

Final Report

MAR - 12

VALLEY FORGE NATIONAL HISTORICAL PARK  
PROPOSED PAWLING RECREATION AREA  
FLORA AND FAUNA SURVEY

Prepared by

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## ABSTRACT

The National Park Service has proposed the establishment of Pawling Recreation Area within Valley Forge National Historical Park. The purpose of this study was to determine the composition of the plant and animal communities in the proposed recreation area. Particular emphasis was given to developing a cover-type map of the area and to identifying any federal or state rare, threatened, or endangered species. No federally listed plants or animals were found, but five animals and one plant species of special status in Pennsylvania occur on the study area. These include the red-bellied turtle (Chrysemys rubriventris) (endangered), osprey (Pandion haliaetus) (endangered), Cooper's hawk (Accipiter cooperii) (vulnerable), great blue heron (Ardea herodias) (vulnerable), tooth-cup (Rotala ramosior) (rare), and least flycatcher (Empidonax minimus) (status undetermined). Several of these species inhabit wetlands, which are also important habitat for many other animals and plants. Due to the importance of wetlands, they should not be disturbed during the development of the recreation area. Instead, recreation facilities should be located in the adjacent fields and woodlands, thereby causing less impact on the local flora and fauna.

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## INTRODUCTION

Valley Forge National Historical Park (VFP) is located in southeastern Pennsylvania approximately 20 km northwest of Philadelphia. The primary purpose of VFP is historical interpretation, but due to its proximity to Philadelphia and densely populated suburbs, VFP is widely used by visitors for recreational activities, such as picnicking and jogging. Park officials wish to provide additional public recreation facilities by creating the Pawling Recreation Area (PRA). Yet, the National Park Service is mandated to protect animals and plants, as well as their habitats. This study was undertaken to determine the composition of the flora and fauna on the proposed PRA and to suggest measures to minimize the effect of development on the existing plant and animal communities.

The objectives of this study were to (1) prepare an inventory of the vascular plants, mammals, birds, reptiles, amphibians, and insects inhabiting the PRA, (2) identify any federal and state rare or endangered floral or faunal species and their critical habitats in the PRA, and (3) prepare a cover-type map of the PRA. The majority of fieldwork for this study was conducted between 21 May and 18 August 1984. Fieldwork included vegetative plot sampling, small mammal trapping, bird surveys, and observations of reptiles, amphibians, and insects. Visits to the PRA in September, October, and November 1984 produced additional plant species and habitat information.

Several studies of plants and animals have been conducted in the vicinity of VFP over the past 30 years, but none were centered

on the PRA. Casual observations of birds, mammals, reptiles, amphibians, and some plants have been reported (McKeever 1979). Lists of the birds and plants observed at Mill Grove Audubon Wildlife Sanctuary, which is approximately 2 km northeast of the PRA, are available (Northwood 1959, Wherry 1959, Anonymous 1974). Finally, lists of vertebrate species that may be expected to occur in Montgomery County, where the PRA is located, have been compiled (Pennsylvania Game Commission 1985). Species identified in these studies must be considered potential inhabitants of the PRA, although only a portion were actually observed there. Species lists from these reports are presented in Appendices A-D.

## DESCRIPTION OF THE PROPOSED PAWLING RECREATION AREA

The PRA is located in the western corner of Valley Forge National Historical Park north of the Schuylkill River, Montgomery County, Pennsylvania (Figure 1). Regional temperatures average 23 C in summer and 0 C in winter. Annual precipitation averages 117 cm, and annual snowfall averages 76 cm. There are 170 to 200 frost-free days per year (Environmental Assessment 1980:31).

About 80% of the 73-hectare (180-acre) PRA study area was used previously as a desilting basin (Figure 2). The desilting process involved construction of curved embankments approximately 6 m high, and built of earth and rock, to contain water that was routed away from the Schuylkill; coal silt that was suspended in the water then precipitated out, and the water was returned to the river. Much coal silt remains in the soil of the basin, and the embankments are still in place. Underlying soils can be characterized as deep, well to moderately drained silt-loams (Smith 1967).

Four major habitats comprise the PRA: fields, woods, wetlands, and sparsely-vegetated waste areas. Prior to the desilting operations, houses were situated in the PRA, and some ornamental plant species remain from that time. Several trails and a dirt road run through the PRA (Figure 2), which are occasionally used by horseback riders and joggers. However, human use is concentrated on the Schuylkill River trail.

Figure 1. Location of the proposed Pawling Recreation Area (shaded area) within Valley Forge National Historical Park, Montgomery County, Pennsylvania.

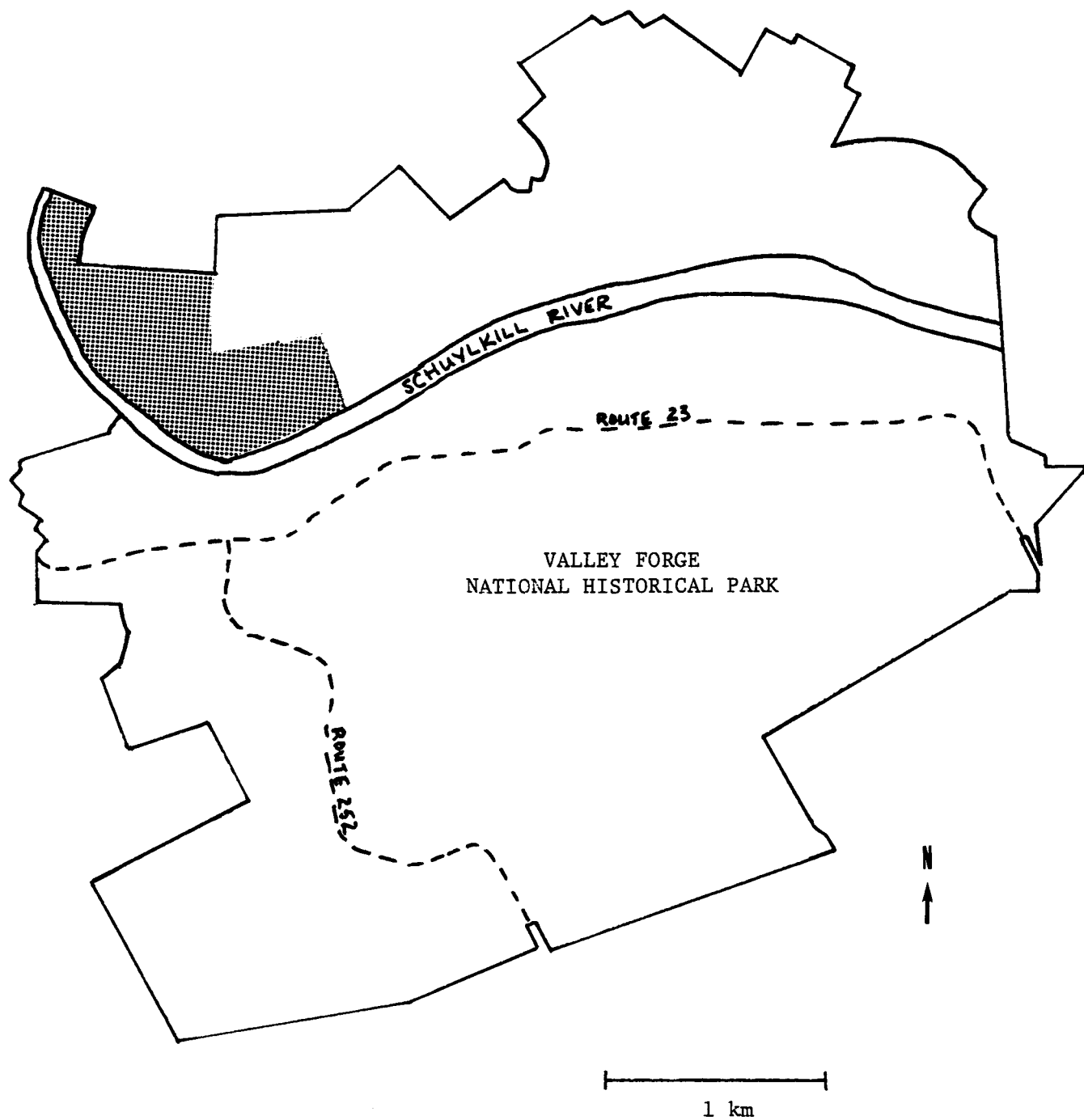
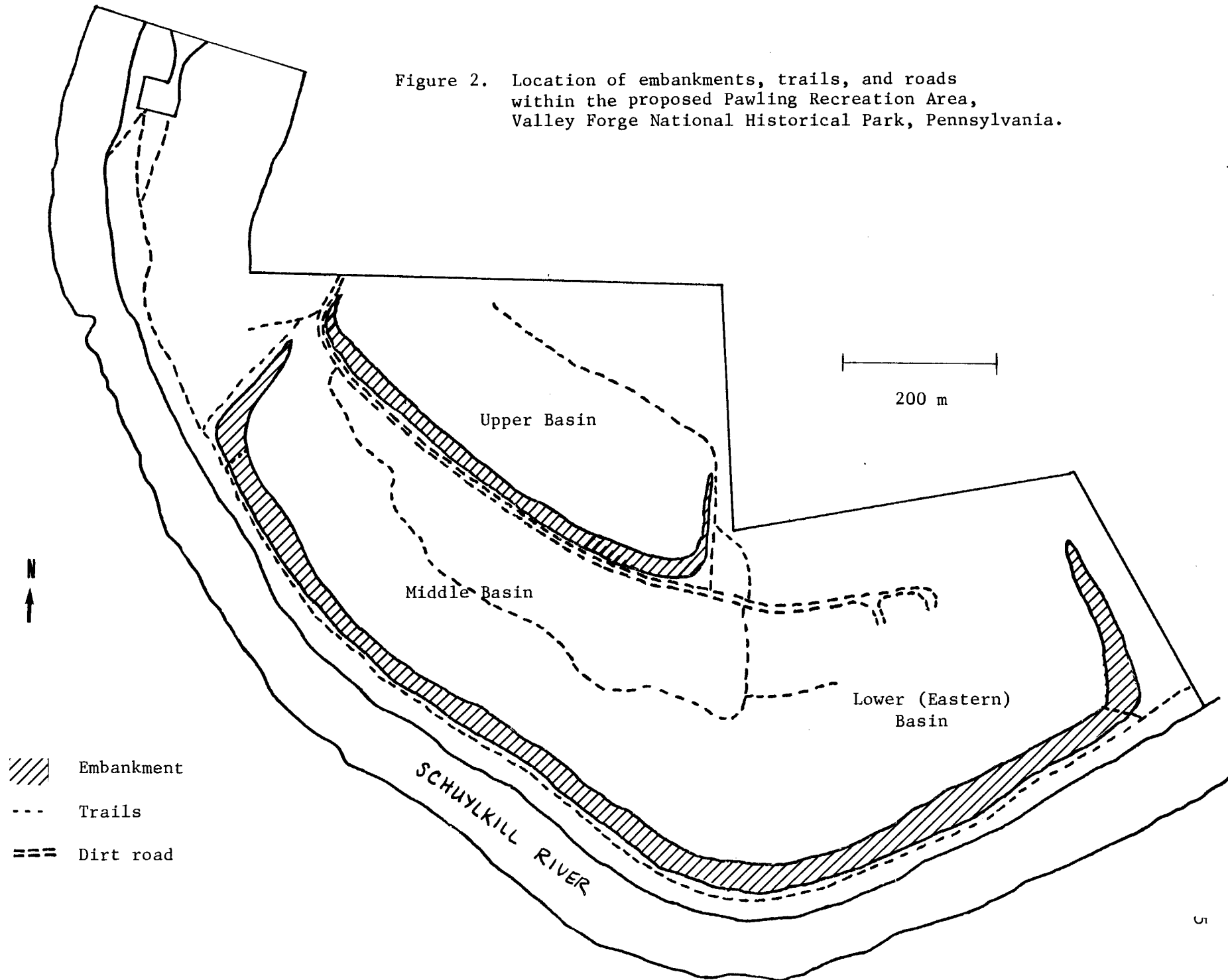


Figure 2. Location of embankments, trails, and roads within the proposed Pawling Recreation Area, Valley Forge National Historical Park, Pennsylvania.



## METHODS

### Vegetative Plot Sampling

Plant sampling was conducted systematically along 24 transect lines. Transects were spaced at approximately 75-m intervals and were established in a north-south orientation to cross environmental gradients. In the extreme northwestern portion of the PRA, transects were oriented east-west due to a shift in the environmental gradient. Sampling stations were located at approximately 50-m intervals along the transects. At each station, five plots were examined: two 1-m<sup>2</sup> ground-cover plots, two 10-m<sup>2</sup> understory plots, and one 100-m<sup>2</sup> overstory plot (Figure 3). On all plots, the amount of each species, excluding dead plants, was quantified (Table 1).

If a transect crossed a pond, the center of the sampling station was established at the pond margin. Thus, one 1-m<sup>2</sup> plot, one 10-m<sup>2</sup> plot, and half of the 100-m<sup>2</sup> plot were located in the water. The transect was resumed on the opposite side of the pond, with the next station located on land 50 m from the pond margin.

Between 23 May and 5 June, 186 sampling stations were established. Because the ponds receded during the summer, 22 stations were added to the transects on 24-25 July to sample areas that had previously been underwater. At that time, one station was located on the current shoreline of the pond and one 5 m into the remaining water. Both of these stations fell within a single overstory plot. Data from the 198 overstory plots and the 416 understory and ground-cover plots sampled during these two periods

Figure 3. Sampling station design showing three types of plots used to sample vegetation in the proposed Pawling Recreation Area, Valley Forge National Historical Park, Pennsylvania.

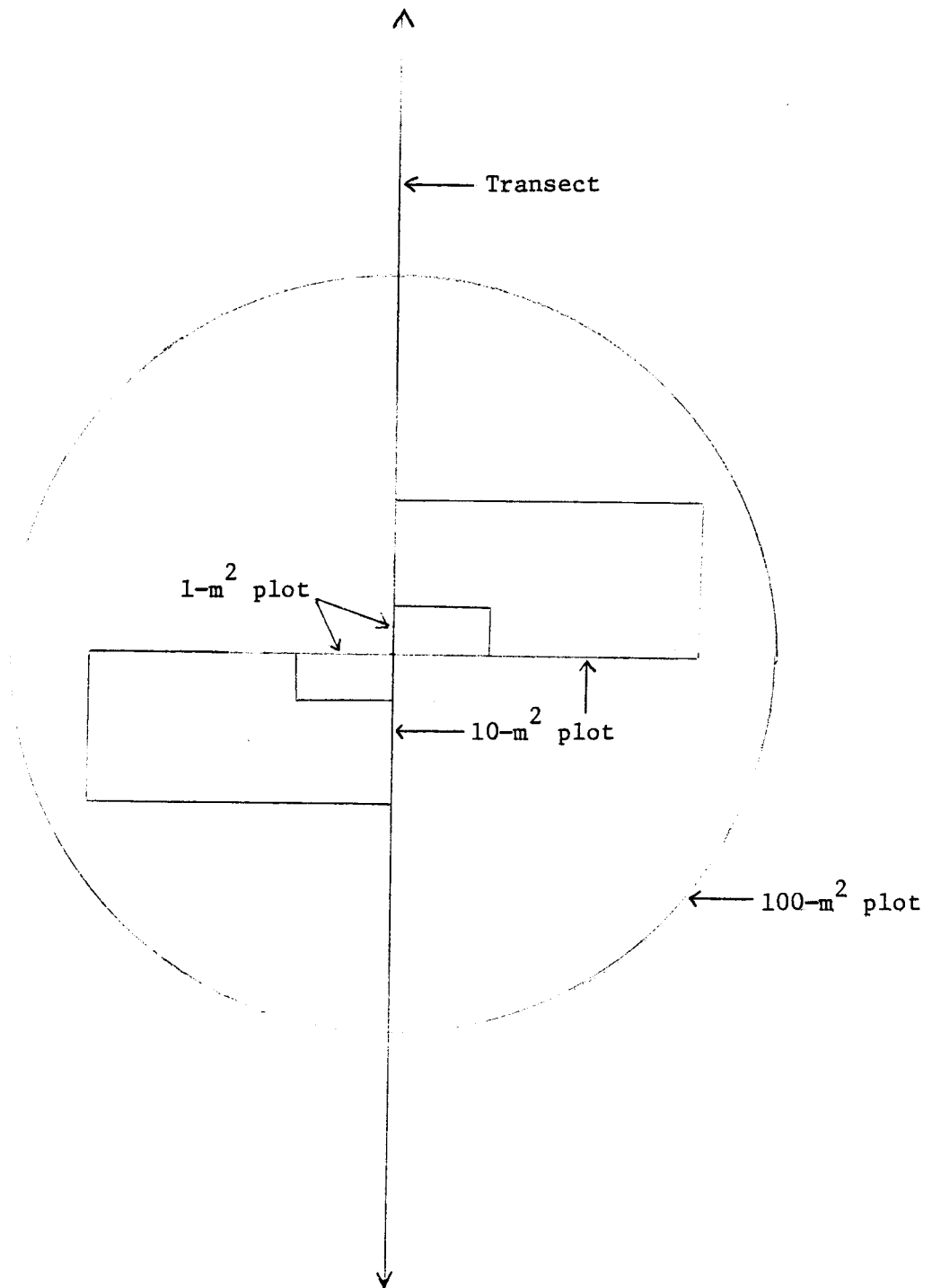


Table 1. Vegetative variables measured in plots located at each sampling station in the proposed Pawling Recreation Area, Valley Forge National Historical Park, Pennsylvania.

| <u>Variable</u>       | <u>Description</u>                                                                                                                                                                                                                                           |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Percent ground cover  | Percentage of a 1-m <sup>2</sup> (0.7 x 1.4 m) plot covered by vegetation $\leq$ 1 m in height, determined for each species individually and for all species combined.                                                                                       |
| Number of shrub stems | Number of stems of woody or non-woody plants between 1 and 3 m in height and $\leq$ 2.5 cm diameter at breast height (1.37 m above ground) on a 10-m <sup>2</sup> (2.2 x 4.5 m) plot, determined for each species individually and for all species combined. |
| Number of tree stems  | Number of stems of woody plants >3 m in height and >2.5 cm diameter at breast height on a 100-m <sup>2</sup> (circle with radius 5.6 m) plot, determined for each species individually and for all species combined.                                         |

were used to determine plant community characteristics and species abundance. Also on 24-25 July, 24 additional ground-cover plots were examined within fields and waste areas. These data were used only to to determine changes in species composition. Random observations within the wooded areas revealed that no major changes in vegetation had occurred since May, so no additional plots were examined.

Frequency of occurrence of each species was obtained by dividing the number of plots in which a given species was found by the total number of plots examined. Density of ground-cover species was expressed as the average percentage cover, whereas

density of trees and shrubs was calculated as the average number of stems per hectare (N/ha).

Plants were either identified in the field or collected for later identification. The primary reference used was Gray's Manual (Fernald 1950), with occasional use of Gleason and Cronquist (1963) and Britton and Brown (1970). All species were checked in the Atlas of the Flora of Pennsylvania (Wherry et al. 1979) to verify their occurrence in the region. Those species that were not reported to occur in the region were collected and preserved. The identity of these specimens was verified and the specimens were deposited in the herbarium of The Pennsylvania State University, University Park.

### Cover Types

Cover types were defined according to species composition and site conditions. Dominant tree, shrub, and ground cover species in each cover type were identified by calculating prominence values (PV), where  $PV = \text{density} \times \sqrt{\text{frequency}}$  (Beals 1960). Cutoff values of PV are chosen subjectively. Dominants were considered to be those species with PV over 0.6 for trees, 0.1 for shrubs, and 1.0 for ground cover.

As a means of comparing species associations among cover types, community similarity coefficients (SC) were calculated by the formula:

$$SC = \frac{C}{A + B - C} \times 100$$

where A = number of species in community A  
B = number of species in community B  
C = number of species common to both communities

(Barbour et al. 1980:187). Values of the SC vary from 0 for communities with no species in common to 100 for identical communities.

### Bird Surveys

Bird surveys were conducted once in May and three times in June, at approximately 9-day intervals. Surveys began about 0630 and lasted an average of 2.5 hours. The survey route was approximately 3.2 km long and traversed all cover types in the PRA. To avoid bias, each survey was begun at a different location on the route.

Bird identification was based on visual observation and/or song. Peterson (1947) and Robbins et al. (1966) were used as references. Bird locations were recorded on a map of the PRA. Use of cover types by a given bird species was determined by calculating the percentage of observations of that species in each cover type. Relative abundance of each species was calculated as the average number of birds of each species recorded per survey on the entire PRA.

### Trapping

Pitfall, box, and snap traps were used to capture small animals throughout all cover types in the PRA. Pitfalls were

constructed by burying 1-gallon metal cans in the soil until the rims were flush with the soil surface. These traps were operated for 108 trap-nights from 3-9 July 1984 and were not baited. Box (live) traps were set from 3-9 July without bait, and from 16-25 July baited with canned dog food, for a total of 141 trap-nights. These traps were constructed of wood, with trip-operated doors and were 17.8 x 62.2 x 21.6 cm. Snap-traps ("Museum Specials") were set from 16-25 July and baited with a mixture of peanut butter and oatmeal. Two traps, approximately 1 m apart, were set per trap site, for a total of 925 trap-nights.

Identification of mammals and amphibians was based on Burt and Grossenheider (1976) and Conant (1975), respectively. Representative specimens of the small mammals were deposited in the vertebrate museum of The Pennsylvania State University, University Park.

### Observations

Incidental observations also were recorded during all visits to the PRA. These included actual visual observations of plants and animals as well as signs of animal activity (e.g., scats and tracks) and animal remains (e.g., skulls and hair). Species identified in this way were added to the lists on a presence/absence basis (i.e., no estimates of abundance were determined). Insects were not sampled, but observations indicated the presence of at least 31 insect families on the PRA. Assignment of insect family names was based on Borror and White (1970).

## RESULTS AND DISCUSSION

### Plants

A total of 371 plant species was identified in the PRA from May through October 1984 (Table 2). Information given for each species includes origin (native or exotic), cover types in which the species was found in the PRA, and overall frequency of occurrence. Frequency of occurrence could not be determined for plants that were observed in the PRA but not found in the sampling plots. Some plants that lacked flowers at the time of plot sampling could not be identified to species, and, therefore, origin could not be determined. In these cases, frequencies are given for the genus or family only.

Although the PRA was extensively sampled for plants, some species may have been overlooked. Plants observed in the southern portion of VFP or at Mill Grove (Appendix A) also may occur in the PRA.

Table 2. Vascular plants identified in the proposed Pawling Recreation Area, Valley Forge National Historical Park, Pennsylvania, May through October 1984.

| Species <sup>a</sup>                                    | Origin <sup>b</sup> | Cover Types <sup>c</sup> | % Frequency in:    |                   |                  |
|---------------------------------------------------------|---------------------|--------------------------|--------------------|-------------------|------------------|
|                                                         |                     |                          | 100-m <sup>2</sup> | 10-m <sup>2</sup> | 1-m <sup>2</sup> |
|                                                         |                     |                          | Plots              | Plots             | Plots            |
| -----                                                   |                     |                          |                    |                   |                  |
| ACERACEAE - MAPLE FAMILY                                |                     |                          |                    |                   |                  |
| Boxelder<br><u>Acer negundo</u>                         | n                   | 1,3,7-9                  | 28.3               | 6.7               | 1.7              |
| Norway maple<br><u>A. platanoides</u>                   | e                   | 7,8                      | 2.5                | 0.5               |                  |
| Red maple<br><u>A. rubrum</u>                           | n                   | 3,5-7,9                  | 10.1               | 0.7               | 3.6              |
| Silver maple<br><u>A. saccharinum</u>                   | n                   | 1,4,6-10                 | 11.6               | 2.4               | 0.5              |
| Sugar maple<br><u>A. saccharum</u>                      | n                   | 5,7,8                    | 1.5                | 0.2               | 0.2              |
| AGAVACEAE - AGAVE FAMILY                                |                     |                          |                    |                   |                  |
| Yucca<br><u>Yucca</u> sp.                               | i                   | 8                        |                    |                   |                  |
| AIZOACEAE (MOLLUGINACEAE) - CARPETWEED FAMILY           |                     |                          |                    |                   |                  |
| Carpetweed<br><u>Mollugo verticillata</u>               | e                   | 3                        |                    |                   | 0.2              |
| ALISMACEAE (ALISMATACEAE) - WATER PLANTAIN FAMILY       |                     |                          |                    |                   |                  |
| Small water plantain<br><u>Alisma plantago-aquatica</u> | n                   | 4                        |                    |                   |                  |
| ANACARDIACEAE - CASHEW FAMILY                           |                     |                          |                    |                   |                  |
| Shining sumac<br><u>Rhus copallina</u>                  | n                   | 3                        |                    |                   |                  |
| Smooth sumac<br><u>R. glabra</u>                        | n                   | 7-9                      | 1.0                | 0.7               |                  |

| Species                                                   | Origin | Cover Types | % Frequency in:             |                            |                           |
|-----------------------------------------------------------|--------|-------------|-----------------------------|----------------------------|---------------------------|
|                                                           |        |             | 100-m <sup>2</sup><br>Plots | 10-m <sup>2</sup><br>Plots | 1-m <sup>2</sup><br>Plots |
| Staghorn sumac<br><u>R. typhina</u>                       | n      | 3,7         | 0.5                         | 0.7                        | 0.7                       |
| Poison ivy<br><u>Toxicodendron radicans</u>               | n      | 1-3,5-9     |                             | 2.4                        | 25.0                      |
| ANNONACEAE - CUSTARD-APPLE FAMILY                         |        |             |                             |                            |                           |
| Common pawpaw<br><u>Asimina triloba</u>                   | n      | 8           | 0.5                         | 0.5                        | 0.2                       |
| APIACEAE (UMBELLIFERAE) - PARSLEY FAMILY                  |        |             |                             |                            |                           |
| Goutweed<br><u>Aegopodium podagraria</u>                  | e      | 8           |                             |                            |                           |
| Fool's parsley<br><u>Aethusa cynapium</u>                 | e      | 8           |                             |                            |                           |
| Honewort<br><u>Cryptotaenia canadensis</u>                | n      | 8           |                             |                            | 0.5                       |
| Wild carrot,<br>Queen Anne's lace<br><u>Daucus carota</u> | e      | 1,2,9       |                             |                            | 2.2                       |
| Wild parsnip<br><u>Pastinaca sativa</u>                   | e      | 8           |                             |                            |                           |
| Golden Alexanders<br><u>Zizia aurea</u>                   | n      | 1,2,8       |                             |                            | 1.0                       |
| APOCYNACEAE - DOGBANE FAMILY                              |        |             |                             |                            |                           |
| Indian hemp<br><u>Apocynum cannabinum</u>                 | n      | 1,2         |                             |                            | 1.2                       |
| ARACEAE - ARUM FAMILY                                     |        |             |                             |                            |                           |
| Green dragon<br><u>Arisaema dracontium</u>                | n      | 7           |                             |                            | 0.2                       |
| Jack-in-the-pulpit<br><u>A. triphyllum</u>                | n      | 5,6,8,9     |                             |                            | 3.1                       |

| Species                                             | Origin | Cover Types | % Frequency in: |       |       |
|-----------------------------------------------------|--------|-------------|-----------------|-------|-------|
|                                                     |        |             | 100-m           | 10-m  | 1-m   |
|                                                     |        |             | Plots           | Plots | Plots |
| -----                                               |        |             |                 |       |       |
| ARALIACEAE - GINSENG FAMILY                         |        |             |                 |       |       |
| English ivy<br><u>Hedera helix</u>                  | e      | 6           |                 |       |       |
| ARISTOLOCHIACEAE - BIRTHWORT FAMILY                 |        |             |                 |       |       |
| Wild ginger<br><u>Asarum canadense</u>              | n      | 8           |                 |       |       |
| ASCLEPIADACEAE - MILKWEED FAMILY                    |        |             |                 |       |       |
| Swamp milkweed<br><u>Asclepias incarnata</u>        | n      | 8           |                 |       |       |
| Common milkweed<br><u>A. syriaca</u>                | n      | 2,7,8       |                 |       | 0.5   |
| Butterfly weed<br><u>A. tuberosa</u>                | n      | 2           |                 |       |       |
| Green milkweed<br><u>A. viridiflora</u>             | n      | 2           |                 |       |       |
| ASPLENIACEAE (POLYPODIACEAE in part) - FERN FAMILY  |        |             |                 |       |       |
| Boott's fern<br><u>Dryopteris x bootii</u>          | n      | 8,9         |                 |       |       |
| Marginal woodfern<br><u>D. marginalis</u>           | n      | 7           |                 |       |       |
| Ostrich fern<br><u>Matteuccia struthiopteris</u>    | n      | 8           |                 |       |       |
| Sensitive fern<br><u>Onoclea sensibilis</u>         | n      | 9           |                 |       | 0.2   |
| Christmas fern<br><u>Polystichum acrostichoides</u> | n      | 5           |                 |       |       |

