

**INVENTORYING AND MONITORING
PROTOCOLS OF VERTEBRATES IN
NATIONAL PARK AREAS OF THE EASTERN
UNITED STATES: THE FAUNAL REPORT**

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Addendum

This September 1994 version of the Faunal Report supersedes the March 1994 version (Technical Report NPS/MAR/NRTR - 94/058). Observations of species through 15 May 1994 within each of the park areas are included. In the March version, data were obtained from the Pennsylvania Breeding Birds Atlas, U.S. Fish and Wildlife Service Breeding Bird Surveys, and Audubon Society Christmas Bird Counts. These sources included data from each park area plus an 8-km radius around the park areas. In the September version, however, data on percentages and totals of species documented within each of the park areas are calculated only from NPS Wildlife Observation Cards and personal observations to ensure that observations came from within the park area. In addition, bird species documented through 15 May 1994 by NPS Wildlife Observation Cards and personal observations are noted in the Occurrence Status (Variable 8) of the Faunal Database and the Results sections for each park area in the September version.

Executive Summary

We developed a comprehensive Faunal Database for terrestrial vertebrate species (excluding white-tailed deer [*Odocoileus virginianus*] and black bear [*Ursus americanus*]) that were predicted or documented to occur in four national park areas of the eastern United States: Gettysburg National Military Park (GETT), Eisenhower National Historic Site (EISE), Hopewell Furnace National Historic Site (HOFU), and Valley Forge National Historical Park (VAFO). The development of this Faunal Database was part of a long-term project (1992-96) in the four national park areas. We created three output (hard copy) versions of the Faunal Database, which allowed the database to be searched manually for the data of interest (i.e., vertebrate species, habitat, or survey protocol). Output Version I focused on the vertebrate species and included:

- 1) Common Name (i.e., Henslow's Sparrow)
- 2) Scientific Name (i.e., *Ammodramus henslowii*)
- 3) Family Name (i.e., Emberizidae)
- 4) Order (i.e., Passeriformes)
- 5) Pro-Cite Group Name (i.e., Passerine)
- 6) Primary Habitat (i.e., Grasslands)
- 7) Secondary Habitat (i.e., Shrub)
- 8) Occurrence Status (i.e., BBA)
- 9) Residency Status (i.e., Summer Resident)
- 10) Legal Population Status (i.e., Protected)
- 11) Protocol (i.e., Spot-mapping)

Output Version II emphasized habitats, and Version III focused on survey protocol. Both Output Versions II and III included

variables 1-7 and 11. Information on predicted and documented species was obtained from field guides, range maps, various databases (e.g., USFWS Breeding Bird Survey, Christmas Bird Counts, National Park Service [NPS] Wildlife Observation Cards), and remote-sensing information (e.g., aerial photographs).

Birds were well-documented compared to amphibians, reptiles, and mammals at the four national park areas. Seventy-four percent of the bird species predicted to occur at the park areas were documented by NPS Wildlife Observation Cards and personal observations. A relatively low proportion of salamander species (40%, 24%), snake species (47%, 12%), and certain mammalian species, such as insectivores (33%, 0%), rodents (41%, 23%), and bats (18%, 0%), were documented at GETT/EISE and HOFU, respectively. This may be because the predicted species did not occur within the park areas. However, these species may be present but simply not observed because little or no field work has been devoted to inventorying these vertebrate groups. In comparison, a relatively high percentage of amphibian (56%), reptilian (44%), avian (77%), and mammalian species (31%) were documented at VAFO, which was studied in an earlier NPS project (Cypher et al. 1985). We recommend that efforts be made to study habitats in which the predicted species of these taxa (i.e., salamanders, snakes, and certain mammals) may be found to verify presence or absence at each park area.

Table of Contents

Addendum	i
Executive Summary	ii
List of Tables	vi
List of Figures	vii
Introduction	1
Objectives of the Faunal Report	3
Study Areas	4
Gettysburg National Military Park and Eisenhower National Historic Site	4
Hopewell Furnace National Historic Site	6
Valley Forge National Historical Park	7
Development and Use of the Faunal Database	9
Output Version I of the Faunal Database	10
Output Version II of the Faunal Database	17
Output Version III of the Faunal Database	20
Searching the Faunal Database	23
Updating the Faunal Database	24
Results of the Faunal Database Searches	25
Gettysburg National Military Park and Eisenhower National Historic Site	25
Hopewell Furnace National Historic Site	28
Valley Forge National Historical Park	30
Summary of Predicted and Documented Species	33
Discussion and Recommendations	57

Literature Cited	59
Appendix 1	61
Appendix 2	64
Appendix 3	73
Appendix 4	75
Appendix 5	77
Appendix 6	79
Appendix 7	81

List of Tables

Table 1.	Example of Output Version I of the Faunal	
Database		11
Table 2.	Example of Output Version II of the Faunal	
Database		18
Table 3.	Example of Output Version III of the Faunal	
Database		21
Table 4.	Number of Species Predicted and Number of Species	
Documented for Gettysburg National Military Park and Eisenhower		
National Historic Site		26
Table 5.	Number of Species Predicted and Number of Species	
Documented for Hopewell Furnace National Historic Site	. . .	29
Table 6.	Number of Species Predicted and Number of Species	
Documented for Valley Forge National Historical Park		31
Table 7.	List of Predicted and Documented Species	 34

List of Figures

Figure 1. Geographic Locations of Eisenhower National Historic Site, Gettysburg National Military Park, Hopewell Furnace National Historic Site, and Valley Forge National Historical Park within Pennsylvania	5
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Introduction

We initiated a long-term project (1992-1996) that was designed to provide a comprehensive review of vertebrates (amphibians, reptiles, birds, and mammals) in four national park areas of the eastern United States: Gettysburg National Military Park (GETT), Eisenhower National Historic Site (EISE), Hopewell Furnace National Historic Site (HOFU), and Valley Forge National Historical Park (VAFO). Information on presence-absence, relative abundance, and distribution of vertebrates on these public lands will be important to NPS personnel (hereafter referred to as Resource Management Specialists) who are mandated to manage natural resources. As large tracts of public lands, such as national park areas, become more insular with increased habitat fragmentation due to agriculture, urbanization, or other land use, public lands will be increasingly valuable for the long-term maintenance of faunal diversity and ensuring the functional integrity of landscapes and ecosystems in the eastern United States (Ambrose and Bratton 1990).

In year 1 of our long-term study, we conducted an extensive search of available databases on vertebrates (i.e., published and unpublished species lists, range maps, etc., of amphibians, reptiles, birds, and mammals) that were predicted to occur or were documented in the four national park areas. The search was conducted to develop a list of vertebrate species (excluding

white-tailed deer [*Odocoileus virginianus*] and black bear [*Ursus americanus*]) that were predicted and documented to occur within the four park areas.

We determined the land-use types (Anderson et al. 1976) associated with each park area using USGS topographical maps, aerial photos, and existing data (Yahner et al. 1991, Russell 1987, Cypher et al. 1985). We combined the land-use data with known habitat requirements and ranges of vertebrate species in the eastern deciduous forest to develop a list of species predicted to occur at the four park areas. In addition, we determined the primary and secondary habitat, occurrence status, residency status, legal population status, and types of survey protocols applicable to each predicted and documented vertebrate species.

Detailed ecological information on documented and predicted vertebrate species is important to Resource Management Specialists who are mandated to manage native and non-native vertebrate species. This ecological information will allow Resource Management Specialists to quickly develop cost-effective and efficient management plans that satisfy their specific objectives for any vertebrate species that may be documented or predicted to occur in their park area.

Objectives of the Faunal Report

The objectives of this report were to:

- 1) identify and provide ecological, biological, and legal information on documented and predicted faunal species for four national park areas in Pennsylvania; and
- 2) organize this ecological, biological, and legal information into a database that allows Resource Management Specialists to obtain information needed to implement and maintain management programs that satisfy their specific management objectives.

This report and database can be used in conjunction with the Technical Report NPS/MAR/NRTR-94/057, which is entitled "Inventorying and Monitoring Protocols of Vertebrates In National Park Areas of The Eastern United States: The Bibliographic Report" (Yahner et al. 1994). When used together, the two reports synthesize comprehensive information on inventorying and monitoring protocols, and ecological, biological, and legal data for vertebrates in eastern deciduous forests.

Study Areas

Gettysburg National Military Park and Eisenhower National Historic Site

GETT and EISE are located in Adams County, south central Pennsylvania. GETT and EISE comprise 1,511 ha and 279 ha, respectively, and are contiguous, with EISE to the southwest of GETT (Fig. 1). The town of Gettysburg (population = 7,025) is surrounded by GETT (Rand McNally 1993). The park areas are located within the Triassic Lowland Section of the Piedmont Province, which corresponds to the Carolinian Life Zone (Rhoads 1903, Genoways and Brenner 1985).

The topography of the park areas is gentle, consisting mainly of rolling hills. There are two principal landforms: Cemetery Ridge and Seminary Ridge. These two parallel ridges (1.6-km apart) transect GETT and are oriented north-south. The mean elevation in the park areas is 168 m, and the highest point is Big Round Top (240 m) (Yahner et al. 1991). There are 10 ponds, numerous small wetlands, and three predominant drainages: Rock Creek in the east, Plum Run in the center, and Willoughby Run in the west of the park areas.

Fifty percent (756 ha) of GETT is agricultural land (cropland and pasture), and 36% (547 ha) is forest land. The remaining 14% is comprised of maintained areas, residential

EISE • Eisenhower National Historic Site

HOFU • Hopewell Furnace National Historic Site

GETT • Gettysburg National Military Park

VAFO • Valley Forge National Historic Park

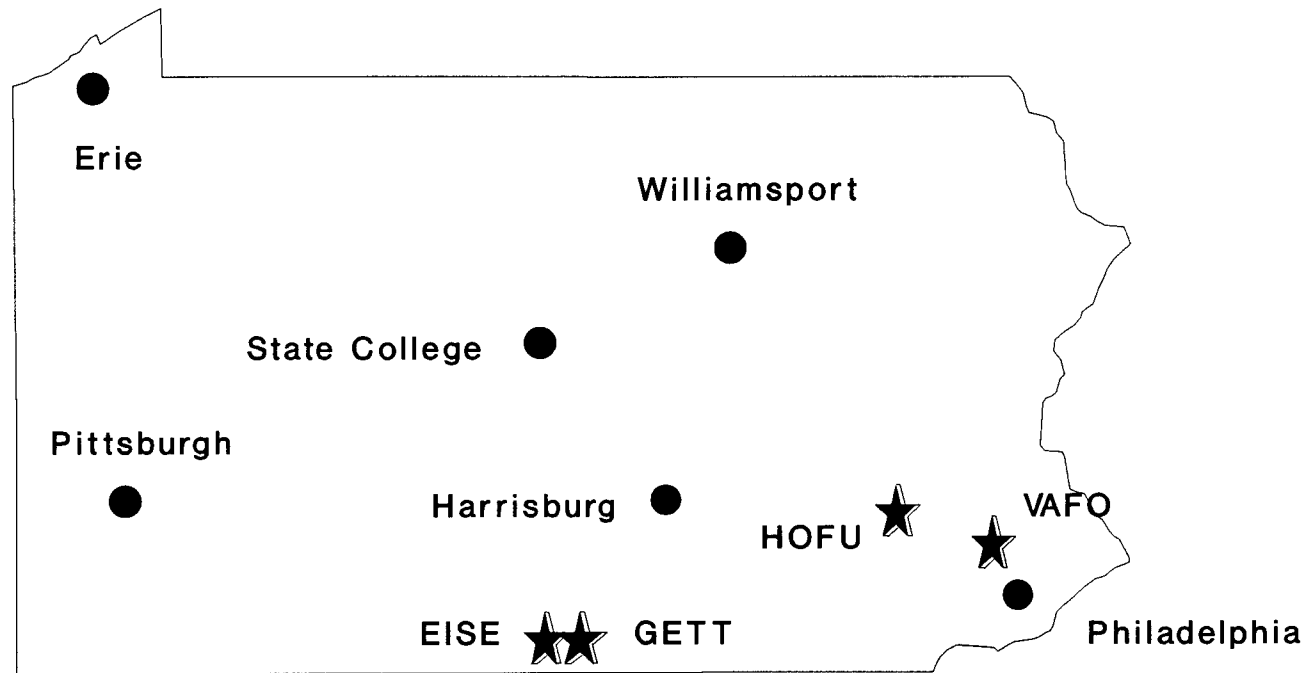


Figure 1. Geographic locations of Eisenhower National Historic Site, Gettysburg National Military Park, Hopewell Furnace National Historic Site, and Valley Forge National Historical Park within Pennsylvania.

areas, or other types of human-dominated developed land (Yahner et al. 1991). Eighty-three percent (232 ha) of EISE is agricultural land, 3% is forest land, and 14% constitutes maintained areas, residential areas, and other developed land (Yahner et al. 1991). Crop species at the park areas include barley, corn, hay (timothy, clover, alfalfa, and fescue), sorghum, oats, rye, soybeans, and winter wheat (Yahner et al. 1991). The forest land consists of wooded areas containing mature tree species that typify Appalachian forest types. The principal overstory tree species are oak (*Quercus* spp.), hickory (*Carya* spp.), and yellow poplar (*Liriodendron tulipifera*) (Kuchler 1964, Yahner et al. 1991).

