurred within Philadelphia. However, the wetlands now present in the park system are typically circumneutral.

Vegetation. Hydrophytic vegetation includes plants that are adapted morphologically to grow in wet conditions. They are found in areas that are, at the least, periodically deficient in oxygen as a result of excess water. These plants have adapted morphological, physiological and reproductive characteristics to the wet conditions in which they grow. Plants lacking morphological, physiological, and/or reproductive adaptations for wet conditions cannot grow, effectively compete,

reproduce, and/or persist in areas that are subject to prolonged inundation or saturated soils. Morphological adaptations to vegetation in wet areas include, but are not limited to, the following: buttressed tree trunks, shallow root systems, floating leaves, and multiple trunks. These adaptations aid the plants in nutrient uptake, buoyancy, and support, and are indicative of a wet area. Physiological adaptations are essential for plants that are subject to the anaerobic conditions of wetlands. Adaptations such as these are not easily quantified in the field since they involve biochemical processes. Prolonged viability of seeds and flood-tolerant seedlings are several reproductive adaptations which plants in wet conditions must also possess.

Wetland delineations are made by determining the dominant wetland vegetation and are no longer based solely on the presence or absence of indicator species. For example, an area dominated by upland species that has several wetland plant individuals would not meet the hydrophytic vegetation criteria which must be satisfied in order for an area to be considered a wetland.

Wetland Functions. Wetlands are often targets for destruction since they can be easily drained or filled for agricultural purposes or development. The benefits of wetlands are sometimes not obvious, and these biologically diverse ecosystems can therefore be regarded as waste areas or areas that attract mosquitoes and pests. Wetland functions are defined as the biological, chemical and physical processes of the wetland, many of which provide direct benefits to human beings. Wetlands play an integral part in the purification of water. They act as a sink for nutrients and metals and can filter the water of sediments and organic matter. They may serve as sites for transformation of nutrients (e.g., from organic nitrogen to inorganic nitrogen gas which is released to the atmosphere) or storage of nutrients. These processes improve overall water quality and provides clean drinking water. Wetlands can process subsurface flows, such as flow into the wetland from the adjacent watershed, as well as riverine flows that flood the wetlands. Wetlands are also involved in the process of water storage. They store rain water either from direct precipitation or from storm water runoff which is then slowly released from the wetland. Some of the values associated with this function include flood protection and erosion control. Wetlands are areas of high biological productivity, serve as breeding grounds for many aquatic species, and provide wildlife with refugia and food sources. Many species depend on wetlands, so that regional biodiversity depends on wetlands. These areas are also significant to the commercial fisheries industry as they are critical habitat types for many fish species.

The benefits provided by wetlands will vary with type, size and other site-specific factors. Different types of wetlands will differ in the relative importance of different benefits (Table 7.C.2). For example, the ability to reduce storm peaks by water holding will depend on the storage capacity relative to the size of the storm flow. Areas that have saturated soils (including ponds, swamps and marshes with standing water) require topography or structures (berms, etc.) that allow ponding of storm water. Since some of the wetland vegetation cannot tolerate long periods of inundation, large areas would be necessary to store significant quantities of water. Furthermore, storm flows may carry sediments which would be deposited into these wetlands. While this can be considered as a type of filtration, these sediments may fill in wetlands unless there is periodic maintenance of the wetland. Similarly, the purification functions of wetlands depend on their size relative to inputs. Because of these factors, wetlands along the Poquessing Creek may not be able to provide large storm water retention or purification benefits of storm water in the creek. Wetlands along tributaries and seeps may be more effective for these functions.

Relevance to Restoration. To preserve and restore the natural landscape in the area, special emphasis must be placed on wetlands. This includes preserving them from further destruction, implementing actions to aid them in proper functioning and working to replace lost wetlands. As part of this project, wetlands have been identified in the park boundaries and recommendations have been made for the protection and/or restoration of these lands. Recommendations are based on the size

and condition of the existing wetland, the ecological benefits of enlarging or creating a wetland and the feasibility of long-term monitoring, and cost associated issues. For example, a wetland located along a large stream would need to be large and deep in order to store the overflow from the stream as well as storm water. This could prove to be an extremely expensive project, and may not prove to be as beneficial as removing exotics and trash from several existing wetlands. The actions recommended as part of the restoration plans are grouped and described according to their functions in the following text.

Protection of the few remaining wetlands in the Poquessing is critical to many species of plants and animals. For many aquatic species, these wetlands acts as refugia, without which the species would not survive in this area. The overall level of biodiversity in the Philadelphia region is dependent on the protection of natural lands in the city. Wetlands have proven to be lands of high productivity and diversity, and it is essential that their ecological significance is understood.

Restoration Activities Recommended in Wetlands. Areas of Poquessing Creek Park that have already been mapped and verified by ground-truthing as wetlands are sites that should be protected and monitored to ensure against future development in the area. These sites are shown on Map 7.F.6 to raise public awareness of the existence and importance of wetlands. Protection and monitoring is recommended for wetlands where little disturbance is evident.

A variety of active restoration activities are recommended for wetlands. Many of these are analogous to activities in other habitats. These include activities designed to reduce damage to wetlands by controlling access or improving trails and structures associated with access, enhancing wetland vegetation, improving hydrology, and enhancing native fauna.

Access:

The following actions address the need for increased or decreased access to an area of the park. Where restoration sites occur on or near sites that are heavily impacted by humans and/or deer, structures such as exclosures must be installed to protect the existing vegetation and/or the new plantings from the effects of trampling and herbivory.

- *Structural Improvement*. If there is an obvious structure, such as a dam or parking lot that is impeding water from reaching the wetland, and it is feasible, it is suggested that these structures be removed to restore the natural hydrology of the area.
- *Trail Improvement*. This is suggested for wetlands that have become part of the trail or have taken part of the trail due to water overflow.
- *Control Access*. This action is recommended for high quality wetlands that are functioning properly and are providing habitat for plants and animals suited to wet conditions. Since this habitat type is rare in the Fairmount Park system, wetlands need to be protected when they are found providing high value functions. Controlling public access limits the destruction. This could be done by placing a physical barrier, such as a fence, around the wetland.

Replanting and Exotics Control:

When attempting to rid an area of exotics, species-specific removal methods need to be researched. Aggressive exotics have demonstrated their ability to grow in a wide variety of habitats under different conditions. Care should be taken when removing these plants from a site to ensure that every part of the plant is removed and disposed of off-site. To promote native vegetation and decrease the incidence of exotics, replanting the area with appropriate native species after exotics have been removed is recommended. The general recommendations for replanting address those

areas in which the native vegetation is sparse due to some factor other than exotic species, such as manmade structures and herbivory.

- *Invasive/Exotic Control*-This action is recommended in those areas where there are minor invasive/exotic issues, the removal of which would promote native vegetation regrowth. This action does not include replanting.
- *Remove Exotics/Replant Natives*-In areas where wetland vegetation is sparse due to the dominance by exotic species, it is recommended that exotics be removed and native wetland species be planted. Removal of exotic species from a wetland and replanting of natives that are appropriate to the region will promote wetlands which are able to support native fauna. This may aid in increasing the level of biodiversity in the area and will promote succession.
- *Replant Native Herbaceous Plants*-This is recommended in areas where the shrub and canopy layers are well established, but the herbaceous layer is sparse due to human disturbance or impacts from deer browsing.
- *Replant Native Shrubs*-In wetlands where the herbaceous and canopy layers are well established, but the shrub layer is sparse due to human disturbance or impacts from deer browsing, replanting of native shrubs is recommended. This adds vertical diversity to the wetland and promotes understory growth.
- *Replant Native Trees*-This is recommended in areas that have large canopy gaps due to exotic vines or dead standing trees. If deer browsing is an issue in the area of replanting, it is suggested that large trees be planted to avoid further damage.

Storm Water/Channel Actions:

Hydrological or topographical modifications are suggested to enhance the water filtering and holding functions of the wetland and to promote high biological productivity.

- *Berms*-Vegetated mounds that act as dikes which are placed in the path of the storm water runoff can be used to promote infiltration and decrease flow velocities. Berms promote the greater infiltration of rainwater into the ground, thereby decreasing storm water runoff and reducing erosion and the occurrence of gullies.
- *Regrade Banks*-Streambanks which are unstable would benefit by regrading to decrease their slopes. Many of the problems which cause unstable streambanks are caused by upstream impacts and would require solutions which are not contained within the scope of this project.

Creation/Expansion:

Suggestions for increasing wetland acreage are provided, such as expanding existing wetlands by changing management techniques and creating new wetlands where they do not currently exist.

- *Release/Widen*-A simple management technique that could enhance wetland activity is to mow less frequently in areas adjacent to wetlands. Some mowed areas may have wetland hydrology and may support wetland vegetation if frequent mowing is stopped. Mowed grass does not function as well as tall grasses and meadow forbs do in erosion protection. Where appropriate, open fields located next to wetlands should be mowed as infrequently as possible. Allowing natural vegetation to grow in a maintained area increases habitat for wetland species. Where usage is not high, these areas should be taken out of the active management regime, since they would then support diverse wetland plants and serve as refugia for animal species.

- *Wetland Creation/Expansion*-This is recommended in areas that once existed as wetlands or appear to have the hydrology and soils that could support hydrophytic vegetation and are typical of a wetland. To ensure success, the hydrology, soil characteristics and vegetation present need to be examined carefully to determine the appropriate depth and area needed to sustain a healthy wetland. This also requires replanting of the wetland with appropriate native wetland species. Some existing wetlands may be enlarged where the surrounding area could be restored to contain appropriate hydrology and vegetation.

7.C.3.6. Faunal Monitoring, Introduction and Management

Most of the restoration activities are expected to affect park fauna by improving habitat for terrestrial and aquatic animals. Some activities directly involve fauna. These include some types of monitoring and introductions.

Deer Monitoring. Deer monitoring is critical for restoration planning and implementation in Poquessing Creek Park. The effects of deer on vegetation in Wissahickon Valley Park were estimated over the 1994-1996 period (Natural Resource Consultants 1996). The FPC reviewed the information on deer and public hearings were held concerning deer impacts and possible remedies. Reduction of the deer population in the Wissahickon was started in late winter of 1999 and continued in the late winter 2001. Control in Pennypack Creek Park was done in in the late winter 2001, as well. Severe impacts of deer are not widespread in Poquessing Creek Park, although some segments appear affected by deer browse. Monitoring will be important to determine whether deer populations are increasing and whether control measures are needed.

The nature of the deer monitoring which could be implemented depends on the goals of the monitoring. For example, estimation of population density may be valuable in planning direct deer management, while estimation of damage may be more relevant to restoration planning. In order to aid restoration planning, ANSP reviewed information on possible approaches to monitoring, developed a protocol for monitoring deer damage, and tested this protocol in the Wissahickon in February 1999.

This information is summarized in Appendix C-2. The results and conclusions of the study may be summarized as follows:

Monitoring of browse/grazing damage was considered to be the most relevant approach for the objectives of natural lands restoration. It was concluded that census methods were too expensive to implement for routine monitoring, and counts based on indicators such as pellet counts and tracks were difficult to relate to deer density or deer damage.

The protocol was based on monitoring browse damage to shrubs and trees with twigs accessible to deer. This allowed monitoring in winter when herbs were not evident. The addition of herbaceous monitoring (e.g., of spring ephemerals like may apple) would be valuable for spring monitoring.

The protocol was practical and could be implemented. There was some subjectivity in distinguishing browsed twigs from other sources of twig damage, but this was not thought to invalidate the protocol. However, false identification of browse could be more of a problem in areas with low frequencies of deer browse. In the future, testing in areas with little or no damage, such as within enclosures, would be useful to determine frequencies of other types of twig damage.

Twig damage may reflect browsing over a relatively long period of time because old cut twigs may still be evident. This is a disadvantage in assessing short-term rates of damage. However, it would be an advantage for monitoring areas with low deer densities, where deer damage may be sporadic.

The rates of browsing on any given plant species probably varies with deer density. Non-preferred species may suffer little damage at low densities, but be browsed at high densities. Deer browsing is likely to affect recruitment of shrubs and saplings, so that species occurrence is not independent of deer density. For example, preferred species may be eliminated in areas of moderate deer density, leaving non-preferred species with relatively low browse rates. In areas with lower deer densities, preferred species may be present, but browsed. Thus, interpretation of browse results needs to consider the frequency of damage by species and the frequency of occurrence of different plant species.

Deer monitoring and management is ongoing by a variety of groups in the region. Contacts with these groups would be valuable in setting up monitoring programs. Personnel with the U.S. Forest Service in Warren, PA (David DeCalesta and Susan Stout) and with the U.S. National Park Service in Gettysburg, PA (Herbert Frost) have been identified as sources of information on deer and deer monitoring (Community Resources, pers. comm.).

Other Monitoring. While the faunal inventory for this study and other monitoring programs provided a great deal of information on faunal occurrence and abundance, sampling was limited in time and space. Additional monitoring can be valuable in determining occurrence of uncommon species, trends in species, and response to restoration. The assessment for this study demonstrated decreases in the native fauna in many groups and increases in exotic species in some groups. Sampling of other taxonomic groups would provide additional information on the park fauna. Monitoring programs can be linked to environmental education activities, to park special events and to more thorough scientific collection.

Faunal monitoring would be particularly valuable as part of some restoration activities. Where feasible, baseline and post-restoration monitoring should be defined as part of restoration planning, although in some cases, funding constraints may preclude monitoring. Monitoring of virtually any taxonomic group would be valuable, but certain groups would be particularly informative for different types of restoration, such as butterflies for meadow and edge management; aquatic macroinvertebrates for wetland creation and restoration, and stream channel restoration; reptiles and amphibians for wetland creation and restoration; fishes for dam removal and restoration in larger wetlands and streams; birds for woodland restorations, meadow restoration, and exotic control; and terrestrial invertebrates such as land snails and slugs, ants and earthworms for woodland restoration.

Faunal Introductions. Re-introduction of animal species can restore the natural biodiversity of an area. However, there are some ecological risks to re-introductions which need to be considered. These risks are outlined in the project goals (Volume I, Section 1.C). Where major restoration of vegetation is done, faunal re-introductions should typically be undertaken after successful establishment of the vegetation. Many organisms which are mobile or have mobile dispersal stages will colonize restored sites. However, introduction may be necessary for less mobile and habitat-restricted species or for species locally extirpated from an area. For example, reintroduction may be especially appropriate for some species of fish, amphibians (e.g., frogs or salamanders which reproduce in small ponds), or butterflies (see Volume I, Section 4.E.5). Such introductions are not recommended for Poquessing Creek Park as part of this plan, since improvements in vegetation and stream conditions should take precedence. Details on protocols for introduction are presented in the plans for other parks (Volume II, Sections 1-5).