| Species                                                           | Origin | Cover Types | % Frequency in:             |                            |                           |
|-------------------------------------------------------------------|--------|-------------|-----------------------------|----------------------------|---------------------------|
|                                                                   |        |             | 100-m <sup>2</sup><br>Plots | 10-m <sup>2</sup><br>Plots | 1-m <sup>2</sup><br>Plots |
| -----                                                             |        |             |                             |                            |                           |
| ASTERACEAE (COMPOSITAE) - COMPOSITE FAMILY                        |        |             |                             |                            |                           |
| Yarrow<br><u>Achillea millefolium</u>                             | n & e  | 1,2         |                             |                            | 1.0                       |
| Common ragweed<br><u>Ambrosia artemisiifolia</u>                  | n      | 2,3,4,7     |                             |                            | 5.5                       |
| Giant ragweed<br><u>A. trifida</u>                                | n      | 8           |                             |                            | 0.2                       |
| Plantain-leaved<br>pussytoes<br><u>Antennaria plantaginifolia</u> | n      | 2,9         |                             |                            |                           |
| Field chamomile<br><u>Anthemis arvensis</u>                       | e      | 2           |                             |                            |                           |
| Common burdock<br><u>Arctium minus</u>                            | e      | 2           |                             |                            |                           |
| Annual wormwood<br><u>Artemisia annua</u>                         | e      | 2           |                             |                            |                           |
| Common mugwort<br><u>A. vulgaris</u>                              | e      | 8           |                             |                            | 0.5                       |
| Aster<br><u>Aster</u> spp.                                        |        | 2-5,8,9     |                             |                            | 1.4                       |
| White wood aster<br><u>Aster divaricatus</u>                      | n      | 5,9         |                             |                            |                           |
| New England aster<br><u>A. novae-angliae</u>                      | n      | 2,8         |                             |                            |                           |
| Heath aster<br><u>A. pilosus</u> var. <u>pilosus</u>              | n      | 2           |                             |                            |                           |
| Small white aster<br><u>A. vimineus</u>                           | n      | 4,9         |                             |                            |                           |
| Long-bracted tickseed-<br>sunflower<br><u>Bidens aristosa</u>     | i      | 3           |                             |                            |                           |
| Tickseed sunflower<br><u>B. coronata</u>                          | n      | 4           |                             |                            | 0.2                       |

| Species                                      | Origin | Cover Types | % Frequency in:             |                            |                           |
|----------------------------------------------|--------|-------------|-----------------------------|----------------------------|---------------------------|
|                                              |        |             | 100-m <sup>2</sup><br>Plots | 10-m <sup>2</sup><br>Plots | 1-m <sup>2</sup><br>Plots |
| Beggar ticks<br><u>B. frondosa</u>           | n      | 3,4         |                             |                            | 0.2                       |
| Brown knapweed<br><u>Centaurea jacea</u>     | e      | 2           |                             |                            |                           |
| Common chicory<br><u>Cichorium intybus</u>   | e      | 2,3         |                             |                            |                           |
| Canada thistle<br><u>Cirsium arvense</u>     | e      | 2,8         |                             |                            | 2.4                       |
| Field thistle<br><u>C. discolor</u>          | n      | 2           |                             |                            |                           |
| Bull thistle<br><u>C. vulgare</u>            | e      | 2           |                             |                            |                           |
| Horseweed<br><u>Conyza canadensis</u>        | n      | 2,3         |                             |                            |                           |
| Yerba de tajo<br><u>Eclipta prostrata</u>    | n      | 4           |                             |                            |                           |
| Pilewort<br><u>Erechtites hieraciifolia</u>  | n      | 3           |                             |                            |                           |
| Fleabane<br><u>Erigeron</u> spp.             |        | 2,8         |                             |                            | 0.2                       |
| Daisy fleabane<br><u>E. annuus</u>           | n      | 2,8         |                             |                            |                           |
| Common fleabane<br><u>E. philadelphicus</u>  | n      | 2,8         |                             |                            |                           |
| Lesser daisy fleabane<br><u>E. strigosus</u> | n      | 2,8         |                             |                            |                           |
| Joe-pye weed<br><u>Eupatorium fistulosum</u> | n      | 8           |                             |                            |                           |
| Boneset<br><u>E. perfoliatum</u>             | n      | 4           |                             |                            | 0.2                       |
| White snakeroot<br><u>E. rugosum</u>         | n      | 8,9         |                             |                            | 1.4                       |

| Species                                                  | Origin | Cover Types | % Frequency in:             |                            |                           |
|----------------------------------------------------------|--------|-------------|-----------------------------|----------------------------|---------------------------|
|                                                          |        |             | 100-m <sup>2</sup><br>Plots | 10-m <sup>2</sup><br>Plots | 1-m <sup>2</sup><br>Plots |
| Lance-leaved goldenrod<br><u>Euthamia graminifolia</u>   | n      | 2,3         |                             |                            |                           |
| Galinsoga, quickweed<br><u>Galinsoga quadriradiata</u>   | e      | 8           |                             |                            |                           |
| Sweet everlasting<br><u>Gnaphalium obtusifolium</u>      | n      | 3           |                             |                            |                           |
| Purple-headed<br>sneezeweed<br><u>Helenium flexuosum</u> | i      | 2,4         |                             |                            | 1.0                       |
| Thin-leaved sunflower<br><u>Helianthus decapetalus</u>   | n      | 8           |                             |                            |                           |
| Ox-eye<br><u>Heliopsis helianthoides</u>                 | n      | 8           |                             |                            |                           |
| King devil<br><u>Hieracium caespitosum</u>               | e      | 2,6         |                             |                            | 1.0                       |
| Large mouse-ear<br>hawkweed<br><u>H. x flagellare</u>    | e      | 2           |                             |                            | 0.7                       |
| Two-flowered Cynthia<br><u>Krigia biflora</u>            | n      | 2           |                             |                            |                           |
| Canada lettuce<br><u>Lactuca canadensis</u>              | n      | 2           |                             |                            |                           |
| Prickly lettuce<br><u>L. serriola</u>                    | e      | 2,8         |                             |                            | 0.2                       |
| Oxeye daisy<br><u>Leucanthemum vulgare</u>               | e      | 1-3         |                             |                            | 1.4                       |
| Pineapple weed<br><u>Matricaria matricarioides</u>       | i      | 2           |                             |                            |                           |
| Black-eyed Susan<br><u>Rudbeckia hirta</u>               | n      | 1,2         |                             |                            |                           |
| Green-headed coneflower<br><u>R. laciniata</u>           | n      | 8           |                             |                            |                           |

| Species                                                                | Origin | Cover Types | % Frequency in:    |                   |                  |
|------------------------------------------------------------------------|--------|-------------|--------------------|-------------------|------------------|
|                                                                        |        |             | 100-m <sup>2</sup> | 10-m <sup>2</sup> | 1-m <sup>2</sup> |
|                                                                        |        |             | Plots              | Plots             | Plots            |
| Goldenrod<br><u>Solidago</u> spp.                                      |        | 1-9         |                    |                   | 25.5             |
| Early goldenrod<br><u>Solidago juncea</u>                              | n      | 2           |                    |                   |                  |
| Rough-stemmed<br>goldenrod<br><u>S. rugosa</u>                         | n      | 2           |                    |                   |                  |
| Spiny-leaved sowthistle<br><u>Sonchus asper</u>                        | e      | 2           |                    |                   |                  |
| Common dandelion<br><u>Taraxacum officinale</u>                        | e      | 1,2         |                    |                   | 1.9              |
| New York ironweed<br><u>Vernonia noveboracensis</u>                    | n      | 2           |                    |                   |                  |
| Common cocklebur<br><u>Xanthium strumarium</u>                         | n      | 2,3         |                    |                   |                  |
| BALSAMINACEAE - TOUCH-ME-NOT FAMILY                                    |        |             |                    |                   |                  |
| Jewelweed, Touch-me-not<br><u>Impatiens capensis</u> or <u>pallida</u> | n      | 2,7-9       |                    |                   | 11.8             |
| Spotted touch-me-not<br><u>I. capensis</u>                             | n      | 2,7-9       |                    |                   |                  |
| Pale touch-me-not<br><u>I. pallida</u>                                 | n      | 2,7-9       |                    |                   |                  |
| BERBERIDACEAE - BARBERRY FAMILY                                        |        |             |                    |                   |                  |
| Japanese barberry<br><u>Berberis thunbergii</u>                        | e      | 8,9         |                    |                   | 0.2              |
| Mayapple<br><u>Podophyllum peltatum</u>                                | n      | 5,8         |                    |                   | 1.7              |

| Species                                            | Origin | Cover Types | % Frequency in:             |                            |                           |
|----------------------------------------------------|--------|-------------|-----------------------------|----------------------------|---------------------------|
|                                                    |        |             | 100-m <sup>2</sup><br>Plots | 10-m <sup>2</sup><br>Plots | 1-m <sup>2</sup><br>Plots |
| BETULACEAE - BIRCH FAMILY                          |        |             |                             |                            |                           |
| Sweet birch<br><u>Betula lenta</u>                 | n      | 6,7         | 1.0                         |                            | 0.2                       |
| River birch<br><u>B. nigra</u>                     | n      | 2,4,8-10    | 6.1                         | 1.9                        | 0.5                       |
| BIGNONIACEAE - TRUMPET CREEPER FAMILY              |        |             |                             |                            |                           |
| Trumpet creeper<br><u>Campsis radicans</u>         | n      | 7,9         |                             |                            | 0.7                       |
| Southern catalpa<br><u>Catalpa bignonioides</u>    | i      | 3,8,9       | 1.5                         | 0.5                        |                           |
| Empress-tree<br><u>Paulownia tomentosa</u>         | e      | 8           | 0.5                         |                            |                           |
| BORAGINACEAE - BORAGE FAMILY                       |        |             |                             |                            |                           |
| Virginia stickseed<br><u>Hackelia virginiana</u>   | n      | 9           |                             |                            |                           |
| Bluebells<br><u>Mertensia virginica</u>            | n      | 8           |                             |                            | 0.2                       |
| True forget-me-not<br><u>Myosotis scorpioides</u>  | e      | 4,8         |                             |                            |                           |
| BRASSICACEAE (CRUCIFERAE) - MUSTARD FAMILY         |        |             |                             |                            |                           |
| Garlic mustard<br><u>Alliaria petiolata</u>        | e      | 2,3,5-9     |                             |                            | 15.4                      |
| Common wintercress<br><u>Barbarea vulgaris</u>     | e      | 8           |                             |                            | 0.2                       |
| Shepherd's purse<br><u>Capsella bursa-pastoris</u> | e      | 1-3         |                             |                            |                           |
| Cut-leaved toothwort<br><u>Dentaria lacinata</u>   | n      | 5           |                             |                            |                           |

| Species                                            | Origin | Cover Types | % Frequency in:             |                            |                           |
|----------------------------------------------------|--------|-------------|-----------------------------|----------------------------|---------------------------|
|                                                    |        |             | 100-m <sup>2</sup><br>Plots | 10-m <sup>2</sup><br>Plots | 1-m <sup>2</sup><br>Plots |
| Dame's rocket<br><u>Hesperis matronalis</u>        | e      | 8           |                             |                            | 1.2                       |
| Field peppergrass<br><u>Lepidium campestre</u>     | e      | 2           |                             |                            | 0.5                       |
| Wild peppergrass<br><u>L. virginicum</u>           | n      | 2           |                             |                            |                           |
| Watercress<br><u>Nasturtium officinale</u>         | e      | 4           |                             |                            |                           |
| Creeping yellow cress<br><u>Rorippa sylvestris</u> | e      | 8           |                             |                            |                           |
| Field pennycress<br><u>Thlaspi arvense</u>         | e      | 2           |                             |                            |                           |

CAMPANULACEAE (including LOBELIACEAE) - HAREBELL FAMILY

|                                                     |   |     |  |  |  |
|-----------------------------------------------------|---|-----|--|--|--|
| Indian tobacco<br><u>Lobelia inflata</u>            | n | 2,3 |  |  |  |
| Venus' looking-glass<br><u>Triodanis perfoliata</u> | n | 3   |  |  |  |

CAPRIFOLIACEAE - HONEYSUCKLE FAMILY

|                                                      |   |       |     |     |      |
|------------------------------------------------------|---|-------|-----|-----|------|
| Japanese honeysuckle<br><u>Lonicera japonica</u>     | e | 1-10  |     | 1.9 | 45.7 |
| Standish honeysuckle<br><u>L. standishii</u>         | e | 9     |     |     |      |
| Tartarian honeysuckle<br><u>L. tatarica</u>          | e | 8     |     | 0.2 |      |
| European honeysuckle<br><u>L. xylosteum</u>          | e | 3,9   |     | 0.2 |      |
| Common elder<br><u>Sambucus canadensis</u>           | n | 2,8,9 | 0.5 | 0.5 | 0.2  |
| Maple-leaved viburnum<br><u>Viburnum acerifolium</u> | n | 9     |     |     | 0.2  |

| Species                                                     | Origin | Cover Types | % Frequency in:             |                            |                           |
|-------------------------------------------------------------|--------|-------------|-----------------------------|----------------------------|---------------------------|
|                                                             |        |             | 100-m <sup>2</sup><br>Plots | 10-m <sup>2</sup><br>Plots | 1-m <sup>2</sup><br>Plots |
| Smooth blackhaw<br><u>V. prunifolium</u>                    | n      | 6,9         | 0.5                         | 0.7                        | 0.5                       |
| Northern arrowwood<br><u>V. recognitum</u>                  | n      | 6           |                             | 0.2                        |                           |
| CARYOPHYLLACEAE - PINK FAMILY                               |        |             |                             |                            |                           |
| Thyme-leaved sandwort<br><u>Arenaria serpyllifolia</u>      | e      | 2,9         |                             |                            | 0.5                       |
| Chickweed<br><u>Cerastium</u> spp. or <u>Stellaria</u> spp. |        | 1,2         |                             |                            | 0.5                       |
| Mouse-ear chickweed<br><u>Cerastium glomeratum</u>          | e      | 2           |                             |                            |                           |
| Deptford pink<br><u>Dianthus armeria</u>                    | e      | 2           |                             |                            |                           |
| Forked chickweed<br><u>Paronychia canadensis</u>            | n      | 3           |                             |                            |                           |
| Forked chickweed<br><u>P. fastigiata</u>                    | n      | 2,3         |                             |                            |                           |
| Bouncing Bet<br><u>Saponaria officinalis</u>                | e      | 3           |                             |                            |                           |
| White campion,<br>evening lychnis<br><u>Silene alba</u>     | e      | 2           |                             |                            |                           |
| Sleepy catchfly<br><u>S. antirrhina</u>                     | n      | 3           |                             |                            |                           |
| Lesser stitchwort<br><u>Stellaria graminea</u>              | e      | 2           |                             |                            |                           |
| Common chickweed<br><u>S. media</u>                         | e      | 2           |                             |                            |                           |
| CELASTRACEAE - STAFF-TREE FAMILY                            |        |             |                             |                            |                           |
| Asiatic bittersweet<br><u>Celastrus orbiculatus</u>         | e      | 3,5-9       |                             | 7.9                        | 12.7                      |

| Species                                          | Origin | Cover Types | % Frequency in:    |                   |                  |
|--------------------------------------------------|--------|-------------|--------------------|-------------------|------------------|
|                                                  |        |             | 100-m <sup>2</sup> | 10-m <sup>2</sup> | 1-m <sup>2</sup> |
|                                                  |        |             | Plots              | Plots             | Plots            |
| -----                                            |        |             |                    |                   |                  |
| CHENOPODIACEAE - GOOSEFOOT FAMILY                |        |             |                    |                   |                  |
| Lamb's quarters<br><u>Chenopodium album</u>      | n & e  | 3           |                    |                   | 0.5              |
| Mexican tea<br><u>C. ambrosioides</u>            | e      | 2,4         |                    |                   |                  |
| CLUSIACEAE (HYPERICACEAE) - ST. JOHNSWORT FAMILY |        |             |                    |                   |                  |
| Dwarf St. Johnswort<br><u>Hypericum mutilum</u>  | n      | 4           |                    |                   |                  |
| Common St. Johnswort<br><u>H. perforatum</u>     | e      | 2           |                    |                   |                  |
| Spotted St. Johnswort<br><u>H. punctatum</u>     | n      | 2           |                    |                   |                  |
| COMMELINACEAE - SPIDERWORT FAMILY                |        |             |                    |                   |                  |
| Common dayflower<br><u>Commelina communis</u>    | e      | 8           |                    |                   |                  |
| CONVOLULACEAE - MORNING-GLORY FAMILY             |        |             |                    |                   |                  |
| Hedge bindweed<br><u>Calystegia sepium</u>       | n & e  | 2,3         |                    |                   | 1.4              |
| Field bindweed<br><u>Convolvulus arvensis</u>    | e      | 2,7-9       |                    | 3.8               | 1.2              |
| Dodder<br><u>Cuscuta campestris</u>              | n      | 2,8         |                    |                   |                  |
| Ivy-leaved morning-glory<br><u>Ipomoea nil</u>   | e      | 3           |                    |                   |                  |
| Wild potato-vine<br><u>I. pandurata</u>          | n      | 2           |                    |                   |                  |

| Species                                                           | Origin | Cover Types | % Frequency in:             |                            |                           |
|-------------------------------------------------------------------|--------|-------------|-----------------------------|----------------------------|---------------------------|
|                                                                   |        |             | 100-m <sup>2</sup><br>Plots | 10-m <sup>2</sup><br>Plots | 1-m <sup>2</sup><br>Plots |
| -----                                                             |        |             |                             |                            |                           |
| CORNACEAE - DOGWOOD FAMILY                                        |        |             |                             |                            |                           |
| Silky dogwood<br><u>Cornus amomum</u>                             | n      | 2-4, 6-10   | 1.5                         | 13.9                       | 2.6                       |
| Flowering dogwood<br><u>C. florida</u>                            | n      | 2, 5, 7-9   | 15.2                        | 3.8                        | 0.7                       |
| CUCURBITACEAE - GOURD FAMILY                                      |        |             |                             |                            |                           |
| Cucumber<br><u>Echinocystis lobata</u> or <u>Sicyos angulatus</u> | n      | 8           |                             |                            | 0.5                       |
| Wild cucumber<br><u>E. lobata</u>                                 | n      | 8           |                             |                            |                           |
| Bur cucumber<br><u>S. angulatus</u>                               | n      | 8           |                             |                            |                           |
| CUPRESSACEAE - CYPRESS FAMILY                                     |        |             |                             |                            |                           |
| Eastern redcedar<br><u>Juniperus virginiana</u>                   | n      | 2, 5, 7, 9  | 3.5                         | 0.5                        |                           |
| CYPERACEAE - SEDGE FAMILY                                         |        |             |                             |                            |                           |
| Sedge<br><u>Carex</u> spp.                                        |        | 2, 4, 7-9   |                             |                            | 1.7                       |
| Bush's sedge<br><u>C. bushii</u>                                  | n      | 4           |                             |                            |                           |
| Crested sedge<br><u>C. cristatella</u>                            | n      | 4           |                             |                            |                           |
| Gray's sedge<br><u>C. grayi</u>                                   | n      | 4, 8        |                             |                            | 0.5                       |
| Sallow sedge<br><u>C. lurida</u>                                  | n      | 3, 4        |                             |                            |                           |
| Stellate sedge<br><u>C. rosea</u>                                 | n      | 8           |                             |                            |                           |

| Species                                                 | Origin | Cover Types | % Frequency in:             |                            |                           |
|---------------------------------------------------------|--------|-------------|-----------------------------|----------------------------|---------------------------|
|                                                         |        |             | 100-m <sup>2</sup><br>Plots | 10-m <sup>2</sup><br>Plots | 1-m <sup>2</sup><br>Plots |
| Squarrose sedge<br><u>C. squarrosa</u>                  | n      | 9           |                             |                            |                           |
| Red-rooted cyperus<br><u>Cyperus erythrorhizos</u>      | n      | 4           |                             |                            |                           |
| Slender cyperus<br><u>C. filiculmis</u>                 | n      | 9           |                             |                            |                           |
| Engelmann's spike-rush<br><u>Eleocharis engelmannii</u> | n      | 4           |                             |                            |                           |
| Blunt spike-rush<br><u>E. obtusa</u>                    | n      | 4           |                             |                            |                           |
| Dark green bulrush<br><u>Scirpus atrovirens</u>         | n      | 2,4         |                             |                            | 0.2                       |
| Pursh's club-rush<br><u>S. purshianus</u>               | n      | 4           |                             |                            |                           |
| Great bulrush<br><u>S. tabernaemontani</u>              | n & e  | 4           |                             |                            |                           |
| DIPSACACEAE - TEASEL FAMILY                             |        |             |                             |                            |                           |
| Teasel<br><u>Dipsacus fullonum</u>                      | e      | 8           |                             |                            |                           |
| ELAEAGNACEAE - OLEASTER FAMILY                          |        |             |                             |                            |                           |
| Autumn olive<br><u>Elaeagnus umbellata</u>              | e      | 1,2         |                             |                            |                           |
| EQUISETACEAE - HORSETAIL FAMILY                         |        |             |                             |                            |                           |
| Field horsetail<br><u>Equisetum arvense</u>             | n      | 2,8         |                             |                            | 0.2                       |
| ERICACEAE - HEATH FAMILY                                |        |             |                             |                            |                           |
| Blueberry<br><u>Vaccinium</u> spp.                      |        | 6,9         |                             |                            | 0.2                       |

| Species                                                 | Origin | Cover Types | % Frequency in:    |                   |                  |
|---------------------------------------------------------|--------|-------------|--------------------|-------------------|------------------|
|                                                         |        |             | 100-m <sup>2</sup> | 10-m <sup>2</sup> | 1-m <sup>2</sup> |
|                                                         |        |             | Plots              | Plots             | Plots            |
| -----                                                   |        |             |                    |                   |                  |
| Early low blueberry<br><u>V. pallidum</u>               | n      | 6           |                    |                   |                  |
| EUPHORBIACEAE - SPURGE FAMILY                           |        |             |                    |                   |                  |
| Three-seeded mercury<br><u>Acalypha rhomboidea</u>      | n      | 2-4         |                    |                   |                  |
| Milk-purslane, eyebane<br><u>Chamaesyce maculata</u>    | n      | 2,3         |                    |                   |                  |
| FABACEAE (LEGUMINOSAE) - BEAN FAMILY                    |        |             |                    |                   |                  |
| Persian acacia<br><u>Albizia julibrissin</u>            | e      | 2           |                    |                   |                  |
| Indigo bush<br><u>Amorpha fruticosa</u>                 | n      | 8           |                    | 0.2               |                  |
| Hog peanut<br><u>Amphicarpaea bracteata</u>             | n      | 8           |                    |                   | 0.2              |
| Cassia<br><u>Cassia fasciculata</u> or <u>nictitans</u> | n      | 2,3         |                    |                   | 0.5              |
| Partridge pea<br><u>C. fasciculata</u>                  | n      | 2,3         |                    |                   |                  |
| Wild sensitive plant<br><u>C. nictitans</u>             | n      | 2,3         |                    |                   |                  |
| Eastern redbud<br><u>Cercis canadensis</u>              | n      | 8           |                    |                   |                  |
| Crown vetch<br><u>Coronilla varia</u>                   | e      | 8           |                    |                   | 0.7              |
| Rattlebox<br><u>Crotalaria sagittalis</u>               | n      | 1,2         |                    |                   |                  |
| Tick-trefoil<br><u>Desmodium</u> spp.                   |        | 1,2         |                    |                   |                  |
| Panicked tick-trefoil<br><u>D. paniculatum</u>          | n      | 1,2,4       |                    |                   | 0.2              |

| Species                                                  | Origin | Cover Types | % Frequency in:             |                            |                           |
|----------------------------------------------------------|--------|-------------|-----------------------------|----------------------------|---------------------------|
|                                                          |        |             | 100-m <sup>2</sup><br>Plots | 10-m <sup>2</sup><br>Plots | 1-m <sup>2</sup><br>Plots |
| Japanese clover<br><u>Kummerowia striata</u>             | e      | 2           |                             |                            | 0.2                       |
| Round-headed<br>bush-clover<br><u>Lespedeza capitata</u> | n      | 1,2,9       |                             |                            | 3.6                       |
| Bush-clover<br><u>L. cuneata</u>                         | e      | 2           |                             |                            |                           |
| Slender bush-clover<br><u>L. virginica</u>               | n      | 1,2         |                             |                            |                           |
| Birdsfoot trefoil<br><u>Lotus corniculatus</u>           | e      | 1           |                             |                            | 0.2                       |
| Black medick<br><u>Medicago lupulina</u>                 | e      | 2           |                             |                            |                           |
| White sweet-clover<br><u>Melilotus alba</u>              | e      | 2           |                             |                            |                           |
| Yellow sweet-clover<br><u>M. officinalis</u>             | e      | 2           |                             |                            |                           |
| Bristly locust<br><u>Robinia hispida</u>                 | i      | 3           |                             |                            |                           |
| Black locust<br><u>R. pseudoacacia</u>                   | n      | 3,7,9       | 14.6                        | 4.3                        | 1.9                       |
| Trailing wild bean<br><u>Strophostyles helvola</u>       | n      | 3           |                             |                            |                           |
| Alsike clover<br><u>Trifolium hybridum</u>               | e      | 1-3         |                             |                            | 0.2                       |
| Red clover<br><u>T. pratense</u>                         | e      | 1,2         |                             |                            | 1.0                       |
| White clover<br><u>T. repens</u>                         | e      | 1-3         |                             |                            | 0.7                       |
| Common vetch<br><u>Vicia sativa</u>                      | e      | 2           |                             |                            |                           |
| Slender vetch<br><u>V. tetrasperma</u>                   | e      | 2           |                             |                            |                           |

| Species                                                    | Origin | Cover Types | % Frequency in:             |                            |                           |
|------------------------------------------------------------|--------|-------------|-----------------------------|----------------------------|---------------------------|
|                                                            |        |             | 100-m <sup>2</sup><br>Plots | 10-m <sup>2</sup><br>Plots | 1-m <sup>2</sup><br>Plots |
| Wisteria<br><u>Wisteria</u> sp.                            |        | 7           |                             | 0.5                        | 0.2                       |
| FAGACEAE - BEECH FAMILY                                    |        |             |                             |                            |                           |
| Spanish chestnut<br><u>Castanea sativa</u>                 | e      | 3           |                             |                            |                           |
| Pin oak<br><u>Quercus palustris</u>                        | n      | 2,4         | 0.5                         | 0.5                        |                           |
| Northern red oak<br><u>Q. rubra</u>                        | n      | 4,8         | 1.0                         | 0.2                        |                           |
| Black oak<br><u>Q. velutina</u>                            | n      | 4,6,7,9     | 1.0                         | 0.5                        | 0.5                       |
| GERANIACEAE - GERANIUM FAMILY                              |        |             |                             |                            |                           |
| Carolina cranesbill<br><u>Geranium carolinianum</u>        | n      | 3           |                             |                            |                           |
| Wild geranium<br><u>G. maculatum</u>                       | n      | 5           |                             |                            |                           |
| HAMAMELIDACEAE - WITCH HAZEL FAMILY                        |        |             |                             |                            |                           |
| Witch hazel<br><u>Hamamelis virginiana</u>                 | n      | 8           |                             |                            |                           |
| HYDROPHYLLACEAE - WATERLEAF FAMILY                         |        |             |                             |                            |                           |
| Virginia waterleaf<br><u>Hydrophyllum virginianum</u>      | n      | 8           |                             |                            | 0.2                       |
| IRIDACEAE - IRIS FAMILY                                    |        |             |                             |                            |                           |
| Stout blue-eyed grass<br><u>Sisyrinchium angustifolium</u> | n      | 1,2         |                             |                            | 0.2                       |

| Species                                                    | Origin | Cover Types | % Frequency in:             |                            |                           |
|------------------------------------------------------------|--------|-------------|-----------------------------|----------------------------|---------------------------|
|                                                            |        |             | 100-m <sup>2</sup><br>Plots | 10-m <sup>2</sup><br>Plots | 1-m <sup>2</sup><br>Plots |
| -----                                                      |        |             |                             |                            |                           |
| JUGLANDACEAE - WALNUT FAMILY                               |        |             |                             |                            |                           |
| Bitternut hickory<br><u>Carya cordiformis</u>              | n      | 5-9         | 2.5                         | 0.5                        | 1.2                       |
| Black walnut<br><u>Juglans nigra</u>                       | n      | 5,7,9       | 1.0                         |                            |                           |
| JUNCACEAE - RUSH FAMILY                                    |        |             |                             |                            |                           |
| Common rush<br><u>Juncus effusus</u>                       | i      | 4           |                             |                            |                           |
| Slender rush<br><u>J. tenuis</u>                           | n      | 7,8         |                             |                            |                           |
| LAMIACEAE (LABIATAE) - MINT FAMILY                         |        |             |                             |                            |                           |
| Yellow giant hyssop<br><u>Agastache nepetoides</u>         | n      | 8           |                             |                            |                           |
| Ground ivy<br><u>Glechoma hederacea</u>                    | e      | 2,8         |                             |                            | 1.7                       |
| Cut-leaved water<br>horehound<br><u>Lycopus americanus</u> | n      | 4           |                             |                            |                           |
| Bugleweed<br><u>L. virginicus</u>                          | n      | 4           |                             |                            | 2.4                       |
| Wild mint<br><u>Mentha arvensis</u>                        | n      | 4           |                             |                            | 1.2                       |
| Wild bergamot<br><u>Monarda fistulosa</u>                  | n      | 2           |                             |                            |                           |
| Selfheal<br><u>Prunella vulgaris</u>                       | n & e  | 2           |                             |                            |                           |
| Virginia mountain-mint<br><u>Pycnanthemum virginianum</u>  | n      | 2           |                             |                            |                           |
| Mad-dog skullcap<br><u>Scutellaria lateriflora</u>         | n      | 4,8         |                             |                            |                           |