Hopewell Furnace National Historic Site

HOFU is located in Berks and Chester Counties, southeastern Pennsylvania (Fig. 1). The 350-ha park area is situated in a rural setting and is approximately 10 km southwest of Pottstown (population = 21,831). It is contiguous on all but the southeast side with French Creek State Park (Rand McNally 1993). HOFU is contained within the Piedmont Upland Section and the Conestoga Valley Section of the Piedmont Province. These sections are contained within the Carolinian Life Zone (Rhoads 1903, Genoways and Brenner 1985).

The southern two-thirds of HOFU is dominated by relatively moderate topography with little relief with the exception of one

forested hill (elevation = 220 m) near the southern border of the park area. The northern one-third of the park area is dominated by a forested south-facing slope and has a mean slope of 10%. The maximum elevation is 280 m, and the minimum elevation near the headwaters of French Creek is 146 m (Russell 1987).

Forest occurs in 262 ha (75%) of HOFU. The principal overstory trees are oak, yellow poplar, red maple (*Acer rubrum*), sycamore (*Platanus occidentalis*), red cedar (*Juniperus virginiana*), ash (*Fraxinus* spp.), elm (*Ulmus* spp.), and black walnut (*Juglans nigra*). Red cedar is only found in early successional stands. The remaining 88 ha (25%) are either developed, historic, or agricultural. The agricultural areas consist of 13 fields totaling 60 ha, which are maintained for pastures, hay fields, and row crops (Russell 1987).

Valley Forge National Historical Park

VAFO is located in Montgomery and Chester Counties, southeastern Pennsylvania (Fig. 1). The area of VAFO is 1,192 ha. The park area is surrounded by urban-suburban land-use types and is approximately 20 km northwest of Philadelphia (population = 1,585,577) (Rand McNally 1993). VAFO is located within the Triassic Lowland Section of the Piedmont Province in the Carolinian Life Zone (Rhoads 1903, Genoways and Brenner 1985).

The topography of VAFO is relatively gentle, consisting of rolling uplands and low hills, with elevations ranging from 10 to

150 m. Fifty-seven percent (679 ha) of the park area is composed of old fields, fields mowed annually, and fields mowed biweekly; 38% (453 ha) is woodlands. The remaining 5% (60 ha) of VAFO includes developed areas (e.g., buildings), barren areas (e.g., dirt parking lots), and wetlands (e.g., small ponds) (Cypher 1986).

Woodlands consist of mature forests, early successional-stage forests, floodplain forests, and conifer plantations. The dominant understory and overstory species in woodlands include flowering dogwood (*Cornus florida*), red maple, yellow poplar, black gum (*Nyssa sylvatica*), chestnut oak (*Quercus prinus*), ash, sassafras (*Sassafras albidum*), northern red oak (*Quercus rubra*), boxelder (*Acer negundo*), and white pine (*Pinus strobus*) (Cypher 1986).

Development and Use of the Faunal Database

We developed a comprehensive Faunal Database for each of the national park areas (GETT and EISE combined, HOFU, and VAFO). The three databases included information on taxonomy, habitat use, residency status, legal status, and protocols for inventorying and monitoring all terrestrial vertebrate species (amphibians, reptiles, birds, and mammals) predicted and documented to occur in the park areas.

The database was maintained on the computer program *dBase III Plus*. The three databases for the park areas were stored on a diskette under the filenames of GETTYS.DBF for Gettysburg National Military Park and Eisenhower National Historic Site, HOPEWE.DBF for Hopewell Furnace National Historic Site, and VALLEY.DBF for Valley Forge National Historical Park.

There were three output (hard copy) versions of the Faunal Database for each of the park areas. The three output versions allowed the Faunal Database to be searched manually for the data of interest (i.e., vertebrate species, habitat, or survey protocol). Output Version I focused on the vertebrate species and included 11 variables:

- 1) Common Name (i.e., Henslow's Sparrow)
- 2) Scientific Name (i.e., *Ammodramus henslowii*)
- 3) Family Name (i.e., Emberizidae)
- 4) Order (i.e., Passeriformes)
- 5) Pro-Cite Group Name (i.e., Passerine)
- 6) Primary Habitat (i.e., Grasslands)
- 7) Secondary Habitat (i.e., Shrub)
- 8) Occurrence Status (i.e., BBA)

- 9) Residency Status (i.e., Summer Resident)
- 10) Legal Population Status (i.e., Protected)
- 11) Protocol (i.e., Spot-mapping).

Output Versions II and III emphasized habitats and survey protocol rather than species, respectively. Both Versions II and III include variables 1-7 and 11.

The Faunal Database is available in diskette and Output Version (hard copy) form from the National Park Service by writing to the National Park Service Mid-Atlantic Regional Office, Division of Resource Management and Visitor Protection, 143 South Third Street, Philadelphia, PA 19106-2878 (refer to Appendix 7).

Output Version I of the Faunal Database

Output Version I of the Faunal Database was a species list designed to provide NPS Resource Management Specialists with information on vertebrate species (Table 1). The database was not designed to provide comprehensive ecological and biological information on each species. Rather, the database was meant to provide baseline information for the development of inventorying and monitoring protocols for these species. Output Version I was stored under the report form PROTAX.FRM in *dBase III Plus*.

Variable 1 of the Faunal Database was the Common Name of the vertebrate species. Variables 2, 3, and 4 were Species Name (i.e., Latin scientific name), Family Name, and Order, respectively. The sources used for these variables were

Table 1. Example of Output Version I of the Faunal Database.

Common Name	Species Name	Family	Order	Pro-Cite Group Name	Occurrence Status	Primary Habitat	Secondary Habitat	Residency	Legal Status	Protocol
Bufflehead	<u>Bucephala</u> <u>albeola</u>	Anatidae	Anseriformes	Waterfowl	WOC	52 53 62 63 65 66		W	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE
Hooded Merganser	<u>Lophodytes</u> <u>cusullatus</u>	Anatidae	Anseriformes	Waterfowl	CBC	52 53 62 65 66 41 43	51	S	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE NET
Common Merganser	<u>Mergus</u> <u>merganser</u>	Anatidae	Anseriformes	Waterfowl	R	41 43 52 65 66	51 53	R	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET CRE
Red-breasted Merganser	<u>Mergus</u> <u>serrator</u>	Anatidae	Anseriformes	Waterfowl	R	52 53		M	GM	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE
Ruddy Duck	<u>Oxyura</u> <u>jamaicensis</u>	Anatidae	Anseriformes	Waterfowl	CBC	52 53 66 62	65	M	GM-C3	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE
Black Vulture	<u>Coragyps</u> <u>stratus</u>	Cathartidae	Falconiformes	Raptor	WOC BBA CBC	21	22 31 32 33 41 42 43 74 51 61	R	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE
Turkey Vulture	<u>Cathartes</u> <u>aura</u>	Cathartidae	Falconiformes	Raptor	WOC PO BBA BBS CBC	21 41 43 74	22 31 42 61 51	R	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE
Osprey	<u>Pandion</u> <u>haliaetus</u>	Accipitridae	Falconiformes	Raptor	WOC		52 53 65 66	S	SE-E	BTR TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE

Table 1. (continued)

Common Name	Species Name	Family	Order	Pro-Cite Group Name	Occurrence Status	Primary Habitat	Secondary Habitat	Residency	Legal Status	Protocol
Bald Eagle	<u>Haliaeetus</u> <u>leucocephalus</u>	Accipitridae	Falconiformes	Raptor	WOC CBC	52 53 54		R	FE-E	BTR TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE
Northern Harrier	<u>Circus</u> <u>cyaneus</u>	Accipitridae	Falconiformes	Raptor	WOC BBA CBC	21 31 61	22	R	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE
Sharp-shinned Hawk	<u>Accipiter</u> <u>striatus</u>	Accipitridae	Falconiformes	Raptor	BBA BBS CBC	41 42 43	61 32 33	R	PR	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE

dependent on the taxonomic group. We used Standard Common and Current Scientific Names for North American Amphibians and Reptiles, 3rd edition (Collins et al. 1990) for amphibians and reptiles, the American Ornithologist's Union Checklist of North American Birds, 6th edition (American Ornithologists' Union 1983) for birds, and the Revised Checklist of North American Mammals North of Mexico, 1992 (Jones et al. 1992) for mammals.

Variable 5 was the *Pro-Cite* Group in which a species was placed (Appendix 1). *Pro-Cite* is a bibliographical computer program that allows the user to store and search literature citations using index terms. The *Pro-Cite* Groups indicated in the database refer to the index terms used to search the *Pro-Cite* bibliography described in the Technical Report NPS/MAR/NRTR-94/057 (Yahner et al. 1994). For more information on *Pro-Cite* Groups and how to search *Pro-Cite*, refer to The Bibliographic Report (Yahner et al. 1994), which contains literature citations to inventorying and monitoring protocols for vertebrate species and details regarding cost and use of each protocol.

Variables 6 and 7 were Primary Habitat(s) and Secondary Habitat(s), respectively, of the vertebrate species. Primary Habitats were the habitats that a given species would be found most often if those habitats were available. Secondary Habitats were habitats that a given species would use in the absence of Primary Habitats. For example, song sparrows (*Melospiza melodia*) are associated frequently with open habitats (i.e., savannah). This species, however, also uses deciduous woodlots and old

fields, although less frequently than open habitats. Thus, the Primary Habitat for song sparrows would be grasslands, and the Secondary Habitats would be old fields and deciduous woodlands. Primary and Secondary Habitat(s) were listed in the Database as Anderson Level II Land-Use Codes (Appendix 2) (Anderson et al. 1976). We consulted field guides and the Pennsylvania Natural Diversity Inventory to determine habitat use by individual vertebrate species (Behler and King 1979, Bull and Farrand 1977, Burt and Grossenheider 1980, National Geographic Society 1987, Ehrlich et al. 1988).

Variable 8 was the Occurrence Status of the vertebrate species. The Occurrence Status indicated whether the species was predicted or documented to occur in a given national park area. If the species were documented, the source of documentation was given (i.e., WOC = NPS Wildlife Observation Card, PO = personal observation) (Appendix 3). A species was considered documented for a given park area by the Christmas Bird Count, Breeding Bird Survey, or Breeding Bird Atlas if it were recorded within 8 km of the boundaries of the park area. Therefore, although a bird species may have been recorded 8 km outside the boundaries of the park area with the Christmas Bird Count, Breeding Bird Survey, or Breeding Bird Atlas, it may be included as a documented species in the database to give a more accurate indication of the species expected to occur within the park areas. However, species documented solely by one of these sources and not by NPS Wildlife Observation Cards or personal observations were not included in

the percentages of documented species. Species documented for a given park area by personal observations or NPS Wildlife Observation Cards were recorded within the park area boundaries. Predicted species could potentially occur within the park area based on geographic distribution and habitat requirements of the species.

Variable 9 was the Residency Status of the vertebrate species (Appendix 4). The Residency Status indicated the presence or absence of a species by season. For example, red-eyed vireo (*Vireo olivaceus*) was listed as a Summer Resident: it occurred at the given park area only during the summer months.

Variable 10 was the Legal Population Status of the vertebrate species (Appendix 5). Legal Population Status was the state and federal status for a species, such as threatened, endangered, and exotic. For this report, the federal status of a species superseded the state status. Thus, if a species were considered federally endangered, it was endangered at the state level as well. This variable also included the Pennsylvania Biological Survey Classification for each species. Variable 10 was the federal or state status followed by the Pennsylvania Biological Survey Classification, such as "PR-X" for Federally Protected but State Extirpated for the common tern (*Sterna hirundo*).