Canada Goose Monitoring and Management. Historically, the Canada goose (*Branta canadensis*) was a common migrant and rare wintering bird in the region. The number of wintering birds increased at least through the 1970s (Hess et al. 2000). This is attributed to changes in migratory patterns, with reduction in migration distances as birds started wintering farther north. This shift apparently started in the 1930s. In recent years, there has been a decline in the number of

migratory geese (Hess et al. 2000, Walsh et al. 1999). The Canada goose has also become a common breeding bird, breeding in a variety of open sites, including parks, golf courses, and refuges. Local breeding started in the 1930s in the mid-Atlantic, but populations have expanded greatly in recent years. The timing and origin of breeding birds is not well-documented. Potential sources of breeding birds include escapes from wildfowl collections (Walsh et al. 1999), wounded or pinioned birds kept as decoys to attract wild birds (Hess et al. 2000), and birds introduced at wildlife management areas to restore populations of the subspecies *B. canadensis maxima* (Brauning et al. 2000). This subspecies (the giant Canada goose) formerly bred in the midwest and was thought extinct until rediscovered in the 1960s. In the Philadelphia area, breeding birds are resident year-round. Resident birds are joined by large numbers of birds in the winter. The origin of these birds is not well known; they could include Arctic nesters, migrants from New England or the northern mid-Atlantic (i.e., derivatives from the new breeding populations), or some locally-bred birds making local movements. Small numbers of snow geese (*B. chen*) and brant (*B. branta*), which breed in the Arctic, are found in winter in the city, such as in FDR Park and along the Schuylkill River, indicating that the park populations may contain long distance migratory birds.

Canada geese are most common in large, open areas, although they are increasingly able to use small lawns and marshes. Aggregations of Canada geese were not noted in Poquessing Creek Park, but large flocks were seen in winter in open fields in Benjamin Rush State Park, adjacent to Fairmount Park land.

With their spread into urban and suburban areas, Canada geese have been considered a nuisance in some cases. Aggressiveness by breeding birds and accumulation of droppings are common concerns, but human health risks resulting from bacterial contamination of droppings and ecological effects may be more serious. Geese graze field, wetland and aquatic plants, and they contribute to nutrient enrichment of resting areas. However, the magnitude and effects of nutrient enrichment in local systems are not documented. The relative contributions of resident birds with the larger numbers of migratory birds is also unknown.

Various techniques have been used to manage concentrations of geese. These include various means of scaring birds (dogs, etc.), shaking eggs, and habitat management to reduce open fields and access to water. Many of the vegetation and storm water restoration techniques recommended for NLREEP, particularly reduction in the amount of mowed area and planting of riparian zones, may reduce suitability for geese. Fencing may also be used to restrict access to water. This has been implemented by the Philadelphia Water Department in partnership with NLREEP, along the Schuylkill River near the Belmont water intakes. Regionally, shifts in hunting seasons have been made to increase the harvest of resident birds and decrease the harvest of migratory birds.

As a migratory species, Canada geese are protected by federal laws and international treaty; geese are managed by the federal government, for example, through hunting regulations (season and limits) and maintenance of waterfowl refuges. Therefore, management actions should be coordinated with other agencies. In 2001, changes in regulations making it easier to control breeding geese have been proposed; these may allow flexibility in controlling resident groups without affecting transients and migratory birds. Migratory geese are considered an important resource whose apparent decline has been of concern. Therefore, control of nonresident birds (migrating and wintering birds) is not recommended. Given uncertainties on the relative effects of breeding and wintering birds, there is not enough information to justify active control of breeding geese. However, habitat management techniques, which are consistent with other NLREEP goals, may be an effective approach to reducing goose impacts in the park.

7.C.3.7. **Floral Re-introduction**

Comparisons of the vegetation/floral assessment of this study with historical information on plants of the Poquessing indicate changes. Re-introduction of some species may be appropriate where current conditions can support the species, where stock is available and where transplanting and establishment are feasible. Types of species which are particularly suitable are forest species which may have been lost during earlier deforestation and forest grazing, meadow species which may be maintained in managed meadows, and wetland species. Virtually all of the historically recorded tree species are still present, and most candidate species are herbaceous or shrubs.

Primary sources for historical information were the herbarium records at ANSP. Localities in or near the current Poquessing Creek Park were considered relevant, such as the many older records from Byberry, many of which were probably from the area that is now part of the park. Many Torresdale records are probably from the park, although some are from the Delaware River shore west of the park. Similarly, Somerton records probably include park and Bucks County records. Even if records were not from park land, they show the potential occurrence in appropriate habitats within the nearby park. Species for which there are a number of records are considered the best candidates, since they were less likely to have depended on unusual conditions at a few sites which may no longer be present.

There are 472 historical records of about 425 species (some taxa may now be considered synonyms of other species). The records document many of the regionally common forest and meadow species. There are also records of some uncommon species, including typically Coastal Plain species such as bayberry (*Myrica pensylvanica*), buttonbush (*Cephalanthus occidentalis*), mistflower (*Eupatorium coelestinum*), staggerbush (*Lyonia mariana*), fetter-bush (*Leucothoe racemosa*) and sweet pepperbush (*Clethra alnifolia*), wetland plants such as cranberry (*Vaccinium macrocarpon*), golden club (*Orontium aquaticum*), and rose-pink (*Sabatia angularis*), and increasingly rare forest species such as whorled pogonia (*Isotria verticillata*), fly poison (*Amianthium muscaetoxicum*) and devil's-bit (*Chamaelirium luteum*).

Possible species for re-introduction based on the historical occurrence and absence from the current inventory include:

Trees/shrubs:

Speckled alder (*Alnus serrulata*)

Chokeberry (*Aronia prunifolia*)

Red-cedar (*Juniperus virginiana*)

American hazelnut (*Corylus americana*)

Summer or autumn blooming herbaceous plants of wetlands meadows:

Turtlehead (*Chelone glabra*)

Butterflyweed (*Asclepias tuberosa*)

A number of other species probably occurred in the park but are not documented by herbarium specimens (cf. Rhoads and Klein 1993, Wherry 1968, Appendix A-1.1). Some of these would probably be good candidates for introduction to the park.

7.D. RECOMMENDED RESTORATION ACTIVITIES

7.D.1. Restoration Site Overview

Restoration activities at various sites were prioritized on the basis of expected ecological benefits, likelihood of success, estimated implementation costs, site constraints and other site-specific factors (Table 7.D.1). Descriptions of sites with high priority restoration activities are presented in Section 7.E and mapped in Section 7.F.

Restoration activities are proposed throughout the park. The different parcels have some different restoration issues, so that there are different foci for different parts of the valley.

The upper section (along Poquessing Creek above Roosevelt Boulevard), consists mainly of a narrow band of riparian forest, with extensive understory of invasive and exotic plants. The channel shows bank erosion and channel widening typical of urban streams. Because of the hydrologic disturbance and degree of vegetation disturbance, few restoration activities are recommended as high priority for this section. However, maintenance of the old field in the site is recommended. This site adjoins some high quality forest and meadow on the Bucks County side, so coordinated management could improve the overall area.

The park land between Roosevelt Boulevard and Century Lane contains a narrow band of woods, as well as shrub lands and old fields. The park adjoins open GSA and state park land. Coordination to preserve these open lands is recommended. Control of trash and trail degradation by ATVs and dirt bikes is also recommended here.

The park owns much of the land along the small tributary which starts in Parkwood (above Belgreen Road) and enters the Poquessing above Knights Road. The upper parts of this tributary are mowed (either by the park or local residents). There is a mature oak woods in the segment between Torrey, Academy and Medford roads. This segment has tremendous damage from ATVs and dirt bikes, as well as dense stands of Japanese knotweed. Restoration of this area would be valuable, if vehicle access can be controlled. The park land at the upper end of this tributary is adjacent to open meadows in the Philadelphia Community College. Coordination between the park, the community college, Byberry Industrial Park and the Philadelphia Recreation Department could create a nearly continuous loop of open land around this tributary, another small tributary of Poquessing Creek and Poquessing Creek.

The park owns much of the riparian strip along Poquessing Creek between Woodhaven Road and Red Lion Road. Most of this area is a narrow strip of riparian woods, with a mix of old fields, woods and exotic-dominated shrublands in the piece of land between Greenmount and Whiting roads. There is little high priority restoration recommended for this area, although control of exotics (e.g., plume grass) and maintenance of some of the old field vegetation is recommended.

The park has several holdings along Byberry Creek and its tributaries. One area, above Academy Road, is nearly surrounded by the Philadelphia Industrial Park. This area has some mature woods and some good quality wetlands, and enhancement of this area is recommended. This area has several outfalls with indications of sewage contamination, and a number of junked cars were present in this area during site visits. Control of exotic vegetation would also be useful in this area. This area may also be impacted by deer, which were not seen to be a problem in the rest of Poquessing. The main creek in this site rises upstream in the Northeast Philadelphia Airport; the headwater are currently undeveloped woods. Protection of the headwaters is recommended to protect this park area.

The riparian zone of Byberry Creek is degraded within Byrne Golf Course. Enlargement of the riparian zone and control of exotic vegetation are recommended in this area.

Table 7.D.1. List of sites in Poquessing Creek Park recommended by ANSP for restoration by NLREEP. Priority codes are: H=high; M=medium; L=low; HC=high, requires coordination; HD=high, after deer; HP=high protection; HPD=high, protection and restoration after deer are controlled; HT=high trail; HVD=high, volunteer action, other actions after deer are controlled; HV=high volunteer; MC=medium, requires coordination.

Site ID	Restoration Type	Site Name	Location	Priority	Acreage
S50.01	Channel	Tributary 3	Between Torrey and Medford Roads	H	0.02
		Action	**Priority**		
		Bank Stabilization/Regrade	H		
S50.02	Channel	Tributary 3	Between Torrey and Medford Roads	H	0.03
		Action	**Priority**		
		Bank Stabilization/Regrade	H		
S50.03	Channel	Tributary 3	Between Torrey and Medford Roads	H	0.37
		Action	**Priority**		
		Structural Improvement (SW)	H		
		Coordinate with other agencies	HC		
S50.04	Channel	Tributary 3	Between Torrey and Medford Roads	H	0.17
		Action	**Priority**		
		Bank Stabilization/Regrade	H		
S60.01	Channel	Tributary 1 of Tributary 1	Off Drummond Road	H	0.02
		Action	**Priority**		
		Trash Removal	H		
S60.02	Channel	Tributary 1 (no mapped polygon)	Between Decatur and Academy Roads	H	
		Action	**Priority**		
		Bank Stabilization/Regrade	H		
S60.03	Channel	Tributary 1	Between Deactur and Academy Roads	H	0.01
		Action	**Priority**		
		Trash Removal	H		
S60.04	Channel	Tributary 1	Between Decatur and Academy Roads	H	0.06
		Action	**Priority**		
		Structural Improvement (SW)	H		
S60.05	Channel	Tributary 1	Between Decatur and Academy Roads	H	0.07
		Action	**Priority**		
		Structural Improvement (SW)	H		
S60.06	Channel	Tributary 2 of 1 (and trib. 1 of 2 of 1)	Between Drummond and Academy Roads	H	0.01
		Action	**Priority**		
		Trash Removal	H		
S70.01	Channel	Trib 1 of Tributary 2 (Byberry Ck)	between Grant and Academy, in golf course boundary	H	0.03
		Action	**Priority**		
		Gully Repair and Prevention	H		

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Site ID	Restoration Type	Site Name	Location	Priority	Acreage
S70.02	Channel	Trib 1 of tributary 2 (Byberry Ck)	Between Grant and Academy in golf course boundary	H	0.03
		Action		**Priority**	
		Gully Repair and Prevention		H	
		Coordinate with other agencies		HC	
S70.03	Channel	Trib 1 of tributary 2 (Byberry Ck)	Between Grant and Academy in golf course boundary	H	0.09
		Action		**Priority**	
		Structural Improvement (SW)		H	
S70.04	Channel	Trib 1 of tributary 2 (Byberry Ck)	between Grant and Academy	H	0.04
		Action		**Priority**	
		Gully Repair		H	
		Structural Improvement (SW)		HC	
S70.05	Channel	Trib 1 of tributary 2 (Byberry Ck)	Between Grant and Academy, in golf course boundary	HT	0.03
		Action		**Priority**	
		Structural Improvement (Trails)		HT	
S70.06	Channel	Trib 1 of tributary 2 (Byberry Ck)	Between Grant and Academy, in golf course boundary	H	1.24
		Action		**Priority**	
		Trash Removal		H	
S70.07	Channel	Trib 1 of tributary 2 (Byberry Ck)	Between Grant and Academy, in golf course boundary	H	0.08
		Action		**Priority**	
		Bank Stabilization/Regrade		H	
S70.08	Channel	Tributary 2 (Byberry Creek)	SW of Grant Avenue, in the golf course	H	0.03
		Action		**Priority**	
		Bank Stabilization/Regrade		H	
S70.09	Channel	Mainstem	Where Red Lion Road crosses	HV	0.13
		Action		**Priority**	
		Trash Removal		HV	
V10.01	Non-Forested Upland	Poquessing Creek Drive meadow	Poquessing Creek Drive	H	5.56
		Action		**Priority**	
		Release/Mow Infrequently		H	
		Meadow Management		H	
		Invasive-Exotic Control		HV	

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Site ID	Restoration Type	Site Name	Location	Priority	Acreage
V10.03	Riparian Zone	Byberry Hospital Riparian zone (no mapped polygon)	north of Roosevelt	HC	
		Action		**Priority**	
		Develop management plan		HC	
V20.01	Non-Forested Upland	Mechanicsville Road meadow	Mechanicsville Road	H	5.02
		Action		**Priority**	
		Meadow Management		H	
		Trash Removal		H	
		Trail Improvement		HT	
V20.03	Riparian Zone	Rush State Park Riparian Zone (no mapped polygon)	South of Roosevelt	HC	
		Action		**Priority**	
		Develop management plan		HC	
V20.04	Riparian Zone	Mechanicsville Woods	between Mechanicsville and Rush State Park	HT	
		Action		**Priority**	
		Trash Removal		H	
		Trail Improvement		HT	
		Control Access		HT	
V30.01	Riparian Zone	Dunk's Ferry Recreation area	South of Dunk's Ferry Road	HC	24.78
		Action		**Priority**	
		Develop management plan		HC	
V50.01	Riparian Zone	Tributary 3	Between Torrey and Medford Roads	H	1.68
		Action		**Priority**	
		Invasive-Exotic Control		H	
		Release/Widen		H	
		Meadow Management		H1	
		Remove Exotics/Replant Native Forest Species		H2	
V50.02	Riparian Zone	Nanton Drive gully	Nanton Drive	H	0.13
		Action		**Priority**	
		Gully Repair		H	
		Invasive-Exotic Control		HV	
V50.06	Riparian Zone	Torrey Road Japanese knotweed	Right bank Tributary 3 below Torrey Road	HV	0.72
		Action		**Priority**	
		Remove Exotics/Replant Native Forest Species		HV	