| Species                                                            | Origin | Cover Types | % Frequency in:             |                            |                           |
|--------------------------------------------------------------------|--------|-------------|-----------------------------|----------------------------|---------------------------|
|                                                                    |        |             | 100-m <sup>2</sup><br>Plots | 10-m <sup>2</sup><br>Plots | 1-m <sup>2</sup><br>Plots |
| Common hedge-nettle<br><u>Stachys tenuifolia</u>                   | n      | 8           |                             |                            |                           |
| American germander<br><u>Teucrium canadense</u>                    | n      | 4           |                             |                            |                           |
| Bluecurls<br><u>Trichostema dichotomum</u>                         | n      | 3           |                             |                            |                           |
| LAURACEAE - LAUREL FAMILY                                          |        |             |                             |                            |                           |
| Spicebush<br><u>Lindera benzoin</u>                                | n      | 5-9         | 5.1                         | 8.9                        | 2.4                       |
| Sassafras<br><u>Sassafras albidum</u>                              | n      | 5-9         | 9.6                         | 1.2                        | 0.5                       |
| LEMNACEAE - DUCKWEED FAMILY                                        |        |             |                             |                            |                           |
| Common duckweed<br><u>Lemna minor</u>                              | n      | 4           |                             |                            |                           |
| LILIACEAE - LILY FAMILY                                            |        |             |                             |                            |                           |
| Wild garlic<br><u>Allium oleraceum</u>                             | e      | 2           |                             |                            |                           |
| Field garlic<br><u>A. vineale</u>                                  | e      | 2, 7-9      |                             |                            | 8.2                       |
| Day lily<br><u>Hemerocallis fulva</u>                              | e      | 7           |                             |                            |                           |
| Blue plantain-lily<br><u>Hosta ventricosa</u>                      | e      | 8           |                             |                            |                           |
| Star of Bethlehem<br><u>Ornithogalum umbellatum</u>                | e      | 8           |                             |                            |                           |
| Solomon's seal<br><u>Polygonatum biflorum</u> var. <u>biflorum</u> | n      | 8           |                             |                            |                           |
| Great Solomon's seal<br><u>P. biflorum</u> var. <u>commutatum</u>  | n      | 8           |                             |                            |                           |

| Species                                           | Origin | Cover Types | % Frequency in:             |                            |                           |
|---------------------------------------------------|--------|-------------|-----------------------------|----------------------------|---------------------------|
|                                                   |        |             | 100-m <sup>2</sup><br>Plots | 10-m <sup>2</sup><br>Plots | 1-m <sup>2</sup><br>Plots |
| False Solomon's seal<br><u>Smilacina racemosa</u> | n      | 8           |                             |                            | 0.2                       |
| Wild oats<br><u>Uvularia sessilifolia</u>         | n      | 5,8         |                             |                            | 0.2                       |
| LINACEAE - FLAX FAMILY                            |        |             |                             |                            |                           |
| Wild yellow flax<br><u>Linum virginianum</u>      | n      | 2           |                             |                            |                           |
| LYTHRACEAE - LOOSESTRIFE FAMILY                   |        |             |                             |                            |                           |
| Purple loosestrife<br><u>Lythrum salicaria</u>    | e      | 4           |                             |                            | 7.5                       |
| Tooth-cup <sup>d</sup><br><u>Rotala ramosior</u>  | n      | 4           |                             |                            | 0.5                       |
| MAGNOLIACEAE - MAGNOLIA FAMILY                    |        |             |                             |                            |                           |
| Tulip tree<br><u>Liriodendron tulipifera</u>      | n      | 5,9         | 5.1                         |                            |                           |
| MALVACEAE - MALLOW FAMILY                         |        |             |                             |                            |                           |
| Velvetleaf<br><u>Abutilon theophrasti</u>         | e      | 2,3         |                             |                            |                           |
| Flower-of-an-hour<br><u>Hibiscus trionum</u>      | e      | 2,3         |                             |                            |                           |
| MENISPERMACEAE - MOONSEED FAMILY                  |        |             |                             |                            |                           |
| Canada moonseed<br><u>Menispermum canadense</u>   | n      | 9           |                             |                            |                           |
| MORACEAE - MULBERRY FAMILY                        |        |             |                             |                            |                           |
| Japanese hop<br><u>Humulus japonicus</u>          | e      | 7,8         |                             |                            | 0.2                       |

| Species                                                                | Origin | Cover Types | % Frequency in:             |                            |                           |
|------------------------------------------------------------------------|--------|-------------|-----------------------------|----------------------------|---------------------------|
|                                                                        |        |             | 100-m <sup>2</sup><br>Plots | 10-m <sup>2</sup><br>Plots | 1-m <sup>2</sup><br>Plots |
| Osage-orange<br><u>Maclura pomifera</u>                                | i      | 8           | 1.0                         |                            |                           |
| White mulberry<br><u>Morus alba</u>                                    | e      | 7,9         |                             |                            |                           |
| NYSSACEAE - TUPELO FAMILY                                              |        |             |                             |                            |                           |
| Black tupelo<br><u>Nyssa sylvatica</u>                                 | n      | 2,5         | 0.5                         |                            |                           |
| OLEACEAE - OLIVE FAMILY                                                |        |             |                             |                            |                           |
| Ash<br><u>Fraxinus americana</u> or <u>pennsylvanica</u>               | n      | 2-9         | 22.2                        | 2.9                        | 3.1                       |
| White ash<br><u>F. americana</u>                                       | n      | 4,7-9       | 8.6                         | 1.0                        | 0.2                       |
| Green or red ash<br><u>F. pennsylvanica</u>                            | n      | 3,8,9       | 1.5                         |                            |                           |
| Regal privet<br><u>Ligustrum obtusifolium</u>                          | e      | 7-9         |                             | 0.5                        |                           |
| ONAGRACEAE - EVENING-PRIMROSE FAMILY                                   |        |             |                             |                            |                           |
| Enchanter's nightshade<br><u>Circaea lutetiana</u>                     | n      | 5,9         |                             |                            | 1.2                       |
| Northern willow-herb<br><u>Epilobium ciliatum</u> ssp. <u>ciliatum</u> | n      | 3           |                             |                            |                           |
| Biennial gaura<br><u>Gaura biennis</u>                                 | n      | 8           |                             |                            |                           |
| Seedbox<br><u>Ludwigia alternifolia</u>                                | n      | 4           |                             |                            |                           |
| Water purslane<br><u>L. palustris</u>                                  | n      | 4           |                             |                            | 2.2                       |
| Common evening-primrose<br><u>Oenothera biennis</u>                    | n      | 2,3         |                             |                            | 1.2                       |

| Species                                                 | Origin | Cover Types | % Frequency in:             |                            |                           |
|---------------------------------------------------------|--------|-------------|-----------------------------|----------------------------|---------------------------|
|                                                         |        |             | 100-m <sup>2</sup><br>Plots | 10-m <sup>2</sup><br>Plots | 1-m <sup>2</sup><br>Plots |
| -----                                                   |        |             |                             |                            |                           |
| OSMUNDACEAE - ROYAL-FERN FAMILY                         |        |             |                             |                            |                           |
| Cinnamon fern<br><u>Osmunda cinnamomea</u>              | n      | 8           |                             |                            |                           |
| OXALIDACEAE - WOOD-SORREL FAMILY                        |        |             |                             |                            |                           |
| Wood-sorrel<br><u>Oxalis europaea</u> or <u>stricta</u> |        | 1-3,8,9     |                             |                            | 3.1                       |
| European wood-sorrel<br><u>O. europaea</u>              | e      | 1-3,8,9     |                             |                            |                           |
| Yellow wood-sorrel<br><u>O. stricta</u>                 | n      | 1-3,8,9     |                             |                            |                           |
| PAPAVERACEAE - POPPY FAMILY                             |        |             |                             |                            |                           |
| Celandine<br><u>Chelidonium majus</u>                   | e      | 8           |                             |                            |                           |
| PHYTOLACCACEAE - POKEWEED                               |        |             |                             |                            |                           |
| Pokeweed<br><u>Phytolacca americana</u>                 | n      | 3,6         |                             |                            | 0.2                       |
| PINACEAE - PINE FAMILY                                  |        |             |                             |                            |                           |
| Norway spruce<br><u>Picea abies</u>                     | e      | 5           | 1.0                         |                            |                           |
| White pine<br><u>Pinus strobus</u>                      | n      | 6,9         | 7.6                         |                            |                           |
| Scotch pine<br><u>P. sylvestris</u>                     | e      | 2,4,6,7,9   | 4.5                         | 1.0                        | 0.7                       |
| PLANTAGINACEAE - PLANTAIN FAMILY                        |        |             |                             |                            |                           |
| Bracted plantain<br><u>Plantago aristata</u>            | i      | 2           |                             |                            |                           |

| Species                                           | Origin | Cover Types | % Frequency in: |               |              |
|---------------------------------------------------|--------|-------------|-----------------|---------------|--------------|
|                                                   |        |             | 100-m<br>Plots  | 10-m<br>Plots | 1-m<br>Plots |
| English plantain<br><u>P. lanceolata</u>          | e      | 2           |                 |               | 0.5          |
| Common plantain<br><u>P. major</u>                | e      | 1,8         |                 |               | 0.7          |
| PLATANACEAE - PLANE-TREE FAMILY                   |        |             |                 |               |              |
| American sycamore<br><u>Platanus occidentalis</u> | n      | 2-4,6-10    | 16.2            | 0.2           | 0.7          |
| POACEAE (GRAMINEAE) - GRASS FAMILY                |        |             |                 |               |              |
| Unknown grass                                     |        | 1-4,6,8,9   |                 |               | 13.5         |
| Quackgrass<br><u>Agropyron repens</u>             | e      | 2           |                 |               |              |
| Bentgrass<br><u>Agrostis</u> spp.                 |        | 1,2,9       |                 |               | 7.9          |
| Bluestem<br><u>Andropogon</u> spp.                |        | 2           |                 |               |              |
| Broomsedge<br><u>A. virginicus</u>                | n      | 2           |                 |               |              |
| Sweet vernalgrass<br><u>Anthoxanthum odoratum</u> | e      | 1,2         |                 |               | 1.7          |
| Tall oat-grass<br><u>Arrhenatherum elatius</u>    | e      | 2           |                 |               | 1.0          |
| Brome<br><u>Bromus</u> spp.                       |        | 1,9         |                 |               | 0.7          |
| Sandbur<br><u>Cenchrus incertus</u>               | n      | 3           |                 |               |              |
| Orchard grass<br><u>Dactylis glomerata</u>        | e      | 1,2         |                 |               | 1.7          |
| Crabgrass<br><u>Digitaria</u> spp.                |        | 3           |                 |               | 0.7          |

| Species                                          | Origin | Cover Types | % Frequency in:             |                            |                           |
|--------------------------------------------------|--------|-------------|-----------------------------|----------------------------|---------------------------|
|                                                  |        |             | 100-m <sup>2</sup><br>Plots | 10-m <sup>2</sup><br>Plots | 1-m <sup>2</sup><br>Plots |
| Large crabgrass<br><u>D. sanguinalis</u>         | e      | 3           |                             |                            |                           |
| Barnyard grass<br><u>Echinochloa</u> spp.        |        | 3,9         |                             |                            | 0.2                       |
| Lovegrass<br><u>Eragrostis</u> spp.              |        | 2,3         |                             |                            | 0.7                       |
| Fescue<br><u>Festuca</u> spp.                    |        | 1,2         |                             |                            | 1.9                       |
| Tall or meadow fescue<br><u>F. elatior</u>       | e      | 2           |                             |                            |                           |
| Bottle-brush grass<br><u>Hystrix patula</u>      | n      | 8           |                             |                            |                           |
| Panicum<br><u>Panicum</u> spp.                   |        | 3,4,6-9     |                             |                            | 8.7                       |
| Paspalum<br><u>Paspalum</u> spp.                 |        | 2           |                             |                            |                           |
| Reed canarygrass<br><u>Phalaris arundinacea</u>  | n      | 4           |                             |                            | 0.7                       |
| Common Timothy<br><u>Phleum pratense</u>         | e      | 1,2         |                             |                            |                           |
| Common reed-grass<br><u>Phragmites australis</u> | n      | 3,4         |                             |                            | 0.2                       |
| Bluegrass<br><u>Poa</u> spp.                     |        | 1,2,9       |                             |                            | 1.4                       |
| Bristlegrass<br><u>Setaria</u> spp.              |        | 3           |                             |                            |                           |
| Purpletop<br><u>Tridens flavus</u>               | n      | 1-4,6,8,9   |                             |                            |                           |
| POLEMONIACEAE                                    |        |             |                             |                            |                           |
| Garden phlox<br><u>Phlox paniculata</u>          | n      | 8           |                             |                            |                           |

| Species                                                      | Origin | Cover Types | % Frequency in:    |                   |                  |
|--------------------------------------------------------------|--------|-------------|--------------------|-------------------|------------------|
|                                                              |        |             | 100-m <sup>2</sup> | 10-m <sup>2</sup> | 1-m <sup>2</sup> |
|                                                              |        |             | Plots              | Plots             | Plots            |
| -----                                                        |        |             |                    |                   |                  |
| ROSACEAE - ROSE FAMILY                                       |        |             |                    |                   |                  |
| Small-flowered agrimony<br><u>Agrimonia parviflora</u>       | n      | 8           |                    |                   |                  |
| Hawthorn<br><u>Crataegus</u> spp.                            |        | 7           |                    | 0.2               |                  |
| Indian strawberry<br><u>Duchesnea indica</u>                 | e      | 6,7,9       |                    |                   | 0.7              |
| Common strawberry<br><u>Fragaria virginiana</u>              | n      | 2,4         |                    |                   | 0.5              |
| White avens<br><u>Geum canadense</u>                         | n      | 8           |                    |                   | 5.8              |
| Crabapple<br><u>Malus</u> spp.                               |        | 2,4         | 0.5                |                   |                  |
| Cinquefoil<br><u>Potentilla canadensis</u> or <u>simplex</u> |        | 2           |                    |                   | 0.5              |
| Dwarf cinquefoil<br><u>P. canadensis</u>                     | n      | 2           |                    |                   |                  |
| Rough cinquefoil<br><u>P. norvegica</u>                      | n & e  | 3           |                    |                   | 0.2              |
| Rough-fruited cinquefoil<br><u>P. recta</u>                  | e      | 2           |                    |                   | 0.2              |
| Common cinquefoil<br><u>P. simplex</u>                       | n      | 1,2,4,5,7,9 |                    |                   | 8.9              |
| Sweet cherry<br><u>Prunus avium</u>                          | e      | 7-9         | 2.0                |                   |                  |
| Black cherry<br><u>P. serotina</u>                           | n      | 1-3,5-9     | 13.1               | 2.4               | 5.0              |
| Dog rose<br><u>Rosa canina</u>                               | e      | 9           |                    |                   |                  |
| Multiflora rose<br><u>R. multiflora</u>                      | e      | 1-9         |                    | 4.8               | 7.0              |

| Species                                             | Origin | Cover Types | % Frequency in:             |                            |                           |
|-----------------------------------------------------|--------|-------------|-----------------------------|----------------------------|---------------------------|
|                                                     |        |             | 100-m <sup>2</sup><br>Plots | 10-m <sup>2</sup><br>Plots | 1-m <sup>2</sup><br>Plots |
| Allegheny blackberry<br><u>Rubus allegheniensis</u> | n      | 1-3,5-9     |                             | 4.8                        | 9.4                       |
| Northern dewberry<br><u>R. flagellaris</u>          | n      | 1,2,4-9     |                             |                            | 7.9                       |
| Blackcap raspberry<br><u>R. occidentalis</u>        | n      | 5,7         |                             |                            | 0.2                       |
| Wine raspberry<br><u>R. phoenicolasius</u>          | e      | 7-9         |                             | 0.5                        | 1.4                       |
| RUBIACEAE - MADDER FAMILY                           |        |             |                             |                            |                           |
| Buttonbush<br><u>Cephalanthus occidentalis</u>      | n      | 4           |                             |                            |                           |
| Buttonweed<br><u>Diodia teres</u>                   | n      | 3           |                             |                            | 0.5                       |
| Bedstraw<br><u>Galium</u> spp.                      |        | 2,9         |                             |                            | 0.2                       |
| Cleavers<br><u>G. aparine</u>                       | n      | 2           |                             |                            |                           |
| Wild madder<br><u>G. mollugo</u>                    | e      | 2           |                             |                            |                           |
| Clayton's bedstraw<br><u>G. tinctorium</u>          | n      | 2,4         |                             |                            |                           |
| Fragrant bedstraw<br><u>G. triflorum</u>            | n      | 6           |                             |                            |                           |
| SALICACEAE - WILLOW FAMILY                          |        |             |                             |                            |                           |
| Eastern cottonwood<br><u>Populus deltoides</u>      | i      | 4,10        | 2.0                         | 1.0                        |                           |
| Bigtooth aspen<br><u>P. grandidentata</u>           | n      | 3,4,9       | 3.0                         | 0.2                        |                           |
| Pussy willow<br><u>Salix discolor</u>               | n      | 4           | 1.0                         | 0.5                        | 0.2                       |

| Species                                             | Origin | Cover Types | % Frequency in:             |                            |                           |
|-----------------------------------------------------|--------|-------------|-----------------------------|----------------------------|---------------------------|
|                                                     |        |             | 100-m <sup>2</sup><br>Plots | 10-m <sup>2</sup><br>Plots | 1-m <sup>2</sup><br>Plots |
| Black willow<br><u>S. nigra</u>                     | n      | 4,10        | 1.0                         | 1.2                        |                           |
| SAURURACEAE - LIZARD'S TAIL FAMILY                  |        |             |                             |                            |                           |
| Lizard's tail<br><u>Saururus cernuus</u>            | n      | 4           |                             |                            |                           |
| SAXIFRAGACEAE - SAXIFRAGE FAMILY                    |        |             |                             |                            |                           |
| Ditch stonecrop<br><u>Penthorum sedoides</u>        | n      | 4           |                             |                            |                           |
| Mock orange<br><u>Philadelphus coronarius</u>       | e      | 8           |                             |                            |                           |
| SCROPHULARIACEAE - FIGWORT FAMILY                   |        |             |                             |                            |                           |
| Clammy hedge-hyssop<br><u>Gratiola neglecta</u>     | n      | 4           |                             |                            | 0.2                       |
| Butter-and-eggs<br><u>Linaria vulgaris</u>          | e      | 2           |                             |                            | 0.5                       |
| False pimpernel<br><u>Lindernia dubia</u>           | n      | 4           |                             |                            |                           |
| Winged monkey flower<br><u>Mimulus alatus</u>       | n      | 4           |                             |                            |                           |
| Foxglove beardtongue<br><u>Penstemon digitalis</u>  | i      | 2           |                             |                            |                           |
| Hairy beardtongue<br><u>P. hirsutus</u>             | n      | 2           |                             |                            |                           |
| Maryland figwort<br><u>Scrophularia marilandica</u> | n      | 8           |                             |                            |                           |
| Moth mullein<br><u>Verbascum blattaria</u>          | e      | 3           |                             |                            |                           |
| Common mullein<br><u>V. thapsus</u>                 | e      | 2,3         |                             |                            |                           |

| Species                                              | Origin | Cover Types | % Frequency in:             |                            |                           |
|------------------------------------------------------|--------|-------------|-----------------------------|----------------------------|---------------------------|
|                                                      |        |             | 100-m <sup>2</sup><br>Plots | 10-m <sup>2</sup><br>Plots | 1-m <sup>2</sup><br>Plots |
| Corn speedwell<br><u>Veronica arvensis</u>           | e      | 9           |                             |                            | 0.5                       |
| Common speedwell<br><u>V. officinalis</u>            | e      | 2           |                             |                            | 0.2                       |
| Purslane speedwell<br><u>V. peregrina</u>            | n      | 8           |                             |                            | 0.2                       |
| SIMAROUBACEAE - QUASSIA FAMILY                       |        |             |                             |                            |                           |
| Tree-of-heaven<br><u>Ailanthus altissima</u>         | e      | 2,3,7-9     | 6.6                         | 2.4                        | 0.7                       |
| SMILACACEAE - GREENBRIER FAMILY                      |        |             |                             |                            |                           |
| Glaucous greenbrier<br><u>Smilax glauca</u>          | n      | 9           |                             |                            |                           |
| SOLANACEAE - NIGHTSHADE FAMILY                       |        |             |                             |                            |                           |
| Clammy ground cherry<br><u>Physalis heterophylla</u> | n      | 1,2         |                             |                            | 0.2                       |
| Horse nettle<br><u>Solanum carolinense</u>           | i      | 2           |                             |                            |                           |
| Bitter nightshade<br><u>S. dulcamara</u>             | e      | 3,8         |                             |                            | 0.2                       |
| STAPHYLEACEAE - BLADDERNUT FAMILY                    |        |             |                             |                            |                           |
| Bladdernut<br><u>Staphylea trifolia</u>              | n      | 8           |                             | 0.5                        | 0.5                       |
| TILIACEAE - BASSWOOD FAMILY                          |        |             |                             |                            |                           |
| American basswood<br><u>Tilia americana</u>          | n      | 8           | 0.5                         |                            |                           |

| Species                                            | Origin | Cover Types | % Frequency in:             |                            |                           |
|----------------------------------------------------|--------|-------------|-----------------------------|----------------------------|---------------------------|
|                                                    |        |             | 100-m <sup>2</sup><br>Plots | 10-m <sup>2</sup><br>Plots | 1-m <sup>2</sup><br>Plots |
| -----                                              |        |             |                             |                            |                           |
| TYPHACEAE - CATTAIL FAMILY                         |        |             |                             |                            |                           |
| Broad-leaved cattail<br><u>Typha latifolia</u>     | n      | 4           |                             |                            |                           |
|                                                    |        |             |                             |                            |                           |
| ULMACEAE - ELM FAMILY                              |        |             |                             |                            |                           |
| Hackberry<br><u>Celtis occidentalis</u>            | n      | 8           | 1.0                         |                            |                           |
|                                                    |        |             |                             |                            |                           |
| Elm<br><u>Ulmus americana</u> or <u>rubra</u>      |        | 1,4,6-9     | 13.1                        | 3.8                        | 1.2                       |
|                                                    |        |             |                             |                            |                           |
| American elm<br><u>U. americana</u>                | n      | 4,7-9       | 1.5                         | 0.2                        |                           |
|                                                    |        |             |                             |                            |                           |
| Slippery elm<br><u>U. rubra</u>                    | n      | 8           |                             |                            |                           |
|                                                    |        |             |                             |                            |                           |
| URTICACEAE - NETTLE FAMILY                         |        |             |                             |                            |                           |
| False nettle<br><u>Boehmeria cylindrica</u>        | n      | 8           |                             |                            |                           |
|                                                    |        |             |                             |                            |                           |
| Wood nettle<br><u>Laportea canadensis</u>          | n      | 8           |                             |                            | 1.4                       |
|                                                    |        |             |                             |                            |                           |
| Clearweed<br><u>Pilea pumila</u>                   | n      | 8           |                             |                            |                           |
|                                                    |        |             |                             |                            |                           |
| Stinging nettle<br><u>Urtica dioica</u>            | e      | 8           |                             |                            |                           |
|                                                    |        |             |                             |                            |                           |
| VALERIANACEAE - VALERIAN FAMILY                    |        |             |                             |                            |                           |
| European corn salad<br><u>Valerianella locusta</u> | e      | 2           |                             |                            |                           |
|                                                    |        |             |                             |                            |                           |
| VERBENACEAE - VERVAIN FAMILY                       |        |             |                             |                            |                           |
| Blue vervain<br><u>Verbena hastata</u>             | n      | 2,4,8       |                             |                            |                           |

| Species                                                             | Origin | Cover Types | % Frequency in:             |                            |                           |
|---------------------------------------------------------------------|--------|-------------|-----------------------------|----------------------------|---------------------------|
|                                                                     |        |             | 100-m <sup>2</sup><br>Plots | 10-m <sup>2</sup><br>Plots | 1-m <sup>2</sup><br>Plots |
| White vervain<br><u>V. urticifolia</u>                              | n      | 8           |                             |                            | 0.2                       |
| VIOLACEAE - VIOLET FAMILY                                           |        |             |                             |                            |                           |
| Common blue violet<br><u>Viola sororia</u>                          | n      | 1,2,8       |                             |                            | 3.8                       |
| Pale violet<br><u>V. striata</u>                                    | n      | 8           |                             |                            | 0.5                       |
| VITACEAE - GRAPE FAMILY                                             |        |             |                             |                            |                           |
| Virginia creeper,<br>woodbine<br><u>Parthenocissus quinquefolia</u> | n      | 1-3,5-10    |                             |                            | 11.1                      |
| Grape<br><u>Vitis</u> spp.                                          |        | 2,3,7-9     | 0.5                         | 1.0                        | 2.4                       |
| Summer grape<br><u>V. aestivalis</u>                                | n      | 7           |                             |                            |                           |
| Frost grape<br><u>V. vulpina</u>                                    | n      | 7           |                             |                            |                           |

a Nomenclature follows Kartesz and Kartesz (1980), which also may be consulted for botanical authors and synonyms.

b e = exotic, i = introduced from other parts of the U.S.,  
n = native to southeastern Pennsylvania

c 1 = mowed field, 2 = old field, 3 = waste area, 4 = pond,  
5 = mature woods, 6 = pine plantation, 7 = successional woods on the  
embankment, 8 = successional woods on the floodplain, 9 = successional  
woods in the interior of the basin, 10 = swamp

d see "Rare, Threatened, and Endangered Species"

## Cover Types

Four major plant communities comprise the PRA: fields, waste areas, wetlands, and woods. These have been divided into 10 specific cover types based on dominant vegetation and site conditions in the PRA (Figure 4).

Herbaceous vegetation undergoes considerable change among seasons, particularly in the old fields and waste areas. Thus, for these two cover types, dominant ground cover species are noted in both May and July. Ground cover in other cover types did not change as dramatically during the field season and, therefore, was recorded only in May. However, winter and early spring ground cover in all areas can be expected to vary greatly from summer composition.

Fields are defined as areas of dense ground cover with canopy cover less than 20%. Vegetation consists mainly of grasses and herbaceous plants. Two types of field occur in the PRA.

Mowed fields - These areas were cut at some time during 1983 or 1984. Generally, mowing was done only once per year, but certain sections were mowed at approximately 2-week intervals. Few woody plants occur (Table 3).

Old fields - These areas were not mowed in 1983 or 1984 and contain some shrubs in addition to the herbaceous plants (Table 4).

Waste areas are characterized by sparse or patchy vegetative

Figure 4. Cover type distribution in the proposed Pawling Recreation Area, Valley Forge National Historical Park, Pennsylvania.

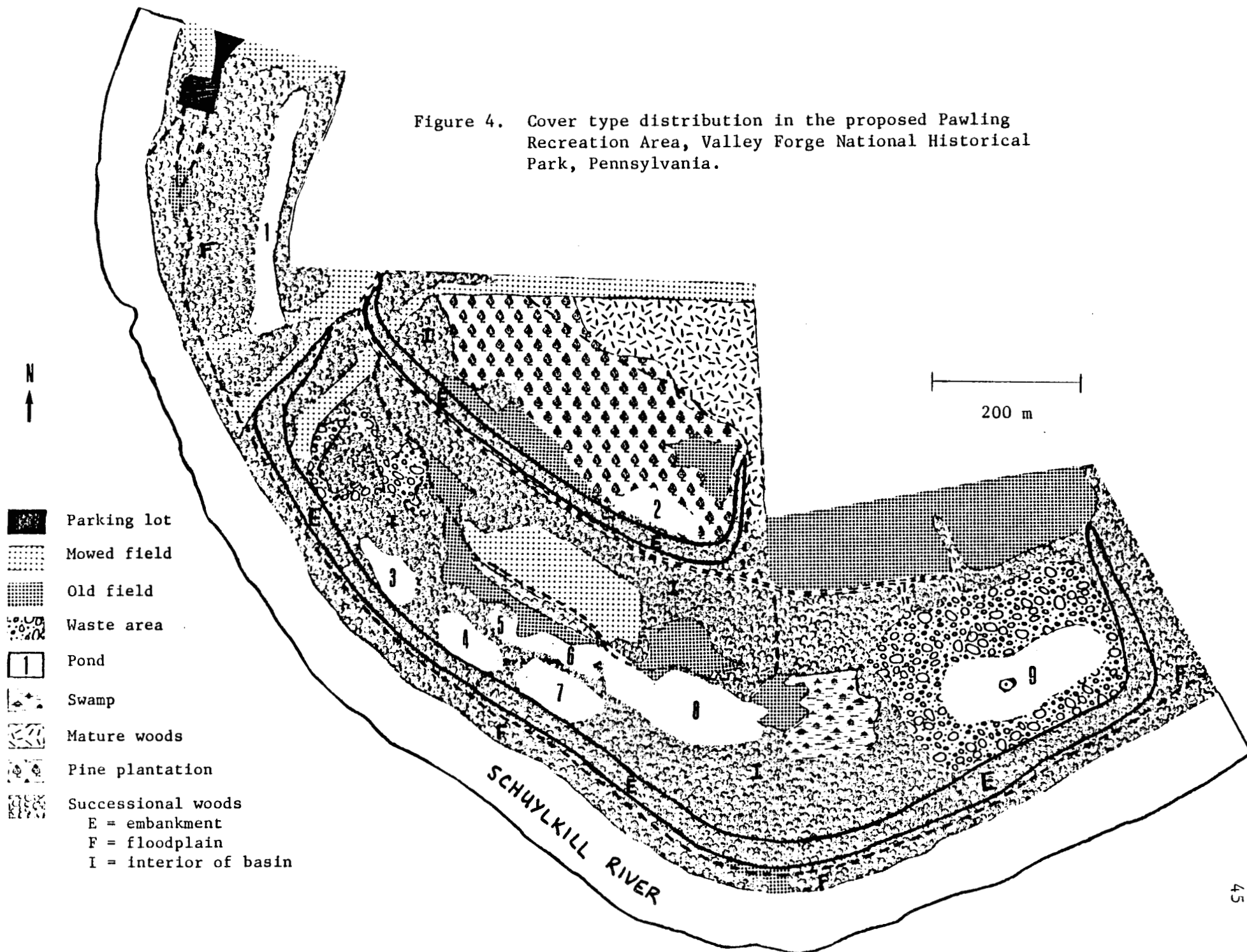


Table 3. Dominant vegetation in mowed fields of the proposed  
Pawling Recreation Area, Valley Forge National  
Historical Park, Pennsylvania.