Variable 11 gave the protocols available for inventorying and monitoring vertebrate species (Appendix 6). These protocols have been tested previously by other investigators and were

presented in the NPS Bibliographic Report (Yahner et al. 1994). Details regarding cost, type of information provided, references, and other information for each protocol were given in the NPS Bibliographic Report.

Output Version I of the Faunal Database was designed primarily to be searched by Common Name or Species Name. The database, however, could be searched by any variable if the variable codes were known. An example of a scenario in which Output Version I of the database may be useful is the following. Suppose that a Resource Management Specialist read the "Atlas of Breeding Birds in Pennsylvania" (Brauning 1992) and noted that the Henslow's sparrow is a species of special concern in Pennsylvania. The Resource Management Specialist then may be interested in knowing whether or not the Henslow's sparrow has been documented or is predicted to occur in the park area. If this species did occur, the Resource Management Specialist may be interested in the habitats used by this bird as well as the inventorying and monitoring protocols that can be used to survey it. To obtain these types of information, the Resource Management Specialist would search the database for Henslow's sparrow (*Ammodramus henslowii*). If the search finds Henslow's sparrow, then the species has been documented or predicted to occur at the park area. The Resource Management Specialist then may search the Legal Population Status variable (e.g., SV = State Vulnerable) of the database for other avian species of special concern. The results of these two searches would yield a list of

species, associated habitats, and inventorying and monitoring protocols. This information would help facilitate the formulation of monitoring and management recommendations for the target species in the appropriate habitats.

Output Version II of the Faunal Database

Output Version II of the Faunal Database emphasized Primary Habitat(s) and Secondary Habitat(s) (Table 2). Output Version II differed from Versions I and III in that the first two columns of the database are Primary and Secondary Habitat(s), respectively, and the *Pro-Cite* Group referenced habitats instead of species or protocols. The report form for Output Version II was stored under the filename PROHAB.FRM in *dBase III Plus*.

An example of how to use Output Version II of the database generally may follow these steps. A Resource Management Specialist is interested in learning what vertebrate species may occur in an abandoned agricultural field located within a given park area. The field was once used for hay production but has not been actively farmed in the past 10 years. The specialist is not familiar with the shrub and brush rangeland into which the field has reverted. The specialist searches the Primary and Secondary Habitat(s) columns of the Database for the Anderson Level II Land-Use Codes that refer to shrub and brush rangeland (i.e., 32 and 33). The results of the search yield a list of species that use these land-use types as primary or secondary

Table 2. Example of Output Version II of the Faunal Database.

Primary Habitat	Secondary Habitat	Common Name	Species Name	Family	Order	Pro-Cite Group Name	Protocol
52 53 62 63 65 66		Bufflehead	<u>Bucephala</u> <u>albeola</u>	Anatidae	Anseriformes	Waterfowl	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE
52 53 62 65 66 41 43	51	Hooded Merganser	<u>Lophodytes</u> <u>cusullatus</u>	Anatidae	Anseriformes	Waterfowl	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE NBT
41 43 52 65 66	51 53	Common Merganser	<u>Mergus</u> <u>merganser</u>	Anatidae	Anseriformes	Waterfowl	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE
52 53		Red-breasted Merganser	<u>Mergus</u> <u>serrator</u>	Anatidae	Anseriformes	Waterfowl	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE
52 53 66 62	65	Ruddy Duck	<u>Oxyura</u> <u>jamaicensis</u>	Anatidae	Anseriformes	Waterfowl	TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE
21	22 31 32 33 41 42 43 74 51 56	Black Vulture	<u>Coragyps</u> <u>stratus</u>	Cathartidae	Falconiformes	Raptor	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE
21 41 43 74	22 31 42 61 51	Turkey Vulture	<u>Cathartes</u> <u>aura</u>	Cathartidae	Falconiformes	Raptor	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE
	52 53 65 66	Osprey	<u>Pandion</u> <u>haliaetus</u>	Accipitridae	Falconiformes	Raptor	BTR TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE
52 53 54		Bald Eagle	<u>Haliaeetus</u> <u>leucocephalus</u>	Accipitridae	Falconiformes	Raptor	BTR TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE

Table 2. (continued)

Primary Habitat	Secondary Habitat	Common Name	Species Name	Family	Order	Pro-Cite Group Name	Protocol
21 31 61	22	Northern Harrier	<u>Circus cyaneus</u>	Accipitridae	Falconiformes	Raptor	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE
41 42 43	61 32 33	Sharp-shinned Hawk	<u>Accipiter striatus</u>	Accipitridae	Falconiformes	Raptor	TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE

habitats. Once the vertebrate species have been identified, the Resource Management Specialist can determine what protocols (i.e., Survey Protocol variable no. 11) can be used to inventory and monitor the species.

Output Version III of The Faunal Database

Output Version III of the Faunal Database emphasized inventorying and monitoring protocols for vertebrate species (Table 3). The first column was Protocol; in this Output Version, the *Pro-Cite* Group referenced protocols instead of species or habitats. Output Version III was stored under the filename PROTEC.FRM in *dBase III Plus*.

The following situation is an example of how Output Version III of the Faunal Database may be used. During a professional wildlife management meeting, a Resource Management Specialist is made aware of an inventorying and monitoring protocol involving the use of scent stations. The specialist would like to use scent stations to survey raccoons (*Procyon lotor*) that have been causing problems at refuse facilities throughout the park area. The specialist searches the Protocol variable (no. 11) of the database for the term Scent Station. The search reveals a list of species, including the raccoon, that can be inventoried using the scent station protocol as well as the Primary and Secondary Habitat(s) associated with these species. In addition, by using the *Pro-Cite* Protocol Name in association with the NPS

Table 3. Example of Output Version III of the Faunal Database.

Protocol	Common Name	Species Name	Family	Order	Pro-Cite Group Name	Primary Habitat	Secondary Habitat
TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	Bufflehead	<u>Bucephala albeola</u>	Anatidae	Anseriformes	Waterfowl	52 53 62 63 65 66	
TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE NBT	Hooded Merganser	<u>Lophodytes cusullatus</u>	Anatidae	Anseriformes	Waterfowl	52 53 62 65 66 41 43	51
TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	Common Merganser	<u>Mergus merganser</u>	Anatidae	Anseriformes	Waterfowl	41 43 52 65 66	51 53
TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	Red-breasted Merganser	<u>Mergus serrator</u>	Anatidae	Anseriformes	Waterfowl	52 53	
TRS PCO SMA NCO FLC NIG RCE BTR AER NET BAN CRE	Ruddy Duck	<u>Oxyura jamaicensis</u>	Anatidae	Anseriformes	Waterfowl	52 53 66 62	65
TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	Black Vulture	<u>Coragyps stratus</u>	Cathartidae	Falconiformes	Raptor	21	22 31 32 33 41 42 43 74 51 56
TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	Turkey Vulture	<u>Cathartes aura</u>	Cathartidae	Falconiformes	Raptor	21 41 43 74	22 31 42 61 51
BTR TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	Osprey	<u>Pandion haliaetus</u>	Accipitridae	Falconiformes	Raptor		52 53 65 66

Table 3. (continued)

Protocol	Common Name	Species Name	Family	Order	Pro-Cite Group Name	Primary Habitat	Secondary Habitat
BTR TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	Bald Eagle	<u>Haliaeetus</u> <u>leucocephalus</u>	Accipitridae	Falconiformes	Raptor	52 53 54	
TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	Northern Harrier	<u>Circus</u> <u>cyaneus</u>	Accipitridae	Falconiformes	Raptor	21 31 61	22
TRS PCO SMA IRE COR OPI NCO RCE AER NET BCT BAN CRE	Sharp-shinned Hawk	<u>Accipiter</u> <u>stratus</u>	Accipitridae	Falconiformes	Raptor	41 42 43	61 32 33

Bibliographic Report (Yahner et al. 1994), the specialist can obtain detailed information (i.e., relative cost, citations, and necessary materials) regarding the use of scent stations. The Resource Management Specialist now has available the pertinent information to inventory and monitor the park area for raccoons.

Searching the Faunal Database

Computer files of the Faunal Database for each park area can be searched using the assist menu system or the dot-prompt in *dBase III Plus*. The assist menu system should be used for variables that contain a single word or symbol for each record. For example, variable 9 called Residency Status will contain a single letter, such as "S" for a summer resident. Variables 1-5 and 9 can be searched using the assist menu system. However, for Common Name (variable 1) and Scientific Name (variable 2), the search text must include at least the first portion of the name for which the search is being conducted. For instance, selecting the display command in the assist menu system and entering "American" for the search text for variable 1 Common Name will yield a list of 13 records including, American toad (*Bufo americanus*), American robin (*Turdus migratorius*), and American redstart (*Setophaga ruticilla*). However, entering "Redstart" as the search text will yield no records, even though the American redstart was predicted to occur within each park area. When a variable contains more than one word or symbol for a single

record, the dot-prompt commands should be used to search the database. Variables 1-2, 6-8, and 10-11 can be searched with the dot-prompt commands.

The general form for a dot-prompt search is: command for 'search text' \$ variable name. As an example, if a Resource Management Specialist wanted to determine which species inhabit deciduous forest (Anderson code 41) as a primary habitat at Gettysburg National Military Park, the search command would be: display for '41' \$ primaryhab. This command would give information about 88 species that were predicted to occur in deciduous forest within the park area. Any *dBase III Plus* command, such as "count" or "list," can be used in this form.

Updating the Faunal Database

The Faunal Database can be updated continually by inserting new species or by changing the occurrence status when species are documented within the park areas. Changes in legal status and taxonomic classification of each species, Variable 10 (Legal Population Status) and Variables 1-4 (Common Name, Scientific Name, Family, and Order), respectively, also can be updated. In addition, Variable 11 (Protocol) in the Faunal Database can be modified as protocols are field-tested or developed to survey terrestrial vertebrates in the eastern United States.

Results of the Faunal Database Searches

Gettysburg National Military Park and Eisenhower National Historic Site

We predicted that 342 terrestrial vertebrate species potentially occurred at GETT and EISE (Table 4). Of these species, 200 (58%) species have been documented previously within the park areas. Ten (40%) of 25 predicted amphibian species were documented. These included four salamanders, five frogs, and one toad. Sixteen of 27 (59%) reptilian species predicted to occur within these parks areas have been documented. The largest number of documented reptilian species were snakes (8 documented versus 17 predicted), followed by turtles (6 documented versus 8 predicted) and lizards (2 documented versus 2 predicted). All reptilian and amphibian species were classified as year-round residents. Only the bog turtle (*Clemmys mullenbergi*), which was a predicted species, was designated as endangered or threatened (state endangered).

The class Aves had the highest number and percentage of documented species. Of the 232 species predicted to occur within GETT and EISE, 153 (66%) have been documented by NPS Wildlife Observation Cards or personal observations. In addition to these documented species, 26 bird species were documented within 8 km of the park area by the Christmas Bird Count (CBC), Breeding Bird Survey (BBS), or Pennsylvania Breeding Bird Atlas (BBA). All

Table 4. Number of species predicted and number of species documented for four vertebrate classes at Gettysburg National Military Park and Eisenhower National Historic Site.

Class:			
<i>Pro-Cite</i> Group	No. Predicted	No. Documented	
Amphibia	25	10	(40%)
Caudata	15	4	(26%)
Salientia	10	6	(60%)
Reptilia	27	16	(59%)
Testudines	8	6	(75%)
Lacertilia	2	2	(100%)
Serpentes	17	8	(47%)
Aves	232	153	(66%)
Waterfowl	29	13	(45%)
Wader	16	5	(31%)
Raptor	15	13	(87%)
Upland Groundbird	6	6	(100%)
Shorebird	9	5	(56%)
Owl	7	5	(71%)
Woodpecker	7	7	(100%)
Passerine	143	99	(69%)
Mammalia	59	21	(36%)
Didelphimorphia	1	0	(0%)
Insectivora	9	3	(33%)
Chiroptera	11	2	(18%)
Carnivora	13	6	(46%)
Rodentia	22	9	(41%)
Lagomorpha	3	1	(33%)

upland groundbirds, woodpeckers, and all but one raptor species that were predicted have been documented. The passerines, which was the largest taxonomic group, had 99 (69%) of the predicted species documented. Of the predicted species of birds, 56 (24%) were year-round residents, 125 (54%) were summer residents only, 16 (7%) were winter residents only, and 33 (14%) occurred during migration only. Two (1%) species were accidental. The bald eagle (*Haliaeetus leucocephalus*), which was the only bird expected within the park area that is federally endangered (soon to be federally threatened), was documented with a NPS Wildlife Observation Card. Three predicted species, including the documented osprey (*Pandion haliaetus*), were endangered at the state level. The great egret (*Casmerodius albus*) and the yellow-crowned night heron (*Nyctanassa violacea*) were two state threatened species documented in the park area. Four predicted species have been extirpated from Pennsylvania.