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Site ID	Restoration Type	Site Name	Location	Priority	Acreage
V50.08	Forested Upland	Torrey Road woods	woods north of Academy, east of Torrey	H	15.22
		Action		**Priority**	
		Gully Repair		H	
		Trash Removal		H	
		Control access		H	
		Trail Improvement		HT	
V60.01	Riparian Zone	Academy Woods Riparian Zone	Decatur and Darnell	HV	0.66
		Action		**Priority**	
		Invasive-Exotic Control		HV	
V60.02	Wetland	Tributary 1 wetlands	Between Decatur and Academy Roads	HV	1.68
		Action		**Priority**	
		Protect/Monitor		HP	
		Replant Native Wetland Species		HV	
		Remove Exotics/Replant Native Herbs		HV	
		Monitor plantings/Control Exotics as Needed		HV	
V60.03	Riparian Zone	Academy Road exotics	Academy Road	HV	0.99
		Action		**Priority**	
		Remove Exotics/Replant Native Shrubs		HV	
		Trash Removal		HV	
V60.04	Wetland	Dutton Road wetland	Dutton Road	H	3.71
		Action		**Priority**	
		Invasive-Exotic Control		H	
V60.05	Forested Upland	Academy Road Woods Trash Removal	Academy Road and Chalfonte Rd.	H	0.42
		Action		**Priority**	
		Trash Removal		H	
		Coordinate with other agencies		HC	
V60.07	Slope	Academy Road Woods Slope Repair	On the slopes in the Academy Road Woods	HV	1.08
		Action		**Priority**	
		Erosion Control		HV	
		Replant Native Forest Species		HV	
		Gully Repair		HC	
V60.08	Wetland	Academy Road wetland	east side of tributary 1 below Decatur	HP	6.05
		Action		**Priority**	
		Protect/Monitor		HP	

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Site ID	Restoration Type	Site Name	Location	Priority	Acreage
V70.01	Wetland	Tributary 1 of Byberry Ck (Trib 2)	Between Grant and academy, in golf course boundary	H	0.06
		Action		**Priority**	
		Release/Widen		H	
		Remove Exotics/Replant Native Wetland Species		H	
		Wetland creation/expansion		H	
V70.02	Riparian Zone	Outlook Street exotics	South of Outlook, North of Frankford Avenue	HV	0.35
		Action		**Priority**	
		Remove Exotics/Replant Native Shrubs		HV	
V70.03	Riparian Zone	Outlook Street Riparian Zone	East of Linden, South of Outlook	HC	0.19
		Action		**Priority**	
		Control Access		HC	
V70.05	Wetland	Pearson Street wetland	Pearson Street	HC	0.87
		Action		**Priority**	
		Trash Removal		HV	
		Remove Exotics/Replant Native Wetland Species		HV	
		Release/Widen		HC	
V70.06	Wetland	Aubrey Avenue wetland	Aubrey Avenue	HC	0.15
		Action		**Priority**	
		Remove Exotics/Replant Native Wetland Species		HV	
		Release/Widen		HC	
V70.07	Non-Forested Upland	Byrne no-mow zone	Byrne Golf Course	HC	1.08
		Action		**Priority**	
		Meadow Management		HC	
		Release/Mow Infrequently		HC	
V70.08	Riparian Zone	Red Lion Road invasives	Red Lion Road	H	0.50
		Action		**Priority**	
		Remove Exotics/Replant Native Forest Species		H	
		Trash Removal		HV	
V80.01	Forested Upland	Woodhaven Road Woods		H	1.39
		Action		**Priority**	
		Release/Widen		H	

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Site ID	Restoration Type	Site Name	Location	Priority	Acreage
V80.02	Non-Forested Upland	Woodhaven Road old field	southwest of Woodhaven Road	H	3.87
		Action		**Priority**	
		Meadow Management		H	
		Remove Exotics/Replant Native Meadow Species		H	
V90.01	Wetland	Mouth of Poquessing intertidal marsh	mouth of Poquessing	HP	1.07
		Action		**Priority**	
		Protect/Monitor		HP	
V90.03	Non-Forested Upland	Hegerman mowed field (upper)	along Hegerman Street and Terrace	H	2.54
		Action		**Priority**	
		Release/Mow Infrequently		H	
V90.04	Non-Forested Upland	Hegerman-St. Denis mowed area	Along Hegerman Street, by St. Denis	H	0.24
		Action		**Priority**	
		Release/Mow Infrequently		H	
V90.05	Riparian Zone	Hegerman woods	woods along Hegerman north of Stevenson	H	5.78
		Action		**Priority**	
		Remove Exotics/Replant Native Forest Species		H	
V100.01	Park Wide	Boundary id and signage	Parkwide	H	
		Action		**Priority**	
		Improve signage		H	
		Clarify boundaries		HC	
V100.02	Park Wide	Monitor deer	Park wide	H	
		Action		**Priority**	
		Deer Monitoring		H	

The park land along Poquessing Creek between Red Lion Road and State Road consists of a narrow band of riparian woods with mowed lawns along much of the street edges of the park. Release of some of the mowed areas into woods and meadow buffer strips would help the riparian woods. The woods along the lower end of this strip (below St. Denis Drive) are of relatively good quality; control of exotic vegetation around the edges of this area is recommended.

Glen Foerd is landscaped and little restoration is recommended in this area. However, the intertidal marsh along Glen Foerd is an important habitat, containing several state-endangered plant species. Protection of this marsh is recommended. Eden Hall is largely landscaped, with essentially no natural land, and no restoration is recommended in that strip.

Despite the small amount of park land in the Poquessing Creek Park, it preserves a range of natural habitats, including woods, old fields, wooded wetlands, and intertidal marshes. As such, it is an important part of the natural lands of the park system. Restoration within the existing land holdings, and coordination with owners of adjacent open land will enhance this area.

7.D.2. General Recommendations for Future Activities

The prior section described specific activities that are recommended for implementation in Poquessing Creek Park. In addition to these, a number of other related activities are also recommended. These relate to overall operations in the park, particularly those involving management of the borders between the designed and natural lands. Some of these are outside the direct purview of NLREEP and should be implemented in cooperation with other groups.

- Damage done to the natural lands by trash dumping is a major problem. Exercising control, through methods such as passive blocking of access points as well as patrolling and/or enforcement of regulations, is necessary to minimize or eliminate the damage.
- Non-native plantings in landscaped areas are often a source of invasion by these plants. An increased use of native plants in landscape settings and avoidance of particularly invasive species, such as Norway maple, is recommended in order to avoid this infiltration of non-native landscapes.
- Decreasing the frequency of mowing can result in taller grass and other vegetation which increases water retention and provides better habitat. Implementation of a decreased mowing schedule in places where this does not interfere with other uses is recommended. However, monitoring of the areas of less frequent mowing should be done to ensure that they are not colonized by exotic plants.
- Exotic species occur in both landscaped areas and natural lands. However, exotic species are often patchy in occurrence and may be controlled if addressed early. Occurrence of the species should be monitored throughout the parks.
- Dumping of large quantities of logs, leaves and other horticultural waste is damaging and should be controlled. However, logs can be used in woods to increase soil fungus, decrease surface runoff, provide animal habitat and restrict access. Mulch can be used in restoration plantings to improve soil and decrease unwanted plants. Methods of making these materials available for restoration can improve the success of the restoration initiative, while reducing the storage needs for these materials.
- Poquessing Creek Park shows extensive damage from ATV and motorcycle use. Like trash dumping, control of access, patrolling and enforcement of laws will be necessary to prevent this damage. Such actions need to be done carefully, to avoid spreading the problem. Circumvention of barriers across roads and trails can increase damage to natural

lands, and controlling vehicle use in one area may lead to switching vehicle use and damage to new areas.

7.E. RESTORATION SITE ASSESSMENTS

The individual restoration site assessments for Poquessing Creek Park are presented on pages II-914 through II-964. The high priority sites are also shown on the Restoration Sites maps in Volume II, Section 7.F. The key to codes used in the restoration site assessments is given below.

Option priorities:

HP High priority to protect/monitor

HV High priority, can be immediately implemented by volunteers

HC High priority; coordination with other agencies should be sought to deal with large complex projects, joint responsibilities or regulatory issues.

H High priority, single action for site or multiple, equivalent actions for site

HT High priority trail work, which should be addressed as part of trail restoration planning.

Site Use constraints:

P Near playground, main paths, etc., where safety a potential issue

OM Ongoing mowing

D Likely ongoing disturbance

Fairmount Park Restoration Sites

Poquessing Creek Park

Park: PQ **Restoration Site ID:** S50.01 **Site Name:** Tributary 3

Location: Between Torrey and Medford Roads

General Location: Torrey Road segment (Tributary 3) 50's

Disturbance/Condition: Mowed/No Riparian Zone

Restoration Category Stream

Restoration Type: Channel **Constraints:**

Acreage: 0.02

Site Priority: H **Location Criteria:**

Description:

Riparian bank stabilization and regrading is recommended. There is a stretch of the stream on the right bank just down from Nanton Road with very little riparian forest. Planting of native trees and shrubs is recommended.

Restoration Options:

ID	Action	Priority	Proportion
A	Bank Stabilization/Regrade	H	100%

Park: PQ **Restoration Site ID:** S50.02 **Site Name:** Tributary 3

Location: Between Torrey and Medford Roads

General Location: Torrey Road segment (Tributary 3) 50's

Disturbance/Condition: Erosion/Scour

Restoration Category Stream

Restoration Type: Channel **Constraints:**

Acreage: 0.03

Site Priority: H **Location Criteria:**

Description:

Riparian bank stabilization and regrading is recommended. Just downstream of this open area, there is a large eroding bank on the right. This could be stabilized using root wads.

Restoration Options:

ID	Action	Priority	Proportion
A	Bank Stabilization/Regrade	H	100%

Park: PQ **Restoration Site ID:** S50.03 **Site Name:** Tributary 3

Location: Between Torrey and Medford Roads

General Location: Torrey Road segment (Tributary 3) 50's

Disturbance/Condition: SW Structure Malfunction/Problem

Restoration Category Stream

Restoration Type: Channel **Constraints:**

Acreage: 0.37

Site Priority: H **Location Criteria:**

Description:

Structural Improvement to Stream Channels. The large culvert has an obvious sewage leak (PWD should be notified). Also, the fence around the culvert should be replaced because it is a very serious safety hazard.

Restoration Options:

ID	Action	Priority	Proportion
A	Structural Improvement (SW)	H	100%
B	Coordinate with other agencies	HC	100%

Park: PQ **Restoration Site ID:** S50.04 **Site Name:** Tributary 3

Location: Between Torrey and Medford Roads

General Location: Torrey Road segment (Tributary 3) 50's

Disturbance/Condition: Erosion/Scour

Restoration Category Stream

Restoration Type: Channel **Constraints:**

Acreage: 0.17

Site Priority: H **Location Criteria:**

Description:

Riparian bank stabilization/regrading is recommended. There is a bank erosion issue where the trail and stream run adjacent to each other. The bank should be stabilized and planted with shrubs/grasses, and the trail should be moved back from the stream.

Restoration Options:

ID	Action	Priority	Proportion
A	Bank Stabilization/Regrade	H	100%

Park: PQ **Restoration Site ID:** S60.01 **Site Name:** Tributary 1 of Tributary 1

Location: Off Drummond Road

General Location: Academy Road segment (Tributary 1, Decatur to Academ

Disturbance/Condition: Trash Dumping

Restoration Category Stream

Restoration Type: Channel **Constraints:**

Acreage: 0.02

Site Priority: H **Location Criteria:**

Description:

This is one of the worst streams in the park. It is heavily impacted by urban stormwater runoff. The only recommendation is to remove the abandoned car from the channel.

Restoration Options:

ID	Action	Priority	Proportion
A	Trash Removal	H	100%

Park: PQ **Restoration Site ID:** S60.02 **Site Name:** Tributary 1 (no mapped polygon)

Location: Between Decatur and Academy Roads

General Location: Academy Road segment (Tributary 1, Decatur to Academ

Disturbance/Condition: Erosion/Scour

Restoration Category Stream

Restoration Type: Channel **Constraints:**

Acreage:

Site Priority: H **Location Criteria:**

Description:

Modify Channel and/or Bank Stabilization/Regrade/Riparian. The stretches of this stream having large woody debris (LWD) tend to be more stable, have more riffle/pool morphology, and provide better habitat. Since the stream supports high densities of frogs, any restoration should have a significant ecological benefit even though the stream is heavily impacted.

The addition of LWD along the entire length of Tributary 1 within the park is recommended. This could include some bank regrading and stabilization with bioengineering techniques. Another option is to have a new natural channel designed (e.g., using Rosgen techniques), similar to the restoration of Saddle River in Baltimore, MD. The Saddle River restoration involved a redesigning of the stream channel to create a more sinuous channel, a well defined low-flow channel, and a larger channel with inset floodplains to allow for large stormflows to pass. The banks were also stabilized with bioengineering techniques. Potential damage to adjacent wetlands would need to be considered (and minimized) in implementing new channel design. Storm water flows may increase with development of the headwaters, which are in Northeast Philadelphia Airport, which could change design parameters for a major channel design.

Restoration Options:

ID	Action	Priority	Proportion
A	Bank Stabilization/Regrade	H	100%

Park: PQ **Restoration Site ID:** S60.03 **Site Name:** Tributary 1

Location: Between Deactur and Academy Roads

General Location: Academy Road segment (Tributary 1, Decatur to Academ

Disturbance/Condition: Trash Dumping

Restoration Category Stream

Restoration Type: Channel **Constraints:**

Acreage: 0.01

Site Priority: H **Location Criteria:**

Description:

There is a car that has been dumped into the stream. It should be removed.