---

TREES

none

SHRUBS

none

| GROUND COVER             | <u>Average % cover</u> | <u>% Frequency</u> |
|--------------------------|------------------------|--------------------|
| Bentgrass                | 23.7                   | 58.8               |
| Common cinquefoil        | 15.4                   | 64.7               |
| Unknown grass            | 12.9                   | 23.5               |
| Goldenrod                | 5.9                    | 70.6               |
| Brome                    | 8.8                    | 11.8               |
| Northern dewberry        | 2.1                    | 47.1               |
| Bluegrass                | 3.5                    | 11.8               |
| Sweet vernalgrass        | 3.2                    | 11.8               |
| Round-headed bush-clover | 1.7                    | 41.2               |

Table 4. Dominant vegetation in old fields of the proposed  
Pawling Recreation Area, Valley Forge National  
Historical Park, Pennsylvania.

TREES

none

| SHRUBS          | <u>Average density (N/ha)</u> | <u>% Frequency</u> |
|-----------------|-------------------------------|--------------------|
| Multiflora rose | 838                           | 8.1                |
| Scotch pine     | 622                           | 10.8               |

| GROUND COVER - May   | <u>Average % cover</u> |      |
|----------------------|------------------------|------|
| Goldenrod            | 40.8                   | 91.9 |
| Bentgrass            | 8.3                    | 56.8 |
| Japanese honeysuckle | 6.0                    | 29.7 |
| Common cinquefoil    | 5.7                    | 16.2 |
| Fescue               | 2.2                    | 21.6 |
| Multiflora rose      | 2.8                    | 13.5 |
| Sweet vernalgrass    | 2.8                    | 13.5 |

GROUND COVER - July

|                          |      |      |
|--------------------------|------|------|
| Unknown grass            | 28.8 | 91.7 |
| Goldenrod                | 11.4 | 91.7 |
| Japanese clover          | 10.4 | 50.0 |
| Aster                    | 8.8  | 66.7 |
| Common cinquefoil        | 0.0  | 50.0 |
| Round-headed bush-clover | 4.8  | 75.0 |
| Partridge pea            | 3.9  | 75.0 |
| Northern dewberry        | 2.3  | 41.7 |
| Panicled tick-trefoil    | 2.3  | 33.3 |

cover. These areas have large accumulations of coal silt and little topsoil due to desilting operations and are revegetating slowly. The eastern waste area has been recently bulldozed (1983) to remove coal silt, further delaying revegetation. Dominant plants are characteristic of disturbed sites (Table 5). Only one cover type is assigned to the waste areas.

Wetlands are defined as areas that contain surface water for at least 3 months per year and support aquatic life. In the PRA, wetlands occur in the form of small ponds (including a slough) and swamps. These are classified as palustrine wetlands by Cowardin et al. (1979). The areas adjacent to the ponds and the Schuylkill River often flood in spring (Figure 5). However, flooded areas are not considered to be wetlands unless the water remains for 3 or more months per year.

Ponds - Ponds are generally characterized by a center of open water with submerged aquatic plants, margins with emergent plants, and a border of shrubs and trees (Table 6, Figure 6).

Pond 1 is a slough of open water surrounded by successional woods. Pond 9 consists of open water only. The ponds remain water-filled throughout most years but may occasionally dry up.

Swamps - These areas contain surface water which rarely dries up and have trees and shrubs present throughout. Ground cover is

Table 5. Dominant vegetation in waste areas of the proposed  
Pawling Recreation Area, Valley Forge National  
Historical Park, Pennsylvania.

-----

TREES

none

| SHRUBS        | <u>Average density (N/ha)</u> | <u>% Frequency</u> |
|---------------|-------------------------------|--------------------|
| Black locust  | 641                           | 14.1               |
| Silky dogwood | 531                           | 9.4                |

| GROUND COVER - May | <u>Average % cover</u> |      |
|--------------------|------------------------|------|
| Unknown grass      | 9.3                    | 45.3 |
| Panicum            | 7.3                    | 15.6 |
| Goldenrod          | 3.6                    | 26.6 |
| Lady's thumb       | 2.4                    | 34.4 |
| Common ragweed     | 2.4                    | 29.7 |

| GROUND COVER - July  |      |      |
|----------------------|------|------|
| Unknown grass        | 26.3 | 100  |
| Common ragweed       | 8.4  | 41.7 |
| Buttonweed           | 5.2  | 25.0 |
| Bluecurls            | 3.8  | 16.7 |
| Wild sensitive plant | 2.5  | 16.7 |

Figure 5. Typical extent of flooding in the proposed Pawling Recreation Area, Valley Forge National Historical Park, Pennsylvania.

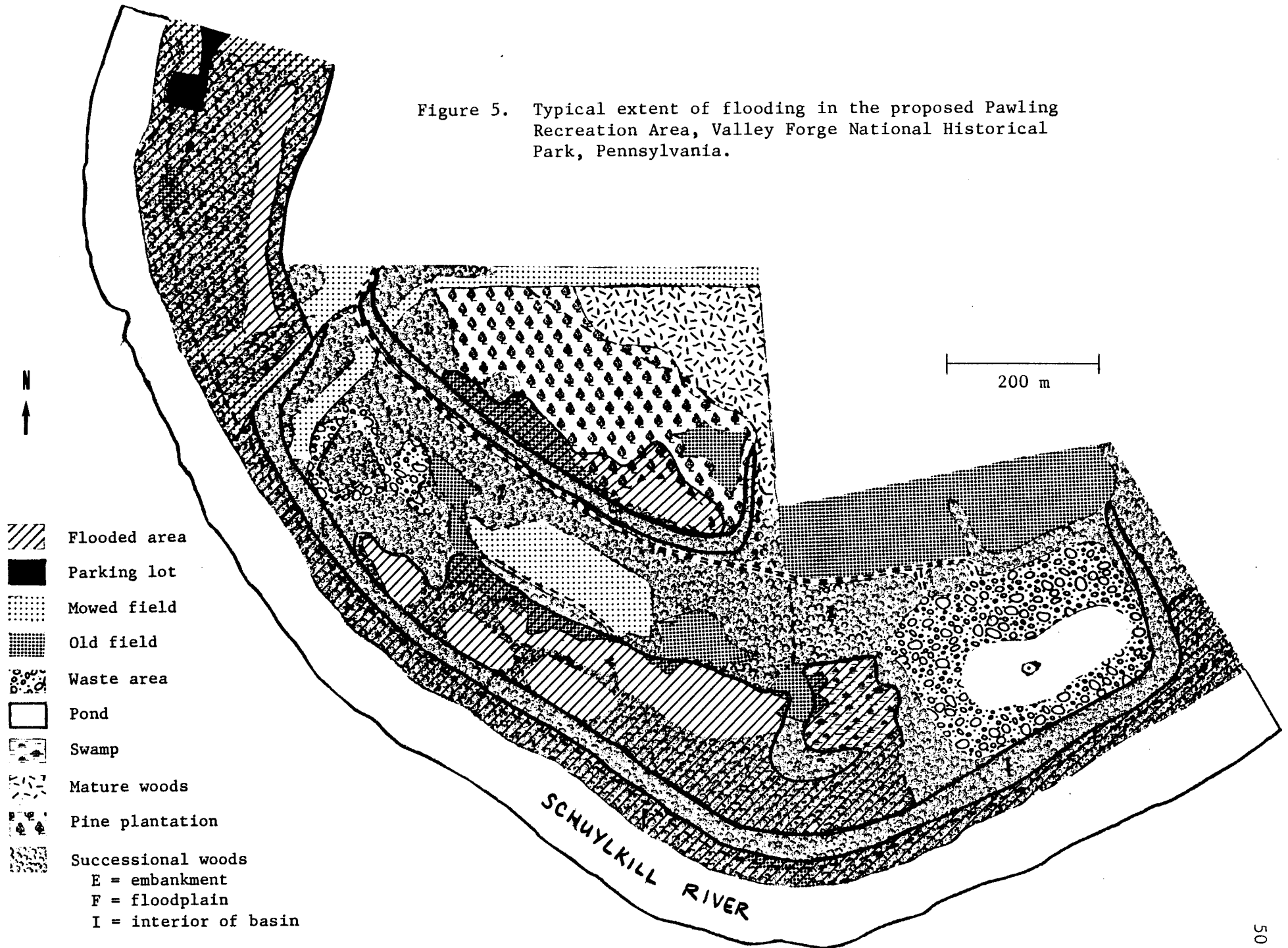
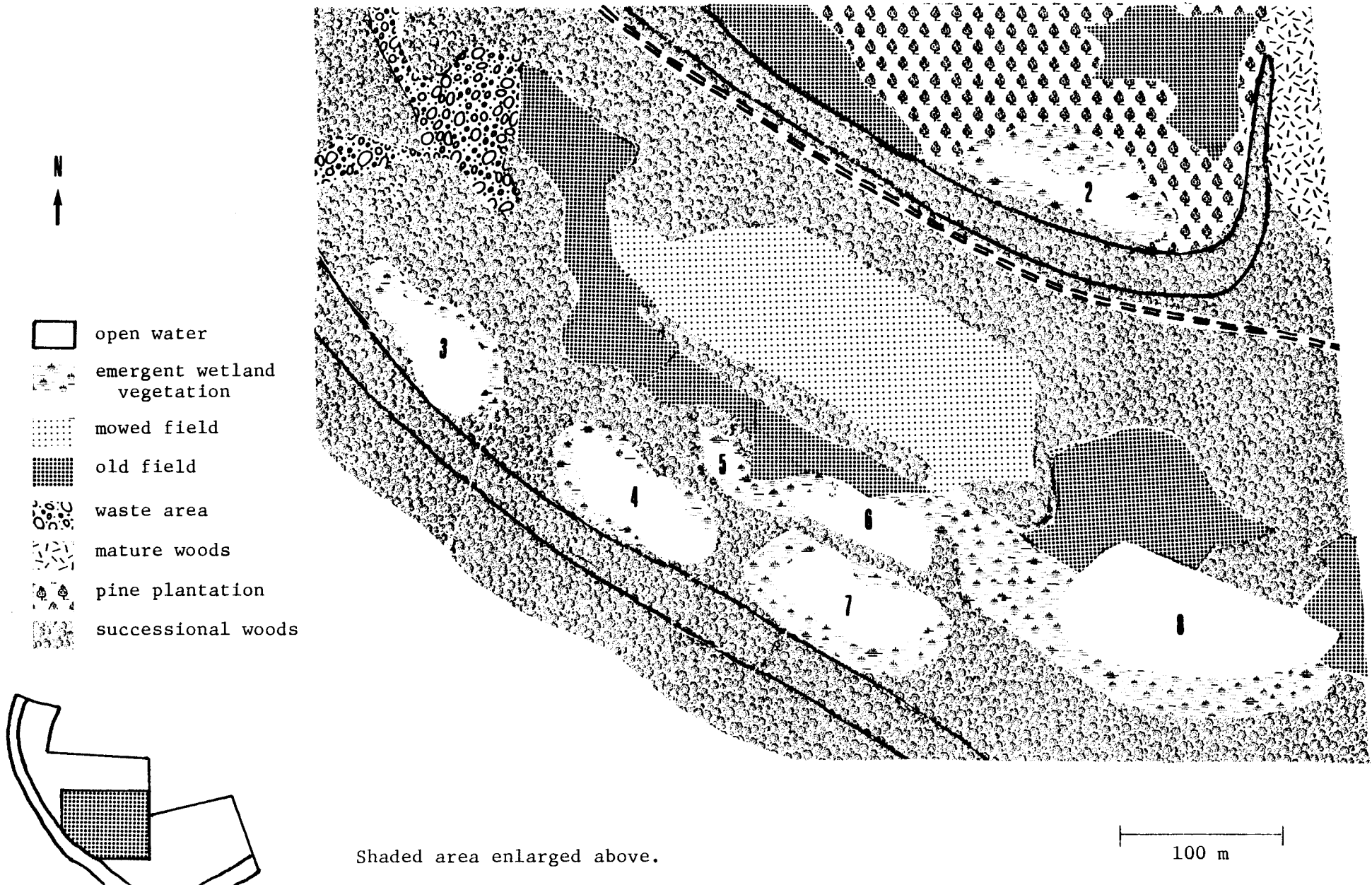


Table 6. Dominant vegetation in ponds of the proposed Pawling Recreation Area, Valley Forge National Historical Park, Pennsylvania.

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| TREES                    | <u>Average density (N/ha)</u> | <u>% Frequency</u> |
|--------------------------|-------------------------------|--------------------|
| River birch              | 222                           | 44.4               |
| Ash                      | 233                           | 33.3               |
| Sycamore                 | 111                           | 55.6               |
| Eastern cottonwood       | 211                           | 11.1               |
| Pussy willow             | 144                           | 22.2               |
|                          |                               |                    |
| SHRUBS                   |                               |                    |
| Silky dogwood            | 3310                          | 46.2               |
| River birch              | 1850                          | 12.8               |
| Black willow             | 410                           | 10.3               |
|                          |                               |                    |
| GROUND COVER             | <u>Average % cover</u>        |                    |
| Purple loosestrife       | 21.2                          | 71.8               |
| Unknown grass            | 6.2                           | 25.6               |
| Water purslane           | 2.2                           | 23.1               |
| Purple-headed sneezeweed | 3.2                           | 10.3               |

Figure 6. Detail of Ponds 2 - 8 in the proposed Pawling Recreation Area, Valley Forge National Historical Park, Pennsylvania.



restricted to moisture-tolerant plants in shallow areas (Table 7).

Woods are characterized by a well-developed overstory of trees, with canopy closure greater than 20%. Understory vegetation consists of shrubs, saplings, and vines, and ground cover consists of herbaceous plants and seedlings. The woods in the PRA are of three types: mature woods, pine plantations, and successional woods.

**Mature woods -** These are deciduous woods containing climax species (Table 8) that are expected to remain the dominant vegetation. The understory is not dense, but ground cover is well developed.

**Pine plantations -** These areas are dominated by either white pine or Scotch pine planted in rows (Table 9). Little understory or ground cover is present except in openings.

**Successional woods -** These are deciduous woods that contain less shade-tolerant tree species than the mature woods. Understory and ground cover are dense. These areas have the potential to become mature woods over time. Successional woods in the PRA are further differentiated into three categories based on site conditions: embankment, floodplain, and

Table 7. Dominant vegetation in swamps of the proposed Pawling Recreation Area, Valley Forge National Historical Park, Pennsylvania.

| -----              |                               |                    |
|--------------------|-------------------------------|--------------------|
| TREES              | <u>Average density (N/ha)</u> | <u>% Frequency</u> |
| Eastern cottonwood | 733                           | 100                |
| River birch        | 200                           | 66.7               |
| Silver maple       | 133                           | 33.3               |
|                    |                               |                    |
| SHRUBS             |                               |                    |
| Silky dogwood      | 5800                          | 60.0               |
| River birch        | 5800                          | 40.0               |
| Eastern cottonwood | 2200                          | 40.0               |
| Black willow       | 1200                          | 20.0               |
|                    |                               |                    |
| GROUND COVER       | <u>Average % cover</u>        |                    |
| Wild mint          | 16.0                          | 40.0               |
| Purple loosestrife | 4.0                           | 60.0               |
| River birch        | 5.0                           | 20.0               |
| Smartweed          | 3.0                           | 20.0               |

Table 8. Dominant vegetation in mature woods of the proposed  
Pawling Recreation Area, Valley Forge National  
Historical Park, Pennsylvania.

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| TREES                  | <u>Average density (N/ha)</u> | <u>% Frequency</u> |
|------------------------|-------------------------------|--------------------|
| Red maple              | 290                           | 80.0               |
| Flowering dogwood      | 290                           | 70.0               |
| Tulip tree             | 150                           | 50.0               |
| Sassafras              | 120                           | 40.0               |
|                        |                               |                    |
| SHRUBS                 |                               |                    |
| Allegheny blackberry   | 850                           | 10.0               |
| Flowering dogwood      | 500                           | 20.0               |
|                        |                               |                    |
| GROUND COVER           | <u>Average % cover</u>        |                    |
| Japanese honeysuckle   | 26.4                          | 80.0               |
| Poison ivy             | 5.9                           | 55.0               |
| Enchanter's nightshade | 5.7                           | 20.0               |
| Oriental bittersweet   | 3.7                           | 25.0               |

Table 9. Dominant vegetation in the pine plantations of the proposed Pawling Recreation Area, Valley Forge National Historical Park, Pennsylvania.

| -----                |                               |                    |
|----------------------|-------------------------------|--------------------|
| TREES                | <u>Average density (N/ha)</u> | <u>% Frequency</u> |
| White pine           | 713                           | 86.7               |
| Scotch pine          | 320                           | 26.7               |
|                      |                               |                    |
| SHRUBS               |                               |                    |
| Oriental bittersweet | 700                           | 30.0               |
| Silky dogwood        | 300                           | 13.3               |
|                      |                               |                    |
| GROUND COVER         | <u>Average % cover</u>        |                    |
| Oriental bittersweet | 10.2                          | 36.7               |

interior of basin.

Embankment - These areas have moderate soil moisture and soil richness. Vegetation (Table 10) is expected to be replaced eventually by species found in the mature woods.

Floodplain - The soil of the river floodplain is rich but is subject to periodic inundation. Vegetation consists of moisture-tolerant species (Table 11). Due to the flooding, the present tree species are likely to persist and not be replaced by the climax species found in the mature woods.

Interior of basin - The soil inside the basins is poor due to removal of topsoil when building the embankments and due to the presence of coal silt. Many areas are subject to spring flooding. The present vegetation (Table 12) is likely to be replaced by climax species, except in areas subject to repeated flooding.

There are no dominant tree species in mowed fields, old fields, or waste areas. However, certain trees do occur in each of these cover types. Boxelder, Scotch pine, and black locust are the most common species in mowed fields, old fields, and waste areas, respectively. No shrub species occur in mowed fields.

Table 10. Dominant vegetation in the successional woods on the embankments of the proposed Pawling Recreation Area, Valley Forge National Historical Park, Pennsylvania.

| -----                |                               |                    |
|----------------------|-------------------------------|--------------------|
| TREES                | <u>Average density (N/ha)</u> | <u>% Frequency</u> |
| Boxelder             | 171                           | 66.7               |
| Ash                  | 171                           | 41.7               |
| Black locust         | 125                           | 33.3               |
| Flowering dogwood    | 133                           | 29.2               |
|                      |                               |                    |
| SHRUBS               |                               |                    |
| Oriental bittersweet | 1400                          | 24.0               |
| Multiflora rose      | 1160                          | 22.0               |
| Japanese honeysuckle | 1220                          | 12.0               |
| Black locust         | 740                           | 10.0               |
| Boxelder             | 260                           | 16.0               |
|                      |                               |                    |
| GROUND COVER         | <u>Average % cover</u>        |                    |
| Japanese honeysuckle | 30.9                          | 90.0               |
| Garlic mustard       | 9.7                           | 50.0               |
| Poison ivy           | 8.7                           | 48.0               |
| Oriental bittersweet | 7.1                           | 32.0               |
| Multiflora rose      | 2.4                           | 18.0               |

Table 11. Dominant vegetation in the successional woods on the floodplain of the proposed Pawling Recreation Area, Valley Forge National Historical Park, Pennsylvania.

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| TREES                | <u>Average density (N/ha)</u> | <u>% Frequency</u> |
|----------------------|-------------------------------|--------------------|
| Boxelder             | 219                           | 69.4               |
| Ash                  | 122                           | 50.0               |
| Silver maple         | 117                           | 33.3               |
|                      |                               |                    |
| SHRUBS               |                               |                    |
| Spicebush            | 1583                          | 37.5               |
| Japanese knotweed    | 2153                          | 11.1               |
| Bladdernut           | 778                           | 2.8                |
| Boxelder             | 250                           | 16.7               |
|                      |                               |                    |
| GROUND COVER         | <u>Average % cover</u>        |                    |
| Poison ivy           | 16.1                          | 54.2               |
| Lesser celandine     | 13.7                          | 27.8               |
| Japanese honeysuckle | 9.3                           | 51.4               |
| Jewelweed            | 3.1                           | 47.2               |
| Common violet        | 2.8                           | 16.7               |

Table 12. Dominant vegetation in the successional woods,  
interior of the basin, of the proposed Pawling  
Recreation Area, Valley Forge National Historical  
Park, Pennsylvania.

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| TREES                | <u>Average density (N/ha)</u> | <u>% Frequency</u> |
|----------------------|-------------------------------|--------------------|
| Black cherry         | 227                           | 36.6               |
| Black locust         | 144                           | 36.6               |
| Flowering dogwood    | 149                           | 31.7               |
| Ash                  | 112                           | 41.5               |
| Boxelder             | 112                           | 29.3               |
|                      |                               |                    |
| SHRUBS               |                               |                    |
| Silky dogwood        | 866                           | 25.6               |
| Field bindweed       | 634                           | 12.2               |
| Oriental bittersweet | 573                           | 11.0               |
| Spicebush            | 451                           | 6.1                |
|                      |                               |                    |
| GROUND COVER         | <u>Average % cover</u>        |                    |
| Japanese honeysuckle | 25.1                          | 79.3               |
| Panicum              | 7.2                           | 20.7               |
| Goldenrod            | 4.2                           | 32.9               |
| Garlic mustard       | 3.8                           | 32.9               |
| Poison ivy           | 3.6                           | 24.4               |
| Common cinquefoil    | 3.0                           | 20.7               |
| Oriental bittersweet | 2.9                           | 20.7               |
| Allegheny blackberry | 2.7                           | 22.0               |

Of the ten cover types, plant diversity was greatest in the successional woods on the floodplain (Table 13). Cover types with community similarity coefficients above 50% can be considered similar (Barbour et al. 1980). No community similarity coefficient exceeded 50% in pairwise comparisons of the ten cover types (Table 14). The most similar cover types in the PRA are the successional woods on the embankment and in the interior of the basin, with SC = 49%. Thus, all cover types described for the PRA are distinct. The least similar cover types are swamps and mature woods, with SC = 5%.

Although each cover type is distinct, vegetation within each is not homogeneous. For example, where roads or trails traverse a cover type, disturbed areas are created that often support different plants. Depressions in the dirt road and waste areas contain puddles that may support aquatic plants. Openings in the pine plantations contain hardwood trees; ground cover in these openings is denser than that found under the pines. Similarly, successional woods in the interior of the basin that flood annually have little ground cover compared to the drier sections. Also, where two cover types meet, creating an edge, plants from both communities are present producing a zone of increased plant diversity.

Table 13. Summary of vegetation characteristics for each cover type in the proposed Pawling Recreation Area, Valley Forge National Historical Park, Pennsylvania.

|                    | N of <sub>2</sub><br>100-m <sup>2</sup><br>plots | N of<br>tree<br>species | Avg.<br>tree<br>stems<br>(N/ha) | N of<br>10-m <sup>2</sup> /<br>1-m <sup>2</sup><br>plots | N of<br>shrub<br>species | Avg.<br>shrub<br>stems<br>(N/ha) | N of<br>ground<br>cover<br>species | Avg.<br>Cover<br>(%) |
|--------------------|--------------------------------------------------|-------------------------|---------------------------------|----------------------------------------------------------|--------------------------|----------------------------------|------------------------------------|----------------------|
| Mowed field        | 8                                                | 3                       | 100                             | 17                                                       | 0                        | 0                                | 30                                 | 89.3                 |
| Old field          | 18                                               | 8                       | 233                             | 37                                                       | 10                       | 2297                             | 51                                 | 91.9                 |
| Waste area         | 34                                               | 9                       | 153                             | 64                                                       | 8                        | 1547                             | 37                                 | 35.8                 |
| Pond               | 9                                                | 11                      | 1033                            | 39                                                       | 12                       | 6077                             | 28                                 | 43.0                 |
| Swamp              | 3                                                | 5                       | 1200                            | 5                                                        | 4                        | 15000                            | 7                                  | 31.0                 |
| Mature woods       | 10                                               | 11                      | 1060                            | 20                                                       | 6                        | 1650                             | 21                                 | 51.8                 |
| Pine plantation    | 15                                               | 9                       | 1227                            | 30                                                       | 7                        | 1400                             | 26                                 | 24.9                 |
| Successional woods |                                                  |                         |                                 |                                                          |                          |                                  |                                    |                      |
| embankment         | 24                                               | 25                      | 938                             | 50                                                       | 21                       | 6480                             | 36                                 | 65.4                 |
| floodplain         | 36                                               | 24                      | 728                             | 72                                                       | 26                       | 6764                             | 67                                 | 71.4                 |
| interior of basin  | 41                                               | 28                      | 1337                            | 82                                                       | 24                       | 4085                             | 54                                 | 66.7                 |

Table 14. Community similarity coefficients for cover types in the proposed Pawling Recreation Area, Valley Forge National Historical Park, Pennsylvania.

|                                       | MF | OF | WA | PO | SW | MW | PP | SE | SF | SI |
|---------------------------------------|----|----|----|----|----|----|----|----|----|----|
| Mowed field (MF)                      | -  | 33 | 15 | 12 | 8  | 17 | 18 | 17 | 16 | 23 |
| Old field (OF)                        |    | -  | 22 | 17 | 8  | 18 | 20 | 24 | 21 | 30 |
| Waste area (WA)                       |    |    | -  | 14 | 9  | 17 | 24 | 27 | 18 | 28 |
| Pond (PO)                             |    |    |    | -  | 27 | 10 | 21 | 19 | 11 | 18 |
| Swamp (SW)                            |    |    |    |    | -  | 5  | 13 | 9  | 7  | 9  |
| Mature woods (MW)                     |    |    |    |    |    | -  | 35 | 36 | 23 | 32 |
| Pine plantation (PP)                  |    |    |    |    |    |    | -  | 43 | 22 | 36 |
| Successional woods<br>embankment (SE) |    |    |    |    |    |    |    | -  | 36 | 49 |
| floodplain (SF)                       |    |    |    |    |    |    |    |    | -  | 34 |
| interior of basin (SI)                |    |    |    |    |    |    |    |    |    | -  |

## Birds

A total of 58 bird species was identified on the PRA from May through August 1984 (Table 15). The birds are classified as either breeding residents, permanent residents, or transients. Breeding residents are those that spend the breeding season (late spring - early summer) in the PRA, but migrate in the autumn. Permanent residents remain in the PRA year-round. Transients include birds that migrate through the PRA in spring or autumn (migrants) and those that are temporary, non-breeding visitors (visitants) in summer or winter (Wood 1979). This status was determined from field data and available references (Northwood 1959, Anonymous 1974, Wood 1979). Due to the limited length of the field season, few migrants and no winter visitants were observed. However, use of the PRA by these birds may be inferred from the birds seen at Mill Grove and those expected in Montgomery County (Appendix B).