Twenty-one (36%) of the 59 predicted mammal species were documented within the park area. No marsupial and only two bats were documented within the park area. Of the documented species, the highest number were in the order Rodentia (9 documented out of 22 predicted). Carnivores had the highest percentage of documented species (46%, 6 out of 13 species) in GETT and EISE. All mammals, except five bat species that were summer residents only, were year-round residents. The Indiana myotis (*Myotis sodalis*) was the only federally or state endangered species. The Allegheny woodrat (*Neotoma magister*) and

the small-footed myotis (*Myotis leibii*), both predicted species, were state threatened. Nine mammalian species were furbearers.

Hopewell Furnace National Historic Site

As with GETT and EISE, 342 vertebrate species were predicted to occur within HOFU (Table 5). Of the 15 salamander species predicted, only the red-backed salamander (*Plethodon cinereus*) and the spotted salamander (*Ambystoma maculatum*) have been recorded. Four (40%) of the 10 predicted frog species were documented within the park area. Two (25%) of the eight predicted turtle species and two (12%) of the 17 predicted snake species have been documented within the park area. Neither of the two predicted lizard species was documented. These 25 amphibian and 27 reptilian species were the same species as those predicted for GETT and EISE and were of the same residency and legal status.

HOFU also had the same 232 predicted species of birds as GETT and EISE. However, HOFU had a slightly higher number of documented cases, with 168 species (72%). This was attributed partially to the 26 species of waterfowl noted within the park area. All species of woodpeckers and five out of six (83%) upland groundbird species predicted to occur have been documented in the park area. HOFU had a larger number of passerines documented, with 110 species (77%) compared to 99 species (69%) for GETT and EISE. Residency and legal status of the species

Table 5. Number of species predicted and number of species documented for four vertebrate classes at Hopewell Furnace National Historic Site.

Class:				
<i>Pro-Cite</i> Group	No. Predicted	No. Documented		
Amphibia	25	6	(24%)	
Caudata	15	2	(13%)	
Salientia	10	4	(40%)	
Reptilia	27	4	(15%)	
Testudines	8	2	(25%)	
Lacertilia	2	0	(0%)	
Serpentes	17	2	(12%)	
Aves	232	168	(72%)	
Waterfowl	29	26	(89%)	
Wader	16	5	(31%)	
Raptor	15	10	(67%)	
Upland Groundbird	6	5	(83%)	
Shorebird	9	3	(33%)	
Owl	7	2	(29%)	
Woodpecker	7	7	(100%)	
Passerine	143	110	(77%)	
Mammalia	59	9	(15%)	
Didelphimorphia	1	1	(100%)	
Insectivora	9	0	(0%)	
Chiroptera	11	0	(0%)	
Carnivora	13	3	(23%)	
Rodentia	22	5	(23%)	
Lagomorpha	3	0	(0%)	

were the same as those for GETT and EISE. The bald eagle, a predicted species, was the only federally endangered species expected to occur within the park area. The osprey (state endangered) and the great egret (state threatened) were both documented by NPS Wildlife Observation Cards. Twenty bird species were recorded by the CBC, BBA, and BBS that were not documented within the park area.

As with GETT and EISE, HOFU also had a very low number of documented species of mammals. Three species of Carnivora (raccoon [*Procyon lotor*], ermine [*Mustela erminea*], and red fox [*Vulpes vulpes*]), five species of Rodentia (woodchuck [*Marmota monax*], red squirrel [*Tamiasciurus hudsonicus*], eastern gray squirrel [*Scuirus carolinensis*], eastern chipmunk [*Tamias striatus*], and southern flying squirrel [*Glaucomys volans*]), and one Didelphimorphia (Virginia Opossum [*Didelphis virginiana*]) have been documented out of the 59 total number of mammalian species predicted. Insectivores, bats, and lagomorphs were not documented at HOFU. Legal and resident status of these mammals were the same as those described for GETT and EISE.

Valley Forge National Historical Park

A total of 360 species was predicted to occur at Valley Forge (Table 6). Fourteen (56%) species of amphibians were documented out of the 25 predicted species. Five of the

Table 6. Number of species predicted and number of species documented for four vertebrate classes at Valley Forge National Historical Park.

Class:			
Pro-Cite Group	No. Predicted	No. Documented	
Amphibia	25	14	(56%)
Caudata	15	5	(33%)
Salientia	10	9	(90%)
Reptilia	27	12	(44%)
Testudines	8	6	(75%)
Lacertilia	2	0	(0%)
Serpentes	17	6	(35%)
Aves	247	210	(85%)
Waterfowl	33	29	(88%)
Wader	17	10	(59%)
Raptor	16	14	(88%)
Upland Groundbird	6	5	(83%)
Shorebird	18	14	(78%)
Owl	7	4	(57%)
Woodpecker	7	7	(100%)
Passerine	143	127	(89%)
Mammalia	59	18	(31%)
Didelphimorphia	1	1	(100%)
Insectivora	9	3	(33%)
Chiroptera	11	0	(0%)
Carnivora	13	3	(23%)
Rodentia	22	10	(45%)
Lagomorpha	3	1	(33%)

documented species were salamanders, and nine of the species were frogs or toads; this represented 33% and 90% of the predicted species, respectively. Most documented cases were obtained from NPS Wildlife Observation Cards based on previous studies conducted at the park area. Like GETT-EISE, VAFO also had a relatively high percentage of documented reptilian species. Six species of turtles (60%) and six species of snakes (35%) were documented. Neither of the two predicted lizard species was documented. The redbelly turtle, a state endangered species, was documented in the park area.

We predicted that 247 species of birds could occur at VAFO. This number is slightly higher than at the other park areas, mainly because of a higher number (18) of predicted shorebird species. Like GETT and EISE, VAFO had all species of woodpeckers documented. One-hundred twenty-seven species (89%) of passerines were documented at the park area, which was higher than GETT-EISE and HOFU. VAFO also had a higher number of documented migratory species (38) than the other park areas. Two federally endangered species, the bald eagle and the peregrine falcon (*Falco peregrinus*), were documented at VAFO. In addition, five state-listed bird species were documented within the park area. A relatively low number of species (7) not documented with NPS Wildlife Observation Cards was recorded by the CBC, BBA, and BBS.

The same 59 mammal species predicted to occur at GETT-EISE and HOFU were predicted for VAFO. Like GETT-EISE, three species of Insectivora were documented at VAFO. Ten (45%) of the 22

species of rodents had been documented, and no bat species were documented.

Summary of Predicted and Documented Species

A summary of the species predicted or documented to occur in at least one park area is presented in Table 7. This list also includes the sources of documentation for each species taken from the Faunal Database (Appendix 3).

Table 7. List of predicted and documented species and source of documentation for four vertebrate classes at Gettysburg National Military Park (GETT), Eisenhower National Historic Site (EISE), Hopewell Furnace National Historic Site (HOFU), and Valley Forge National Historical Park (VAFO). Documentation for species not predicted or documented to occur within a park area is left empty (see Appendix 3 for descriptions of documentation codes).

AMPHIBIA

	GETT/EISE	HOFU	VAFO
<u>Caudata</u>			
Hellbender <i>Cryptobranchus alleganiensis</i>	R	R	R
Eastern Newt <i>Notophthalmus viridescens</i>	PO	R	R
Jefferson Salamander <i>Ambystoma jeffersonianum</i>	R	R	R
Spotted Salamander <i>Ambystoma maculatum</i>	PO WOC	PO	R
Marbled Salamander <i>Ambystoma opacum</i>	R	R	R
Dusky Salamander <i>Desmognathus fuscus</i>	R	R	WOC
Mountain Dusky Salamander <i>Desmognathus ochrophaeus</i>	R	R	R
Northern Two-lined Salamander <i>Eurycea bislineata</i>	PO WOC	R	WOC
Long-tailed Salamander <i>Eurycea longicauda</i>	R	R	WOC
Spring Salamander <i>Gyrinophilus porphyriticus</i>	R	R	R
Four-toed Salamander <i>Hemidactylium scutatum</i>	R	R	R
Red-backed Salamander <i>Plethodon cinereus</i>	PO	PO	WOC
Slimy Salamander <i>Plethodon glutinosus</i>	R	R	R
Valley and Ridge Salamander <i>Plethodon hoffmani</i>	R	R	R

Table 7. (continued)

	GETT/EISE	HOFU	VAFO
Red Salamander <i>Pseudotriton ruber</i>	R	R	WOC
<u>Salientia</u>			
Eastern Spadefoot <i>Scaphiopus holbrooki</i>	R	R	WOC
Bullfrog <i>Rana catesbeiana</i>	R	R	WOC
Green Frog <i>Rana clamitans</i>	PO	PO	WOC
Pickerel Frog <i>Rana palustris</i>	PO	PO	WOC
Wood Frog <i>Rana sylvatica</i>	PO	R	WOC
American Toad <i>Bufo americanus</i>	PO	PO	WOC
Woodhouse's Toad <i>Bufo woodhousei</i>	R	R	WOC
Common Gray Treefrog <i>Hyla versicolor</i>	R	R	WOC
Spring Peeper <i>Hyla crucifer</i>	PO WOC	PO	WOC
Chorus Frog <i>Pseudacris triseriata</i>	PO	R	R

REPTILIA

	GETT/EISE	HOFU	VAFO
<u>Testudines</u>			
Snapping Turtle <i>Chelydra serpentina</i>	PO WOC	WOC	WOC
Stinkpot <i>Sternotherus odoratus</i>	PO	R	R
Painted Turtle <i>Chrysemys picta</i>	PO	R	WOC
Redbelly Turtle <i>Chrysemys rubriventris</i>			WOC

Table 7. (continued)

	GETT/EISE	HOFU	VAFO
Slider <i>Chrysemys scripta</i>			WOC
Spotted Turtle <i>Clemmys guttata</i>	PO	R	WOC
Wood Turtle <i>Clemmys insculpta</i>	WOC	R	R
Bog Turtle <i>Clemmys muhlenbergi</i>	R	R	R
Map Turtle <i>Graptemys geographica</i>	R	R	R
Eastern Box Turtle <i>Terrapene carolina</i>	PO	PO	WOC
<u>Lacertilia</u>			
Coal Skink <i>Eumeces anthracinus</i>	WOC	R	R
Five-lined Skink <i>Eumeces fasciatus</i>	WOC	R	R
<u>Serpentes</u>			
Worm Snake <i>Carphophis amoenus</i>	R	R	R
Racer <i>Coluber constrictor</i>	PO	R	R
Northern Ringneck Snake <i>Diadophis punctatus</i>	PO WOC	R	WOC
Corn Snake <i>Elaphe guttata</i>	R	R	R
Black Rat Snake <i>Elaphe obsoleta</i>	PO WOC	R	WOC
Eastern Hognose Snake <i>Heterodon platyrhinos</i>	WOC	R	R
Milk Snake <i>Lampropeltis triangulum</i>	R	R	WOC
Northern Water Snake <i>Nerodia sipedon</i>	PO	PO	WOC

Table 7. (continued)

	GETT/EISE	HOFU	VAFO
Smooth Green Snake <i>Opheodrys vernalis</i>	R	R	R
Queen Snake <i>Regina septemvittata</i>	R	R	R
Brown Snake <i>Storeria dekayi</i>	R	R	R
Red-bellied Snake <i>Storeria occipitomaculata</i>	R	R	R
Eastern Ribbon Snake <i>Thamnophis sauritus</i>	R	R	R
Common Garter Snake <i>Thamnophis sirtalis</i>	PO	PO WOC	WOC
Smooth Earth Snake <i>Virginia valeriae</i>	R	R	R
Copperhead <i>Agkistrodon contortrix</i>	WOC	R	WOC
Timber Rattlesnake <i>Crotalus horridus</i>	WOC	R	R