Restoration Options:

ID	Action	Priority	Proportion
A	Trash Removal	H	100%

Park: PQ **Restoration Site ID:** S60.04 **Site Name:** Tributary 1

Location: Between Decatur and Academy Roads

General Location: Academy Road segment (Tributary 1, Decatur to Academ

Disturbance/Condition: SW Structure Malfunction/Problem

Restoration Category Stream

Restoration Type: Channel **Constraints:**

Acreage: 0.06

Site Priority: H **Location Criteria:**

Description:

Structural Improvement to Stream Channels. This culvert dumps storm flows about 5' above the stream bed and is causing the formation of a gully and erosion of the stream banks. The outlet structure is failing. A drop structure should be designed and installed to drop the storm flows down to the elevation of the stream and to dissipate energy.

Restoration Options:

ID	Action	Priority	Proportion
A	Structural Improvement (SW)	H	100%

Park: PQ **Restoration Site ID:** S60.05 **Site Name:** Tributary 1

Location: Between Decatur and Academy Roads

General Location: Academy Road segment (Tributary 1, Decatur to Academ

Disturbance/Condition: Erosion/Scour

Restoration Category Stream

Restoration Type: Channel **Constraints:**

Acreage: 0.07

Site Priority: H **Location Criteria:**

Description:

Structural Improvement to Stream Channels. Culvert from David Michael's parking lot could use some large rocks at the outlet to dissipate energy and prevent further scouring and erosion of the bed and banks.

This tributary is heavily impacted by urban runoff; it has downcut over the years, it has a wide, shallow bed, and the banks are high, vertical and eroding. This portion of the park is little used and is actually difficult to move around in for lack of trails, the steep banks, and poison ivy. However, it has a high density of frogs and some very nice, large vernal pools in its floodplain. In addition, while portions of the stream were classified as impaired, others were classified as moderately impaired. The difference between the impaired and moderately impaired reaches of this stream seem to be directly related to the amount of large woody debris (LWD)-- the more LWD, the better the condition of the stream.

Restoration Options:

ID	Action	Priority	Proportion
A	Structural Improvement (SW)	H	100%

Park: PQ **Restoration Site ID:** S60.06 **Site Name:** Tributary 2 of 1 (and trib. 1 of 2 of 1)

Location: Between Drummond and Academy Roads

General Location: Academy Road segment (Tributary 1, Decatur to Academ

Disturbance/Condition: Trash Dumping

Restoration Category Stream

Restoration Type: Channel **Constraints:**

Acreage: 0.01

Site Priority: H **Location Criteria:**

Description:

Trash Removal. Remove the cars in and around the stream.

Restoration Options:

ID	Action	Priority	Proportion
A	Trash Removal	H	100%

Park: PQ **Restoration Site ID:** S70.01 **Site Name:** Trib 1 of Tributary 2 (Byberry Ck)

Location: between Grant and Academy, in golf course boundary

General Location: Byberry Creek (mouth of Byberry to Byrne Golf Course) 7

Disturbance/Condition: Channel Gully

Restoration Category Stream

Restoration Type: Channel **Constraints:**

Acreage: 0.03

Site Priority: H **Location Criteria:**

Description:

Gully Repair and Prevention. Just upstream on the left bank (looking downstream) of where Pearson Avenue dead-ends at the stream, there is a large gully forming from golf course runoff. Runoff should be controlled from the golf course by preventing the concentration of flow at this point. This could be done by putting in a small berm to act as a level spreader or a larger buffer area with native planting could be installed. Once the flows are controlled the gully can be repaired by filling. If flows are not controlled, the gully will continue to migrate back toward the golf course and could become a health hazard.

Restoration Options:

ID	Action	Priority	Proportion
A	Gully Repair and Prevention	H	100%

Park: PQ **Restoration Site ID:** S70.02 **Site Name:** Trib 1 of tributary 2 (Byberry Ck)

Location: Between Grant and Academy in golf course boundary

General Location: Byberry Creek (mouth of Byberry to Byrne Golf Course) 7

Disturbance/Condition: Channel Gully

Restoration Category Stream

Restoration Type: Channel **Constraints:**

Acreage: 0.03

Site Priority: H **Location Criteria:**

Description:

Gully Repair and Prevention. Where Pearson Avenue dead-ends next to the stream, it appears that storm runoff is missing the storm drain. This is causing a large gully to form and destabilizing the fence as well as the stream bank. The Philadelphia Streets Dept. should be contacted to correct this. The gully can then be filled and planted.

Restoration Options:

ID	Action	Priority	Proportion
A	Gully Repair and Prevention	H	100%
B	Coordinate with other agencies	HC	100%

Park: PQ **Restoration Site ID:** S70.03 **Site Name:** Trib 1 of tributary 2 (Byberry Ck)

Location: Between Grant and Academy in golf course boundary

General Location: Byberry Creek (mouth of Byberry to Byrne Golf Course) 7

Disturbance/Condition: SW Structure Malfunction/Problem

Restoration Category Stream

Restoration Type: Channel **Constraints:**

Acreage: 0.09

Site Priority: H **Location Criteria:**

Description:

Structural Improvement to Stream Channels or Daylighting. Where Pearson Avenue apparently used to cross the golf course, there is a very large concrete culvert within the stream. This does not appear to be in use and should be removed. This could be called a Structural Improvement or a very short Daylighting.

Restoration Options:

ID	Action	Priority	Proportion
A	Structural Improvement (SW)	H	100%

Park: PQ **Restoration Site ID:** S70.04 **Site Name:** Trib 1 of tributary 2 (Byberry Ck)

Location: between Grant and Academy

General Location: Byberry Creek (mouth of Byberry to Byrne Golf Course) 7

Disturbance/Condition: SW Structure Malfunction/Problem

Restoration Category Stream

Restoration Type: Channel **Constraints:**

Acreage: 0.04

Site Priority: H **Location Criteria:**

Description:

Gully Repair and Prevention and Structural Improvement. Just downstream of Pearson Avenue, there is a gully on the right bank due to a stormwater outfall. The outfall has deteriorated. There is no concrete pad, and the pipe has collapsed. The pipe should be repaired, and a suitable outlet structure should be installed with wing walls and a pad. Energy dissipation to prevent further gullying should be an integral part of the outlet structure design.

Restoration Options:

ID	Action	Priority	Proportion
A	Gully Repair	H	100%
B	Structural Improvement (SW)	HC	100%

Park: PQ **Restoration Site ID:** S70.05 **Site Name:** Trib 1 of tributary 2 (Byberry Ck)

Location: Between Grant and Academy, in golf course boundary

General Location: Byberry Creek (mouth of Byberry to Byrne Golf Course) 7

Disturbance/Condition: Trail Crossing (culvert, bridge, etc.)

Restoration Category Stream

Restoration Type: Channel **Constraints:**

Acreage: 0.03

Site Priority: HT **Location Criteria:**

Description:

Structural Improvement to Stream Channels. The stream crossing for the first fairway (going downstream) is a very poorly designed double culvert. This double culvert causes aggrading (deposition) of the stream channel behind the crossing and scouring below. In addition, double culverts have the tendency to clog with debris and streams will try to cut around them during storms. This culvert should be removed and replaced with a spanning walkway (like the others just downstream).

Restoration Options:

ID	Action	Priority	Proportion
A	Structural Improvement (Trails)	HT	100%

Park: PQ **Restoration Site ID:** S70.06 **Site Name:** Trib 1 of tributary 2 (Byberry Ck)

Location: Between Grant and Academy, in golf course boundary

General Location: Byberry Creek (mouth of Byberry to Byrne Golf Course) 7

Disturbance/Condition: Trash Dumping

Restoration Category Stream

Restoration Type: Channel **Constraints:**

Acreage: 1.24

Site Priority: H **Location Criteria:**

Description:

Trash Removal. Concrete rubble has been dumped throughout this whole stretch of stream in an attempt to stabilize the stream banks. We recommend removing this debris and planting the banks with native grasses and sedges.

Restoration Options:

ID	Action	Priority	Proportion
A	Trash Removal	H	100%

Park: PQ **Restoration Site ID:** S70.07 **Site Name:** Trib 1 of tributary 2 (Byberry Ck)

Location: Between Grant and Academy, in golf course boundary

General Location: Byberry Creek (mouth of Byberry to Byrne Golf Course) 7

Disturbance/Condition: Slope Erosion

Restoration Category Stream

Restoration Type: Channel **Constraints:**

Acreage: 0.08

Site Priority: H **Location Criteria:**

Description:

Bank Stabilization/Regrade/Riparian. Where the stream crosses the third fairway (going downstream), just before it enters the woods again, there is an opportunity to do a bank regrading, stabilization (with fiber mats and logs) and planting of native grasses, sedges and low-growing shrubs on the left bank (looking downstream).

Restoration Options:

ID	Action	Priority	Proportion
A	Bank Stabilization/Regrade	H	100%

Park: PQ **Restoration Site ID:** S70.08 **Site Name:** Tributary 2 (Byberry Creek)

Location: SW of Grant Avenue, in the golf course

General Location: Byberry Creek (mouth of Byberry to Byrne Golf Course) 7

Disturbance/Condition: Slope Erosion

Restoration Category Stream

Restoration Type: Channel **Constraints:**

Acreage: 0.03

Site Priority: H **Location Criteria:**

Description:

Bank Stabilization/Regrade/Riparian. The entire stretch from the confluence with Tributary 1 of Tributary 2 down to Grant Avenue has concrete debris dumped sporadically and has several areas of mowed grass and large cut banks. Throughout this stretch, the rubble should be removed, the riparian forest should be expanded where possible (or no mow zones), and stretches where steep eroded banks have formed could be stabilized using regrading, bioengineering techniques, and native plantings.

Restoration Options:

ID	Action	Priority	Proportion
A	Bank Stabilization/Regrade	H	100%

Park: PQ **Restoration Site ID:** S70.09 **Site Name:** Mainstem

Location: Where Red Lion Road crosses

General Location: Byberry Creek (mouth of Byberry to Byrne Golf Course) 7

Disturbance/Condition: Trash Dumping

Restoration Category Stream

Restoration Type: Channel **Constraints:**

Acreage: 0.13

Site Priority: HV **Location Criteria:**

Description:

Trash Removal. There is a huge debris dam upstream of the bridge where Red Lion Road crosses Pouquessing Creek. This may or may not be FPC responsibility. Regardless, it should be removed before it causes major bank failures, road collapse, or bridge failure.

Restoration Options:

ID	Action	Priority	Proportion
A	Trash Removal	HV	100%

Park: PQ **Restoration Site ID:** V10.01 **Site Name:** Poquessing Creek Drive meadow

Location: Poquessing Creek Drive

General Location: Poquessing Drive segment (Trevose to Roosevelt) 10's

Disturbance/Condition: None/Minimal

Restoration Category Vegetation

Restoration Type: Non-Forested Upland **Constraints:**

Acreage: 5.56

Site Priority: H **Location Criteria:** Affects ecolog. significant site

Description:

A meadow behind the houses on Lukens Lane can benefit from meadow management.The field contains bluestem, goldenrods and other herbs. It may be mowed by local residents. It should be maintained as meadow.

Restoration Options:

ID	Action	Priority	Proportion
B	Meadow Management	H	80%
A	Release/Mow Infrequently	H	80%
C	Invasive-Exotic Control	HV	100%

Park: PQ **Restoration Site ID:** V10.03 **Site Name:** Byberry Hospital Riparian zone (no mapped poly

Location: north of Roosevelt

General Location: Poquessing Drive segment (Trevose to Roosevelt) 10's

Disturbance/Condition:

Restoration Category

Restoration Type: Riparian Zone **Constraints:** Presently not part of the park

Acreage:

Site Priority: HC **Location Criteria:** Affects ecolog. significant site

Description:

This area may become part of the park. If so, a management plan should be developed and implemented. (No mapped polygon)

Restoration Options:

ID	Action	Priority	Proportion
B	Develop management plan	HC	100%

Park: PQ **Restoration Site ID:** V20.01 **Site Name:** Mechanicsville Road meadow

Location: Mechanicsville Road

General Location: Mechanicsville Road segment (Roosevelt Blvd to Dunks F

Disturbance/Condition: Invasive/Exotic Vegetation

Restoration Category Vegetation

Restoration Type: Non-Forested Upland **Constraints:**

Acreage: 5.02

Site Priority: H **Location Criteria:** Affects ecolog. significant site

Description:

Within the young forest is an old field with multiflora and honeysuckle, as well as blackberry and other shrubs. Meadow management is recommended. The forest along this section of the park is relatively young, and there was much evidence of earlier dumping and filling as reported by Rhoads. Canopy trees included white ash, sycamore, box-elder, and American elm.

Restoration Options:

ID	Action	Priority	Proportion
D	Meadow Management	H	100%
B	Trash Removal	H	100%
C	Trail Improvement	HT	100%

Park: PQ **Restoration Site ID:** V20.03 **Site Name:** Rush State Park Riparian Zone (no mapped polyg

Location: South of Roosevelt

General Location: Mechanicsville Road segment (Roosevelt Blvd to Dunks F

Disturbance/Condition:

Restoration Category

Restoration Type: Riparian Zone **Constraints:** Coordination with other agencies probla

Acreage:

Site Priority: HC **Location Criteria:** Affects ecolog. significant site

Description:

This area may become part of the park, as part of land transfers relating to the State Park and State Hospital. If so, a management plan should be developed and implemented. (No mapped polygon)

Restoration Options:

ID	Action	Priority	Proportion
A	Develop management plan	HC	100%

Park: PQ **Restoration Site ID:** V20.04 **Site Name:** Mechanicsville Woods

Location: between Mechanicsville and Rush State Park

General Location: Mechanicsville Road segment (Roosevelt Blvd to Dunks F

Disturbance/Condition:

Restoration Category

Restoration Type: Riparian Zone **Constraints:** Relies on coordination with Benj. Rush S

Acreage:

Site Priority: HT **Location Criteria:** Affects ecolog. significant site

Description:

The whole woods are abused by ATV use. Control of access and repair of damage should be done in conjunction with long term development of Benjamin Rush State Park.