Table 15. Birds identified in the proposed Pawling Recreation Area, Valley Forge National Historical Park, Pennsylvania, summer 1984.

| Species <sup>a</sup>                                    | Sta- <sup>b</sup><br>tus | Avg. N<br>per<br>Survey | Percentage of birds observed in: <sup>c</sup> |                   |     |     |     |                |
|---------------------------------------------------------|--------------------------|-------------------------|-----------------------------------------------|-------------------|-----|-----|-----|----------------|
|                                                         |                          |                         | Air                                           | Edge <sup>d</sup> | Fld | Was | Wds | Wet            |
| Pied-billed Grebe<br><u>Podilymbus podiceps</u>         | T                        | -                       |                                               |                   |     |     |     | X <sup>e</sup> |
| Great Blue Heron <sup>f</sup><br><u>Ardea herodias</u>  | T                        | 0.5                     |                                               |                   |     |     |     | 100            |
| Great Egret<br><u>Casmerodius albus</u>                 | T                        | -                       |                                               |                   |     |     |     | X              |
| Little Blue Heron<br><u>Egretta caerulea</u>            | T                        | -                       |                                               |                   |     |     |     | X              |
| Green-backed Heron<br><u>Butorides striatus</u>         | BR                       | 1.0                     |                                               |                   |     |     |     | 100            |
| Canada Goose<br><u>Branta canadensis</u>                | BR                       | 2.25                    |                                               | 44 A              |     |     |     | 56             |
| Wood Duck<br><u>Aix sponsa</u>                          | BR                       | 3.5                     |                                               |                   |     |     |     | 100            |
| American Black Duck<br><u>Anas rubripes</u>             | T                        | -                       |                                               |                   |     |     |     | X              |
| Mallard<br><u>Anas platyrhynchos</u>                    | PR                       | 3.75                    | 20                                            |                   |     |     |     | 80             |
| Scaup<br><u>Aythya sp.</u>                              | T                        | 0.5                     |                                               |                   |     |     |     | 100            |
| Turkey Vulture<br><u>Cathartes aura</u>                 | T                        | 1.25                    | 100                                           |                   |     |     |     |                |
| Osprey <sup>f</sup><br><u>Pandion haliaetus</u>         | T                        | 0.25                    | 100                                           |                   |     |     |     |                |
| Cooper's Hawk <sup>f</sup><br><u>Accipiter cooperii</u> | PR?                      | 0.25                    | 100                                           |                   |     |     |     |                |
| Red-tailed Hawk<br><u>Buteo jamaicensis</u>             | PR?                      | 0.5                     | 100                                           |                   |     |     |     |                |
| American Kestrel<br><u>Falco sparverius</u>             | PR                       | -                       | X                                             |                   |     |     |     |                |

| Species                                                               | Sta-<br>tus | Avg. N<br>per<br>Survey | Percentage of birds observed in: |              |     |     |     |     |
|-----------------------------------------------------------------------|-------------|-------------------------|----------------------------------|--------------|-----|-----|-----|-----|
|                                                                       |             |                         | Air                              | Edge         | Fld | Was | Wds | Wet |
| Ring-necked Pheasant<br><u>Phasianus colchicus</u>                    | PR          | 0.25                    |                                  |              |     |     | 100 |     |
| Killdeer<br><u>Charadrius vociferus</u>                               | BR          | 3.75                    |                                  |              |     | 100 |     |     |
| American Woodcock<br><u>Scolopax minor</u>                            | T           | -                       |                                  |              |     |     |     | X   |
| Mourning Dove<br><u>Zenaida macroura</u>                              | PR          | 1.25                    |                                  |              | 20  | 80  |     |     |
| Yellow-billed Cuckoo<br><u>Coccyzus americanus</u>                    | BR          | 0.75                    |                                  |              |     |     | 100 |     |
| Belted Kingfisher<br><u>Ceryle alcyon</u>                             | BR          | 1.0                     |                                  |              |     |     | 25  | 75  |
| Hairy Woodpecker<br><u>Picoides villosus</u>                          | PR          | 0.5                     |                                  |              |     |     | 100 |     |
| Northern Flicker<br><u>Colaptes auratus</u>                           | PR          | 0.5                     |                                  | 50 A         | 50  |     |     |     |
| Eastern Wood-Pewee<br><u>Conoptus virens</u>                          | BR          | 0.75                    |                                  | 33 A<br>33 B |     |     | 33  |     |
| Acadian Flycatcher<br><u>Empidonax virescens</u>                      | BR?         | -                       |                                  |              |     |     |     | X   |
| Least Flycatcher <sup>f</sup><br><u>Empidonax minimus</u>             | BR?         | -                       |                                  |              |     |     |     | X   |
| Great Crested<br>Flycatcher<br><u>Myiarchus crinitus</u>              | BR          | -                       |                                  |              |     |     |     | X   |
| Eastern Kingbird<br><u>Tyrannus tyrannus</u>                          | BR          | 0.75                    |                                  |              | 33  |     |     | 67  |
| Northern Rough-winged<br>Swallow<br><u>Stelgidopteryx serripennis</u> | T           | -                       |                                  |              |     |     |     | X   |
| Barn Swallow<br><u>Hirundo rustica</u>                                | BR          | 4.25                    |                                  |              | 6   |     |     | 94  |
| Blue Jay<br><u>Cyanocitta cristata</u>                                | PR          | 3.0                     | 25                               | 17 A         | 17  |     | 42  |     |

| Species                                          | Sta-<br>tus | Avg. N<br>per<br>Survey | Percentage of birds observed in: |                    |     |     |     |     |
|--------------------------------------------------|-------------|-------------------------|----------------------------------|--------------------|-----|-----|-----|-----|
|                                                  |             |                         | Air                              | Edge               | Fld | Was | Wds | Wet |
| American Crow<br><u>Corvus brachyrhynchos</u>    | PR          | 3.75                    | 7                                |                    | 47  | 13  | 33  |     |
| Carolina Chickadee<br><u>Parus carolinensis</u>  | PR          | 2.25                    |                                  | 22 A               |     |     | 78  |     |
| Tufted Titmouse<br><u>Parus bicolor</u>          | PR          | 1.0                     |                                  | 25 A               |     |     | 75  |     |
| House Wren<br><u>Troglodytes aedon</u>           | BR          | 1.0                     |                                  |                    |     |     | 100 |     |
| Veery<br><u>Catharus fuscescens</u>              | BR          | 0.75                    |                                  |                    |     |     | 100 |     |
| Wood Thrush<br><u>Hylocichla mustelina</u>       | BR          | 2.75                    |                                  |                    |     |     | 100 |     |
| American Robin<br><u>Turdus migratorius</u>      | PR          | 3.5                     |                                  | 7 A<br>14 C        | 36  |     | 43  |     |
| Gray Catbird<br><u>Dumetella carolinensis</u>    | BR          | 7.25                    |                                  | 14 A               | 14  |     | 72  |     |
| Northern Mockingbird<br><u>Mimus polyglottos</u> | PR          | 1.5                     |                                  | 17 D<br>17 E       |     | 33  | 33  |     |
| Brown Thrasher<br><u>Toxostoma rufum</u>         | BR          | 1.25                    |                                  | 40 F               | 40  |     | 20  |     |
| European Starling<br><u>Sturnus vulgaris</u>     | PR          | 5.75                    | 4                                | 4 D                | 4   | 87  |     |     |
| White-eyed Vireo<br><u>Vireo griseus</u>         | T           | -                       |                                  |                    |     |     | X   |     |
| Red-eyed Vireo<br><u>Vireo olivaceus</u>         | BR          | 2.25                    |                                  |                    |     |     | 100 |     |
| Blue-winged Warbler<br><u>Vermivora pinus</u>    | BR          | 2.0                     |                                  | 38 A<br>13 D       |     |     | 50  |     |
| Ovenbird<br><u>Seiurus aurocapillus</u>          | BR          | 0.5                     |                                  | 50 D               |     |     | 50  |     |
| Common Yellowthroat<br><u>Geothlypis trichas</u> | BR          | 5.0                     |                                  | 5 A<br>5 D<br>10 E | 20  |     | 50  | 10  |

| Species                                               | Sta-<br>tus | Avg. N<br>per<br>Survey | Percentage of birds observed in: |                      |     |     |     |     |
|-------------------------------------------------------|-------------|-------------------------|----------------------------------|----------------------|-----|-----|-----|-----|
|                                                       |             |                         | Air                              | Edge                 | Fld | Was | Wds | Wet |
| Scarlet Tanager<br><u>Piranga olivacea</u>            | BR          | 0.75                    |                                  |                      |     |     | 100 |     |
| Northern Cardinal<br><u>Cardinalis cardinalis</u>     | PR          | 3.75                    |                                  | 7 A<br>7 F           |     |     | 87  |     |
| Indigo Bunting<br><u>Passerina cyanea</u>             | BR          | 1.5                     |                                  | 17 B<br>17 F         |     |     | 67  |     |
| Rufous-sided Towhee<br><u>Pipilo erythrophthalmus</u> | PR          | 3.0                     |                                  | 8 A<br>8 G           |     |     | 83  |     |
| Field Sparrow<br><u>Spizella pusilla</u>              | PR?         | 4.5                     |                                  | 39 A<br>11 D<br>11 E | 28  |     | 11  |     |
| Song Sparrow<br><u>Melospiza melodia</u>              | PR?         | 6.25                    |                                  | 12 A                 | 4   |     | 84  |     |
| Red-winged Blackbird<br><u>Agelaius phoeniceus</u>    | PR?         | 8.0                     |                                  | 6 A<br>16 G          | 9   | 6   |     | 63  |
| Common Grackle<br><u>Quiscalus quiscula</u>           | PR?         | 6.75                    | 44                               | 22 A<br>19 G         |     | 7   | 7   |     |
| Brown-headed Cowbird<br><u>Molothrus ater</u>         | PR?         | 0.25                    |                                  | 100 F                |     |     |     |     |
| Northern Oriole<br><u>Icterus galbula</u>             | BR          | 3.0                     |                                  | 8 A<br>25 E          |     |     | 67  |     |
| American Goldfinch<br><u>Carduelis tristis</u>        | PR          | 4.25                    |                                  | 29 A<br>6 E          | 18  |     | 47  |     |

<sup>a</sup> Nomenclature and phylogenetic order follow Eisenmann et al. (1982).

<sup>b</sup> BR=breeding resident, PR=permanent resident, T=transient

<sup>c</sup> Air=flying over, Fld=field, Was=waste area, Wds=woods, Wet=wetland

<sup>d</sup> Edges: A=field-woods, B=field-waste area, C=field-woods-wetland,  
D=waste area-woods, E=field-wetland, F=field-waste area-woods,  
G=woods-wetland

<sup>e</sup> Indicates location of birds observed at times other than during a survey.

<sup>f</sup> See "Rare, Threatened, and Endangered Species."

## Mammals

A variety of mammals was found in the PRA (Table 16). Relative abundance of species was difficult to determine from trapping results. However, white-footed mice apparently were the most abundant small mammals on the PRA. Meadow jumping mice also were common. Based on sign and sightings, raccoons and eastern cottontails were more abundant than suggested by the number of captures. In addition to the species trapped, six others were observed in the PRA. Virginia opossums were not seen, but a skull was found in the eastern basin and opossum hair was identified in red fox scats collected throughout the PRA. One dead star-nosed mole was found on the river trail, and mole tunnels were evident both on the river trail and in the western waste area of the basin. The latter tunnels may have been made by a different species of mole. Woodchucks were seen frequently on the dirt road and in the old fields. Muskrat sign was seen near the ponds. Red foxes were seen in several parts of the PRA. A fox den was located in the eastern waste area, but the number of young born in 1984 could not be determined. Fox scats were abundant in the waste area and along the dirt road and trails. White-tailed deer were observed regularly throughout the PRA and are known to breed there. A very young fawn was found in one of the old fields in late May. Other mammals may inhabit the PRA (Appendix C).

Table 16. Mammals identified in the proposed Pawling Recreation Area, Valley Forge National Historical Park, Pennsylvania, summer 1984.

| Species <sup>a</sup>                                     | Number Trapped | Percentage trapped in: <sup>b</sup> |     |                |     |     |
|----------------------------------------------------------|----------------|-------------------------------------|-----|----------------|-----|-----|
|                                                          |                | Edge <sup>c</sup>                   | Fld | Was            | Wds | Wet |
| Virginia Opossum<br><u>Didelphis virginiana</u>          | 0              |                                     |     |                |     |     |
| Masked Shrew<br><u>Sorex cinereus</u>                    | 5              | 20 A                                | 20  |                | 60  |     |
| Northern Short-tailed Shrew<br><u>Blarina brevicauda</u> | 2              | 50 A                                |     |                | 50  |     |
| Star-nosed Mole<br><u>Condylura cristata</u>             | 0              |                                     |     | X <sup>d</sup> | X   |     |
| Eastern Cottontail<br><u>Sylvilagus floridanus</u>       | 1              | 100 B                               | X   |                | X   |     |
| Woodchuck<br><u>Marmota monax</u>                        | 0              |                                     | X   |                |     |     |
| Gray Squirrel<br><u>Sciurus carolinensis</u>             | 1              |                                     |     |                | 100 |     |
| White-footed Mouse<br><u>Peromyscus leucopus</u>         | 26             | 4 B<br>4 C                          | 4   |                | 88  |     |
| Meadow Vole<br><u>Microtus pennsylvanicus</u>            | 7              |                                     | 100 |                |     |     |
| Muskrat<br><u>Ondatra zibethicus</u>                     | 0              |                                     |     |                |     | X   |
| Meadow Jumping Mouse<br><u>Zapus hudsonius</u>           | 11             | 64 A<br>9 B                         | 18  |                | 9   |     |

| Species                                            | Number<br>Trapped | Percentage trapped in: |     |     |     |     |
|----------------------------------------------------|-------------------|------------------------|-----|-----|-----|-----|
|                                                    |                   | Edge                   | Fld | Was | Wds | Wet |
| Red Fox<br><u>Vulpes vulpes</u>                    | 0                 | X                      | X   | X   |     |     |
| Raccoon<br><u>Procyon lotor</u>                    | 2                 |                        |     |     | 100 | X   |
| White-tailed Deer<br><u>Odocoileus virginianus</u> | 0                 | X                      | X   | X   | X   |     |

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<sup>a</sup> Nomenclature and phylogenetic order follow Jones et al. (1982).

<sup>b</sup> Fld=field, Was=waste area, Wds=woods, Wet=wetland

<sup>c</sup> Edges: A=field-woods, B=field-woods-wetland, C=waste area-woods

<sup>d</sup> Indicates areas where the species was observed but not trapped.

### Amphibians and Reptiles

A total of 12 amphibian and reptilian species was noted in the PRA during 1984 (Table 17). Other amphibians and reptiles that are potential inhabitants of the PRA are listed in Appendix D.

### Insects

A total inventory of insects on the PRA was beyond the scope of this study. Insects, when observed, were identified to family if possible (Table 18). No insects native to Pennsylvania are listed as rare, threatened, or endangered (Berger and Neuner 1979, Berger et al. 1979).

Table 17. Amphibians and reptiles identified on the proposed  
Pawling Recreation Area, Valley Forge National  
Historical Park, Pennsylvania, summer 1984.

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AMPHIBIANS <sup>a</sup>

|                          |                                       |
|--------------------------|---------------------------------------|
| Eastern Spadefoot (Toad) | <u>Scaphiopus holbrooki holbrooki</u> |
| Eastern American Toad    | <u>Bufo americanus americanus</u>     |
| Fowler's Toad            | <u>B. woodhousei fowleri</u>          |
| Bullfrog                 | <u>Rana catesbeiana</u>               |
| Pickerel Frog            | <u>R. palustris</u>                   |
| Wood Frog                | <u>R. sylvatica</u>                   |

REPTILES

|                                 |                                       |
|---------------------------------|---------------------------------------|
| Common Snapping Turtle          | <u>Chelydra serpentina serpentina</u> |
| Eastern Box Turtle              | <u>Terrapene carolina carolina</u>    |
| Midland Painted Turtle          | <u>Chrysemys picta marginata</u>      |
| Red-bellied Turtle <sup>b</sup> | <u>C. rubriventris rubriventris</u>   |
| Eastern Garter Snake            | <u>Thamnophis sirtalis sirtalis</u>   |
| Black Rat Snake                 | <u>Elaphe obsoleta obsoleta</u>       |

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<sup>a</sup> Nomenclature follows Conant (1975) and McCoy (1982).

<sup>b</sup> See "Rare, Threatened, and Endangered Species."

Table 18. Insect families identified on the proposed Pawling Recreation Area, Valley Forge National Historical Park, Pennsylvania, summer 1984.

| <u>Order</u> <sup>a</sup> | <u>Family</u>  | <u>Insects in family</u>      |
|---------------------------|----------------|-------------------------------|
| Odonata                   | Coenagrionidae | narrow-winged damselflies     |
|                           | uncertain      | darners or skimmers           |
| Orthoptera                | uncertain      | grasshoppers                  |
|                           | Gryllacrididae | cave crickets                 |
|                           | Gryllidae      | crickets                      |
|                           | Mantidae       | mantids                       |
| Dermaptera                | uncertain      | earwigs                       |
| Hemiptera                 | uncertain      | water boatmen or backswimmers |
|                           | Gerridae       | water striders                |
|                           | Pentatomidae   | stink bugs                    |
| Homoptera                 | Cicadidae      | cicadas                       |
|                           | Membracidae    | treehoppers                   |
|                           | Cicadellidae   | leafhoppers                   |
|                           | Aphididae      | aphids                        |
| Megaloptera               | Corydalidae    | dobsonflies                   |
| Coleoptera                | Carabidae      | ground beetles                |
|                           | Lampyridae     | fireflies                     |
|                           | Elateridae     | click beetles                 |
|                           | Coccinellidae  | ladybird beetles              |
|                           | Scarabaeidae   | scarab beetles                |

| <u>Order</u> | <u>Family</u> | <u>Insects in family</u>         |
|--------------|---------------|----------------------------------|
| Lepidoptera  | Papilionidae  | swallowtails                     |
|              | Pieridae      | whites, sulfurs, and orange-tips |
|              | Nymphalidae   | brush-footed butterflies         |
|              | Sphingidae    | sphinx or hawk moths             |
|              | Saturniidae   | giant silkworm moths             |
|              | Arctiidae     | tiger moths                      |
| Diptera      | Culicidae     | mosquitoes                       |
|              | Simuliidae    | blackflies                       |
|              | Tabanidae     | horse and deer flies             |
| Hymenoptera  | Formicidae    | ants                             |
|              | Apidae        | bees                             |

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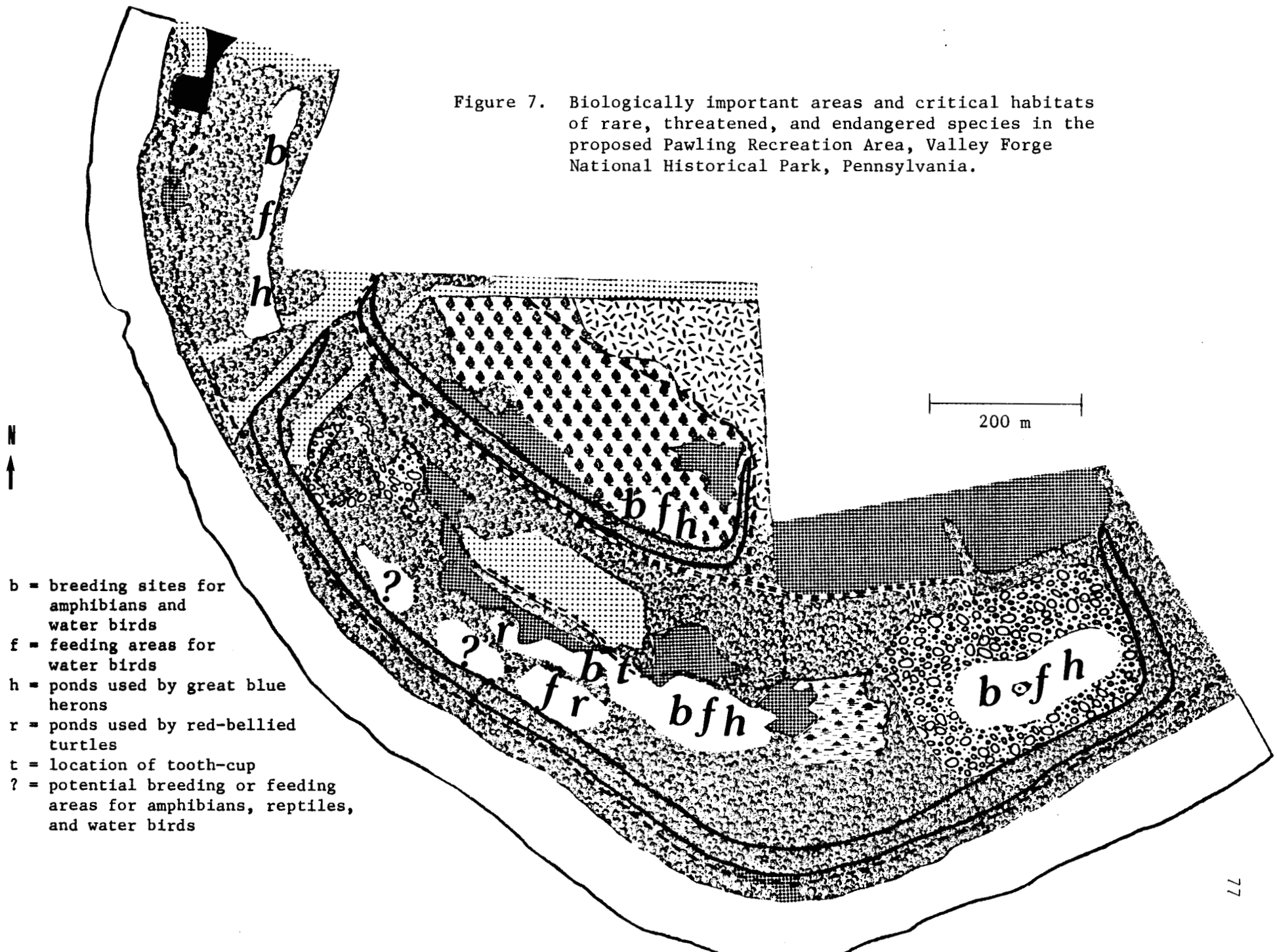
<sup>a</sup> Order and family names according to Borror and White (1970).

### Biologically Important Areas

Wetlands represent the most vulnerable and biologically important sites in the PRA. Aquatic habitats are more vulnerable to disturbance than are terrestrial habitats (Thomas 1979:44). Approximately 70% of the wetlands in VFP, excluding the Schuylkill River and Valley Creek, are located in the PRA. Normally, ponds in the PRA contain standing water year-round. In summer 1984, the ponds dried up for the first time in at least 3 years (D. Pumphrey, personal communication). The effect this will have on the permanent residents of the ponds is unknown.

Ponds are breeding grounds for waterbirds, amphibians, and insects; feeding areas for birds, mammals, reptiles, amphibians, and insects; and habitat for many plants. Among the wildlife depending upon the wetlands in the PRA throughout summer 1984 were Canada geese, great blue herons, green-backed herons, painted turtles, red-bellied turtles, snapping turtles, and bullfrogs. Numerous other animals used the ponds in other seasons or sporadically during the summer. A list of plants growing in the wetlands was presented in the "Cover Types" section. Figure 7 shows the locations of specific breeding areas and other important sites. The other cover types in the PRA also are important as breeding and feeding areas for animals and as habitat for plants. However, the non-wetland cover types are more widely available both within VFP and in adjacent lands.

Figure 7. Biologically important areas and critical habitats of rare, threatened, and endangered species in the proposed Pawling Recreation Area, Valley Forge National Historical Park, Pennsylvania.



### Rare, Threatened, and Endangered Species

Six species of special status were found in the PRA. Although none are federally listed as endangered or threatened, two are endangered, two are "species of concern" (vulnerable), one is rare, and one is of undetermined status within Pennsylvania (Pennsylvania Fish Commission 1979, Pennsylvania Department of Environmental Resources 1985, Title 58 1985).

An endangered reptile found in the PRA is the red-bellied turtle. According to the Pennsylvania Fish Commission (1979), it is "actively threatened with extinction in the state. Continued survival [is] unlikely without special protective measures." Habitat destruction and killing of the turtles for food have contributed to the decline of this turtle. The red-bellied turtle prefers deep water containing logs and rocks for basking in the sun, but it comes on land to lay eggs. Its diet consists of aquatic plants and animals (Ernst and Barbour 1972). Typically, these turtles remain in the same location year-round. This species was seen in ponds 5 and 7 in the PRA (Figure 7). Their response to the drying of the ponds in 1984 is unknown. Perhaps the turtles migrated to the Schuylkill River (J. D. Groves, personal communication) or entered early hibernation when ponds dried. The size of the red-bellied turtle population in the PRA is unknown and warrants further investigation. At least three individuals were seen during summer 1984. Red-bellied turtles can co-exist well with people as long as the turtles are not disturbed and critical habitat is preserved (R. A. Mercer, personal communication).

The second endangered species is the osprey. This bird was seen flying once along the southern edge of the PRA parallel to the Schuylkill River. This osprey was probably a visitor; no nests have been reported from Montgomery or Chester Counties (Wood 1979). Ospreys are generally found near water because their main prey is fish. They are endangered due to a combination of factors, including poaching, loss of nesting habitat, and poor reproductive success due to eggshell thinning caused by pesticides (Terres 1980). No action by VFP is recommended other than protection of visiting birds.

The two vulnerable species found in the PRA are the great blue heron and the Cooper's hawk. According to Genoways (1984), vulnerable species "are not yet threatened but could become so because they occur in restricted habitats or geographic areas in Pennsylvania." The great blue heron is a species of concern due to continuing destruction of nesting and feeding sites in wetlands. Several individuals of this species were observed in ponds 1, 2, 8, and 9 in the PRA (Figure 7). The diet of herons consists mainly of aquatic animals, such as fish and frogs, but they also consume small mammals and insects (Terres 1980). In Pennsylvania, great blue herons breed only in northwestern counties (Wood 1979). Thus, birds seen in the PRA during summer probably were dispersing from breeding areas or were non-breeding individuals. Protection of the wetlands also would be beneficial to this species.

VFP is within the breeding range of the Cooper's hawk (Robbins et al. 1966), but whether or not this species nests in the PRA is

unknown. Cooper's hawks were seen several times in the PRA. It is a woodland species and nests in both hardwood and pine forests. Small mammals and birds are the main prey of the Cooper's hawk. In the past, numbers have declined due to eggshell thinning caused by pesticides (Terres 1980). Unless nests are found in the PRA, specific actions for the preservation of this species should not be necessary because extensive woodlands occur throughout VFP.

No plants are listed officially as rare, threatened, or endangered in Pennsylvania. Such a list currently is being prepared and includes tooth-cup as a proposed rare species (Pennsylvania Department of Environmental Resources 1985). Tooth-cup is an inconspicuous plant growing mainly in muddy or wet soil of coastal areas and locally inland; this restricted distribution is responsible for the plant's proposed rare status (Wiegman 1979). In the PRA, tooth-cup is found on a dirt trail adjacent to pond 8 (Figure 7). Receding spring floodwaters leave a mud-flat upon which the tooth-cup grows. The plants and their habitat must not be disturbed to protect this species.

The final species of special interest in the PRA is the least flycatcher. Its status in Pennsylvania has not yet been determined, so continued monitoring is necessary. Whether or not this species is breeding in the study area is not known, but least flycatchers are considered transients at Mill Grove (Northwood 1959). These birds usually nest in hardwood trees of woodlands, towns, or open areas, and feed primarily on insects (Terres 1980).

## CONCLUSIONS AND RECOMMENDATIONS

Although the proposed Pawling Recreation Area is small, it contains a great diversity of animals and plants. Wetlands are the most important habitat in the PRA, in terms of both the presence of rare plants and animals and sensitivity to disturbance. Therefore, we recommend that the wetlands remain undisturbed during development of the recreation area. In fact, the General Management Plan for the Park (1982:58) states, "Swamps, marshes, bogs, wet meadows, mudflats, and other wetlands within the Valley Forge planning area have been identified, and they will be preserved and enhanced to the greatest degree possible. No actions are proposed for these wetlands."

Critical habitat for rare and endangered species inhabiting the PRA should be preserved. This includes wetland habitat for red-bellied turtles, tooth-cup plants, and great blue herons. Specific management of the wetlands for these species should not be necessary. Park officials should consider additional studies designed to monitor the population status of the six species of special concern.

Approximately 35% of the plant species found on the PRA are exotic. Exotic species are not desired in national parks, but removal of these plants would be virtually impossible because most are well established, widely distributed, and reproducing in the PRA. However, if any plantings are proposed for the recreation area, we suggest that native species be used.

The location of the Pawling Recreation Area in such a diverse habitat provides an excellent opportunity for natural

interpretation. This could be particularly beneficial to the many urban visitors to VFP. Natural interpretation could be approached in a passive or an active manner by VFP. Passive approaches could include making checklists of plants and animals available to visitors (rare and endangered species should be deleted from such lists) or creating displays on the importance of flora and fauna diversity. An active approach would include the use of interpreters to describe the PRA or to conduct tours.