AVES

	GETT/EISE	HOFU	VAFO
<u>Gaviiformes</u>			
Common Loon <i>Gavia immer</i>	R	WOC CBC	WOC
<u>Podicipediformes</u>			
Red-necked Grebe <i>Podiceps grisegena</i>			WOC
Pied-billed Grebe <i>Podilymbus podiceps</i>	R	WOC CBC	WOC BBA CBC
Horned Grebe <i>Podiceps auritus</i>	WOC CBC	WOC CBC	WOC

Table 7. (continued)

GETT/EISE

HOFU

VAFO

<u>Pelecaniformes</u>			
Double-crested Cormorant <i>Phalacrocorax auritus</i>	PO WOC	WOC	BBS
<u>Ciconiiformes</u>			
American Bittern <i>Botaurus lentiginosus</i>	R	R	WOC
Least Bittern <i>Ixobrychus exilis</i>	R	R	R
Great Blue Heron <i>Ardea herodias</i>	PO BBA BBS CBC	WOC BBA CBC	WOC BBA BBS CBC
Great Egret <i>Casmerodius albus</i>	PO WOC	WOC	WOC
Snowy Egret <i>Egretta thula</i>			WOC
Little Blue Heron <i>Egretta caerulea</i>	R	WOC	WOC
Tricolored Heron <i>Egretta tricolor</i>	R	R	R
Cattle Egret <i>Bubulcus ibis</i>	R	R	WOC
Green-backed Heron <i>Butorides striatus</i>	PO WOC BBA BBS	WOC BBA BBS	WOC BBA BBS
Black-crowned Night Heron <i>Nycticorax nycticorax</i>	R	WOC BBA BBS	BBA
Yellow-crowned Night Heron <i>Nyctanassa violacea</i>	WOC	R	WOC
Glossy Ibis <i>Plegadis falcinellus</i>	R	R	R
<u>Anseriformes</u>			
Tundra Swan <i>Olor columbianus</i>	WOC CBC	WOC CBC	R
Mute Swan <i>Cygnus olor</i>	WOC	CBC	BBA

Table 7. (continued)

	GETT/EISE	HOFU	VAFO
Greater White-fronted Goose <i>Anser albifrons</i>			WOC
Snow Goose <i>Chen caerulescens</i>	R	CBC	WOC CBC
Canada Goose <i>Branta canadensis</i>	PO WOC BBA BBS CBC	PO WOC BBA BBS CBC	WOC BBA BBS CBC
Wood Duck <i>Aix sponsa</i>	PO WOC BBA	PO WOC BBA CBC	WOC BBA CBC
Green-winged Teal <i>Anas crecca</i>	CBC	WOC CBC	WOC
American Black Duck <i>Anas rubripes</i>	WOC CBC	WOC BBS CBC	WOC BBA CBC
Mallard <i>Anas platyrhynchos</i>	PO WOC BBA BBS CBC	PO WOC BBA BBS CBC	WOC BBA BBS CBC
Northern Pintail <i>Anas acuta</i>	CBC	WOC CBC	WOC
Blue-winged Teal <i>Anas discors</i>	WOC	WOC	WOC
Northern Shoveler <i>Anas clypeata</i>	R	CBC	R
Gadwall <i>Anas strepera</i>	WOC	WOC CBC	WOC CBC
American Wigeon <i>Anas americana</i>	WOC CBC	WOC	WOC
Canvasback <i>Aythya valisineria</i>	CBC	WOC CBC	WOC CBC
Redhead <i>Aythya americana</i>	R	WOC CBC	WOC
Ring-necked Duck <i>Aythya collaris</i>	R	WOC CBC	WOC CBC
Greater Scaup <i>Aythya marila</i>	R	WOC	WOC CBC
Lesser Scaup <i>Aythya affinis</i>	R	WOC CBC	WOC CBC
Black Scoter <i>Melanitta nigra</i>			WOC

Table 7. (continued)

	GETT/EISE	HOFU	VAFO
White-winged Scoter <i>Melanitta fusca</i>			WOC
Oldsquaw <i>Clangula hyemalis</i>	R	WOC	WOC
Common Goldeneye <i>Bucephala clangula</i>	R	WOC CBC	WOC CBC
Bufflehead <i>Bucephala albeola</i>	WOC	WOC CBC	WOC CBC
Hooded Merganser <i>Lophodytes cucullatus</i>	CBC	WOC CBC	WOC CBC
Common Merganser <i>Mergus merganser</i>	R	WOC CBC	WOC CBC
Red-breasted Merganser <i>Mergus serrator</i>	R	WOC	WOC
Ruddy Duck <i>Oxyura jamaicensis</i>	CBC	WOC CBC	WOC CBC
<u>Falconiformes</u>			
Black Vulture <i>Coragyps atratus</i>	PO WOC BBA CBC	PO WOC BBA CBC	WOC BBA CBC
Turkey Vulture <i>Cathartes aura</i>	PO WOC BBA BBS CBC	PO WOC BBA BBS CBC	WOC BBA CBC
Osprey <i>Pandion haliaetus</i>	WOC	WOC BBA	WOC BBA
Bald Eagle <i>Haliaeetus leucocephalus</i>	WOC CBC	CBC	WOC
Northern Harrier <i>Circus cyaneus</i>	PO WOC BBA CBC	WOC CBC	WOC CBC
Sharp-shinned Hawk <i>Accipiter striatus</i>	PO BBA BBS CBC	WOC BBA CBC	WOC BBA CBC
Cooper's Hawk <i>Accipiter cooperii</i>	PO CBC	WOC CBC	WOC CBC
Northern Goshawk <i>Accipiter gentilis</i>	R	R	WOC CBC
Red-shouldered Hawk <i>Buteo lineatus</i>	PO WOC BBA CBC	CBC	WOC CBC

Table 7. (continued)

	GETT/EISE	HOFU	VAFO
Broad-winged Hawk <i>Buteo platypterus</i>	PO BBA	WOC BBA	WOC BBA BBS
Red-tailed Hawk <i>Buteo jamaicensis</i>	PO WOC BBA CBC	PO WOC BBA BBS CBC	WOC BBA BBS CBC
Rough-legged Hawk <i>Buteo lagopus</i>	CBC	WOC CBC	CBC
Golden Eagle <i>Aquila chrysaetos</i>	WOC	R	WOC
American Kestrel <i>Falco sparverius</i>	PO WOC BBA BBS CBC	WOC BBA BBS CBC	WOC BBA BBS CBC
Merlin <i>Falco columbarius</i>	WOC CBC	R	CBC
Peregrine Falcon <i>Falco peregrinus</i>			WOC
<u>Galliformes</u>			
Ring-necked Pheasant <i>Phasianus colchicus</i>	WOC BBA BBS CBC	PO WOC BBA BBS CBC	WOC BBA BBS CBC
Ruffed Grouse <i>Bonasa umbellus</i>	WOC BBA BBS CBC	WOC BBA CBC	WOC BBA
Wild Turkey <i>Meleagris gallopavo</i>	WOC BBA CBC	WOC BBA CBC	R
Northern Bobwhite <i>Colinus virginianus</i>	WOC BBA BBS CBC	BBA BBS	WOC BBA BBS
<u>Gruiformes</u>			
King Rail <i>Rallus elegans</i>	R	R	R
Virginia Rail <i>Rallus limicola</i>	R	R	BBA
Sora <i>Porzana carolina</i>	R	R	R
Common Moorhen <i>Gallinula chloropus</i>	R	R	WOC
American Coot <i>Fulica americana</i>	WOC	CBC	WOC CBC

Table 7. (continued)

	GETT/EISE	HOFU	VAFO
<u>Charadriiformes</u>			
Semipalmated Plover <i>Charadrius semipalmatus</i>			WOC
Killdeer <i>Charadrius vociferus</i>	PO WOC BBA BBS CBC	WOC BBA BBS CBC	WOC BBA BBS CBC
Greater Yellowlegs <i>Tringa melanoleuca</i>	PO		WOC
Lesser Yellowlegs <i>Tringa flavipes</i>			WOC
Solitary Sandpiper <i>Tringa solitaria</i>			WOC
Spotted Sandpiper <i>Actitis macularia</i>	PO BBA	WOC BBA BBS	WOC BBA BBS
Upland Sandpiper <i>Bartramia longicauda</i>	BBS	R	R
Least Sandpiper <i>Calidris minutilla</i>			WOC
Semipalmated Sandpiper <i>Calidris pusilla</i>			WOC
Common Snipe <i>Gallinago gallinago</i>	PO CBC	CBC	R
American Woodcock <i>Scolopax minor</i>	PO WOC BBA	BBA	WOC BBA
Laughing Gull <i>Larus atricilla</i>			WOC
Bonaparte's Gull <i>Larus philadelphia</i>			WOC
Ring-billed Gull <i>Larus delawarensis</i>	PO	CBC	WOC CBC
Herring Gull <i>Larus argentatus</i>	R	WOC CBC	WOC CBC
Lesser Black-backed Gull <i>Larus fuscus</i>	R	CBC	R
Great Black-backed Gull <i>Larus marinus</i>			WOC

Table 7. (continued)

	GETT/EISE	HOFU	VAFO
Common Tern <i>Sterna hirundo</i>	R	R	R
<u>Columbiformes</u>			
Rock Dove <i>Columba livia</i>	PO BBA BBS CBC	PO WOC BBA BBS CBC	WOC BBA BBS CBC
Mourning Dove <i>Zenaida macroura</i>	PO WOC BBA BBS CBC	PO WOC BBA BBS CBC	WOC BBA BBS CBC
<u>Cuculiformes</u>			
Black-billed Cuckoo <i>Coccyzus erythrophthalmus</i>	BBA BBS	BBA BBS	WOC BBA BBS
Yellow-billed Cuckoo <i>Coccyzus americanus</i>	PO WOC BBA BBS	WOC BBA BBS	WOC BBA BBS
<u>Strigiformes</u>			
Common Barn-Owl <i>Tyto alba</i>	WOC BBA CBC	R	WOC BBS CBC
Eastern Screech-Owl <i>Otus asio</i>	BBA CBC	WOC BBA CBC	WOC BBA BBS CBC
Great Horned Owl <i>Bubo virginianus</i>	PO WOC BBA CBC	WOC BBA CBC	WOC BBA BBS CBC
Barred Owl <i>Strix varia</i>	PO WOC BBA CBC	R	WOC BBA
Long-eared Owl <i>Asio otus</i>	R	CBC	R
Short-eared Owl <i>Asio flammeus</i>	WOC CBC	CBC	R
Northern Saw-whet Owl <i>Aegolius acadicus</i>	WOC	R	R
<u>Caprimulgiformes</u>			
Common Nighthawk <i>Chordeiles minor</i>	WOC BBA	BBA	WOC BBA BBS
Whip-poor-will <i>Caprimulgus vociferus</i>	BBA BBS	BBA	WOC

Table 7. (continued)

	GETT/EISE	HOFU	VAFO
<u>Apodiiformes</u>			
Chimney Swift <i>Chaetura pelagica</i>	PO BBA BBS	PO WOC BBA BBS	WOC BBA BBS
Ruby-throated Hummingbird <i>Archilochus colubris</i>	PO WOC BBA BBS	WOC BBA	WOC BBA BBS
<u>Coraciiformes</u>			
Belted Kingfisher <i>Ceryle alcyon</i>	PO BBA BBS CBC	WOC BBA BBS CBC	WOC BBA CBC
<u>Piciformes</u>			
Red-headed Woodpecker <i>Melanerpes erythrocephalus</i>	PO WOC BBA BBS CBC	WOC BBA CBC	WOC CBC
Red-bellied Woodpecker <i>Melanerpes carolinus</i>	PO WOC BBA BBS CBC	PO WOC BBA BBS CBC	WOC BBA BBS CBC
Yellow-bellied Sapsucker <i>Sphyrapicus varius</i>	PO WOC CBC	WOC CBC	WOC CBC
Downy Woodpecker <i>Picoides pubescens</i>	PO BBA BBS CBC	PO WOC BBA BBS CBC	WOC BBA BBS CBC
Hairy Woodpecker <i>Picoides villosus</i>	PO WOC BBA BBS CBC	WOC BBA BBS CBC	WOC BBA BBS CBC
Northern Flicker <i>Colaptes auratus</i>	PO BBA BBS CBC	PO WOC BBA BBS CBC	WOC BBA BBS CBC
Pileated Woodpecker <i>Dryocopus pileatus</i>	PO WOC BBA BBS CBC	PO WOC BBA CBC	WOC
<u>Passeriformes</u>			
Olive-sided Flycatcher <i>Contopus borealis</i>	R	R	WOC
Eastern Wood-Pee-wee <i>Contopus virens</i>	PO WOC BBA BBS	PO WOC BBA BBS	WOC BBA BBS
Yellow-bellied Flycatcher <i>Empidonax flaviventris</i>	R	R	WOC