Restoration Options:

ID	Action	Priority	Proportion
A	Trash Removal	H	100%
D	Control Access	HT	100%
B	Trail Improvement	HT	5%

Park: PQ **Restoration Site ID:** V30.01 **Site Name:** Dunk's Ferry Recreation area

Location: South of Dunk's Ferry Road

General Location: Dunks Ferry segment (on mainstem south of Dunks Ferry)

Disturbance/Condition:

Restoration Category

Restoration Type: Riparian Zone **Constraints:** May be conflict with recreation interests

Acreage: 24.78

Site Priority: HC **Location Criteria:** Near other cultural resources

Description:

This area contains old fields and woods. Long term management as natural lands would provide a larger park corridor. The area could be maintained as Recreation land or transferred to FPC. Management of areas north of the recreation fields on the north side of Dunk's Ferry Road (i.e., between the Community College and recreation fields) could greatly increase the amount of natural land, nearly linking land along Tributary 3 and the mainstem of Poquessing Creek.

Restoration Options:

ID	Action	Priority	Proportion
A	Develop management plan	HC	100%

Park: PQ **Restoration Site ID:** V50.01 **Site Name:** Tributary 3

Location: Between Torrey and Medford Roads

General Location: Torrey Road segment (Tributary 3) 50's

Disturbance/Condition: Invasive/Exotic Vegetation

Restoration Category Vegetation

Restoration Type: Riparian Zone **Constraints:**

Acreage: 1.68

Site Priority: H **Location Criteria:** Affects ecolog. significant site

Description:

The area is mowed down the slope. There is a narrow band of herbaceous vegetation containing some natives (including swamp milkweed). The mowed area should be reduced, and the area managed as meadow or woods. This area is probably subsumed in V50.08.

Restoration Options:

ID	Action	Priority	Proportion
A	Invasive-Exotic Control	H	20%
D	Meadow Management	H1	80%
C	Release/Widen	H	80%
B	Remove Exotics/Replant Native Forest Species	H2	80%

Park: PQ **Restoration Site ID:** V50.02 **Site Name:** Nanton Drive gully

Location: Nanton Drive

General Location: Torrey Road segment (Tributary 3) 50's

Disturbance/Condition: Slope Erosion

Restoration Category Vegetation

Restoration Type: Riparian Zone **Constraints:**

Acreage: 0.13

Site Priority: H **Location Criteria:** Affects ecolog. significant site

Description:

There are large gullies along the right bank in this area (Trib #1 of Trib #3). On the left bank, the understory is sparse and replanting of native shrubs is recommended. Repair probably depends on controlling ATV/dirt bike access to the whole area.

Restoration Options:

ID	Action	Priority	Proportion
A	Gully Repair	H	100%
B	Invasive-Exotic Control	HV	100%

Park: PQ **Restoration Site ID:** V50.06 **Site Name:** Torrey Road Japanese knotweed

Location: Right bank Tributary 3 below Torrey Road

General Location: Torrey Road segment (Tributary 3) 50's

Disturbance/Condition:

Restoration Category

Restoration Type: Riparian Zone **Constraints:**

Acreage: 0.72

Site Priority: HV **Location Criteria:** Near other restorations

Description:

There is a dense patch of Japanese knotweed along the creek and extending to the road. The Japanese knotweed should be controlled and replanted.

Restoration Options:

ID	Action	Priority	Proportion
A	Remove Exotics/Replant Native Forest Species	HV	100%

Park: PQ **Restoration Site ID:** V50.08 **Site Name:** Torrey Road woods

Location: woods north of Academy, east of Torrey

General Location: Torrey Road segment (Tributary 3) 50's

Disturbance/Condition:

Restoration Category

Restoration Type: Forested Upland **Constraints:** Control dirt bikes before planting

Acreage: 15.22

Site Priority: H **Location Criteria:** Affects ecolog. significant site

Description:

The woods have remnants of good forest, but is heavily impacted by dirt bike and ATV use.

Restoration Options:

ID	Action	Priority	Proportion
E	Control access	H	100%
D	Gully Repair	H	10%
A	Trash Removal	H	100%
B	Trail Improvement	HT	10%

Park: PQ **Restoration Site ID:** V60.01 **Site Name:** Academy Woods Riparian Zone

Location: Decatur and Darnell

General Location: Academy Road segment (Tributary 1, Decatur to Academ

Disturbance/Condition: Deer Damage

Restoration Category Vegetation

Restoration Type: Riparian Zone **Constraints:** Deer control is problamatic

Acreage: 0.66

Site Priority: HV **Location Criteria:** Affects ecolog. significant site

Description:

This floodplain has been damaged by deer browse, but overall is in good shape. This floodplain is dominated by tulip poplar and red maple. Spicebush is in the understory, and poison ivy dominates the herb layer.

Restoration Options:

ID	Action	Priority	Proportion
A	Invasive-Exotic Control	HV	100%

Park: PQ **Restoration Site ID:** V60.02 **Site Name:** Tributary 1 wetlands

Location: Between Decatur and Academy Roads

General Location: Academy Road segment (Tributary 1, Decatur to Academ

Disturbance/Condition: None/Minimal

Restoration Category Vegetation

Restoration Type: Wetland **Constraints:** Deer

Acreage: 1.68

Site Priority: HV **Location Criteria:** Affects ecolog. significant site

Description:

Protect/Monitor. Just before the confluence of Tributary 1 and Tributary 1 of Tributary 1, on the right bank, there is a wet meadow and then a large wetland area. These should be protected.

Restoration Options:

ID	Action	Priority	Proportion
A	Protect/Monitor	HP	100%
D	Monitor plantings/Control Exotics as Needed	HV	100%
B	Remove Exotics/Replant Native Herbs	HV	20%
C	Replant Native Wetland Species	HV	20%

Park: PQ **Restoration Site ID:** V60.03 **Site Name:** Academy Road exotics

Location: Academy Road

General Location: Academy Road segment (Tributary 1, Decatur to Academ

Disturbance/Condition: Invasive/Exotic Vegetation

Restoration Category Vegetation

Restoration Type: Riparian Zone **Constraints:**

Acreage: 0.99

Site Priority: HV **Location Criteria:** Affects ecolog. significant site

Description:

Tributary 1 of Tributary 2 of Tributary 1. Japanese honeysuckle and English ivy should be removed, and the understory should be replanted with native shrubs. Deer may be a problem in this area.

Restoration Options:

ID	Action	Priority	Proportion
D	Remove Exotics/Replant Native Shrubs	HV	100%
B	Trash Removal	HV	100%

Park: PQ **Restoration Site ID:** V60.04 **Site Name:** Dutton Road wetland

Location: Dutton Road

General Location: Academy Road segment (Tributary 1, Decatur to Academ

Disturbance/Condition: Disturbed Floodplain

Restoration Category Vegetation

Restoration Type: Wetland **Constraints:**

Acreage: 3.71

Site Priority: H **Location Criteria:** Affects ecolog. significant site

Description:

This site is located north of Trib #3 of Trib #1. This is a large skunk cabbage wetland area dominated by mile-a-minute. Bulrush and fringed loosestrife were also found here.

Restoration Options:

ID	Action	Priority	Proportion
B	Invasive-Exotic Control	H	20%

Park: PQ **Restoration Site ID:** V60.05 **Site Name:** Academy Road Woods Trash Removal

Location: Academy Road and Chalfonte Rd.

General Location: Academy Road segment (Tributary 1, Decatur to Academ

Disturbance/Condition: Trash Dumping

Restoration Category Vegetation

Restoration Type: Forested Upland **Constraints:** Coordination with Water Department

Acreage: 0.42

Site Priority: H **Location Criteria:** Affects ecolog. significant site

Description:

The site is impacted by trash dumping (including cars) and gray water.

Restoration Options:

ID	Action	Priority	Proportion
B	Trash Removal	H	100%
A	Coordinate with other agencies	HC	100%

Park: PQ **Restoration Site ID:** V60.07 **Site Name:** Academy Road Woods Slope Repair

Location: On the slopes in the Academy Road Woods

General Location: Academy Road segment (Tributary 1, Decatur to Academ

Disturbance/Condition: Slope Erosion

Restoration Category Vegetation

Restoration Type: Slope **Constraints:**

Acreage: 1.08

Site Priority: HV **Location Criteria:** Affects ecolog. significant site

Description:

There is an erosion gully from runoff from the adjacent commercial property, and there is slope erosion on the slope going down to the wetland. Gully should be coordinated with landowner.

Restoration Options:

ID	Action	Priority	Proportion
F	Erosion Control	HV	100%
E	Replant Native Forest Species	HV	40%
A	Gully Repair	HC	10%

Park: PQ **Restoration Site ID:** V60.08 **Site Name:** Academy Road wetland

Location: east side of tributary 1 below Decatur

General Location: Academy Road segment (Tributary 1, Decatur to Academ

Disturbance/Condition:

Restoration Category

Restoration Type: Wetland **Constraints:**

Acreage: 6.05

Site Priority: HP **Location Criteria:** Affects ecolog. significant site

Description:

This is a large wetland, with skunk cabbage, skullcap, etc.

Restoration Options:

ID	Action	Priority	Proportion
A	Protect/Monitor	HP	100%

Park: PQ **Restoration Site ID:** V70.01 **Site Name:** Tributary 1 of Byberry Ck (Trib 2)

Location: Between Grant and academy, in golf course boundary

General Location: Byberry Creek (mouth of Byberry to Byrne Golf Course) 7

Disturbance/Condition: Filled/Drained Pond or Wetland

Restoration Category Vegetation

Restoration Type: Wetland **Constraints:**

Acreage: 0.06

Site Priority: H **Location Criteria:** Affects ecolog. significant site

Description:

This wetland should be enlarged, protected and enhanced with invasive removal and native plantings.

Restoration Options:

ID	Action	Priority	Proportion
C	Release/Widen	H	100%
B	Remove Exotics/Replant Native Wetland Species	H	100%
A	Wetland creation/expansion	H	100%

Park: PQ **Restoration Site ID:** V70.02 **Site Name:** Outlook Street exotics

Location: South of Outlook, North of Frankford Avenue

General Location: Byberry Creek (mouth of Byberry to Byrne Golf Course) 7

Disturbance/Condition: Disturbed Floodplain

Restoration Category Vegetation

Restoration Type: Riparian Zone **Constraints:**

Acreage: 0.35

Site Priority: HV **Location Criteria:** Affects ecolog. significant site

Description:

This site is overrrun with Japanese knotweed and multiflora rose. These species need to be removed, and the understory should be replanted with native shrubs.

Restoration Options:

ID	Action	Priority	Proportion
B	Remove Exotics/Replant Native Shrubs	HV	100%

Park: PQ **Restoration Site ID:** V70.03 **Site Name:** Outlook Street Riparian Zone

Location: East of Linden, South of Outlook

General Location: Byberry Creek (mouth of Byberry to Byrne Golf Course) 7

Disturbance/Condition: Vehicle Damage

Restoration Category Vegetation

Restoration Type: Riparian Zone **Constraints:** Dirt Bikes

Acreage: 0.19

Site Priority: HC **Location Criteria:** Affects ecolog. significant site

Description:

This is a dirt bike trail and the soils have been severly compacted by dirt bikes and other vehicular traffic. Fencing this site may help. Replanting is not recommended if access to this site is not controlled.

Restoration Options:

ID	Action	Priority	Proportion
B	Control Access	HC	100%

Park: PQ **Restoration Site ID:** V70.05 **Site Name:** Pearson Street wetland

Location: Pearson Street

General Location: Byberry Creek (mouth of Byberry to Byrne Golf Course) 7

Disturbance/Condition: Invasive/Exotic Vegetation

Restoration Category Vegetation

Restoration Type: Wetland **Constraints:**

Acreage: 0.87

Site Priority: HC **Location Criteria:** Affects ecolog. significant site

Description:

This is a wetland area that should be expanded. It is currently being maintained by mowing. Cattail, jewelweed, bulrush and mulberry were found at this wet site. This site should be protected, possibly by fencing. The area of wetland vegetation would be enlarged by protecting the site from mowing. Once fenced, the area could be replanted with native wetland herbs.

Restoration Options:

ID	Action	Priority	Proportion
C	Remove Exotics/Replant Native Wetland Species	HV	100%
B	Trash Removal	HV	100%
D	Release/Widen	HC	100%

Park: PQ **Restoration Site ID:** V70.06 **Site Name:** Aubrey Avenue wetland

Location: Aubrey Avenue

General Location: Byberry Creek (mouth of Byberry to Byrne Golf Course) 7

Disturbance/Condition: Disturbed Floodplain

Restoration Category Vegetation

Restoration Type: Wetland **Constraints:**

Acreage: 0.15

Site Priority: HC **Location Criteria:** Affects ecolog. significant site

Description:

This area would benefit from wetland plantings.

Restoration Options:

ID	Action	Priority	Proportion
B	Remove Exotics/Replant Native Wetland Species	HV	100%
C	Release/Widen	HC	100%

Park: PQ **Restoration Site ID:** V70.07 **Site Name:** Byrne no-mow zone

Location: Byrne Golf Course

General Location: Byberry Creek (mouth of Byberry to Byrne Golf Course) 7

Disturbance/Condition: Golf Course Impacts

Restoration Category Vegetation

Restoration Type: Non-Forested Upland **Constraints:** Coordination with golf course

Acreage: 1.08

Site Priority: HC **Location Criteria:** Affects ecolog. significant site

Description:

This area is not located in the fairway, and there is no need to maintain by mowing.

Restoration Options:

ID	Action	Priority	Proportion
B	Meadow Management	HC	100%
A	Release/Mow Infrequently	HC	100%

Park: PQ **Restoration Site ID:** V70.08 **Site Name:** Red Lion Road invasives

Location: Red Lion Road

General Location: Byberry Creek (mouth of Byberry to Byrne Golf Course) 7

Disturbance/Condition: Invasive/Exotic Vegetation

Restoration Category Vegetation

Restoration Type: Riparian Zone **Constraints:**

Acreage: 0.50

Site Priority: H **Location Criteria:**

Description:

Japanese knotweed is dominant along the left bank of the mainstem. The Japanese knotweed should be removed.

Restoration Options:

ID	Action	Priority	Proportion
A	Remove Exotics/Replant Native Forest Species	H	100%
C	Trash Removal	HV	100%

Park: PQ **Restoration Site ID:** V80.01 **Site Name:** Woodhaven Road Woods

Location:

General Location: Woodhaven Road segment (mainstem south of Woodhave

Disturbance/Condition: Disturbed Forest

Restoration Category Vegetation

Restoration Type: Forested Upland **Constraints:**

Acreage: 1.39

Site Priority: H **Location Criteria:** Near other restorations

Description:

This area should be released from mowing.