#### Critique of the Management Plan

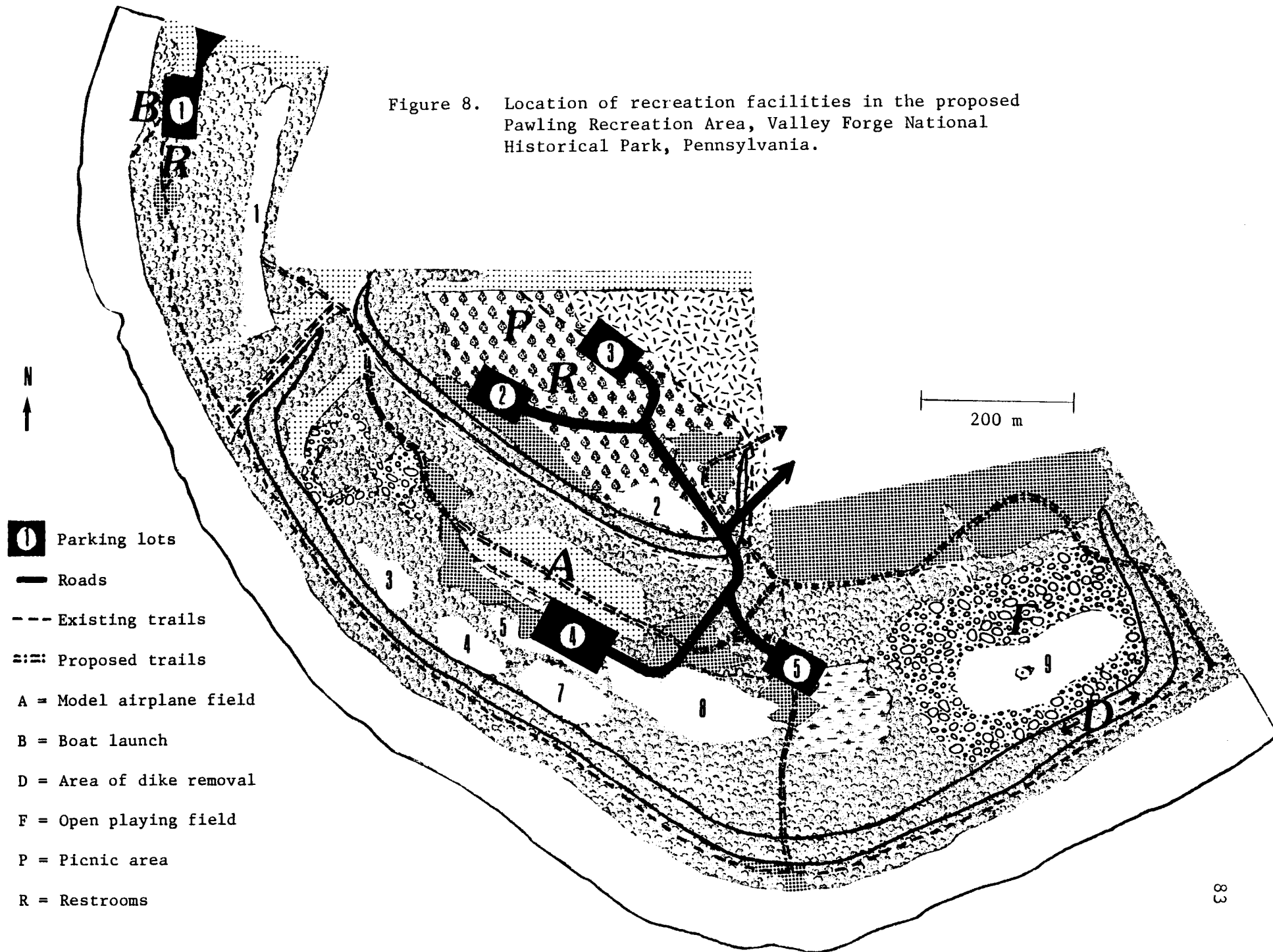
The General Management Plan for Valley Forge National Historical Park (1982:63-64) gives the following account of the proposed Pawling Recreation Area:

The concentrated recreation area will be developed in the northwestern section of the park in and around the reclaimed siltation basin. The basin is divided by dikes into three distinct areas. The upper basin will contain two parking areas, for a total of 70 car spaces and 5 bus spaces, and a restroom facility. Fifty picnic sites will be located in the surrounding pine forest and open meadows. In the middle basin, two 20-car parking areas will serve other recreational uses, including open fields where model airplane flying will be permitted. The lower or easternmost basin will be used for open field play, with some recontouring of the flattened bottom of the basin. The east end of the basin will be opened to the natural floodplain by removing 300 feet of dike to create a more natural area offering greater recreational opportunities. The remaining dikes will protect the cultural resources from any sight or sound of activity in these three areas.

A nonmotorized boat launch will be developed with the commonwealth of Pennsylvania off Pawling Road in the northwestern corner of the Park. This development will include a 40-car parking area and floodproofed restroom facilities.

The location of the proposed facilities and trails, as diagrammed in the Management Plan, is shown in Figure 8. Our

Figure 8. Location of recreation facilities in the proposed Pawling Recreation Area, Valley Forge National Historical Park, Pennsylvania.



recommendations, relative to the actions proposed in the Management Plan, are outlined below.

1. Proposed action: "The upper basin will contain two parking areas [Parking Lots 2 and 3] ... and a restroom facility."

Our recommendation: Relocate Parking Lot 2 and the access road to both parking areas.

Comments: The proposed site for Parking Lot 2 may be unsuitable because it is in an area that floods in the spring (Figure 5). The proposed locations of Parking Lot 3 and the restroom facility are acceptable. However, the access road to Parking Lots 2 and 3 is shown traversing the edge of Pond 2. The placement of this road in the proposed location is not recommended due to disturbance of the pond life. Instead, the road should be located well away from the pond margin to avoid potential flooding problems in the spring and to prevent road runoff from entering the pond.

2. Proposed action: "Fifty picnic sites will be located in the surrounding pine forest and open meadows [of the upper basin]."

Our recommendation: Proposed location of the picnic area is acceptable.

Comments: Location of the picnic grounds in the upper basin would not disturb any rare species. The pines and the meadows would provide pleasant surroundings for

picnickers, but some thinning of the plantation will be necessary.

3. Proposed action: "In the middle basin, two 20-car parking areas [Parking Lots 4 and 5] will serve other recreational uses ...."

Our recommendation: Relocate both Parking Lots 4 and 5.

Comments: Parking Lot 4 definitely should not be built in the proposed location. This would eliminate Pond 6, which is potential red-bellied turtle habitat, and the access road would destroy the tooth-cup habitat. Instead, the parking lot could be placed east or west of the model airplane field (Figure 8), with the access road following the existing dirt road. In this way, critical wetland habitat would be protected from both physical destruction and possible pollutants carried in road runoff.

Parking Lot 5 would not be a threat to any rare species, but could be subject to spring flooding. Therefore, relocation of Parking Lot 5 in the successional woods just to the north may be desirable.

4. Proposed action: "In the middle basin, ... model airplane flying will be permitted." (Figure 8).

Our recommendation: Create barriers to prevent visitors from destroying critical habitat adjacent to the model airplane field.

Comments: Use of the open field for model airplane flying would be acceptable. However, people would have to be discouraged or prevented from entering the adjacent wetlands, which are inhabited by red-bellied turtles and tooth-cup plants. For example, a fence could be erected or a dense hedge could be planted between the field and the ponds to minimize human disturbance of the wetlands south and east of the model airplane field.

5. Proposed action: "The lower or easternmost basin will be used for open field play, with some recontouring of the flattened bottom of the basin. The east end of the basin will be opened to the natural floodplain by removing 300 feet of dike ...." (Figure 8).

Our recommendation: Consider leaving the dike (i.e., embankment) and Pond 9 intact and using only the dry "waste area" portion of the eastern basin as a playing field.

Comments: Alterations proposed for the eastern basin are more complicated than the Management Plan suggests. Removing a section of the embankment may allow floodwaters from the Schuylkill River to enter the basin. Levelling of the basin floor may not raise it above the flood level; addition of fill may be necessary. Removal of the embankment and/or recontouring of the basin would require permits from both the Pennsylvania Department of Environmental Resources and the Army Corps of Engineers

because a pond (Pond 9) and the river floodplain would be altered. Although all ponds should be left intact, elimination of this pond would not be as detrimental to wildlife as would elimination of the other ponds. Pond 9 does not support as many plants and animals as the other ponds in the PRA; the basin was bulldozed in early 1983, and few aquatic species have had time to become established. However, frogs bred in the pond in 1984, and Canada geese nested on the pond edge in 1983 and 1984. Also, considerably more vegetation grew in the surrounding basin in 1984 than in 1983, indicating rapid colonization by plant species.

6. Proposed action: "A nonmotorized boat launch will be developed ... off Pawling Road. This development will include a 40-car parking area [Parking Lot 1] and floodproofed restroom facilities."

Our recommendation: Proposed locations are acceptable.

Comments: The construction of a boat launch near the existing Pawling Road Parking Area (Parking Lot 1) would present no ecological problems. VFP officials already are aware that this area can be expected to flood several times per year, and that the parking area, boat launch, and restrooms will be inaccessible during flood periods. Floodproofing of the restrooms should prevent contamination of the Schuylkill River.

7. Proposed action: A network of trails through the PRA is shown in the General Management Plan (Figure 8).

Our recommendation: Proposed location of trails is acceptable.

Comments: A trail system through the PRA will provide additional educational and recreational experiences for the visitors. Trails should be kept well away from wetlands to prevent disturbance to critical habitats, rare and endangered species, and other wetland organisms.

Summary of Major Recommendations

- 1) Wetlands should be preserved.
- 2) Recreation facilities and parking lots should be located away from critical habitats of rare, threatened, and endangered species.
- 3) Recreation facilities and parking lots should be located away from areas that flood annually.
- 4) Natural interpretation should be considered.

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## APPENDICES

Appendix A. Plants reported to occur in the vicinity of Valley Forge  
National Historical Park, Pennsylvania.

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| <u>Common Name</u>     | <u>Scientific Name</u> <sup>a</sup> | <u>Source</u> <sup>b</sup> |
|------------------------|-------------------------------------|----------------------------|
| FAMILY AIZOACEAE       |                                     |                            |
| Carpetweed             | <u>Mollugo verticillata</u>         | 5,6                        |
| FAMILY ALISMACEAE      |                                     |                            |
| Broad-leaved Arrowhead | <u>Sagittaria latifolia</u>         | 5                          |
| FAMILY AMARANTHACEAE   |                                     |                            |
| Tumbleweed             | <u>Amaranthus albus</u>             | 5                          |
| Pigweed                | <u>A. hybridus</u>                  | 5                          |
| FAMILY ANACARDIACEAE   |                                     |                            |
| Staghorn Sumac         | <u>Rhus typhina</u>                 | 5,6                        |
| Poison Ivy             | <u>Toxicodendron radicans</u>       | 5,6                        |
| FAMILY APIACEAE        |                                     |                            |
| Water Hemlock          | <u>Cicuta maculata</u>              | 5                          |
| Honewort               | <u>Cryptotaenia canadensis</u>      | 5,6                        |
| Queen Anne's Lace      | <u>Daucus carota</u>                | 5,6                        |
| Cow Parsnip            | <u>Heracleum lanatum</u>            | 2,5                        |
| Sweet Cicely           | <u>Osmorhiza longistylis</u>        | 2,5                        |
| Black Snakeroot        | <u>Sanicula marilandica</u>         | 5                          |
| Golden Alexanders      | <u>Zizia aurea</u>                  | 2,6                        |
| FAMILY APOCYNACEAE     |                                     |                            |
| Indian Hemp            | <u>Apocynum cannabinum</u>          | 5,6                        |
| Myrtle                 | <u>Vinca minor</u>                  | 5                          |

## FAMILY ARACEAE

|                    |                              |         |
|--------------------|------------------------------|---------|
| Sweetflag          | <u>Acorus americanus</u>     | 5       |
| Jack-in-the-pulpit | <u>Arisaema triphyllum</u>   | 2, 5, 6 |
| Skunk Cabbage      | <u>Symplocarpus foetidus</u> | 2, 5    |

## FAMILY ARALIACEAE

|              |                          |      |
|--------------|--------------------------|------|
| Sarsaparilla | <u>Aralia nudicaulis</u> | 5    |
| Spikenard    | <u>A. racemosa</u>       | 5    |
| English Ivy  | <u>Hedera helix</u>      | 5, 6 |

## FAMILY ARISTOLOCHIACEAE

|             |                         |         |
|-------------|-------------------------|---------|
| Wild Ginger | <u>Asarum canadense</u> | 2, 5, 6 |
|-------------|-------------------------|---------|

## FAMILY ASCLEPIADACEAE

|                 |                            |      |
|-----------------|----------------------------|------|
| Swamp Milkweed  | <u>Asclepias incarnata</u> | 5, 6 |
| Common Milkweed | <u>A. syriaca</u>          | 5, 6 |

## FAMILY ASPLENIACEAE

|                     |                                                      |      |
|---------------------|------------------------------------------------------|------|
| Ebony Spleenwort    | <u>Asplenium platyneuron</u>                         | 5    |
| Northern Lady-fern  | <u>Athyrium filix-femina</u><br>var. <u>angustum</u> | 5    |
| Brittle Fern        | <u>Cystopteris fragilis</u><br>var. <u>mackayi</u>   | 5    |
| Silvery Spleenwort  | <u>Deparia acrostichoides</u>                        | 5    |
| Evergreen Wood-fern | <u>Dryopteris intermedia</u>                         | 5    |
| Marginal Wood-fern  | <u>D. marginalis</u>                                 | 5, 6 |
| Spinulose Wood-fern | <u>D. spinulosa</u>                                  | 5    |
| Sensitive Fern      | <u>Onoclea sensibilis</u>                            | 5, 6 |
| Christmas Fern      | <u>Polystichum acrostichoides</u>                    | 5, 6 |
| New York Fern       | <u>Thelypteris noveboracensis</u>                    | 5    |

|                           |                                       |         |
|---------------------------|---------------------------------------|---------|
| Blunt-lobed Woodsia       | <u>Woodsia obtusa</u>                 | 5       |
| FAMILY ASTERACEAE         |                                       |         |
| Yarrow                    | <u>Achillea millefolium</u>           | 2, 5, 6 |
| Common Ragweed            | <u>Ambrosia artemisiifolia</u>        | 5, 6    |
| Giant Ragweed             | <u>A. trifida</u>                     | 5, 6    |
| Field Pussytoes           | <u>Antennaria neglecta</u>            | 2, 5    |
| Plantain-leaved Pussytoes | <u>A. plantaginifolia</u>             | 5, 6    |
| Mayweed                   | <u>Anthemis cotula</u>                | 2, 5    |
| Common Burdock            | <u>Arctium minus</u>                  | 5, 6    |
| Heart-leaved Aster        | <u>Aster cordifolius</u>              | 5       |
| White Wood Aster          | <u>A. divaricatus</u>                 | 5, 6    |
| Calico Aster              | <u>A. lateriflorus</u>                | 5       |
| New England Aster         | <u>A. novae-angliae</u>               | 5, 6    |
| White-topped Aster        | <u>A. paternus</u>                    | 5       |
| Heath Aster               | <u>A. pilosus</u> var. <u>demotus</u> | 5       |
| Crooked-stemmed Aster     | <u>A. prenanthoides</u>               | 5       |
| Purple-stemmed Aster      | <u>A. puniceus</u>                    | 5       |
| Panicled Aster            | <u>A. simplex</u>                     | 5       |
| Wavy-leaved Aster         | <u>A. undulatus</u>                   | 5       |
| English Daisy             | <u>Bellis perennis</u>                | 5       |
| Spanish Needles           | <u>Bidens bipinnata</u>               | 5       |
| Stick-tight               | <u>B. cernua</u>                      | 5       |
| Swamp Beggar-ticks        | <u>B. connata</u>                     | 5       |
| Beggar-ticks              | <u>B. frondosa</u>                    | 5, 6    |
| Cornflower                | <u>Centaurea cyanus</u>               | 5       |
| Common Chicory            | <u>Cichorium intybus</u>              | 5, 6    |
| Canada Thistle            | <u>Cirsium arvense</u>                | 2, 5, 6 |

|                          |                                 |       |
|--------------------------|---------------------------------|-------|
| Bull Thistle             | <u>C. vulgare</u>               | 5,6   |
| Horseweed                | <u>Conyza canadensis</u>        | 5,6   |
| Yerba de Tajo            | <u>Eclipta prostrata</u>        | 5,6   |
| Pilewort                 | <u>Erechtites hieraciifolia</u> | 5,6   |
| Daisy Fleabane           | <u>Erigeron annuus</u>          | 5,6   |
| Common Fleabane          | <u>E. philadelphicus</u>        | 5,6   |
| Robin Plantain           | <u>E. pulchellus</u>            | 5     |
| Lesser Daisy Fleabane    | <u>E. strigosus</u>             | 2,5,6 |
| Joe-pye Weed             | <u>Eupatorium fistulosum</u>    | 5,6   |
| Boneset                  | <u>E. perfoliatum</u>           | 5,6   |
| Sweet Joe-pye Weed       | <u>E. purpureum</u>             | 5     |
| White Snakeroot          | <u>E. rugosum</u>               | 5,6   |
| Lance-leaved Goldenrod   | <u>Euthamia graminifolia</u>    | 5,6   |
| Galinsoga                | <u>Galinsoga quadriradiata</u>  | 5,6   |
| Sweet Everlasting        | <u>Gnaphalium obtusifolium</u>  | 5,6   |
| Sneezeweed               | <u>Helenium autumnale</u>       | 5     |
| Thin-leaved Sunflower    | <u>Helianthus decapetalus</u>   | 5,6   |
| Woodland Sunflower       | <u>H. divaricatus</u>           | 5     |
| Ox-eye                   | <u>Heliopsis helianthoides</u>  | 5,6   |
| King Devil               | <u>Hieracium caespitosum</u>    | 2,5,6 |
| Large Mouse-ear Hawkweed | <u>H. x flagellare</u>          | 5,6   |
| Panicled Hawkweed        | <u>H. paniculatum</u>           | 5     |
| Mouse-ear Hawkweed       | <u>H. pilosella</u>             | 2     |
| Rattlesnake-weed         | <u>H. venosum</u>               | 5     |
| Two-flowered Cynthia     | <u>Krigia biflora</u>           | 2,5,6 |
| Blue Lettuce             | <u>Lactuca biennis</u>          | 5     |
| Canada Lettuce           | <u>L. canadensis</u>            | 5,6   |

|                         |                                                   |       |
|-------------------------|---------------------------------------------------|-------|
| Oxeye Daisy             | <u>Leucanthemum vulgare</u>                       | 2,5,6 |
| Gall-of-the-earth       | <u>Prenanthes trifoliolata</u>                    | 5     |
| Black-eyed Susan        | <u>Rudbeckia hirta</u><br>var. <u>pulcherrima</u> | 5,6   |
| Green-headed Coneflower | <u>R. laciniata</u>                               | 5,6   |
| Golden Ragwort          | <u>Senecio aureus</u>                             | 5     |
| Sharp-leaved Goldenrod  | <u>Solidago arguta</u>                            | 5     |
| Silver-rod              | <u>S. bicolor</u>                                 | 5     |
| Blue-stemmed Goldenrod  | <u>S. caesia</u>                                  | 5     |
| Canada Goldenrod        | <u>S. canadensis</u> var. <u>hargerii</u>         | 5     |
| Zigzag Goldenrod        | <u>S. flexicaulis</u>                             | 5     |
| Late Goldenrod          | <u>S. gigantea</u>                                | 5     |
| Early Goldenrod         | <u>S. juncea</u>                                  | 5,6   |
| Gray Goldenrod          | <u>S. nemoralis</u>                               | 5     |
| Rough-stemmed Goldenrod | <u>S. rugosa</u>                                  | 5,6   |
| Elm-leaved Goldenrod    | <u>S. ulmifolia</u>                               | 5     |
| Spiny-leaved Sowthistle | <u>Sonchus asper</u>                              | 5,6   |
| Dandelion               | <u>Taraxacum</u> sp.                              | 2     |
| Dandelion               | <u>T. palustre</u>                                | 5     |
| Yellow Goat's-beard     | <u>Tragopogon pratensis</u>                       | 2     |
| Wingstem                | <u>Verbesina alternifolia</u>                     | 5     |
| New York Ironweed       | <u>Vernonia noveboracensis</u>                    | 5,6   |
| Common Cocklebur        | <u>Xanthium strumarium</u>                        | 5,6   |
| FAMILY BALSAMINACEAE    |                                                   |       |
| Spotted Touch-me-not    | <u>Impatiens capensis</u>                         | 5,6   |
| Pale Touch-me-not       | <u>I. pallida</u>                                 | 5,6   |

## FAMILY BERBERIDACEAE

|                   |                             |       |
|-------------------|-----------------------------|-------|
| Japanese Barberry | <u>Berberis thunbergii</u>  | 5,6   |
| Mayapple          | <u>Podophyllum peltatum</u> | 2,5,6 |

## FAMILY BETULACEAE

|                   |                          |   |
|-------------------|--------------------------|---|
| American Hazelnut | <u>Corylus americana</u> | 5 |
|-------------------|--------------------------|---|

## FAMILY BIGNONIACEAE

|                 |                            |     |
|-----------------|----------------------------|-----|
| Trumpet Creeper | <u>Campsis radicans</u>    | 5,6 |
| Empress-tree    | <u>Paulownia tomentosa</u> | 5,6 |

## FAMILY BORAGINACEAE

|                    |                             |       |
|--------------------|-----------------------------|-------|
| Virginia Stickseed | <u>Hackelia virginiana</u>  | 5,6   |
| Bluebells          | <u>Mertensia virginica</u>  | 2,5,6 |
| True Forget-me-not | <u>Myosotis scorpioides</u> | 2,5,6 |

## FAMILY BRASSICACEAE

|                      |                                |       |
|----------------------|--------------------------------|-------|
| Garlic Mustard       | <u>Alliaria petiolata</u>      | 2,5,6 |
| Mouse-ear Cress      | <u>Arabidopsis thaliana</u>    | 5     |
| Smooth Rock Cress    | <u>Arabis laevigata</u>        | 5     |
| Early Wintercress    | <u>Barbarea verna</u>          | 2     |
| Common Wintercress   | <u>B. vulgaris</u>             | 2,5,6 |
| Field Mustard        | <u>Brassica rapa</u>           | 2     |
| Shepherd's Purse     | <u>Capsella bursa-pastoris</u> | 2,5,6 |
| Spring Cress         | <u>Cardamine bulbosa</u>       | 2,5   |
| Slender Toothwort    | <u>Dentaria heterophylla</u>   | 5     |
| Cut-leaved Toothwort | <u>D. laciniata</u>            | 2,5,6 |
| Whitlow-grass        | <u>Erophila verna</u>          | 5     |
| Dame's Rocket        | <u>Hesperis matronalis</u>     | 2,5,6 |

|                        |                                 |         |
|------------------------|---------------------------------|---------|
| Field Peppergrass      | <u>Lepidium campestre</u>       | 2, 5, 6 |
| Wild Peppergrass       | <u>L. virginicum</u>            | 2, 5, 6 |
| Watercress             | <u>Nasturtium officinale</u>    | 2, 5, 6 |
| Yellow Cress           | <u>Rorippa palustris</u>        | 5       |
| Tumble Mustard         | <u>Sisymbrium altissimum</u>    | 2       |
| Hedge Mustard          | <u>S. officinale</u>            | 5       |
| FAMILY CALLITRICHACEAE |                                 |         |
| Water Starwort         | <u>Callitriche heterophylla</u> | 5       |
| FAMILY CAMPANULACEAE   |                                 |         |
| Bedstraw Bellflower    | <u>Campanula aparinoides</u>    | 5       |
| Indian Tobacco         | <u>Lobelia inflata</u>          | 5, 6    |
| Great Lobelia          | <u>L. siphilitica</u>           | 5       |
| Pale-spike Lobelia     | <u>L. spicata</u>               | 5       |
| Venus' Looking-glass   | <u>Triodanis perfoliata</u>     | 2, 5, 6 |
| FAMILY CAPRIFOLIACEAE  |                                 |         |
| Japanese Honeysuckle   | <u>Lonicera japonica</u>        | 5, 6    |
| Common Elder           | <u>Sambucus canadensis</u>      | 5, 6    |
| Maple-leaved Viburnum  | <u>Viburnum acerifolium</u>     | 5, 6    |
| Smooth Blackhaw        | <u>V. prunifolium</u>           | 5, 6    |
| FAMILY CARYOPHYLLACEAE |                                 |         |
| Thyme-leaved Sandwort  | <u>Arenaria serpyllifolia</u>   | 5, 6    |
| Mouse-ear Chickweed    | <u>Cerastium fontanum</u>       | 2, 5    |
| Deptford Pink          | <u>Dianthus armeria</u>         | 2, 5, 6 |
| Bouncing Bet           | <u>Saponaria officinalis</u>    | 5, 6    |
| White Campion          | <u>Silene alba</u>              | 2, 5, 6 |

|                         |                               |       |
|-------------------------|-------------------------------|-------|
| Starry Campion          | <u>S. stellata</u>            | 5     |
| Bladder Campion         | <u>S. vulgaris</u>            | 2     |
| Lesser Stitchwort       | <u>Stellaria graminea</u>     | 2,6   |
| Common Chickweed        | <u>S. media</u>               | 2,5,6 |
| Star Chickweed          | <u>S. pubera</u>              | 5     |
| FAMILY CELASTRACEAE     |                               |       |
| Climbing Bittersweet    | <u>Celastrus scandens</u>     | 5     |
| FAMILY CERATOPHYLLACEAE |                               |       |
| Hornwort                | <u>Ceratophyllum demersum</u> | 5     |
| FAMILY CHENOPODIACEAE   |                               |       |
| Lamb's-quarters         | <u>Chenopodium album</u>      | 5,6   |
| FAMILY CLUSIACEAE       |                               |       |
| Common St. Johnswort    | <u>Hypericum perforatum</u>   | 5,6   |
| Spotted St. Johnswort   | <u>H. punctatum</u>           | 5,6   |
| FAMILY COMMELINACEAE    |                               |       |
| Common Dayflower        | <u>Commelina communis</u>     | 5,6   |
| FAMILY CONVULVULACEAE   |                               |       |
| Field Bindweed          | <u>Convolvulus arvensis</u>   | 2,6   |
| Gronovius' Dodder       | <u>Cuscuta gronovii</u>       | 5     |
| Wild Potato-vine        | <u>Ipomoea pandurata</u>      | 5,6   |
| FAMILY CORNACEAE        |                               |       |
| Silky Dogwood           | <u>Cornus amomum</u>          | 5,6   |
| Flowering Dogwood       | <u>C. florida</u>             | 5,6   |

## FAMILY CUCURBITACEAE

|              |                         |     |
|--------------|-------------------------|-----|
| Bur Cucumber | <u>Sicyos angulatus</u> | 5,6 |
|--------------|-------------------------|-----|

## FAMILY CUPRESSACEAE

|                  |                             |     |
|------------------|-----------------------------|-----|
| Eastern Redcedar | <u>Juniperus virginiana</u> | 5,6 |
|------------------|-----------------------------|-----|

## FAMILY DENNSTAEDTIACEAE

|                    |                                  |   |
|--------------------|----------------------------------|---|
| Hay-scented Fern . | <u>Dennstaedtia punctilobula</u> | 5 |
|--------------------|----------------------------------|---|

## FAMILY DIOSCOREACEAE

|               |                          |   |
|---------------|--------------------------|---|
| Wild Yam-root | <u>Dioscorea villosa</u> | 5 |
|---------------|--------------------------|---|

## FAMILY EQUISETACEAE

|                 |                          |     |
|-----------------|--------------------------|-----|
| Field Horsetail | <u>Equisetum arvense</u> | 5,6 |
|-----------------|--------------------------|-----|

## FAMILY ERICACEAE

|                     |                            |   |
|---------------------|----------------------------|---|
| Spotted Wintergreen | <u>Chimaphila maculata</u> | 5 |
|---------------------|----------------------------|---|

|                  |                       |   |
|------------------|-----------------------|---|
| Trailing Arbutus | <u>Epigaea repens</u> | 5 |
|------------------|-----------------------|---|

|             |                              |   |
|-------------|------------------------------|---|
| Wintergreen | <u>Gaultheria procumbens</u> | 5 |
|-------------|------------------------------|---|

|                   |                            |   |
|-------------------|----------------------------|---|
| Black Huckleberry | <u>Gaylussacia baccata</u> | 5 |
|-------------------|----------------------------|---|

|                 |                         |   |
|-----------------|-------------------------|---|
| Mountain Laurel | <u>Kalmia latifolia</u> | 5 |
|-----------------|-------------------------|---|

|         |                             |   |
|---------|-----------------------------|---|
| Pinesap | <u>Monotropa hypopithys</u> | 5 |
|---------|-----------------------------|---|

|             |                    |   |
|-------------|--------------------|---|
| Indian-pipe | <u>M. uniflora</u> | 5 |
|-------------|--------------------|---|

|             |                                     |   |
|-------------|-------------------------------------|---|
| Pink Azalea | <u>Rhododendron periclymenoides</u> | 5 |
|-------------|-------------------------------------|---|

|                     |                           |     |
|---------------------|---------------------------|-----|
| Early Low Blueberry | <u>Vaccinium pallidum</u> | 5,6 |
|---------------------|---------------------------|-----|

|           |                     |   |
|-----------|---------------------|---|
| Deerberry | <u>V. stamineum</u> | 5 |
|-----------|---------------------|---|

## FAMILY EUPHORBIACEAE

|               |                            |     |
|---------------|----------------------------|-----|
| Milk-purslane | <u>Chamaesyce maculata</u> | 5,6 |
|---------------|----------------------------|-----|