Table 7. (continued)

	GETT/EISE	HOFU	VAFO
Acadian Flycatcher <i>Empidonax virescens</i>	PO BBA BBS	PO BBA BBS	WOC BBA
Alder Flycatcher <i>Empidonax alnorum</i>	BBS	WOC	R
Willow Flycatcher <i>Empidonax traillii</i>	PO BBA BBS	BBA BBS	WOC BBA BBS
Least Flycatcher <i>Empidonax minimus</i>	BBS	WOC	WOC BBS
Eastern Phoebe <i>Sayornis phoebe</i>	PO WOC BBA	PO WOC BBA BBS	WOC BBA BBS CBC
Great Crested Flycatcher <i>Myiarchus crinitus</i>	PO WOC BBS	PO WOC BBA BBS	WOC BBA BBS
Eastern Kingbird <i>Tyrannus tyrannus</i>	PO WOC BBA BBS	WOC BBA BBS	WOC BBA BBS
Horned Lark <i>Eremophila alpestris</i>	WOC BBS CBC	WOC BBA CBC	BBA BBS CBC
Purple Martin <i>Progne subis</i>	PO WOC BBA BBS	WOC BBA BBS	WOC BBA BBS
Tree Swallow <i>Tachycineta bicolor</i>	PO BBA BBS	BBA BBS	WOC BBA
Northern Rough-winged Swallow <i>Stelgidopteryx serripennis</i>	PO BBA BBS	WOC BBA BBS	WOC BBA BBS
Bank Swallow <i>Riparia riparia</i>	BBA	WOC BBA	WOC BBA BBS
Cliff Swallow <i>Hirundo pyrrhonota</i>	BBS	PO WOC BBA BBS	WOC
Barn Swallow <i>Hirundo rustica</i>	PO WOC BBA BBS	PO WOC BBA BBS	WOC BBA BBS
Blue Jay <i>Cyanocitta cristata</i>	PO WOC BBA BBS CBC	PO WOC BBA BBS CBC	PO WOC BBA BBS CBC
American Crow <i>Corvus brachyrhynchos</i>	PO BBA BBS CBC	PO WOC BBA BBS CBC	WOC BBA BBS CBC
Fish Crow <i>Corvus ossifragus</i>	PO BBA BBS CBC	PO BBS CBC	WOC BBA BBS CBC
Common Raven <i>Corvus corax</i>	PO BBS CBC	R	R

Table 7. (continued)

	GETT/EISE	HOFU	VAFO
Black-capped Chickadee <i>Parus atricapillus</i>	PO WOC BBA BBS CBC	PO WOC BBA BBS CBC	WOC BBA BBS CBC
Carolina Chickadee <i>Parus carolinensis</i>	PO BBA BBS CBC	PO WOC BBA BBS CBC	WOC BBA BBS CBC
Tufted Titmouse <i>Parus bicolor</i>	PO WOC BBA BBS CBC	PO WOC BBA BBS CBC	WOC BBA BBS CBC
Red-breasted Nuthatch <i>Sitta canadensis</i>	PO WOC CBC	WOC CBC	WOC BBS CBC
White-breasted Nuthatch <i>Sitta carolinensis</i>	PO BBA BBS CBC	PO WOC BBA BBS CBC	WOC BBA BBS CBC
Brown Creeper <i>Certhia americana</i>	PO WOC BBA CBC	PO WOC BBA CBC	WOC CBC
Carolina Wren <i>Thryothorus ludovicianus</i>	PO WOC BBA BBS CBC	WOC BBA BBS CBC	WOC BBA BBS CBC
Bewick's Wren <i>Thryomanes bewickii</i>	R	R	R
House Wren <i>Troglodytes aedon</i>	PO BBA BBS	PO WOC BBA BBS	WOC BBA BBS
Winter Wren <i>Troglodytes troglodytes</i>	PO	WOC CBC	WOC CBC
Sedge Wren <i>Cistothorus platensis</i>	R	R	R
Marsh Wren <i>Cistothorus palustris</i>	PO	R	WOC BBA
Golden-crowned Kinglet <i>Regulus satrapa</i>	PO WOC CBC	PO WOC BBA CBC	WOC CBC
Ruby-crowned Kinglet <i>Regulus calendula</i>	PO WOC CBC	WOC CBC	WOC CBC
Blue-gray Gnatcatcher <i>Polioptila caerulea</i>	PO BBA BBS	PO WOC BBA BBS	WOC BBA BBS
Eastern Bluebird <i>Sialia sialis</i>	PO WOC BBA BBS CBC	PO WOC BBA BBS CBC	WOC BBA CBC

Table 7. (continued)

	GETT/EISE	HOFU	VAFO
Veery <i>Catharus fuscescens</i>	BBA	PO WOC BBA	WOC BBA BBS
Gray-cheeked Thrush <i>Catharus minimus</i>	PO	WOC	WOC
Swainson's Thrush <i>Catharus ustulatus</i>	WOC	WOC	WOC
Hermit Thrush <i>Catharus guttatus</i>	PO WOC	WOC CBC	WOC CBC
Wood Thrush <i>Hylocichla mustelina</i>	PO BBA BBS	PO WOC BBA BBS	WOC BBA BBS
American Robin <i>Turdus migratorius</i>	PO WOC BBA BBS CBC	PO WOC BBA BBS CBC	WOC BBA BBS CBC
Gray Catbird <i>Dumetella carolinensis</i>	PO BBA BBS CBC	PO WOC BBA BBS CBC	WOC BBA BBS CBC
Northern Mockingbird <i>Mimus polyglottos</i>	PO BBA BBS CBC	PO WOC BBA BBS CBC	WOC BBA BBS CBC
Brown Thrasher <i>Toxostoma rufum</i>	PO BBA BBS	WOC BBA BBS CBC	WOC BBA BBS CBC
American Pipit <i>Anthus rubescens</i>	R	WOC CBC	WOC
Cedar Waxwing <i>Bombycilla cedrorum</i>	PO WOC BBA BBS CBC	PO WOC BBA CBC	WOC BBA BBS CBC
Northern Shrike <i>Lanius excubitor</i>	CBC	CBC	R
Loggerhead Shrike <i>Lanius ludovicianus</i>	CBC	WOC CBC	R
European Starling <i>Sturnus vulgaris</i>	PO BBA BBS CBC	PO WOC BBA BBS CBC	WOC BBA BBS CBC
White-eyed Vireo <i>Vireo griseus</i>	PO BBA	WOC BBA	WOC BBA BBS
Solitary Vireo <i>Vireo solitarius</i>	PO	PO WOC	WOC
Yellow-throated Vireo <i>Vireo flavifrons</i>	PO BBA	PO WOC BBA	WOC BBA

Table 7. (continued)

	GETT/EISE	HOFU	VAFO
Warbling Vireo <i>Vireo gilvus</i>	BBA BBS	BBA	WOC BBA
Philadelphia Vireo <i>Vireo philadelphicus</i>	PO	R	WOC
Red-eyed Vireo <i>Vireo olivaceus</i>	PO BBA BBS	PO WOC BBA BBS	WOC BBA BBS
Blue-winged Warbler <i>Vermivora pinus</i>	PO BBA	PO WOC BBA BBS	WOC BBA BBS
Golden-winged Warbler <i>Vermivora chrysoptera</i>	R	R	WOC
Tennessee Warbler <i>Vermivora peregrina</i>	PO	WOC	WOC
Orange-crowned Warbler <i>Vermivora celata</i>	R	R	WOC
Nashville Warbler <i>Vermivora ruficapilla</i>	PO	R	WOC
Northern Parula <i>Parula americana</i>	PO BBS	PO WOC BBA	WOC BBA
Yellow Warbler <i>Dendroica petechia</i>	PO BBA BBS	PO WOC BBA BBS	WOC BBA BBS
Chestnut-sided Warbler <i>Dendroica pensylvanica</i>	PO BBS	PO WOC BBA	WOC BBA
Magnolia Warbler <i>Dendroica magnolia</i>	PO	WOC	WOC
Cape May Warbler <i>Dendroica tigrina</i>	PO	WOC	WOC
Black-throated Blue Warbler <i>Dendroica caerulescens</i>	PO	PO WOC	WOC
Yellow-rumped Warbler <i>Dendroica coronata</i>	PO WOC CBC	PO WOC CBC	WOC CBC
Black-throated Green Warbler <i>Dendroica virens</i>	PO BBS	PO WOC	WOC
Blackburnian Warbler <i>Dendroica fusca</i>	PO	WOC	WOC
Yellow-throated Warbler <i>Dendroica dominica</i>	R	R	WOC

Table 7. (continued)

	GETT/EISE	HOFU	VAFO
Pine Warbler <i>Dendroica pinus</i>	PO BBS	R	WOC BBA
Prairie Warbler <i>Dendroica discolor</i>	PO BBA BBS	PO BBA	WOC BBA BBS
Palm Warbler <i>Dendroica palmarum</i>	R	PO WOC	WOC
Bay-breasted Warbler <i>Dendroica castanea</i>	R	WOC	WOC
Blackpoll Warbler <i>Dendroica striata</i>	PO	PO WOC	WOC
Cerulean Warbler <i>Dendroica cerulea</i>	R	WOC BBA	WOC BBA
Black-and-White Warbler <i>Mniotilta varia</i>	PO BBA BBS	PO WOC BBA	WOC BBA
American Redstart <i>Setophaga ruticilla</i>	PO BBA BBS	PO WOC BBA BBS	WOC BBA BBS
Prothonotary Warbler <i>Protonotaria citrea</i>	R	R	WOC BBA
Worm-eating Warbler <i>Helmitheros vermivorus</i>	PO BBA BBS	PO WOC BBA	WOC BBA
Swainson's Warbler <i>Limnethlypis swainsonii</i>	R	R	R
Ovenbird <i>Seiurus aurocapillus</i>	PO BBA BBS	PO WOC BBA BBS	WOC BBA BBS
Northern Waterthrush <i>Seiurus noveboracensis</i>	R	WOC	WOC
Louisiana Waterthrush <i>Seiurus motacilla</i>	PO	PO WOC BBA	WOC BBA
Kentucky Warbler <i>Oporornis formosus</i>	BBA BBS	WOC BBA	WOC BBA
Connecticut Warbler <i>Oporornis agilis</i>	R	R	WOC
Mourning Warbler <i>Oporornis philadelphia</i>	R	R	WOC
Common Yellowthroat <i>Geothlypis trichas</i>	PO WOC BBA BBS	PO WOC BBA	WOC BBA BBS

Table 7. (continued)

	GETT/EISE	HOFU	VAFO
Hooded Warbler <i>Wilsonia citrina</i>	PO BBA BBS	PO WOC	WOC BBA
Wilson's Warbler <i>Wilsonia pusilla</i>	PO	R	WOC
Canada Warbler <i>Wilsonia canadensis</i>	R	WOC	WOC
Yellow-breasted Chat <i>Icteria virens</i>	BBA BBS	WOC BBA BBS	WOC BBA BBS
Summer Tanager <i>Piranga rubra</i>	BBA	R	R
Scarlet Tanager <i>Piranga olivacea</i>	PO WOC BBA BBS	PO WOC BBA BBS	WOC BBA BBS
Northern Cardinal <i>Cardinalis cardinalis</i>	PO WOC BBA BBS CBC	PO WOC BBA BBS CBC	WOC BBA BBS CBC
Rose-breasted Grosbeak <i>Pheucticus ludovicianus</i>	PO BBA	WOC BBA	WOC BBA BBS
Blue Grosbeak <i>Guiraca caerulea</i>	R	R	WOC BBA
Indigo Bunting <i>Passerina cyanea</i>	PO WOC BBA BBS	PO WOC BBA BBS	WOC BBA BBS
Dickcissel <i>Spiza americana</i>	R	R	WOC CBC
Rufous-sided Towhee <i>Pipilo erythrophthalmus</i>	PO WOC BBA BBS	PO WOC BBA BBS CBC	WOC BBA BBS CBC
American Tree Sparrow <i>Spizella arborea</i>	PO WOC CBC	WOC CBC	WOC CBC
Chipping Sparrow <i>Spizella passerina</i>	PO BBA BBS CBC	PO WOC BBA BBS	WOC BBA BBS CBC
Field Sparrow <i>Spizella pusilla</i>	PO WOC BBA BBS CBC	PO WOC BBA BBS CBC	WOC BBA BBS CBC
Vesper Sparrow <i>Pooecetes gramineus</i>	BBA BBS	WOC BBS	R
Savannah Sparrow <i>Passerculus sandwichensis</i>	BBA BBS CBC	WOC CBC	WOC BBA BBS