Restoration Options:

ID	Action	Priority	Proportion
C	Release/Widen	H	100%

Park: PQ **Restoration Site ID:** V80.02 **Site Name:** Woodhaven Road old field

Location: southwest of Woodhaven Road

General Location: Woodhaven Road segment (mainstem south of Woodhave

Disturbance/Condition:

Restoration Category

Restoration Type: Non-Forested Upland **Constraints:**

Acreage: 3.87

Site Priority: H **Location Criteria:** Affects ecolog. significant site

Description:

The old field has stands of plume grass, but also has a variety of native old field herbs (mountain mint, etc.). Control of exotics and maintenance as meadow are recommended.

Restoration Options:

ID	Action	Priority	Proportion
A	Meadow Management	H	100%
B	Remove Exotics/Replant Native Meadow Species	H	20%

Park: PQ **Restoration Site ID:** V90.01 **Site Name:** Mouth of Poquessing intertidal marsh

Location: mouth of Poquessing

General Location: Mouth of Poquessing(Frankford to mouth) 90's

Disturbance/Condition:

Restoration Category

Restoration Type: Wetland **Constraints:**

Acreage: 1.07

Site Priority: HP **Location Criteria:** Near other cultural resources

Description:

This wetland has at least one state-listed plant species. Intertidal marsh is an important habitat in the Delaware Valley, and remnants like this should be protected.

Restoration Options:

ID	Action	Priority	Proportion
A	Protect/Monitor	HP	100%

Park: PQ **Restoration Site ID:** V90.03 **Site Name:** Hegerman mowed field (upper)

Location: along Hegerman Street and Terrace

General Location: Mouth of Poquessing(Frankford to mouth) 90's

Disturbance/Condition:

Restoration Category

Restoration Type: Non-Forested Upland **Constraints:**

Acreage: 2.54

Site Priority: H **Location Criteria:**

Description:

The mowed area could be reduced, and a meadow buffer strip created and maintained.

Restoration Options:

ID	Action	Priority	Proportion
A	Release/Mow Infrequently	H	20%

Park: PQ **Restoration Site ID:** V90.04 **Site Name:** Hegerman-St. Denis mowed area

Location: Along Hegerman Street, by St. Denis

General Location: Mouth of Poquessing(Frankford to mouth) 90's

Disturbance/Condition:

Restoration Category

Restoration Type: Non-Forested Upland **Constraints:**

Acreage: 0.24

Site Priority: H **Location Criteria:** Near other cultural resources

Description:

The mowed area could be reduced, and a meadow buffer strip created and maintained.

Restoration Options:

ID	Action	Priority	Proportion
A	Release/Mow Infrequently	H	80%

Park: PQ **Restoration Site ID:** V90.05 **Site Name:** Hegerman woods

Location: woods along Hegerman north of Stevenson

General Location: Mouth of Poquessing(Frankford to mouth) 90's

Disturbance/Condition:

Restoration Category

Restoration Type: Riparian Zone **Constraints:**

Acreage: 5.78

Site Priority: H **Location Criteria:** Affects ecolog. significant site

Description:

Parts of the forest have a diversity of native trees and understory. Control of exotics along the edges would improve the site.

Restoration Options:

ID	Action	Priority	Proportion
A	Remove Exotics/Replant Native Forest Species	H	20%

Park: PQ **Restoration Site ID:** V100.01 **Site Name:** Boundary id and signage

Location: Parkwide

General Location: Parkwide 100's

Disturbance/Condition:

Restoration Category

Restoration Type: Park Wide **Constraints:** Not sure of ownership

Acreage:

Site Priority: H **Location Criteria:** Affects ecolog. significant site

Description:

Most of the park segments are not identified on the ground or on many local maps. There are ambiguities in ownership among different data sources for several areas. Signs should be erected identifying park lands.

Restoration Options:

ID	Action	Priority	Proportion
A	Improve signage	H	100%
B	Clarify boundaries	HC	100%

Park: PQ **Restoration Site ID:** V100.02 **Site Name:** Monitor deer

Location: Park wide

General Location: Park wide

Disturbance/Condition:

Restoration Category

Restoration Type: Park Wide **Constraints:**

Acreage:

Site Priority: H **Location Criteria:**

Description:

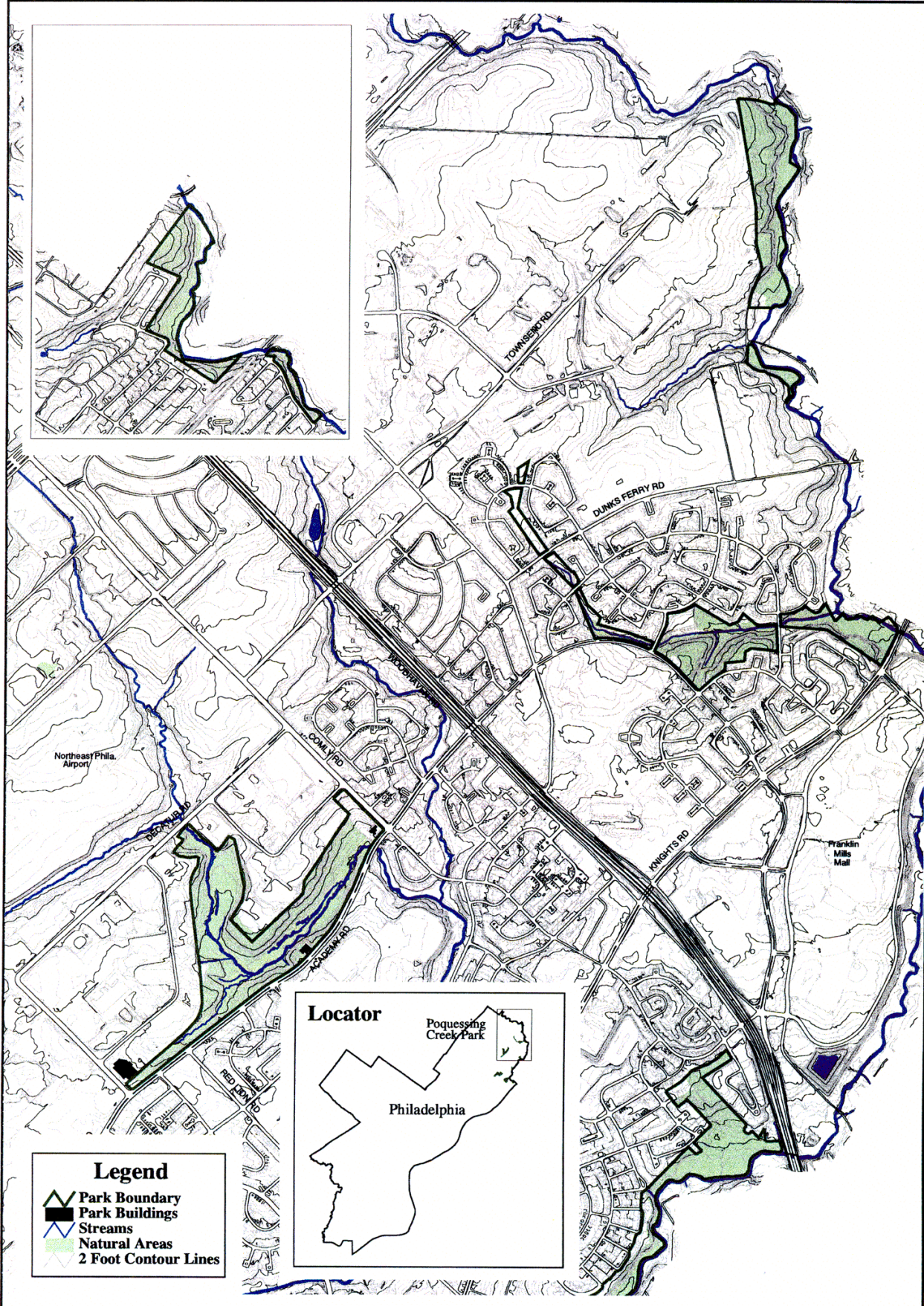
Deer may be a problem in Academy Road woods now and could be in other parts in the future. Monitor to determine management needs.

Restoration Options:

ID	Action	Priority	Proportion
A	Deer Monitoring	H	100%

7.F. MASTER PLAN MAPS

The Master Plan Maps for Poquessing Creek Park follow.



POQUESSING CREEK PARK
Natural Lands Restoration Master Plan
PARK BASE MAP

Map 1 of 2

FAIRMOUNT PARK COMMISSION

N

500 0 500 Feet

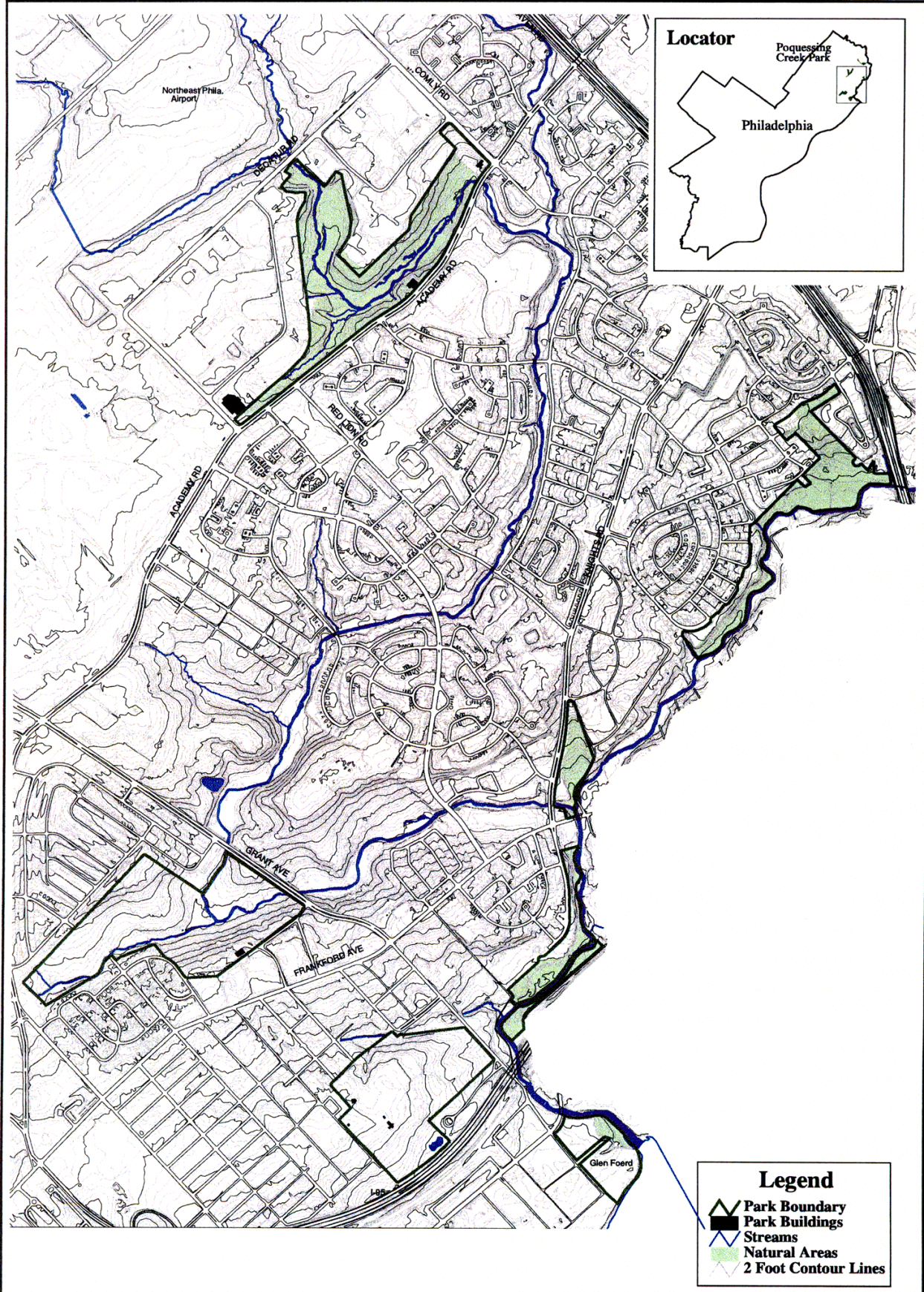
1 inch = 1300 feet

Prepared for: Fairmount Park Commission
Natural Lands Restoration and Environmental Education Program

Prepared by: THE ACADEMY OF NATURAL SCIENCES
Patrick Center for Environmental Research

Date: January 2001

Base Map Data: Roads from Phila. Water Department Digital Data Set
Park Boundaries from the Phila. Planning Commission with updates by PCER
Hydrology from the Phila. Water Department Digital Data Set with updates from PCER



POQUESSING CREEK PARK
Natural Lands Restoration Master Plan
PARK BASE MAP

Map 2 of 2

FAIRMOUNT P·A·R·K COMMISSION

N

500 0 500 Feet

1 inch = 1300 feet

Prepared for: Fairmount Park Commission Natural Lands Restoration and Environmental Education Program

Prepared by: THE ACADEMY OF NATURAL SCIENCES Patrick Center for Environmental Research