## FAMILY FABACEAE

|                             |                               |       |
|-----------------------------|-------------------------------|-------|
| Hog Peanut                  | <u>Amphicarpaea bracteata</u> | 5,6   |
| Wild Indigo                 | <u>Baptisia tinctoria</u>     | 5     |
| Wild Sensitive Plant        | <u>Cassia nictitans</u>       | 5,6   |
| Eastern Redbud              | <u>Cercis canadensis</u>      | 5,6   |
| Crown Vetch                 | <u>Coronilla varia</u>        | 2,6   |
| Naked-flowered Tick-trefoil | <u>Desmodium nudiflorum</u>   | 5     |
| Birdsfoot Trefoil           | <u>Lotus corniculatus</u>     | 2,6   |
| Black Medick                | <u>Medicago lupulina</u>      | 2,5,6 |
| White Sweet-clover          | <u>Melilotus alba</u>         | 5,6   |
| Yellow Sweet-clover         | <u>M. officinalis</u>         | 2,5,6 |
| Hop-clover                  | <u>Trifolium aureum</u>       | 2,5   |
| Smaller Hop-clover          | <u>T. campestre</u>           | 2     |
| Alsike Clover               | <u>T. hybridum</u>            | 5,6   |
| Red Clover                  | <u>T. pratense</u>            | 2,5,6 |
| White Clover                | <u>T. repens</u>              | 2,5,6 |

## FAMILY GERANIACEAE

|                     |                              |       |
|---------------------|------------------------------|-------|
| Carolina Cranesbill | <u>Geranium carolinianum</u> | 5,6   |
| Wild Geranium       | <u>G. maculatum</u>          | 2,5,6 |

## FAMILY HAMAMELIDACEAE

|             |                             |     |
|-------------|-----------------------------|-----|
| Witch Hazel | <u>Hamamelis virginiana</u> | 5,6 |
|-------------|-----------------------------|-----|

## FAMILY HYDROCHARITACEAE

|                      |                         |   |
|----------------------|-------------------------|---|
| Nuttall's Water-weed | <u>Elodea nuttallii</u> | 5 |
|----------------------|-------------------------|---|

## FAMILY HYDROPHYLLACEAE

|                    |                                 |     |
|--------------------|---------------------------------|-----|
| Virginia Waterleaf | <u>Hydrophyllum virginianum</u> | 2,6 |
|--------------------|---------------------------------|-----|

## FAMILY IRIDACEAE

|                         |                                   |      |
|-------------------------|-----------------------------------|------|
| Yellow Iris             | <u>Iris pseudacorus</u>           | 2, 5 |
| Stout Blue-eyed Grass   | <u>Sisyrinchium angustifolium</u> | 2, 6 |
| Slender Blue-eyed Grass | <u>S. mucronatum</u>              | 5    |

## FAMILY JUNCACEAE

|           |                          |   |
|-----------|--------------------------|---|
| Wood-rush | <u>Luzula multiflora</u> | 5 |
|-----------|--------------------------|---|

## FAMILY LAMIACEAE

|                             |                                 |         |
|-----------------------------|---------------------------------|---------|
| Yellow Giant Hyssop         | <u>Agastache nepetoides</u>     | 5, 6    |
| Wild Basil                  | <u>Clinopodium vulgare</u>      | 5       |
| Horse-balm                  | <u>Collinsonia canadensis</u>   | 5       |
| Dittany                     | <u>Cunila origanoides</u>       | 5       |
| Ground Ivy                  | <u>Glechoma hederacea</u>       | 2, 5, 6 |
| American Pennyroyal         | <u>Hedeoma pulegioides</u>      | 5       |
| Henbit                      | <u>Lamium amplexicaule</u>      | 5       |
| Purple Dead-nettle          | <u>L. purpureum</u>             | 2       |
| Motherwort                  | <u>Leonurus cardiaca</u>        | 5       |
| Northern Bugleweed          | <u>Lycopus uniflorus</u>        | 5       |
| Virginia Bugleweed          | <u>L. virginicus</u>            | 5, 6    |
| Water Mint                  | <u>Mentha aquatica</u>          | 5       |
| Spearmint                   | <u>M. spicata</u>               | 5       |
| Catnip                      | <u>Nepeta cataria</u>           | 5       |
| Selfheal                    | <u>Prunella vulgaris</u>        | 5, 6    |
| Narrow-leaved Mountain-mint | <u>Pycnanthemum tenuifolium</u> | 5       |
| Lyre-leaved Sage            | <u>Salvia lyrata</u>            | 2       |
| Hairy Skullcap              | <u>Scutellaria elliptica</u>    | 5       |
| Mad-dog Skullcap            | <u>S. lateriflora</u>           | 5, 6    |

|                         |                                |       |
|-------------------------|--------------------------------|-------|
| American Germander      | <u>Teucrium canadense</u>      | 5,6   |
| Bluecurls               | <u>Trichostema dichotomum</u>  | 5,6   |
| FAMILY LAURACEAE        |                                |       |
| Spicebush               | <u>Lindera benzoin</u>         | 5,6   |
| Sassafras               | <u>Sassafras albidum</u>       | 5,6   |
| FAMILY LEMNACEAE        |                                |       |
| Common Duckweed         | <u>Lemna minor</u>             | 5,6   |
| Many-root Duckweed      | <u>Spirodela polyrhiza</u>     | 5     |
| FAMILY LILIACEAE        |                                |       |
| Wild Garlic             | <u>Allium canadense</u>        | 5     |
| Wild Leek               | <u>A. tricoccum</u>            | 5     |
| Asparagus               | <u>Asparagus officinalis</u>   | 5     |
| Trout-lily              | <u>Erythronium americanum</u>  | 2,5   |
| Day Lily                | <u>Hemerocallis fulva</u>      | 5,6   |
| Stargrass               | <u>Hypoxis hirsuta</u>         | 5     |
| Canada Lily             | <u>Lilium canadense</u>        | 5     |
| Wild Lily-of-the-valley | <u>Maianthemum canadense</u>   | 2     |
| Grape Hyacinth          | <u>Muscari botryoides</u>      | 2     |
| Star of Bethlehem       | <u>Ornithogalum umbellatum</u> | 2,5,6 |
| Solomon's Seal          | <u>Polygonatum biflorum</u>    | 2,5,6 |
| Squill                  | <u>Scilla sibirica</u>         | 5     |
| False Solomon's Seal    | <u>Smilacina racemosa</u>      | 2,5,6 |
| Nodding Trillium        | <u>Trillium cernuum</u>        | 2     |
| Red Trillium            | <u>T. erectum</u>              | 2     |
| Large-flowered Trillium | <u>T. grandiflorum</u>         | 2     |
| Perfoliate Bellwort     | <u>Uvularia perfoliata</u>     | 2     |

|                           |                                      |     |
|---------------------------|--------------------------------------|-----|
| Wild Oats                 | <u>U. sessilifolia</u>               | 5,6 |
| FAMILY LYTHRACEAE         |                                      |     |
| Clammy Cuphea             | <u>Cuphea viscosissima</u>           | 5   |
| FAMILY MALVACEAE          |                                      |     |
| Common Mallow             | <u>Malva neglecta</u>                | 5   |
| FAMILY MORACEAE           |                                      |     |
| Japanese Hop              | <u>Humulus japonicus</u>             | 5,6 |
| Common Hop                | <u>H. lupulus</u>                    | 5   |
| FAMILY NYMPHAEACEAE       |                                      |     |
| Bullhead-lily             | <u>Nuphar luteum ssp. variegatum</u> | 2   |
| Fragrant Water-lily       | <u>Nymphaea odorata</u>              | 5   |
| FAMILY ONAGRACEAE         |                                      |     |
| Enchanter's Nightshade    | <u>Circaea lutetiana</u>             | 5,6 |
| Purple-leaved Willow-herb | <u>Epilobium coloratum</u>           | 5   |
| Biennial Gaura            | <u>Gaura biennis</u>                 | 5,6 |
| Water Purslane            | <u>Ludwigia palustris</u>            | 5,6 |
| Common Evening-primrose   | <u>Oenothera biennis</u>             | 5,6 |
| Sundrops                  | <u>O. fruticosa ssp. glauca</u>      | 5   |
| FAMILY OPHIOGLOSSACEAE    |                                      |     |
| Cut-leaved Grape-fern     | <u>Botrychium dissectum</u>          | 5   |
| Virginia Grape-fern       | <u>B. virginianum</u>                | 5   |
| FAMILY ORCHIDACEAE        |                                      |     |
| Moccasin-flower           | <u>Cypripedium acaule</u>            | 2   |
| Ragged Fringed Orchis     | <u>Platanthera lacera</u>            | 5   |

|                          |                                               |         |
|--------------------------|-----------------------------------------------|---------|
| Slender Ladies'-tresses  | <u>Spiranthes lacera</u> var. <u>gracilis</u> | 5       |
| FAMILY OROBANCHACEAE     |                                               |         |
| Beechdrops               | <u>Epifagus virginiana</u>                    | 5       |
| One-flowered Cancer-root | <u>Orobanche uniflora</u>                     | 5       |
| FAMILY OXALIDACEAE       |                                               |         |
| European Wood-sorrel     | <u>Oxalis europaea</u>                        | 2, 5, 6 |
| Yellow Wood-sorrel       | <u>O. stricta</u>                             | 2, 6    |
| Violet Wood-sorrel       | <u>O. violacea</u>                            | 2, 5    |
| FAMILY PAPAVERACEAE      |                                               |         |
| Celandine                | <u>Chelidonium majus</u>                      | 5, 6    |
| Squirrel-corn            | <u>Dicentra canadensis</u>                    | 2       |
| Dutchman's-breeches      | <u>D. cucullaria</u>                          | 2, 5    |
| Bloodroot                | <u>Sanguinaria canadensis</u>                 | 2, 5    |
| FAMILY PHYTOLACCACEAE    |                                               |         |
| Pokeweed                 | <u>Phytolacca americana</u>                   | 5, 6    |
| FAMILY PINACEAE          |                                               |         |
| Pitch Pine               | <u>Pinus rigida</u>                           | 5       |
| Scotch Pine              | <u>P. sylvestris</u>                          | 5, 6    |
| Scrub Pine               | <u>P. virginiana</u>                          | 5       |
| FAMILY PLANTAGINACEAE    |                                               |         |
| English Plantain         | <u>Plantago lanceolata</u>                    | 5, 6    |
| Pale Plantain            | <u>P. rugelii</u>                             | 5       |
| FAMILY POLEMONIACEAE     |                                               |         |
| Downy Phlox              | <u>Phlox pilosa</u>                           | 5       |

## FAMILY POLYGONACEAE

|                          |                            |     |
|--------------------------|----------------------------|-----|
| Common Knotweed          | <u>Polygonum aviculare</u> | 5,6 |
| ?                        | <u>P. longisetum</u>       | 5   |
| Pink Smartweed           | <u>P. pennsylvanicum</u>   | 5,6 |
| Lady's Thumb             | <u>P. persicaria</u>       | 5,6 |
| Arrow-leaved Tearthumb   | <u>P. sagittatum</u>       | 5,6 |
| Climbing False Buckwheat | <u>P. scandens</u>         | 5,6 |
| Virginia Knotweed        | <u>P. virginianum</u>      | 5,6 |
| Sheep Sorrel             | <u>Rumex acetosella</u>    | 5,6 |
| Curled Dock              | <u>R. crispus</u>          | 5,6 |
| Broad-leaved Dock        | <u>R. obtusifolius</u>     | 5,6 |

## FAMILY POLYPODIACEAE

|               |                               |   |
|---------------|-------------------------------|---|
| Rock-polypody | <u>Polypodium virginianum</u> | 5 |
|---------------|-------------------------------|---|

## FAMILY PONTEDERIACEAE

|                 |                           |     |
|-----------------|---------------------------|-----|
| Water Stargrass | <u>Heteranthera dubia</u> | 5   |
| Mud-plantain    | <u>H. reniformis</u>      | 5,6 |
| Pickerelweed    | <u>Pontederia cordata</u> | 5   |

## FAMILY PORTULACACEAE

|               |                            |       |
|---------------|----------------------------|-------|
| Spring Beauty | <u>Claytonia virginica</u> | 2,5,6 |
|---------------|----------------------------|-------|

## FAMILY PRIMULACEAE

|                     |                           |     |
|---------------------|---------------------------|-----|
| Pimpernel           | <u>Anagallis arvensis</u> | 5,6 |
| Fringed Loosestrife | <u>Lysimachia ciliata</u> | 5,6 |
| Moneywort           | <u>L. nummularia</u>      | 5,6 |
| Whorled Loosestrife | <u>L. quadrifolia</u>     | 5   |

## FAMILY RANUNCULACEAE

|                      |                                            |       |
|----------------------|--------------------------------------------|-------|
| White Baneberry      | <u>Actaea pachypoda</u>                    | 2,5   |
| Red Baneberry        | <u>A. rubra</u>                            | 5     |
| Columbine            | <u>Aquilegia canadensis</u>                | 2,5   |
| Marsh Marigold       | <u>Caltha palustris</u>                    | 5     |
| Black Cohosh         | <u>Cimicifuga racemosa</u>                 | 5     |
| Virgin's Bower       | <u>Clematis virginiana</u>                 | 5     |
| Round-lobed Hepatica | <u>Hepatica nobilis</u> var. <u>obtusa</u> | 2,5   |
| Aborted Buttercup    | <u>Ranunculus abortivus</u>                | 5,6   |
| Bulbous Buttercup    | <u>R. bulbosus</u>                         | 2,6   |
| Lesser Celandine     | <u>R. ficaria</u>                          | 2,5,6 |
| Hooked Buttercup     | <u>R. recurvatus</u>                       | 5     |
| Early Meadow-rue     | <u>Thalictrum dioicum</u>                  | 2     |
| Tall Meadow-rue      | <u>T. pubescens</u>                        | 5,6   |
| Rue-anemone          | <u>T. thalictroides</u>                    | 2,5   |

## FAMILY ROSACEAE

|                          |                                |       |
|--------------------------|--------------------------------|-------|
| Agrimony                 | <u>Agrimonia gryposepala</u>   | 5     |
| Shadbush                 | <u>Amelanchier arborea</u>     | 5     |
| Hawthorn                 | <u>Crataegus</u> spp.          | 5,6   |
| Indian Strawberry        | <u>Duchesnea indica</u>        | 2,6   |
| Common Strawberry        | <u>Fragaria virginiana</u>     | 2,5,6 |
| White Avens              | <u>Geum canadense</u>          | 5,6   |
| Ninebark                 | <u>Physocarpus opulifolius</u> | 5     |
| Silvery Cinquefoil       | <u>Potentilla argentea</u>     | 2     |
| Dwarf Cinquefoil         | <u>P. canadensis</u>           | 2,5,6 |
| Rough-fruited Cinquefoil | <u>P. recta</u>                | 2,5,6 |
| Common Cinquefoil        | <u>P. simplex</u>              | 2,5,6 |

|                         |                                    |       |
|-------------------------|------------------------------------|-------|
| Pasture Rose            | <u>Rosa carolina</u>               | 5     |
| FAMILY RUBIACEAE        |                                    |       |
| Buttonbush              | <u>Cephalanthus occidentalis</u>   | 5,6   |
| Cleavers                | <u>Galium aparine</u>              | 2,5,6 |
| Fragrant Bedstraw       | <u>G. triflorum</u>                | 5,6   |
| Bluets                  | <u>Hedyotis caerulea</u>           | 2,5   |
| Partridgeberry          | <u>Mitchella repens</u>            | 5     |
| FAMILY SAXIFRAGACEAE    |                                    |       |
| Alumroot                | <u>Heuchera americana</u>          | 5     |
| Early Saxifrage         | <u>Saxifraga virginiensis</u>      | 2,5   |
| Foamflower              | <u>Tiarella cordifolia</u>         | 5     |
| FAMILY SCROPHULARIACEAE |                                    |       |
| Slender Gerardia        | <u>Agalinis tenuifolia</u>         | 5     |
| Turtlehead              | <u>Chelone glabra</u>              | 5     |
| Clammy Hedge-hyssop     | <u>Gratiola neglecta</u>           | 5,6   |
| Butter-and-eggs         | <u>Linaria vulgaris</u>            | 2,5,6 |
| Winged Monkey Flower    | <u>Mimulus alatus</u>              | 5,6   |
| Monkey Flower           | <u>M. ringens</u>                  | 5     |
| Foxglove Beardtongue    | <u>Penstemon digitalis</u>         | 2,6   |
| Hairy Beardtongue       | <u>P. hirsutus</u>                 | 2,5,6 |
| Moth Mullein            | <u>Verbascum blattaria</u>         | 2,5,6 |
| Common Mullein          | <u>V. thapsus</u>                  | 5,6   |
| Water Speedwell         | <u>Veronica anagallis-aquatica</u> | 5     |
| Corn Speedwell          | <u>V. arvensis</u>                 | 2,6   |
| Common Speedwell        | <u>V. officinalis</u>              | 2,5,6 |
| Thyme-leaved Speedwell  | <u>V. serpyllifolia</u>            | 2,5   |

## FAMILY SMILACACEAE

Greenbrier Smilax rotundifolia 5

## FAMILY SOLANACEAE

Jimsonweed Datura stramonium 5

Smooth Ground Cherry Physalis subglabrata 5

Common Nightshade Solanum americanum 5

Horse Nettle S. carolinense 5,6

Buffalo Bur S. cornutum 5

Bitter Nightshade S. dulcamara 2,5,6

## FAMILY STAPHYLEACEAE

Bladdernut Staphylea trifolia 5,6

## FAMILY TYPHACEAE

Broad-leaved Cattail Typha latifolia 2,6

## FAMILY URTICACEAE

False Nettle Boehmeria cylindrica 5,6

Wood Nettle Laportea canadensis 5,6

Pellitory Parietaria pensylvanica 5

Clearweed Pilea pumila 5,6

## FAMILY VERBENACEAE

Lopseed Phryma leptostachya 5

Blue Vervain Verbena hastata 5,6

White Vervain V. urticifolia 5,6

## FAMILY VIOLACEAE

|                      |                                           |       |
|----------------------|-------------------------------------------|-------|
| Northern Bog Violet  | <u>Viola nephrophylla</u>                 | 2     |
| Marsh Blue Violet    | <u>V. obliqua</u>                         | 2     |
| Birdfoot Violet      | <u>V. pedata</u>                          | 2     |
| Smooth Yellow Violet | <u>V. pubescens</u> var. <u>eriocarpa</u> | 2,5   |
| Common Blue Violet   | <u>V. sororia</u>                         | 2,5,6 |
| Stone's Violet       | <u>V. stoneana</u>                        | 2     |
| Pale Violet          | <u>V. striata</u>                         | 2,5,6 |

## FAMILY VITACEAE

|             |                                    |     |
|-------------|------------------------------------|-----|
| Woodbine    | <u>Parthenocissus quinquefolia</u> | 5,6 |
| Frost Grape | <u>Vitis vulpina</u>               | 5,6 |

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<sup>a</sup> All scientific names have been updated to conform to Kartesz and Kartesz (1980).

<sup>b</sup> 2 = McKeever (1979).

5 = Wherry (1959).

6 = Observed by the authors during this study.

Appendix B. Birds reported to occur in the vicinity of Valley Forge  
National Historical Park, Pennsylvania.

| <u>Common Name</u> <sup>a</sup> | <u>Scientific Name</u>       | <u>Source</u> <sup>b</sup> |
|---------------------------------|------------------------------|----------------------------|
| FAMILY GAVIIDAE                 |                              |                            |
| Common Loon                     | <u>Gavia immer</u>           | 1,3,4                      |
| FAMILY PODICIPEDIDAE            |                              |                            |
| Pied-billed Grebe               | <u>Podilymbus podiceps</u>   | 1-4,6                      |
| Horned Grebe                    | <u>P. auritus</u>            | 1-3                        |
| FAMILY ARDEIDAE                 |                              |                            |
| American Bittern <sup>c</sup>   | <u>Botaurus lentiginosus</u> | 2,4                        |
| Least Bittern <sup>c</sup>      | <u>Ixobrychus exilis</u>     | 4                          |
| Great Blue Heron <sup>d</sup>   | <u>Ardea herodias</u>        | 1-4,6                      |
| Great Egret                     | <u>Casmerodius albus</u>     | 3,4,6                      |
| Snowy Egret                     | <u>Egretta thula</u>         | 4                          |
| Little Blue Heron               | <u>E. caerulea</u>           | 1,3,6                      |
| Cattle Egret                    | <u>Bubulcus ibis</u>         | 4                          |
| Green-backed Heron              | <u>Butorides striatus</u>    | 1-4,6                      |
| Black-crowned Night-Heron       | <u>Nycticorax nycticorax</u> | 1,3,4                      |
| Yellow-crowned Night-Heron      | <u>N. violaceus</u>          | 4                          |
| FAMILY THRESKIORNITHIDAE        |                              |                            |
| Glossy Ibis                     | <u>Plegadis falcinellus</u>  | 4                          |
| FAMILY ANATIDAE                 |                              |                            |
| Tundra Swan                     | <u>Cygnus columbianus</u>    | 4                          |
| Mute Swan                       | <u>C. olor</u>               | 1                          |
| Snow Goose                      | <u>Chen caerulescens</u>     | 1                          |
| Brant                           | <u>Branta bernicla</u>       | 4                          |

|                        |                              |         |
|------------------------|------------------------------|---------|
| Canada Goose           | <u>B. canadensis</u>         | 1-4, 6  |
| Wood Duck              | <u>Aix sponsa</u>            | 1-4, 6  |
| Green-winged Teal      | <u>Anas crecca</u>           | 2, 4    |
| American Black Duck    | <u>A. rubripes</u>           | 1-4, 6  |
| Mallard                | <u>A. platyrhynchos</u>      | 1-4, 6  |
| Northern Pintail       | <u>A. acuta</u>              | 1, 3, 4 |
| Blue-winged Teal       | <u>A. discors</u>            | 1-4     |
| Northern Shoveler      | <u>A. clypeata</u>           | 4       |
| Gadwall                | <u>A. strepera</u>           | 1, 4    |
| American Wigeon        | <u>A. americana</u>          | 1-4     |
| Canvasback             | <u>Aythya valisineria</u>    | 1, 4    |
| Redhead                | <u>A. americana</u>          | 4       |
| Ring-necked Duck       | <u>A. collaris</u>           | 2, 4    |
| Greater Scaup          | <u>A. marila</u>             | 1, 2, 4 |
| Lesser Scaup           | <u>A. affinis</u>            | 4       |
| Oldsquaw               | <u>Clangula hyemalis</u>     | 2, 4    |
| Black Scoter           | <u>Melanitta nigra</u>       | 2, 4    |
| White-winged Scoter    | <u>M. fusca</u>              | 4       |
| Common Goldeneye       | <u>Bucephala clangula</u>    | 1-4     |
| Bufflehead             | <u>B. albeola</u>            | 1-4     |
| Hooded Merganser       | <u>Lophodytes cucullatus</u> | 1-4     |
| Common Merganser       | <u>Mergus merganser</u>      | 1-4     |
| Red-breasted Merganser | <u>M. serrator</u>           | 4       |
| Ruddy Duck             | <u>Oxyura jamaicensis</u>    | 4       |
| FAMILY CATHARTIDAE     |                              |         |
| Black Vulture          | <u>Coragyps atratus</u>      | 4       |
| Turkey Vulture         | <u>Carthartes aura</u>       | 1-4, 6  |

## FAMILY ACCIPITRIDAE

|                                  |                                 |            |
|----------------------------------|---------------------------------|------------|
| Osprey <sup>e</sup>              | <u>Pandion haliaetus</u>        | 1-4, 6     |
| Bald Eagle <sup>f</sup>          | <u>Haliaeetus leucocephalus</u> | 1, 3       |
| Northern Harrier <sup>d</sup>    | <u>Circus cyaneus</u>           | 1, 3, 4    |
| Sharp-shinned Hawk <sup>g</sup>  | <u>Accipiter striatus</u>       | 1-4        |
| Cooper's Hawk <sup>d</sup>       | <u>A. cooperii</u>              | 1, 3, 4, 6 |
| Northern Goshawk <sup>g</sup>    | <u>A. gentilis</u>              | 4          |
| Red-shouldered Hawk <sup>d</sup> | <u>Buteo lineatus</u>           | 1-4        |
| Broad-winged Hawk                | <u>B. platypterus</u>           | 1-4        |
| Red-tailed Hawk                  | <u>B. jamaicensis</u>           | 1-4, 6     |
| Rough-legged Hawk                | <u>B. lagopus</u>               | 4          |
| Golden Eagle                     | <u>Aquila chrysaetos</u>        | 1, 4       |

## FAMILY FALCONIDAE

|                               |                         |        |
|-------------------------------|-------------------------|--------|
| American Kestrel              | <u>Falco sparverius</u> | 1-4, 6 |
| Merlin                        | <u>F. columbarius</u>   | 4      |
| Peregrine Falcon <sup>h</sup> | <u>F. peregrinus</u>    | 1, 3   |

## FAMILY PHASIANIDAE

|                                |                            |         |
|--------------------------------|----------------------------|---------|
| Ring-necked Pheasant           | <u>Phasianus colchicus</u> | 1-4, 6  |
| Ruffed Grouse                  | <u>Bonasa umbellus</u>     | 4       |
| Wild Turkey                    | <u>Meleagris gallopavo</u> | 4       |
| Northern Bobwhite <sup>d</sup> | <u>Colinus virginianus</u> | 1, 3, 4 |

## FAMILY RALLIDAE

|                        |                         |   |
|------------------------|-------------------------|---|
| King Rail <sup>e</sup> | <u>Rallus elegans</u>   | 4 |
| Virginia Rail          | <u>R. limicola</u>      | 4 |
| Sora                   | <u>Porzana carolina</u> | 4 |

|                               |                                |       |
|-------------------------------|--------------------------------|-------|
| Common Moorhen                | <u>Gallinula chloropus</u>     | 2,4   |
| American Coot                 | <u>Fulica americana</u>        | 1,4   |
| FAMILY CHARADRIIDAE           |                                |       |
| Black-bellied Plover          | <u>Pluvialis squatarola</u>    | 4     |
| Semipalmated Plover           | <u>Charadrius semipalmatus</u> | 4     |
| Killdeer                      | <u>C. vociferus</u>            | 1-4,6 |
| FAMILY SCOLOPACIDAE           |                                |       |
| Greater Yellowlegs            | <u>Tringa melanoleuca</u>      | 1-4   |
| Lesser Yellowlegs             | <u>T. flavipes</u>             | 2,4   |
| Solitary Sandpiper            | <u>T. solitaria</u>            | 1-4   |
| Spotted Sandpiper             | <u>Actitis macularia</u>       | 1-4   |
| Upland Sandpiper <sup>c</sup> | <u>Bartramia longicauda</u>    | 4     |
| Ruddy Turnstone               | <u>Arenaria interpres</u>      | 4     |
| Semipalmated Sandpiper        | <u>Calidris pusilla</u>        | 4     |
| Least Sandpiper               | <u>C. minutilla</u>            | 1-4   |
| Pectoral Sandpiper            | <u>C. melanotos</u>            | 4     |
| Dunlin                        | <u>C. alpina</u>               | 4     |
| Short-billed Dowitcher        | <u>Limnodromus griseus</u>     | 4     |
| Common Snipe                  | <u>Gallinago gallinago</u>     | 4     |
| American Woodcock             | <u>Scolopax minor</u>          | 1-4,6 |
| FAMILY LARIDAE                |                                |       |
| Laughing Gull                 | <u>Larus atricilla</u>         | 1,2   |
| Bonaparte's Gull              | <u>L. philadelphia</u>         | 4     |
| Ring-billed Gull              | <u>L. delawarensis</u>         | 1-4   |
| Herring Gull                  | <u>L. argentatus</u>           | 1-4   |
| Caspian Tern                  | <u>Sterna caspia</u>           | 4     |

|                              |                                  |         |
|------------------------------|----------------------------------|---------|
| Common Tern <sup>i</sup>     | <u>S. hirundo</u>                | 4       |
| Black Tern <sup>c</sup>      | <u>Chlidonias niger</u>          | 4       |
| FAMILY COLUMBIDAE            |                                  |         |
| Rock Dove                    | <u>Columba livia</u>             | 1, 2, 4 |
| Mourning Dove                | <u>Zenaida macroura</u>          | 1-4, 6  |
| FAMILY CUCULIDAE             |                                  |         |
| Black-billed Cuckoo          | <u>Coccyzus erythrophthalmus</u> | 1-4     |
| Yellow-billed Cuckoo         | <u>C. americanus</u>             | 1-4, 6  |
| FAMILY TYTONIDAE             |                                  |         |
| Common Barn-Owl <sup>d</sup> | <u>Tyto alba</u>                 | 1-4     |
| FAMILY STRIGIDAE             |                                  |         |
| Eastern Screech-Owl          | <u>Otus asio</u>                 | 1-4     |
| Great Horned Owl             | <u>Bubo virginianus</u>          | 1-4     |
| Snowy Owl                    | <u>Nyctea scandiaca</u>          | 4       |
| Barred Owl                   | <u>Strix varia</u>               | 1, 4    |
| Long-eared Owl <sup>g</sup>  | <u>Asio otus</u>                 | 4       |
| Short-eared Owl <sup>e</sup> | <u>A. flammeus</u>               | 4       |
| Northern Saw-Whet Owl        | <u>Aegolius acadicus</u>         | 4       |
| FAMILY CAPRIMULGIDAE         |                                  |         |
| Common Nighthawk             | <u>Chordeiles minor</u>          | 1-4     |
| Whip-poor-will <sup>g</sup>  | <u>Caprimulgus vociferus</u>     | 1, 3, 4 |
| FAMILY APODIDAE              |                                  |         |
| Chimney Swift                | <u>Chaetura pelagica</u>         | 1-4     |