Table 7. (continued)

	GETT/EISE	HOFU	VAFO
Grasshopper Sparrow <i>Ammodramus savannarum</i>	PO BBA BBS	WOC BBA	BBS
Henslow's Sparrow <i>Ammodramus henslowii</i>	R	WOC	R
Fox Sparrow <i>Passerella iliaca</i>	WOC CBC	WOC CBC	WOC CBC
Song Sparrow <i>Melospiza melodia</i>	PO BBA BBS CBC	PO WOC BBA BBS CBC	WOC BBA BBS CBC
Lincoln's Sparrow <i>Melospiza lincolnii</i>	R	R	WOC
Swamp Sparrow <i>Melospiza georgiana</i>	CBC	WOC BBA CBC	WOC BBA CBC
White-throated Sparrow <i>Zonotrichia albicollis</i>	PO CBC	PO WOC CBC	WOC CBC
White-crowned Sparrow <i>Zonotrichia leucophrys</i>	PO WOC CBC	WOC CBC	WOC CBC
Dark-eyed Junco <i>Junco hyemalis</i>	PO BBS CBC	PO WOC CBC	WOC CBC
Lapland Longspur <i>Calcarius lapponicus</i>	R	R	R
Snow Bunting <i>Plectrophenax nivalis</i>	R	WOC CBC	R
Bobolink <i>Dolichonyx oryzivorus</i>	PO WOC BBA	WOC BBA	WOC BBS
Red-winged Blackbird <i>Agelaius phoeniceus</i>	PO WOC BBA BBS CBC	PO WOC BBA BBS CBC	WOC BBA BBS CBC
Eastern Meadowlark <i>Sturnella magna</i>	PO BBA BBS CBC	WOC BBA BBS CBC	WOC BBA BBS CBC
Rusty Blackbird <i>Euphagus carolinus</i>	CBC	WOC CBC	WOC CBC
Common Grackle <i>Quiscalus quiscula</i>	PO WOC BBA BBS CBC	PO WOC BBA BBS CBC	WOC BBA BBS CBC
Brown-headed Cowbird <i>Molothrus ater</i>	PO CBC	PO WOC BBA BBS CBC	WOC BBA BBS CBC

Table 7. (continued)

	GETT/EISE	HOFU	VAFO
Orchard Oriole <i>Icterus spurius</i>	PO BBA BBS	WOC BBA BBS	WOC BBA BBS
Northern Oriole <i>Icterus galbula</i>	PO WOC BBA BBS	PO WOC BBA BBS	WOC BBA BBS
Pine Grosbeak <i>Pinicola enucleator</i>	R	R	WOC
Purple Finch <i>Carpodacus purpureus</i>	PO WOC BBS CBC	WOC BBA CBC	WOC CBC
House Finch <i>Carpodacus mexicanus</i>	PO WOC BBA BBS CBC	PO BBA BBS CBC	WOC BBA BBS CBC
Red Crossbill <i>Loxia curvirostra</i>	R	R	R
White-winged Crossbill <i>Loxia leucoptera</i>	WOC	R	R
Common Redpoll <i>Carduelis flammea</i>	CBC	R	WOC
Pine Siskin <i>Carduelis pinus</i>	PO WOC	WOC CBC	WOC CBC
American Goldfinch <i>Carduelis tristis</i>	PO WOC BBA BBS CBC	PO WOC BBA BBS CBC	WOC BBA BBS CBC
Evening Grosbeak <i>Coccothraustes vespertinus</i>	CBC	WOC CBC	WOC
House Sparrow <i>Passer domesticus</i>	PO BBA BBS CBC	PO WOC BBA BBS CBC	WOC BBA BBS CBC

MAMMALIA

	GETT/EISE	HOFU	VAFO
<u>Didelphimorphia</u>			
Virginia Opossum <i>Didelphis virginiana</i>	R	WOC	WOC

Table 7. (continued)

GETT/EISE

HOFU

VAFO

<u>Insectivora</u>			
Masked Shrew <i>Sorex cinereus</i>	WOC	R	WOC
Maryland Shrew <i>Sorex fontinalis</i>	PO	R	R
Smoky Shrew <i>Sorex fumeus</i>	R	R	R
Long-tailed Shrew <i>Sorex dispar</i>	R	R	R
Northern Water Shrew <i>Sorex palustris</i>	R	R	R
Short-tailed Shrew <i>Blarina brevicauda</i>	PO	R	WOC
Eastern Mole <i>Scalopus aquaticus</i>	R	R	R
Starnose Mole <i>Condylura cristata</i>	R	R	WOC
Hairytail Mole <i>Parascalops aquaticus</i>	R	R	R
<u>Chiroptera</u>			
Northern Myotis <i>Myotis septentrionalis</i>	R	R	R
Little Brown Myotis <i>Myotis lucifugus</i>	PO	R	R
Indiana Myotis <i>Myotis sodalis</i>	R	R	R
Small-footed Myotis <i>Myotis leibii</i>	R	R	R
Silver-haired Bat <i>Lasionycteris noctivagans</i>	R	R	R
Eastern Pipistrel <i>Pipistrellus subflavus</i>	R	R	R
Red Bat <i>Lasiurus borealis</i>	R	R	R

Table 7. (continued)

	GETT/EISE	HOFU	VAFO
Big Brown Bat <i>Eptesicus fuscus</i>	PO	R	R
Hoary Bat <i>Lasiurus cinereus</i>	R	R	R
Seminole Bat <i>Lasiurus seminolus</i>	R	R	R
Evening Bat <i>Nycticeius humeralis</i>	R	R	R
<u>Carnivora</u>			
Raccoon <i>Procyon lotor</i>	PO WOC	PO WOC	WOC
Least Weasel <i>Mustela nivalis</i>	R	R	R
Ermine <i>Mustela erminea</i>	R	WOC	R
Long-tailed Weasel <i>Mustela frenata</i>	PO WOC	R	R
Mink <i>Mustela vison</i>	WOC	R	R
Fisher <i>Martes pennanti</i>	R	R	R
Marten <i>Martes americanus</i>	R	R	R
River Otter <i>Lutra canadensis</i>	R	R	R
Eastern Spotted Skunk <i>Spilogale putorius</i>	R	R	R
Striped Skunk <i>Mephitis mephitis</i>	PO	R	WOC
Red Fox <i>Vulpes vulpes</i>	PO WOC	PO WOC	WOC
Gray Fox <i>Urocyon cinereoargenteus</i>	WOC	R	R
Bobcat <i>Felis rufus</i>	R	R	R

Table 7. (continued)

GETT/EISE

HOFU

VAFO

<u>Rodentia</u>			
Woodchuck <i>Marmota monax</i>	PO WOC	WOC	WOC
Eastern Chipmunk <i>Tamias striatus</i>	PO	PO	R
Eastern Gray Squirrel <i>Sciurus carolinensis</i>	PO WOC	PO	PO WOC
Eastern Fox Squirrel <i>Sciurus niger</i>	R	R	R
Red Squirrel <i>Tamiasciurus hudsonicus</i>	R	PO	WOC
Southern Flying Squirrel <i>Glaucomys volans</i>	WOC	WOC	WOC
Northern Flying Squirrel <i>Glaucomys sabrinus</i>	R	R	R
Beaver <i>Castor canadensis</i>	R	R	R
White-footed Mouse <i>Peromyscus leucopus</i>	PO	R	WOC
Deer Mouse <i>Peromyscus maniculatus</i>	PO	R	R
Allegheny Woodrat <i>Neotoma magister</i>	R	R	R
Southern Bog Lemming <i>Synaptomys cooperi</i>	R	R	R
Boreal Red-backed Vole <i>Clethrionomys gapperi</i>	R	R	R
Meadow Vole <i>Microtus pennsylvanicus</i>	PO	R	WOC
Rock Vole <i>Microtus chrotorrhinus</i>	R	R	R
Woodland Vole <i>Microtus pinetorum</i>	R	R	R
Muskrat <i>Ondatra zibethicus</i>	PO	R	WOC

Table 7. (continued)

	GETT/EISE	HOFU	VAFO
Norway Rat <i>Rattus norvegicus</i>	R	R	WOC
House Mouse <i>Mus musculus</i>	R	R	WOC
Meadow Jumping Mouse <i>Zapus hudsonicus</i>	PO	R	WOC
Woodland Jumping Mouse <i>Napaeozapus insignis</i>	R	R	R
Porcupine <i>Erethizon dorsatum</i>	R	R	R
<u>Lagomorpha</u>			
Snowshoe Hare <i>Lepus americana</i>	R	R	R
Eastern Cottontail <i>Sylvilagus floridanus</i>	PO	R	WOC
Appalachian Cottontail <i>Sylvilagus obscurus</i>	R	R	R

Discussion and Recommendations

Based on the numbers of predicted and documented species, the taxonomic groups needing the most survey effort in the four national park areas of Pennsylvania were amphibians (particularly salamanders), reptiles, and certain mammal groups (e.g., Insectivora, Chiroptera, and Rodentia). Perhaps some predicted species of amphibians, reptiles, and certain mammals, especially for Gettysburg National Military Park, Eisenhower National Historic Site, and Hopewell Furnace National Historic Site, do not occur in these park areas. However, virtually no field work, excluding this project, has been devoted to GETT, EISE, and HOFU to surveying or inventorying these species. In contrast, when the fauna were inventoried at VAFO (Cypher et al. 1985), a much higher percentage of the amphibians and reptiles has been documented. Thus, we recommend that efforts be made to study habitats in which these predicted species may be found to verify presence or absence at each park area. This effort will provide a better understanding of the terrestrial vertebrate biodiversity found in each of the park areas.

More than 75% of the predicted bird species were documented in the four park areas combined for at least two reasons: public interest in birds and conspicuousness of birds. In fact, 97 (80%) of the 121 total NPS Wildlife Observation Cards reported

birds for GETT and EISE versus only 24 (20%) of the cards for other taxa combined.

As part of the objectives of our long-term (1992-96) project on park areas in the eastern United States, we will field-test inventorying and monitoring protocols at GETT and EISE in 1993-94. Special efforts will be made to sample under-represented taxonomic groups, such as amphibians, reptiles, insectivores, and microtine rodents, and under-represented time periods, such as the spring and fall migratory periods for birds. The field-testing will continue at Hopewell Furnace in 1994 and Valley Forge in 1995.

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Appendix 1
***Pro-Cite* Group Names**

Appendix 1. *Pro-Cite* Group Names for all classes of faunal species used in the Faunal Database at Gettysburg National Military Park, Eisenhower National Historic Site, Hopewell Furnace National Historic Site, and Valley Forge National Historical Park (Variable No. 5).

Class	Pro-Cite Group	Fauna
I. Amphibia	Caudata	Salamanders
	Salientia	Toads, Frogs
II. Reptilia	Serpentes	Snakes
	Lacertilia	Lizards
	Testudines	Turtles and Tortoises
III. Aves	Waterfowl	Gaviiformes, Podicipediformes, Pelecaniformes, and Anseriformes
	Shorebird	Charadriiformes
	Wader	Ciconiiformes and Gruiformes
	Upland Groundbird	Galliformes and Columbiformes
	Raptor	Falconiformes
	Owl	Strigiformes
	Woodpecker	Piciformes
	Passerine	Passeriformes, Caprimulgiformes, Cuculiformes, Apodiformes, and Coraciiformes
IV. Mammalia	Didelphimorphia	Virginia Opossum
	Insectivora	Shrews, Moles
	Chiroptera	Bats
	Carnivora	Raccoon, Weasels, Skunks, Canids, and Felids

Appendix 1. (continued)

Class	Pro-Cite Group	Fauna
	Rodentia	
	Sciuridae	Squirrels, Chipmunks, Prairie Dogs, and Ground Squirrels
	Castoridae	Beaver
	Muridae	Mice, Rats, Lemmings, and Voles
	Erethizontidae	Porcupine
	Lagomorpha	Rabbits and Hares

Appendix 2
Anderson Land-Use Codes

Appendix 2. Anderson land-use codes (Anderson et al. 1976) for the primary and secondary habitats for vertebrate species in the Faunal Database at Gettysburg National Historic Park, Eisenhower National Historic Site, Hopewell Furnace National Historic Site, and Valley Forge National Historical Park (Variables No. 6 and No. 7).