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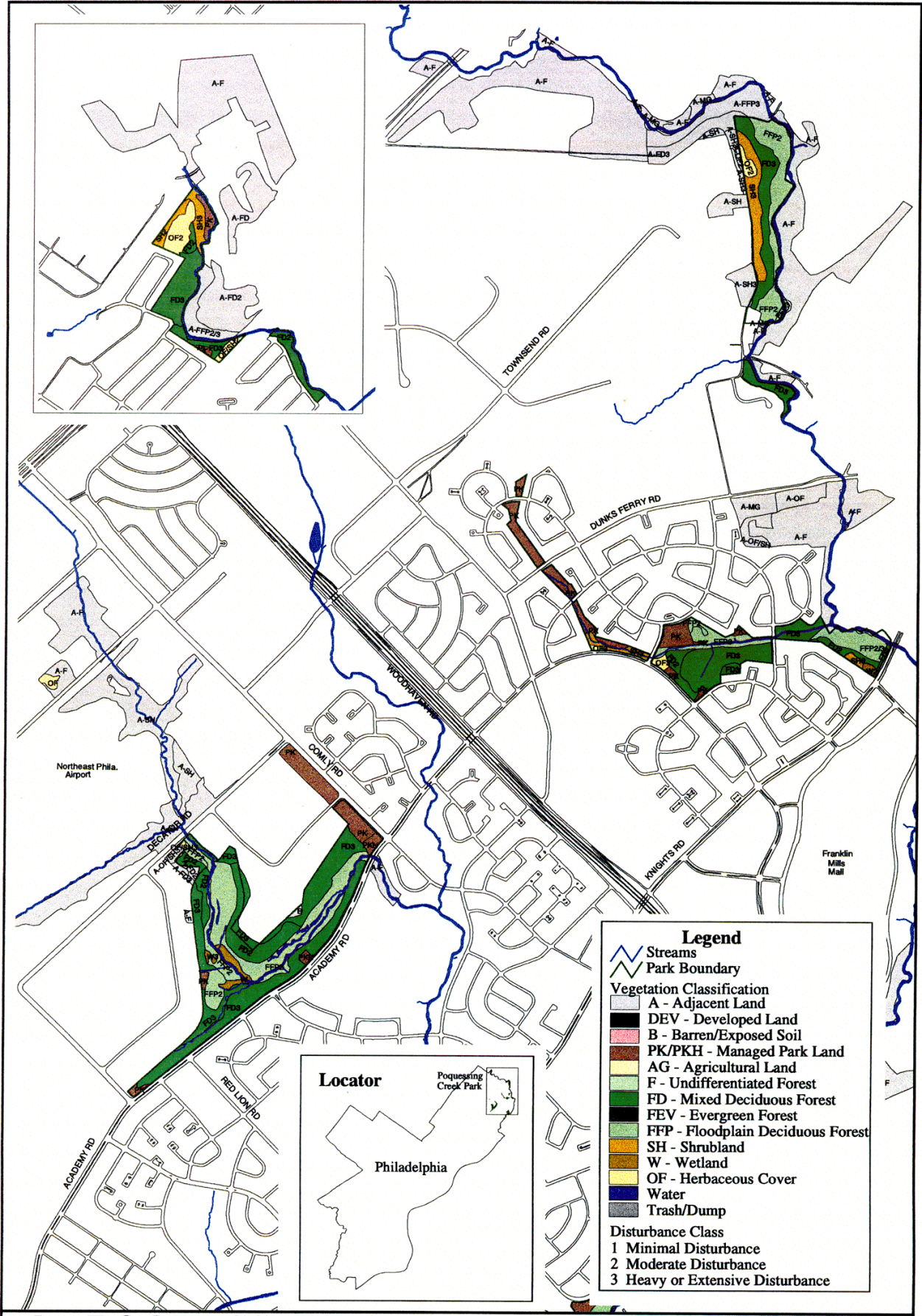

POQUESSING CREEK PARK
Natural Lands Restoration Master Plan
VEGETATION CLASSIFICATION
Map 1 of 2

N

500 0 500 Feet

1 inch = 1300 feet

Prepared for: Fairmount Park Commission Natural Lands Restoration and Environmental Education Program

Prepared by: The Academy of Natural Sciences, Patrick Center for Environmental Research

Date: January 2001

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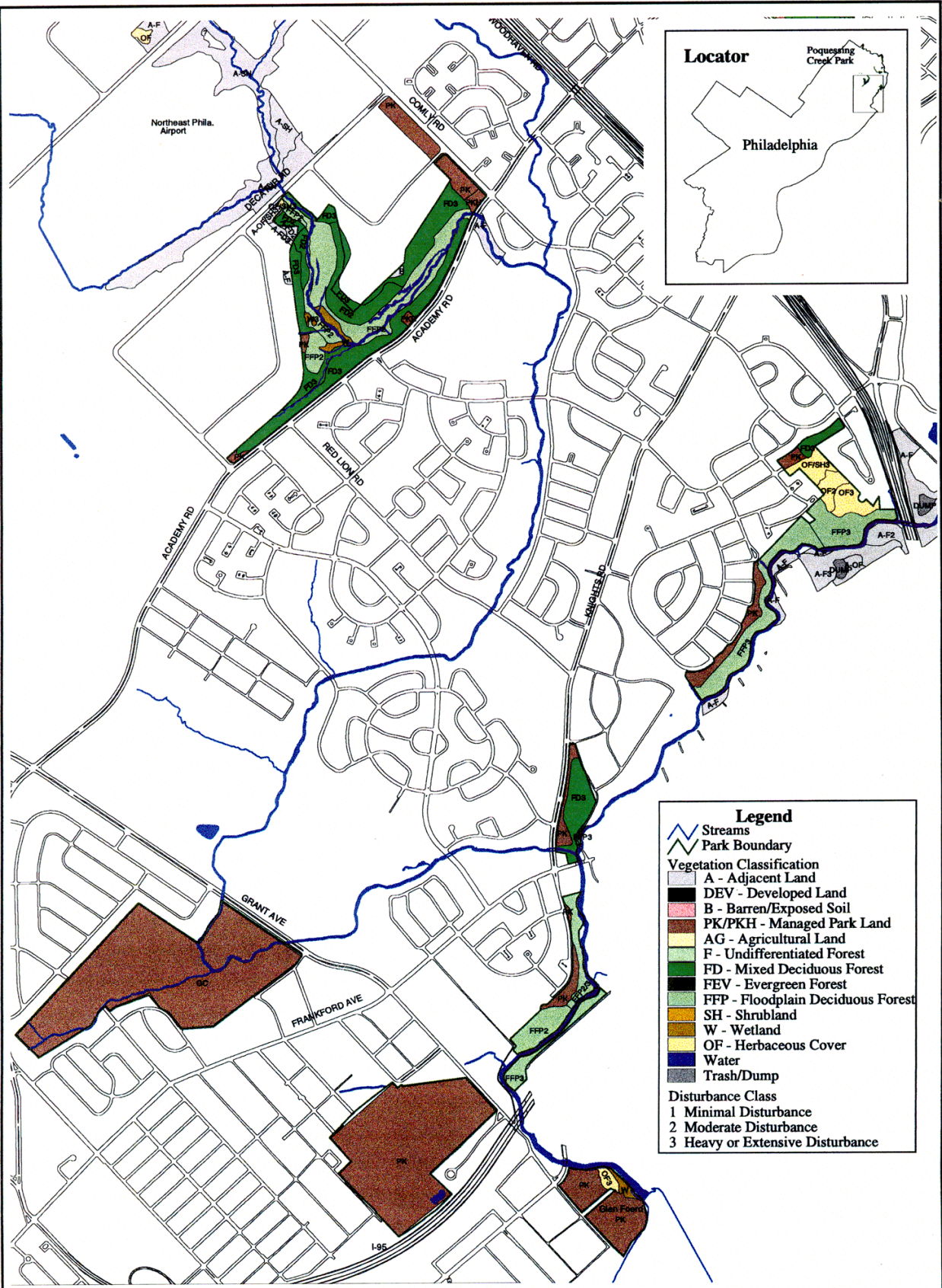

POQUESSING CREEK PARK
Natural Lands Restoration Master Plan
VEGETATION CLASSIFICATION
Map 2 of 2

FAIRMOUNT PARK COMMISSION

N

500 0 500 Feet

1 inch = 1300 feet

Prepared for: Fairmount Park Commission Natural Lands Restoration and Environmental Education Program

Prepared by: THE ACADEMY OF NATURAL SCIENCES Patrick Center for Environmental Research

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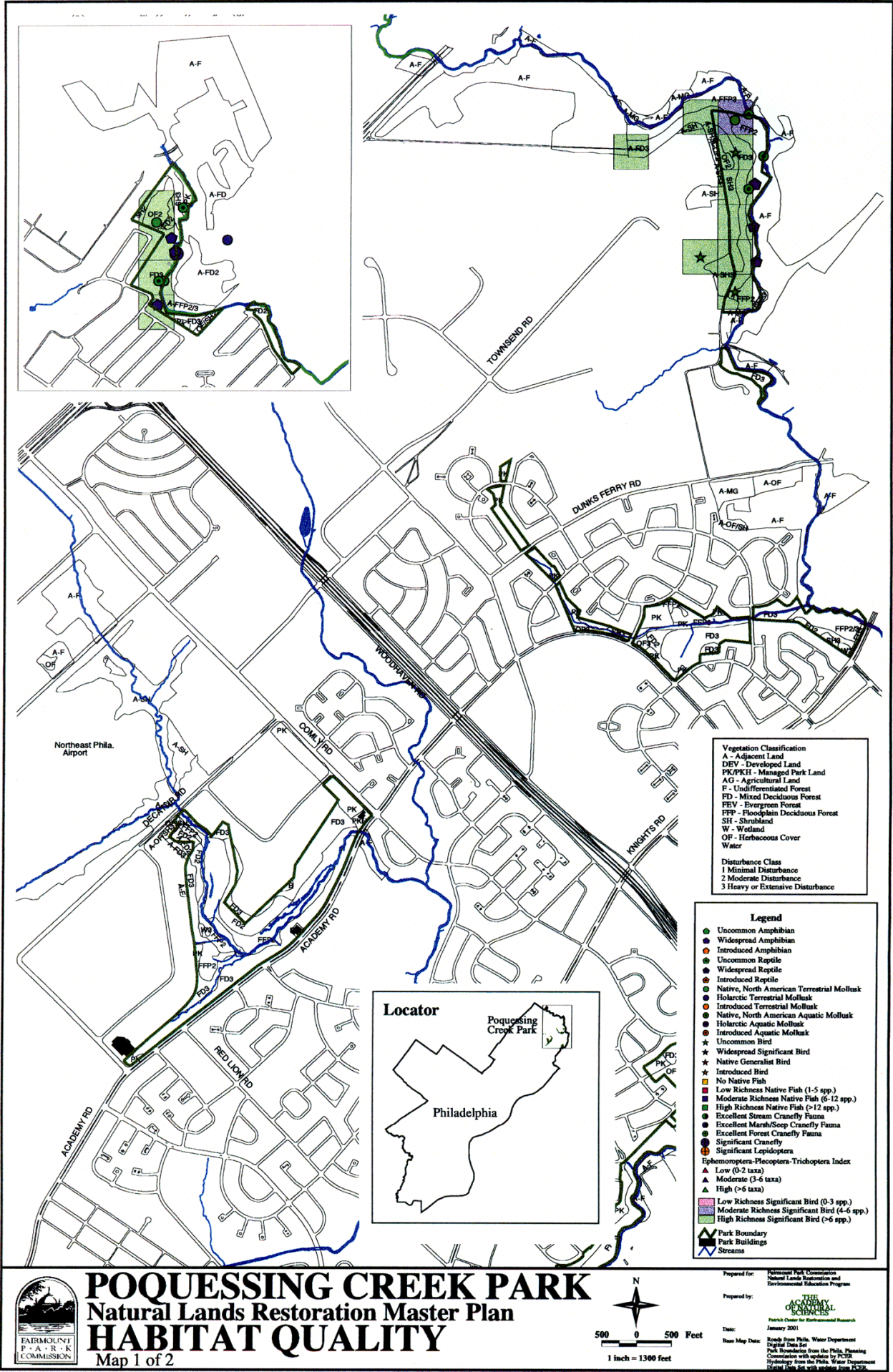

POQUESSING CREEK PARK
Natural Lands Restoration Master Plan
HABITAT QUALITY
Map 1 of 2

FAIRMOUNT P·A·R·K COMMISSION

N

500 0 500 Feet

1 inch = 1300 feet

Prepared for: Fairmount Park Commission Natural Lands Restoration and Environmental Education Program

Prepared by: THE ACADEMY OF NATURAL SCIENCES Patrick Center for Environmental Research

Date: January 2001

Base Map Data: Roads from Phila. Water Department Digital Data Set
Park Boundaries from the Phila. Planning Commission with updates by PCER
Hydrology from the Phila. Water Department Digital Data Set with updates from PCER

POQUESSING CREEK PARK
Natural Lands Restoration Master Plan
HABITAT QUALITY
Map 2 of 2

FAIRMOUNT P·A·R·K COMMISSION

N

500 0 500 Feet

1 inch = 1300 feet

Prepared for: Fairmount Park Commission
Natural Lands Restoration and Environmental Education Program

Prepared by: THE ACADEMY OF NATURAL SCIENCES
Patrick Center for Environmental Research

Date: January 2001

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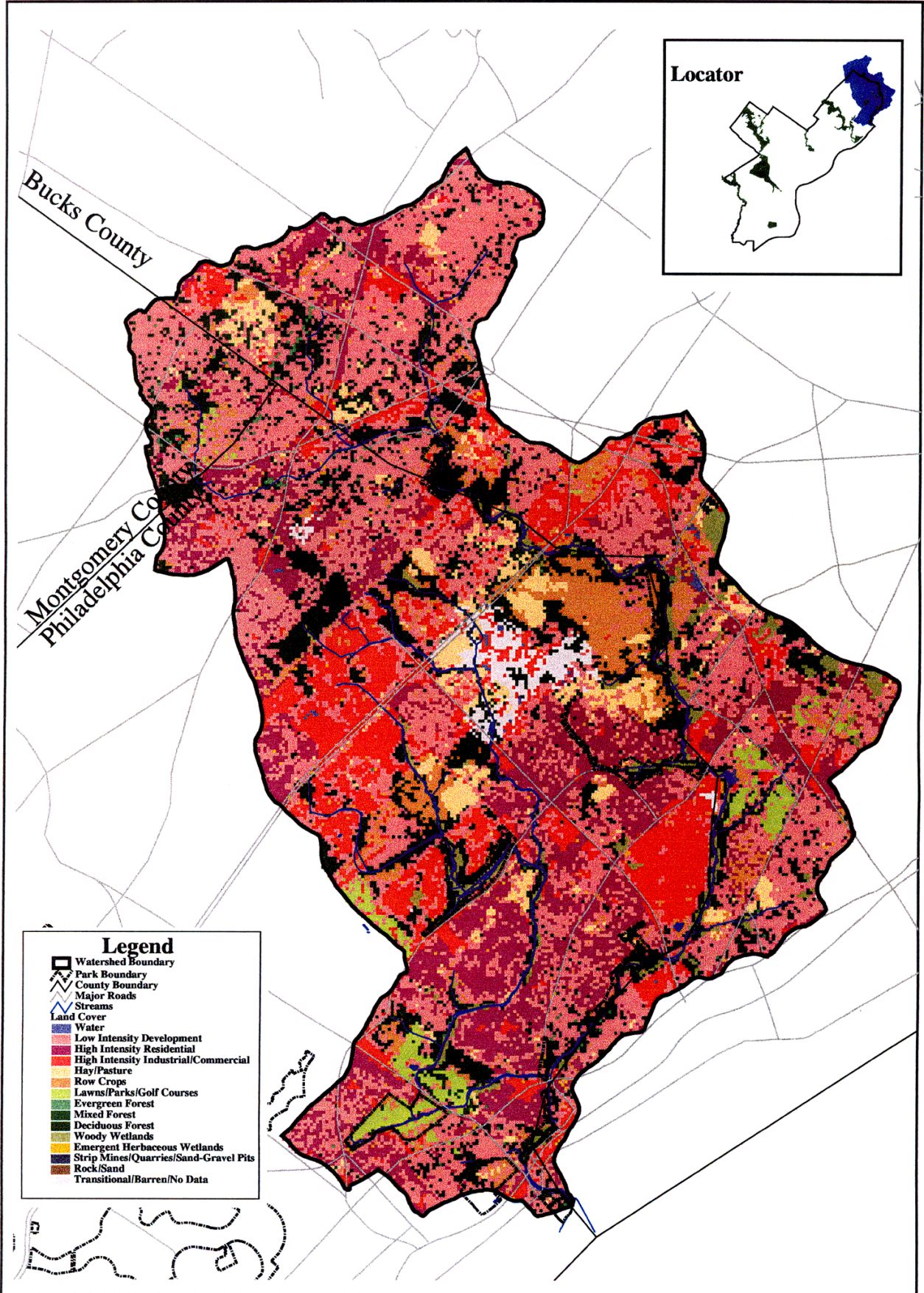