## FAMILY TROCHILIDAE

|                           |                             |     |
|---------------------------|-----------------------------|-----|
| Ruby-throated Hummingbird | <u>Archilochus colubris</u> | 1-4 |
|---------------------------|-----------------------------|-----|

## FAMILY ALCEDINIDAE

|                   |                      |        |
|-------------------|----------------------|--------|
| Belted Kingfisher | <u>Ceryle alcyon</u> | 1-4, 6 |
|-------------------|----------------------|--------|

## FAMILY PICIDAE

|                                    |                                   |         |
|------------------------------------|-----------------------------------|---------|
| Red-headed Woodpecker <sup>d</sup> | <u>Melanerpes erythrocephalus</u> | 1, 3, 4 |
|------------------------------------|-----------------------------------|---------|

|                        |                     |         |
|------------------------|---------------------|---------|
| Red-bellied Woodpecker | <u>M. carolinus</u> | 1, 2, 4 |
|------------------------|---------------------|---------|

|                                       |                           |         |
|---------------------------------------|---------------------------|---------|
| Yellow-bellied Sapsucker <sup>g</sup> | <u>Sphyrapicus varius</u> | 1, 3, 4 |
|---------------------------------------|---------------------------|---------|

|                  |                           |     |
|------------------|---------------------------|-----|
| Downy Woodpecker | <u>Picoides pubescens</u> | 1-4 |
|------------------|---------------------------|-----|

|                  |                    |        |
|------------------|--------------------|--------|
| Hairy Woodpecker | <u>P. villosus</u> | 1-4, 6 |
|------------------|--------------------|--------|

|                  |                         |        |
|------------------|-------------------------|--------|
| Northern Flicker | <u>Colaptes auratus</u> | 1-4, 6 |
|------------------|-------------------------|--------|

|                     |                           |   |
|---------------------|---------------------------|---|
| Pileated Woodpecker | <u>Dryocopus pileatus</u> | 4 |
|---------------------|---------------------------|---|

## FAMILY TYRANNIDAE

|                        |                          |   |
|------------------------|--------------------------|---|
| Olive-sided Flycatcher | <u>Contopus borealis</u> | 4 |
|------------------------|--------------------------|---|

|                    |                  |        |
|--------------------|------------------|--------|
| Eastern Wood-Pewee | <u>C. virens</u> | 1-4, 6 |
|--------------------|------------------|--------|

|                           |                               |   |
|---------------------------|-------------------------------|---|
| Yellow-bellied Flycatcher | <u>Empidonax flaviventris</u> | 4 |
|---------------------------|-------------------------------|---|

|                    |                     |      |
|--------------------|---------------------|------|
| Acadian Flycatcher | <u>E. virescens</u> | 4, 6 |
|--------------------|---------------------|------|

|                   |                    |   |
|-------------------|--------------------|---|
| Willow Flycatcher | <u>E. traillii</u> | 4 |
|-------------------|--------------------|---|

|                               |                   |            |
|-------------------------------|-------------------|------------|
| Least Flycatcher <sup>g</sup> | <u>E. minimus</u> | 1, 3, 4, 6 |
|-------------------------------|-------------------|------------|

|                |                        |     |
|----------------|------------------------|-----|
| Eastern Phoebe | <u>Sayornis phoebe</u> | 1-4 |
|----------------|------------------------|-----|

|                          |                           |        |
|--------------------------|---------------------------|--------|
| Great Crested Flycatcher | <u>Myiarchus crinitus</u> | 1-4, 6 |
|--------------------------|---------------------------|--------|

|                  |                          |        |
|------------------|--------------------------|--------|
| Eastern Kingbird | <u>Tyrannus tyrannus</u> | 1-4, 6 |
|------------------|--------------------------|--------|

## FAMILY ALAUDIDAE

|             |                             |      |
|-------------|-----------------------------|------|
| Horned Lark | <u>Eremophila alpestris</u> | 1, 4 |
|-------------|-----------------------------|------|

## FAMILY HIRUNDINIDAE

|                               |                                   |         |
|-------------------------------|-----------------------------------|---------|
| Purple Martin <sup>d</sup>    | <u>Progne subis</u>               | 1-4     |
| Tree Swallow                  | <u>Tachycineta bicolor</u>        | 1-4     |
| Northern Rough-winged Swallow | <u>Stelgidopteryx serripennis</u> | 1-4, 6  |
| Bank Swallow                  | <u>Riparia riparia</u>            | 1-4     |
| Cliff Swallow                 | <u>Hirundo pyrrhonota</u>         | 1, 3, 4 |
| Barn Swallow                  | <u>H. rustica</u>                 | 1-4, 6  |

## FAMILY CORVIDAE

|               |                              |         |
|---------------|------------------------------|---------|
| Blue Jay      | <u>Cyanocitta cristata</u>   | 1-4, 6  |
| American Crow | <u>Corvus brachyrhynchos</u> | 1-4, 6  |
| Fish Crow     | <u>C. ossifragus</u>         | 1, 3, 4 |
| Common Raven  | <u>C. corax</u>              | 4       |

## FAMILY PARIDAE

|                        |                           |            |
|------------------------|---------------------------|------------|
| Black-capped Chickadee | <u>Parus atricapillus</u> | 1-4        |
| Carolina Chickadee     | <u>P. carolinensis</u>    | 1, 2, 4, 6 |
| Tufted Titmouse        | <u>P. bicolor</u>         | 1-4, 6     |

## FAMILY SITTIDAE

|                         |                         |     |
|-------------------------|-------------------------|-----|
| Red-breasted Nuthatch   | <u>Sitta canadensis</u> | 1-4 |
| White-breasted Nuthatch | <u>S. carolinensis</u>  | 1-4 |

## FAMILY CETHIIDAE

|               |                          |     |
|---------------|--------------------------|-----|
| Brown Creeper | <u>Certhia americana</u> | 1-4 |
|---------------|--------------------------|-----|

## FAMILY TROGLODYTIDAE

|                            |                                 |        |
|----------------------------|---------------------------------|--------|
| Carolina Wren              | <u>Thryothorus ludovicianus</u> | 1-4    |
| Bewick's Wren <sup>e</sup> | <u>Thryomanes bewickii</u>      | 4      |
| House Wren                 | <u>Troglodytes aedon</u>        | 1-4, 6 |

|                                |                               |       |
|--------------------------------|-------------------------------|-------|
| Winter Wren                    | <u>T. troglodytes</u>         | 1,3,4 |
| Sedge Wren <sup>c</sup>        | <u>Cistothorus platensis</u>  | 4     |
| Marsh Wren <sup>d</sup>        | <u>C. palustris</u>           | 2,4   |
| FAMILY MUSCICAPIDAE            |                               |       |
| Golden-crowned Kinglet         | <u>Regulus satrapa</u>        | 1,3,4 |
| Ruby-crowned Kinglet           | <u>R. calendula</u>           | 1-4   |
| Blue-gray Gnatcatcher          | <u>Polioptila caerulea</u>    | 1,3,4 |
| Eastern Bluebird <sup>d</sup>  | <u>Sialia sialis</u>          | 1,3,4 |
| Veery                          | <u>Catharus fuscescens</u>    | 1-4,6 |
| Gray-cheeked Thrush            | <u>C. minimus</u>             | 1,3   |
| Swainson's Thrush              | <u>C. ustulatus</u>           | 1-4   |
| Hermit Thrush                  | <u>C. guttatus</u>            | 1-4   |
| Wood Thrush                    | <u>Hylocichla mustelina</u>   | 1-4,6 |
| American Robin                 | <u>Turdus migratorius</u>     | 1-4,6 |
| FAMILY MIMIDAE                 |                               |       |
| Gray Catbird                   | <u>Dumetella carolinensis</u> | 1-4,6 |
| Northern Mockingbird           | <u>Mimus polyglottos</u>      | 1-4,6 |
| Brown Thrasher                 | <u>Toxostoma rufum</u>        | 1-4,6 |
| FAMILY MOTACILLIDAE            |                               |       |
| Water Pipit                    | <u>Anthus spinoletta</u>      | 1,4   |
| FAMILY BOMBYCILLIDAE           |                               |       |
| Cedar Waxwing                  | <u>Bombycilla cedrorum</u>    | 1-4   |
| FAMILY LANIIDAE                |                               |       |
| Loggerhead Shrike <sup>i</sup> | <u>Lanius ludovicianus</u>    | 4     |

## FAMILY STURNIDAE

|                   |                         |       |
|-------------------|-------------------------|-------|
| European Starling | <u>Sturnus vulgaris</u> | 1-4,6 |
|-------------------|-------------------------|-------|

## FAMILY VIREONIDAE

|                       |                          |       |
|-----------------------|--------------------------|-------|
| White-eyed Vireo      | <u>Vireo griseus</u>     | 1-4,6 |
| Solitary Vireo        | <u>V. solitarius</u>     | 1-4   |
| Yellow-throated Vireo | <u>V. flavifrons</u>     | 1,3,4 |
| Warbling Vireo        | <u>V. gilvus</u>         | 1-4   |
| Philadelphia Vireo    | <u>V. philadelphicus</u> | 1     |
| Red-eyed Vireo        | <u>V. olivaceus</u>      | 1-4,6 |

## FAMILY EMBERIZIDAE

|                              |                           |       |
|------------------------------|---------------------------|-------|
| Blue-winged Warbler          | <u>Vermivora pinus</u>    | 1-4,6 |
| Golden-winged Warbler        | <u>V. chrysoptera</u>     | 1,3,4 |
| Tennessee Warbler            | <u>V. peregrina</u>       | 1-4   |
| Nashville Warbler            | <u>V. ruficapilla</u>     | 1,3,4 |
| Northern Parula Warbler      | <u>Parula americana</u>   | 1,3,4 |
| Yellow Warbler               | <u>Dendroica petechia</u> | 1-4   |
| Chestnut-sided Warbler       | <u>D. pensylvanica</u>    | 1-4   |
| Magnolia Warbler             | <u>D. magnolia</u>        | 1-4   |
| Cape May Warbler             | <u>D. tigrina</u>         | 1-4   |
| Black-throated Blue Warbler  | <u>D. caerulescens</u>    | 1-4   |
| Yellow-rumped Warbler        | <u>D. coronata</u>        | 1-4   |
| Black-throated Green Warbler | <u>D. virens</u>          | 1-4   |
| Blackburnian Warbler         | <u>D. fusca</u>           | 1-4   |
| Yellow-throated Warbler      | <u>D. dominica</u>        | 4     |
| Pine Warbler                 | <u>D. pinus</u>           | 1,3,4 |
| Prairie Warbler              | <u>D. discolor</u>        | 1-4   |

|                         |                                |       |
|-------------------------|--------------------------------|-------|
| Palm Warbler            | <u>D. palmarum</u>             | 1-3   |
| Bay-breasted Warbler    | <u>D. castanea</u>             | 1,3,4 |
| Blackpoll Warbler       | <u>D. striata</u>              | 1-4   |
| Cerulean Warbler        | <u>D. cerulea</u>              | 2,4   |
| Black-and-White Warbler | <u>Mniotilta varia</u>         | 1-4   |
| American Redstart       | <u>Setophaga ruticilla</u>     | 1-4   |
| Prothonotary Warbler    | <u>Protonotaria citrea</u>     | 1,3,4 |
| Worm-eating Warbler     | <u>Helminthos vermivorus</u>   | 1,3,4 |
| Ovenbird                | <u>Seiurus aurocapillus</u>    | 1-4,6 |
| Northern Waterthrush    | <u>S. noveboracensis</u>       | 1-4   |
| Louisiana Waterthrush   | <u>S. motacilla</u>            | 1,3,4 |
| Kentucky Warbler        | <u>Oporornis formosus</u>      | 1,3,4 |
| Mourning Warbler        | <u>O. philadelphia</u>         | 4     |
| Common Yellowthroat     | <u>Geothlypis trichas</u>      | 1-4,6 |
| Hooded Warbler          | <u>Wilsonia citrina</u>        | 1,4   |
| Wilson's Warbler        | <u>W. pusilla</u>              | 1-4   |
| Canada Warbler          | <u>W. canadensis</u>           | 1-4   |
| Yellow-breasted Chat    | <u>Icteria virens</u>          | 1,3,4 |
| Summer Tanager          | <u>Piranga rubra</u>           | 4     |
| Scarlet Tanager         | <u>P. olivacea</u>             | 1-4,6 |
| Northern Cardinal       | <u>Cardinalis cardinalis</u>   | 1-4,6 |
| Rose-breasted Grosbeak  | <u>Pheucticus ludovicianus</u> | 1-4   |
| Blue Grosbeak           | <u>Guiraca caerulea</u>        | 1,4   |
| Indigo Bunting          | <u>Passerina cyanea</u>        | 1-4,6 |
| Dickcissel <sup>i</sup> | <u>Spiza americana</u>         | 1     |
| Rufous-sided Towhee     | <u>Pipilo erythrophthalmus</u> | 1-4,6 |
| American Tree Sparrow   | <u>Spizella arborea</u>        | 1,3,4 |

|                                  |                                  |         |
|----------------------------------|----------------------------------|---------|
| Chipping Sparrow                 | <u>S. passerina</u>              | 1-4     |
| Field Sparrow                    | <u>S. pusilla</u>                | 1-4, 6  |
| Vesper Sparrow <sup>d</sup>      | <u>Poocetes gramineus</u>        | 4       |
| Savannah Sparrow                 | <u>Passerculus sandwichensis</u> | 4       |
| Grasshopper Sparrow <sup>d</sup> | <u>Ammodramus savannarum</u>     | 4       |
| Henslow's Sparrow <sup>c</sup>   | <u>A. henslowii</u>              | 4       |
| Fox Sparrow                      | <u>Passerella iliaca</u>         | 1-3     |
| Song Sparrow                     | <u>Melospiza melodia</u>         | 1-4, 6  |
| Lincoln's Sparrow                | <u>M. lincolni</u>               | 4       |
| Swamp Sparrow                    | <u>M. georgiana</u>              | 1-4     |
| White-throated Sparrow           | <u>Zonotrichia albicollis</u>    | 1-4     |
| White-crowned Sparrow            | <u>Z. leucophrys</u>             | 1-4     |
| Dark-eyed Junco                  | <u>Junco hyemalis</u>            | 1-4     |
| Lapland Longspur                 | <u>Calcarius lapponicus</u>      | 4       |
| Snow Bunting                     | <u>Plectrophenax nivalis</u>     | 4       |
| Bobolink <sup>g</sup>            | <u>Dolichonyx oryzivorus</u>     | 1, 3, 4 |
| Red-winged Blackbird             | <u>Agelaius phoeniceus</u>       | 1-4, 6  |
| Eastern Meadowlark               | <u>Sturnella magna</u>           | 1-4     |
| Rusty Blackbird                  | <u>Euphagus carolinus</u>        | 1-4     |
| Common Grackle                   | <u>Quiscalus quiscula</u>        | 1-4, 6  |
| Brown-headed Cowbird             | <u>Molothrus ater</u>            | 1-4, 6  |
| Orchard Oriole                   | <u>Icterus spurius</u>           | 1, 2, 4 |
| Northern Oriole                  | <u>I. galbula</u>                | 1-4, 6  |
| FAMILY FRINGILLIDAE              |                                  |         |
| Purple Finch                     | <u>Carpodacus purpureus</u>      | 1, 3, 4 |
| House Finch                      | <u>C. mexicanus</u>              | 1, 2, 4 |
| Common Redpoll                   | <u>Carduelis flammea</u>         | 4       |

|                    |                                   |       |
|--------------------|-----------------------------------|-------|
| Pine Siskin        | <u>C. pinus</u>                   | 1,3,4 |
| American Goldfinch | <u>C. tristis</u>                 | 1-4,6 |
| Evening Grosbeak   | <u>Coccothraustes vespertinus</u> | 1,3,4 |
| FAMILY PASSERIDAE  |                                   |       |
| House Sparrow      | <u>Passer domesticus</u>          | 1-4   |

-----

<sup>a</sup> Nomenclature follows Eisenmann et al. (1982).

<sup>b</sup> 1 = Anonymous (1974).  
 2 = McKeever (1979).  
 3 = Northwood (1959).  
 4 = Pennsylvania Game Commission (1985).  
 6 = Observed by the authors during this study.

<sup>c</sup> Threatened in Pennsylvania.

<sup>d</sup> Species of concern in Pennsylvania.

<sup>e</sup> Endangered in Pennsylvania.

<sup>f</sup> Endangered federally and in Pennsylvania.

<sup>g</sup> Status undetermined in Pennsylvania.

<sup>h</sup> Endangered federally, extirpated in Pennsylvania.

<sup>i</sup> Extirpated in Pennsylvania.

Appendix C. Mammals reported to occur in the vicinity of Valley Forge National Historical Park, Pennsylvania.

| <u>Common Name</u>               | <u>Scientific Name</u> <sup>a</sup> | <u>Source</u> <sup>b</sup> |
|----------------------------------|-------------------------------------|----------------------------|
| FAMILY DIDELPHIDAE               |                                     |                            |
| Virginia Opossum                 | <u>Didelphis virginiana</u>         | 2,4,6                      |
| FAMILY SORICIDAE                 |                                     |                            |
| Masked Shrew                     | <u>Sorex cinereus</u>               | 4,6                        |
| Smoky Shrew                      | <u>S. fumeus</u>                    | 4                          |
| Northern Short-tailed Shrew      | <u>Blarina brevicauda</u>           | 4,6                        |
| Least Shrew <sup>c</sup>         | <u>Cryptotis parva</u>              | 4                          |
| FAMILY TALPIDAE                  |                                     |                            |
| Eastern Mole                     | <u>Scalopus aquaticus</u>           | 4                          |
| Star-nosed Mole                  | <u>Condylura cristata</u>           | 4,6                        |
| FAMILY VESPERTILIONIDAE          |                                     |                            |
| Little Brown Myotis              | <u>Myotis lucifugus</u>             | 4                          |
| Keen's Myotis <sup>d</sup>       | <u>M. keenii</u>                    | 4                          |
| Small-footed Myotis <sup>e</sup> | <u>M. leibii</u>                    | 4                          |
| Silver-haired Bat <sup>c</sup>   | <u>Lasionycteris noctivagans</u>    | 4                          |
| Eastern Pipistrelle              | <u>Pipistrellus subflavus</u>       | 4                          |
| Big Brown Bat                    | <u>Eptesicus fuscus</u>             | 4                          |
| Red Bat                          | <u>Lasiurus borealis</u>            | 4                          |
| Hoary Bat                        | <u>L. cinereus</u>                  | 4                          |
| FAMILY LEPORIDAE                 |                                     |                            |
| Eastern Cottontail               | <u>Sylvilagus floridanus</u>        | 2,4,6                      |

## FAMILY SCIURIDAE

|                          |                                |       |
|--------------------------|--------------------------------|-------|
| Eastern Chipmunk         | <u>Tamias striatus</u>         | 4     |
| Woodchuck                | <u>Marmota monax</u>           | 2,4,6 |
| Gray Squirrel            | <u>Sciurus carolinensis</u>    | 2,4,6 |
| Red Squirrel             | <u>Tamiasciurus hudsonicus</u> | 2,4   |
| Southern Flying Squirrel | <u>Glaucomys volans</u>        | 2,4   |

## FAMILY CASTORIDAE

|        |                          |   |
|--------|--------------------------|---|
| Beaver | <u>Castor canadensis</u> | 4 |
|--------|--------------------------|---|

## FAMILY CRICETIDAE

|                    |                                |       |
|--------------------|--------------------------------|-------|
| Deer Mouse         | <u>Peromyscus maniculatus</u>  | 4     |
| White-footed Mouse | <u>P. leucopus</u>             | 4,6   |
| Meadow Vole        | <u>Microtus pennsylvanicus</u> | 4,6   |
| Woodland Vole      | <u>M. pinetorum</u>            | 4     |
| Muskrat            | <u>Ondatra zibethicus</u>      | 2,4,6 |

## FAMILY MURIDAE

|             |                          |     |
|-------------|--------------------------|-----|
| Norway Rat  | <u>Rattus norvegicus</u> | 2,4 |
| House Mouse | <u>Mus musculus</u>      | 2,4 |

## FAMILY ZAPODIDAE

|                      |                        |     |
|----------------------|------------------------|-----|
| Meadow Jumping Mouse | <u>Zapus hudsonius</u> | 4,6 |
|----------------------|------------------------|-----|

## FAMILY CANIDAE

|          |                                 |       |
|----------|---------------------------------|-------|
| Red Fox  | <u>Vulpes vulpes</u>            | 2,4,6 |
| Gray Fox | <u>Urocyon cinereoargenteus</u> | 4     |

## FAMILY PROCYONIDAE

|         |                      |       |
|---------|----------------------|-------|
| Raccoon | <u>Procyon lotor</u> | 2,4,6 |
|---------|----------------------|-------|

## FAMILY MUSTELIDAE

|                    |                          |     |
|--------------------|--------------------------|-----|
| Long-tailed Weasel | <u>Mustela frenata</u>   | 4   |
| Mink               | <u>M. vison</u>          | 4   |
| Striped Skunk      | <u>Mephitis mephitis</u> | 2,4 |

## FAMILY CERVIDAE

|                   |                               |       |
|-------------------|-------------------------------|-------|
| White-tailed Deer | <u>Odocoileus virginianus</u> | 2,4,6 |
|-------------------|-------------------------------|-------|

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<sup>a</sup> Nomenclature follows Jones et al. (1982).

<sup>b</sup> 2 = McKeever (1979).

4 = Pennsylvania Game Commission (1985).

6 = Observed by the authors during this study.

<sup>c</sup> Status undetermined in Pennsylvania.

<sup>d</sup> Species of concern in Pennsylvania.

<sup>e</sup> Threatened in Pennsylvania.

Appendix D. Amphibians and reptiles reported to occur in the vicinity  
of Valley Forge National Historical Park, Pennsylvania.

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| <u>Common Name</u>                    | <u>Scientific Name</u> <sup>a</sup>                       | <u>Source</u> <sup>b</sup> |
|---------------------------------------|-----------------------------------------------------------|----------------------------|
| <u>AMPHIBIANS</u>                     |                                                           |                            |
| FAMILY AMBYSTOMATIDAE                 |                                                           |                            |
| Marbled Salamander                    | <u>Ambystoma opacum</u>                                   | 4                          |
| Spotted Salamander                    | <u>A. maculatum</u>                                       | 4                          |
| Eastern Tiger Salamander <sup>c</sup> | <u>A. tigrinum tigrinum</u>                               | 4                          |
| FAMILY SALAMANDRIDAE                  |                                                           |                            |
| Red-spotted Newt                      | <u>Notophthalmus viridescens</u><br><u>viridescens</u>    | 4                          |
| FAMILY PLETHODONTIDAE                 |                                                           |                            |
| Northern Dusky Salamander             | <u>Desmognathus fuscus fuscus</u>                         | 2, 4                       |
| Red-backed Salamander                 | <u>Plethodon cinereus cinereus</u>                        | 2, 4                       |
| Slimy Salamander                      | <u>P. glutinosus glutinosus</u>                           | 4                          |
| Four-toed Salamander                  | <u>Hemidactylium scutatum</u>                             | 4                          |
| Northern Spring Salamander            | <u>Gyrinophilus porphyriticus</u><br><u>porphyriticus</u> | 4                          |
| Northern Red Salamander               | <u>Pseudotriton ruber ruber</u>                           | 2, 4                       |
| Northern Two-lined Salamander         | <u>Eurycea bislineata bislineata</u>                      | 2, 4                       |
| Long-tailed Salamander                | <u>E. longicauda longicauda</u>                           | 2, 4                       |
| FAMILY PELOBATIDAE                    |                                                           |                            |
| Eastern Spadefoot                     | <u>Scaphiopus holbrooki holbrooki</u>                     | 4, 6                       |
| FAMILY BUFONIDAE                      |                                                           |                            |
| Eastern American Toad                 | <u>Bufo americanus americanus</u>                         | 2, 4, 6                    |
| Fowler's Toad                         | <u>B. woodhousei fowleri</u>                              | 2, 4, 6                    |

## FAMILY HYLIDAE

|                        |                                       |     |
|------------------------|---------------------------------------|-----|
| Northern Cricket Frog  | <u>Acris crepitans crepitans</u>      | 4   |
| Northern Spring Peeper | <u>Hyla crucifer crucifer</u>         | 2,4 |
| Gray Treefrog          | <u>H. versicolor</u>                  | 2,4 |
| Upland Chorus Frog     | <u>Pseudacris triseriata feriarum</u> | 4   |

## FAMILY RANIDAE

|                     |                              |       |
|---------------------|------------------------------|-------|
| Bullfrog            | <u>Rana catesbeiana</u>      | 2,4,6 |
| Green Frog          | <u>R. clamitans melanota</u> | 2,4   |
| Wood Frog           | <u>R. sylvatica</u>          | 4,6   |
| Plains Leopard Frog | <u>R. blairi</u>             | 4     |
| Pickerel Frog       | <u>R. palustris</u>          | 2,4,6 |

REPTILES

## FAMILY CHELYDRIDAE

|                        |                                       |       |
|------------------------|---------------------------------------|-------|
| Common Snapping Turtle | <u>Chelydra serpentina serpentina</u> | 2,4,6 |
|------------------------|---------------------------------------|-------|

## FAMILY KINOSTERNIDAE

|                                 |                                        |   |
|---------------------------------|----------------------------------------|---|
| Stinkpot                        | <u>Sternotherus odoratus</u>           | 4 |
| Eastern Mud Turtle <sup>c</sup> | <u>Kinosternon subrubrum subrubrum</u> | 4 |

## FAMILY EMYDIDAE

|                                 |                                    |       |
|---------------------------------|------------------------------------|-------|
| Spotted Turtle                  | <u>Clemmys guttata</u>             | 2,4   |
| Bog Turtle <sup>d</sup>         | <u>C. muhlenbergi</u>              | 4     |
| Wood Turtle                     | <u>C. insculpta</u>                | 4     |
| Eastern Box Turtle              | <u>Terrapene carolina carolina</u> | 2,4,6 |
| Red-eared Turtle                | <u>Chrysemys scripta elegans</u>   | 2     |
| Red-bellied Turtle <sup>c</sup> | <u>C. (Pseudemys) rubriventris</u> | 2,6   |

|                                    |                                                       |       |
|------------------------------------|-------------------------------------------------------|-------|
| Eastern Painted Turtle             | <u>C. picta picta</u>                                 | 4     |
| Midland Painted Turtle             | <u>C. picta marginata</u>                             | 2,4,6 |
| FAMILY IGUANIDAE                   |                                                       |       |
| Northern Fence Lizard              | <u>Sceloporus undulatus</u><br><u>hyacinthinus</u>    | 4     |
| FAMILY SCINCIDAE                   |                                                       |       |
| Five-lined Skink                   | <u>Eumeces fasciatus</u>                              | 4     |
| Broad-headed Skink <sup>e</sup>    | <u>E. laticeps</u>                                    | 4     |
| FAMILY COLUBRIDAE                  |                                                       |       |
| Northern Water Snake               | <u>Natrix (Nerodia) sipedon</u><br><u>sipedon</u>     | 2,4   |
| Queen Snake                        | <u>Natrix (Regina) septemvittata</u>                  | 4     |
| Northern Brown Snake               | <u>Storeria dekayi dekayi</u>                         | 4     |
| Northern Red-bellied Snake         | <u>S. occipitomaculata</u><br><u>occipitomaculata</u> | 4     |
| Eastern Garter Snake               | <u>Thamnophis sirtalis sirtalis</u>                   | 2,4,6 |
| Eastern Ribbon Snake               | <u>T. sauritus sauritus</u>                           | 4     |
| Smooth Earth Snake                 | <u>Virginia valeriae</u>                              | 4     |
| Eastern Hognose Snake <sup>e</sup> | <u>Heterodon platyrhinos</u>                          | 4     |
| Northern Ringneck Snake            | <u>Diadophis punctatus edwardsi</u>                   | 2,4   |
| Eastern Worm Snake                 | <u>Carphophis amoenus amoenus</u>                     | 4     |
| Northern Black Racer               | <u>Coluber constrictor constrictor</u>                | 4     |
| Black Rat Snake                    | <u>Elaphe obsoleta obsoleta</u>                       | 4,6   |
| Eastern Milk Snake                 | <u>Lampropeltis triangulum</u><br><u>triangulum</u>   | 2,4   |

## FAMILY VIPERIDAE

Northern Copperhead

Agkistrodon contortrix mokeson 2,4

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- <sup>a</sup> Nomenclature follows Conant (1975) and McCoy (1982).
- <sup>b</sup> 2 = McKeever (1979).  
4 = Pennsylvania Game Commission (1985).  
6 = Observed by the authors during this study.
- <sup>c</sup> Endangered in Pennsylvania.
- <sup>d</sup> Endangered federally and in Pennsylvania.
- <sup>e</sup> Status undetermined in Pennsylvania.