Anderson Land-Use Codes

LEVEL I	LEVEL II	LEVEL III
1 URBAN OR BUILT-UP LAND	11 RESIDENTIAL	
	12 COMMERCIAL AND SERVICES	
	13 INDUSTRIAL	
	14 TRANSPORTATION, COMMUNICATIONS, AND UTILITIES	
	15 INDUSTRIAL AND COMMERCIAL COMPLEXES	
	16 MIXED URBAN OR BUILT-UP LAND	
	17 OTHER URBAN OR BUILT-UP LAND	
2 AGRICULTURAL LAND	21 CROPLAND AND PASTURE	211 CROPLAND
		212 PASTURELAND
		213 HAYLAND
	22 ORCHARDS, GROVES, VINEYARDS, NURSERIES, AND ORNAMENTAL HORTICULTURE AREAS	
	23 CONFINED FEEDING OPERATIONS	
	24 OTHER AGRICULTURAL LAND	

Appendix 2. (continued)

LEVEL I	LEVEL II	LEVEL III
3 RANGELAND	31 HERBACEOUS RANGE- LAND NOT GRAZED, AT LEAST 2/3 HERBS, GRASS, AND GRASS- LIKE VEGETATION	311 HERBACEOUS RANGE- LAND: MOWED AREAS SUCH AS RECREATION FIELDS
		312 HERBACEOUS RANGE- LAND: EARLY SUCCESSION OLD FIELD
	32 SHRUB AND BRUSH RANGELAND AT LEAST 2/3 OF AREA GROWN UP IN SHRUBS	321 SHRUB AND BRUSH RANGELAND: SHRUB LAYER MODERATE TO DENSE: LATERAL VISIBILITY SOMEWHAT RESTRICTED
		322 SHRUB AND BRUSH RANGELAND: AREA GRAZED AND/OR SHRUB LAYER VEGETATION THIN AND SCATTERED, LATERAL VISIBILITY RELATIVELY GOOD
	33 MIXED RANGELAND: MORE THAN 1/3 INTERMIXTURE OF EITHER SHRUB AND BRUSH RANGELAND AND HERBACEOUS RANGELAND	331 MIXED RANGELAND: SHRUB AND HERB- ACEOUS LAYER VEGETATION MODERATE TO DENSE
		332 MIXED RANGELAND: AREA GRAZED AND/OR HERBACEOUS AND SHRUB LAYER VEGETATION THIN

Appendix 2. (continued)

LEVEL I	LEVEL II	LEVEL III
4 FOREST LAND	41 DECIDUOUS FOREST LAND	411 SAPLING STAGE: SHRUB LAYER MODERATE TO DENSE
		412 SAPLING STAGE: GRAZED AND/OR SHRUB LAYER SPARSE
		413 POLE STAGE: SHRUB LAYER MODERATE TO DENSE
		414 POLE STAGE: GRAZED AND/OR SHRUB LAYER SPARSE
		415 MATURE STAGE: SHRUB LAYER MODERATE TO DENSE
		416 MATURE STAGE: GRAZED AND/OR SHRUB LAYER SPARSE
	42 EVERGREEN TREE LAND	421 SAPLING STAGE: SHRUB LAYER MODERATE TO DENSE
		422 SAPLING STAGE: GRAZED AND/OR SHRUB LAYER SPARSE
		423 POLE STAGE: SHRUB LAYER MODERATE TO DENSE
		424 POLE STAGE: GRAZED AND/OR SHRUB LAYER SPARSE

Appendix 2. (continued)

LEVEL I	LEVEL II	LEVEL III
		425 MATURE STAGE: SHRUB LAYER MODERATE TO DENSE
		426 MATURE STAGE: GRAZED AND/OR SHRUB LAYER SPARSE
	43 MIXED FOREST LAND	431 SAPLING STAGE: SHRUB LAYER MODERATE TO DENSE
		432 SAPLING STAGE: GRAZED AND/OR SHRUB LAYER SPARSE
		433 POLE STAGE: SHRUB LAYER MODERATE TO DENSE
		434 POLE STAGE: GRAZED AND/OR SHRUB LAYER SPARSE
		435 MATURE STAGE: SHRUB LAYER MODERATE TO DENSE
		436 MATURE STAGE: GRAZED AND/OR SHRUB LAYER SPARSE

5 WATER: MAP WATER
UNDER WETLAND
CATEGORIES

Appendix 2. (continued)

LEVEL I	LEVEL II	LEVEL III
6 WETLAND	61 PALUSTRINE	611 ROCK BOTTOM
		612 UNCONSOLIDATED BOTTOM
		613 AQUATIC BED
		614 UNCONSOLIDATED SHORE
		615 MOSS-LICHEN WETLAND
		616 EMERGENT WETLAND
		617 SCRUB-SHRUB WETLAND
		618 FORESTED WETLAND
	62 LACUSTRINE LIMNETIC	621 ROCK BOTTOM
		622 UNCONSOLIDATED BOTTOM
		623 AQUATIC BED
	63 LACUSTRINE LITTORIAL	631 ROCK BOTTOM
		632 UNCONSOLIDATED BOTTOM
		633 AQUATIC BED
		634 ROCKY SHORE
		635 UNCONSOLIDATED SHORE
		636 EMERGENT (NONPERSISTENT)

Appendix 2. (continued)

LEVEL I	LEVEL II	LEVEL III
	64 RIVERINE TIDAL	641 ROCK BOTTOM
		642 UNCONSOLIDATED BOTTOM
		643 AQUATIC BED
		644 ROCKY SHORE
		645 UNCONSOLIDATED SHORE
		646 EMERGENT (NONPERSISTENT)
	65 RIVERINE LOWER PERENNIAL	651 ROCK BOTTOM
		652 UNCONSOLIDATED BOTTOM
		653 AQUATIC BED
		654 ROCKY SHORE
		655 UNCONSOLIDATED SHORE
		656 EMERGENT WETLAND (NONPERSISTENT)
	66 RIVERINE UPPER PERENNIAL	661 ROCK BOTTOM
		662 UNCONSOLIDATED BOTTOM
		663 AQUATIC BED
		664 ROCKY SHORE
		665 UNCONSOLIDATED SHORE

Appendix 2. (continued)

LEVEL I	LEVEL II	LEVEL III
	67 RIVERINE INTERMITTENT	671 STREAMBED
	68 ESTUARINE SUBTIDAL	681 ROCK BOTTOM
		682 UNCONSOLIDATED BOTTOM
		683 AQUATIC BED
		684 REEF
	69 ESTUARINE INTERTIDAL	691 AQUATIC BED
		692 REEF
		693 STREAMBED
		694 ROCKY SHORE
		695 UNCONSOLIDATED SHORE
		696 EMERGENT WETLAND
		697 SCRUB-SHRUB WETLAND
		698 FORESTED WETLAND
	70 MARINE	

Appendix 2. (continued)

LEVEL I	LEVEL II	LEVEL III
7 BARREN LAND	71 DRY SALT FLATS	
	72 BEACHES	
	73 SANDY AREAS OTHER THAN BEACHES	
	74 BARE EXPOSED ROCK	
	75 STRIP MINES, QUARRIES, AND GRADE PITS	
	76 TRANSITIONAL AREAS	
	77 MIXED BARREN LAND	
8 TUNDRA		
9 PERENNIAL SNOW OR ICE		

Appendix 3

Abbreviations of Sources of Documentation

Appendix 3. Abbreviations of sources of documentation used for the occurrence status in the Faunal Database at Gettysburg National Military Park, Eisenhower National Historic Site, Hopewell Furnace National Historic Site, and Valley Forge National Historical Park (Variable No. 8)

Abbreviation	Documentation
BBA	Pennsylvania Breeding Bird Atlas (Years: 1983-1989, Brauning 1992)
BBS	U.S. Fish and Wildlife Service Breeding Bird Survey (Years: 1966-present, Robbins et al. 1986)
CBC	Audubon Society Christmas Bird Count (Years: 1989-present, American Birds, issue no. 4 of each year)
WOC	National Park Service wildlife observation cards
PO	Personal observation (Years: 1992-present)
R	Predicted occurrence from published range maps (Behler and King 1979, Bull and Farrand 1977, and Ehrlich et al. 1988)

Appendix 4
Abbreviations of Residency Status Codes

Appendix 4. Abbreviations of the residency status codes for vertebrate species in the Faunal Database at Gettysburg National Historic Park, Eisenhower National Historic Site, Hopewell Furnace National Historic Site, and Valley Forge National Historical Park (Variable 9)

Abbreviation	Status
W	Winter Resident
S	Summer Resident
R	Year-round Resident
M	Migrant
A	Accidental

Appendix 5

Abbreviations of Federal and State Legal Population Status

Appendix 5. Abbreviations for the federal and state legal population status of vertebrate species in the Faunal Database at Gettysburg National Military Park, Eisenhower National Historic Site, Hopewell Furnace National Historic Site, and Valley Forge National Historical Park (Variable No. 10)

Legal Status:

FE = Federally Endangered

FT = Federally Threatened

SE = State Endangered

ST = State Threatened

SV = State Vulnerable

EX = State Extirpated

NN = State Non-native

PR = State Protected

GM = State Game

FB = State Furbearer

PA Biological Survey Classification:

E = Endangered

T = Threatened

X = Extirpated

C1 = State At Risk Candidate Species

C2 = State Rare Candidate Species

C3 = State Status Undetermined Species

Appendix 6

Abbreviations of Inventorying and Monitoring Survey Protocols

Appendix 6. Abbreviations of survey protocols for inventorying and monitoring vertebrate species for the Faunal Database at Gettysburg National Military Park, Eisenhower National Historic Site, Hopewell Furnace National Historic Site, and Valley Forge National Historical Park (Variable No. 11)

TRS = Transect (Fixed-width, Variable-width, Strip, Line)
VCP = Variable-width Circular-plot
PCO = Point Count (Fixed-width Circular-plot)
SMA = Spot-mapping
V&C = Communication (and Vocalization) Index
IRE = Interspecific Recording
COR = Conspecific Recording
SCI = Scat/Sign Index
OPI = Pellet Index
DLI = Dam/Lodge/Den Index
TRA = Tracking
SST = Scent Station
NCO = Nest Count
ROC = Roost Count
FLC = Flush Count
NIG = Nightlighting
SOU = Sounding
RKI = Road Kill
RCE = Road Census
BTR = Boat Census
AER = Aerial Census
QUA = Quadrat
NET = Netting (Mist-net)
TNE = Tadpole Netting
SNR = Snaring
PFT = Pitfall Trapping
STT = Snap-trapping
LTT = Live-trapping
BCT = Bal-chatri Trapping
NBT = Nestbox Trapping
FTR = Funnel-trapping
DFE = Drift Fence
MAR = Marking
BAN = Banding/Tagging
CRE = Capture-recapture
LTR = Log-turning/Rock-turning
CVB = Coverboard
AST = Artificial Shelter
TSE = Timed Search
FSV = Feeder Survey

Appendix 7

Instructions for Ordering the Faunal Database

Appendix 7. Instructions for ordering a copy of the Faunal Database from the National Park Service

For a copy of the Faunal Database send a letter to: National Park Service Mid-Atlantic Regional Office, Division of Resource Management and Visitor Protection, 143 South Third Street, Philadelphia, PA 19106-2878. The letter should include the following:

- 1) Name and mailing address.

- 2) Form of the database: 3.5 in. diskette, 5.25 in. floppy disk, or Output Version hard copy. For a computer disk, specify report form file(s) PROTAX, PROHAB, or PROTEC. For a hard copy, specify Output Version(s) I, II, or III.

- 3) National park area(s) of interest: Gettysburg National Military Park/Eisenhower National Historic Site, Hopewell Furnace National Historic Site, or Valley Forge National Historical Park.