POQUESSING CREEK PARK
Natural Lands Restoration Master Plan
WATERSHED MAP

FAIRMOUNT P·A·R·K COMMISSION

N

1000 0 1000 2000 Feet

1 inch = 3500 feet

Prepared for: Fairmount Park Commission
Natural Lands Restoration and Environmental Education Program

Prepared by: THE ACADEMY OF NATURAL SCIENCES
Patrick Center for Environmental Research

Date: January 2001

Base Map Data: Roads from Phila. Water Department Digitial Data Set
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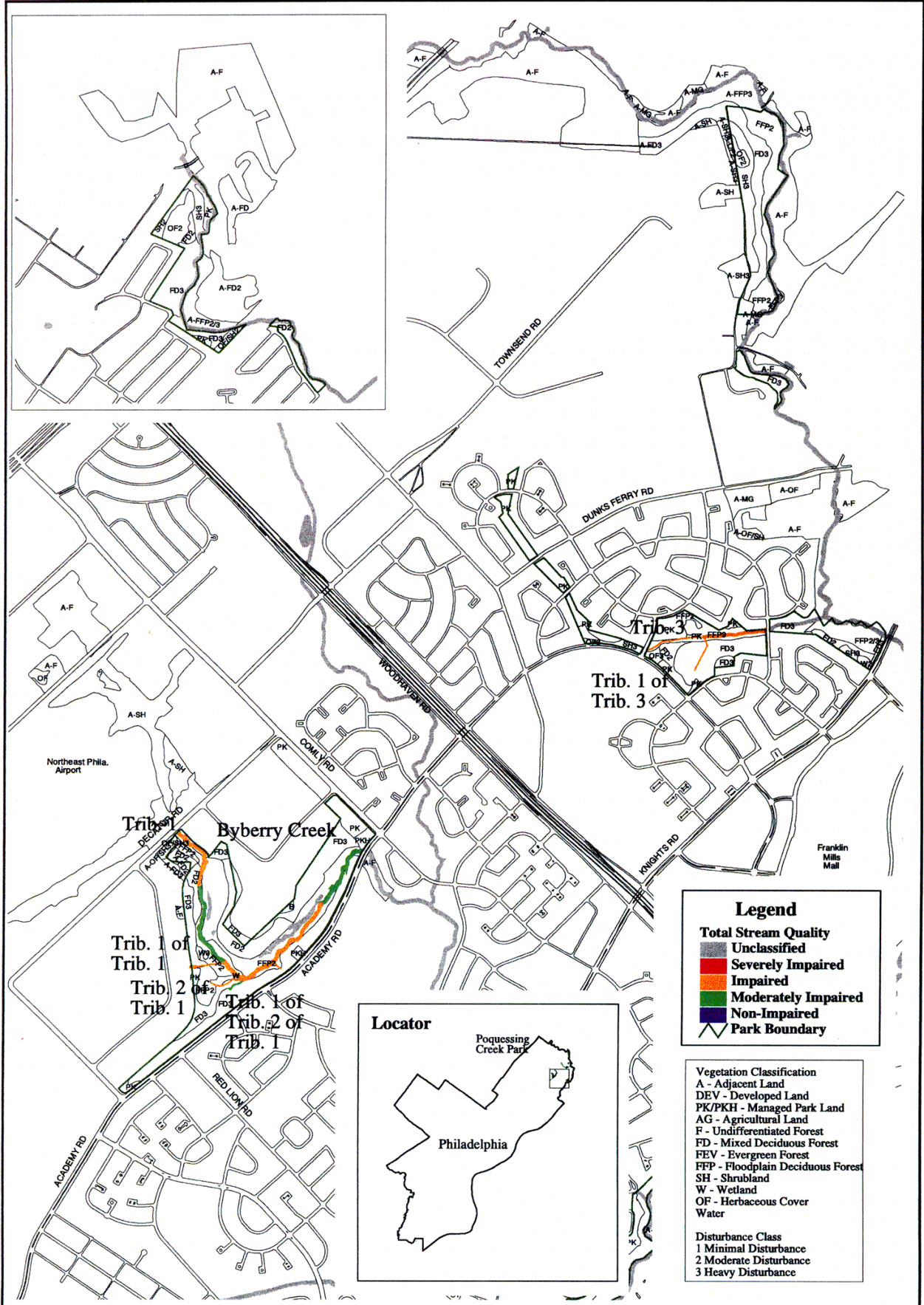
Hydrology from the Phila. Water Department Digital Data Set with updates from PCER.



POQUESSING CREEK PARK
Natural Lands Restoration Master Plan
STREAM QUALITY

Map 1 of 2

FAIRMOUNT P·A·R·K COMMISSION

N

500 0 500 Feet

1 inch = 1300 feet

Prepared for: Fairmount Park Commission Natural Lands Restoration and Environmental Education Program

Prepared by: THE ACADEMY OF NATURAL SCIENCES Patrick Center for Environmental Research

Date: January 2001

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POQUESSING CREEK PARK
Natural Lands Restoration Master Plan
STREAM QUALITY
Map 2 of 2

FAIRMOUNT P·A·R·K COMMISSION

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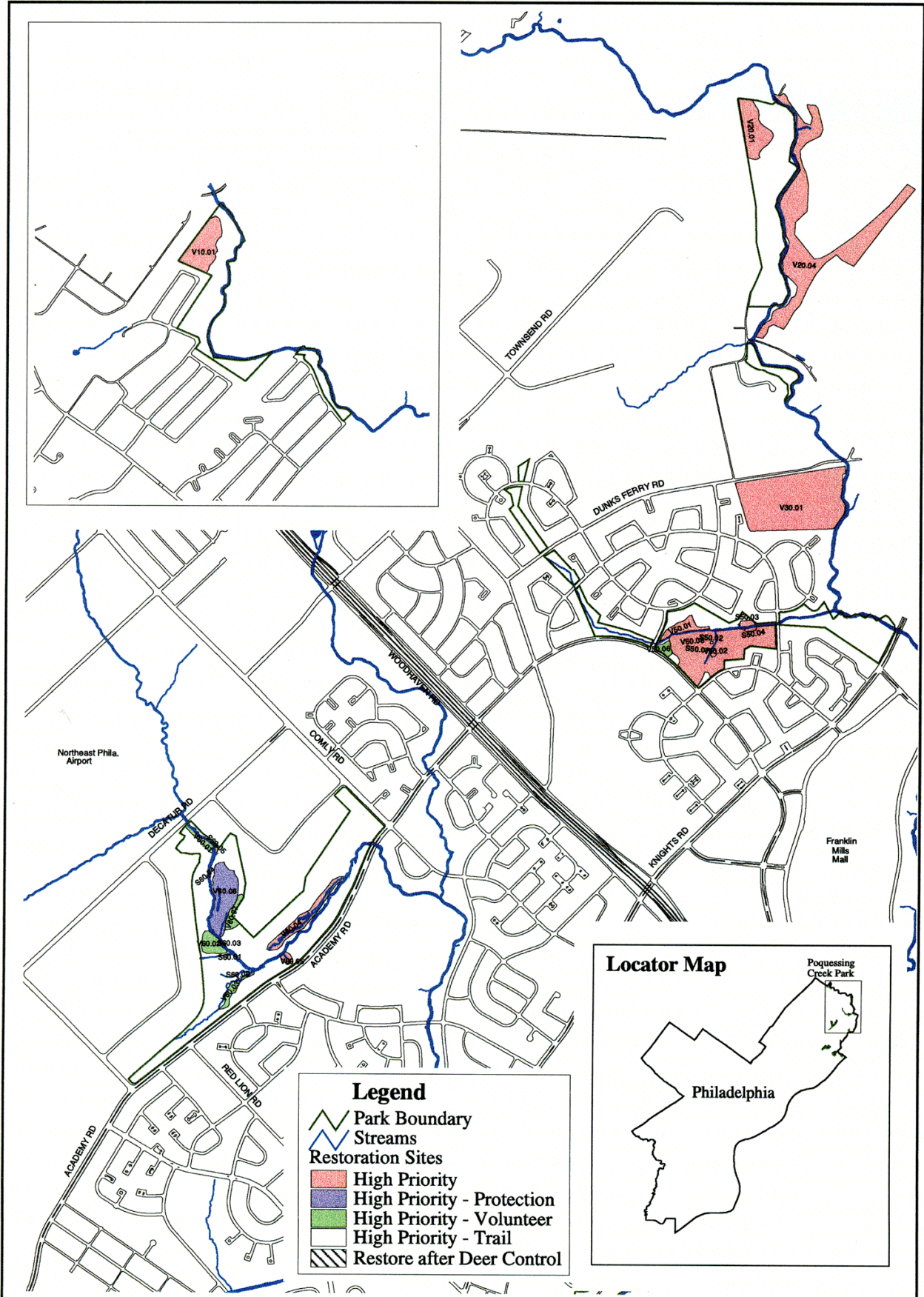

POQUESSING CREEK PARK
Natural Lands Restoration Master Plan
RESTORATION SITES

Map 1 of 2

FAIRMOUNT PARK COMMISSION

N

500 0 500 Feet

1 inch = 1300 feet

Prepared for: Fairmount Park Commission Natural Lands Restoration and Environmental Education Program

Prepared by: THE ACADEMY OF NATURAL SCIENCES Patrick Center for Environmental Research

Date: May 2001

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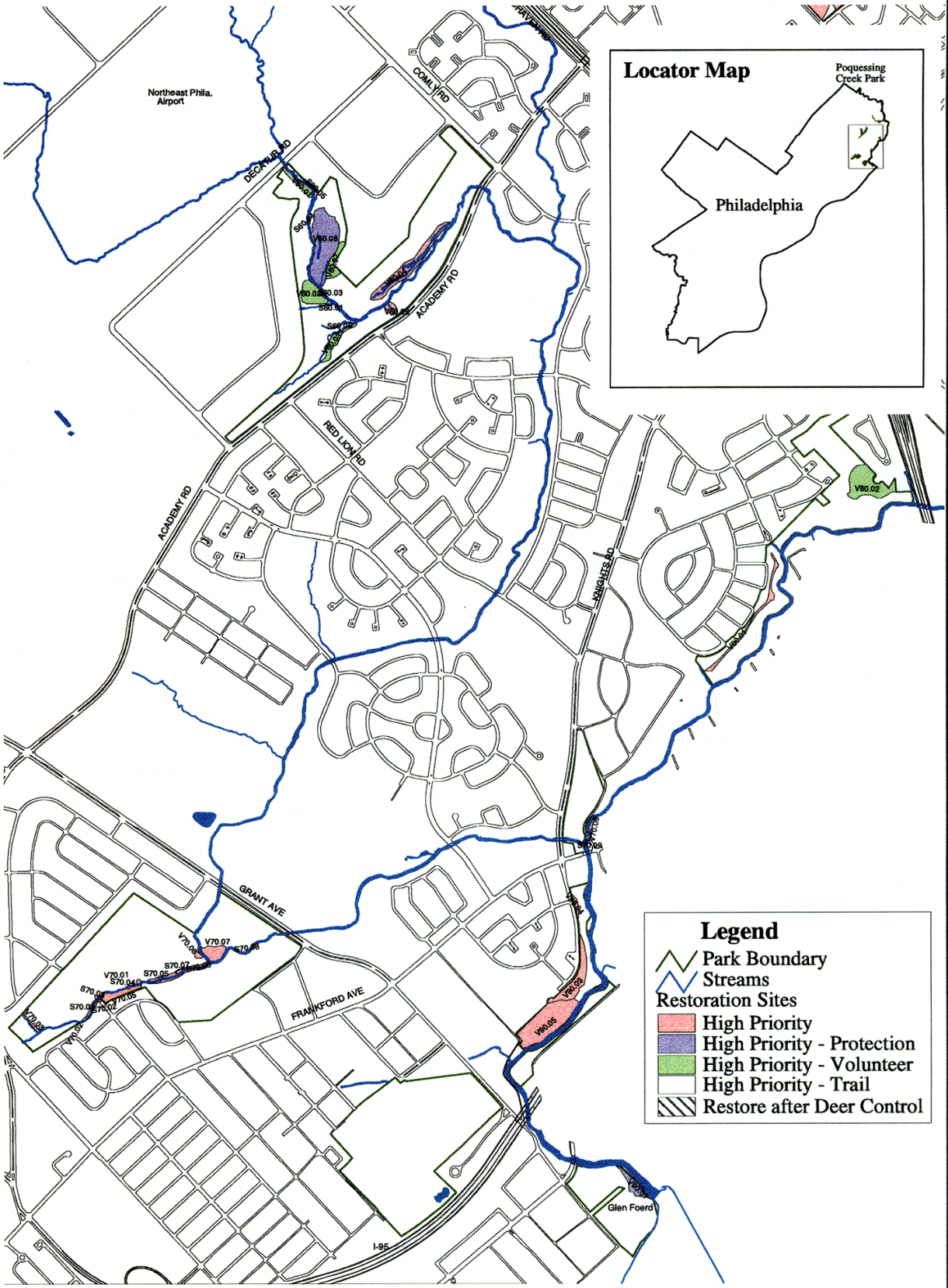

POQUESSING CREEK PARK
Natural Lands Restoration Master Plan
RESTORATION SITES
Map 2 of 2

FAIRMOUNT P·A·R·K COMMISSION

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