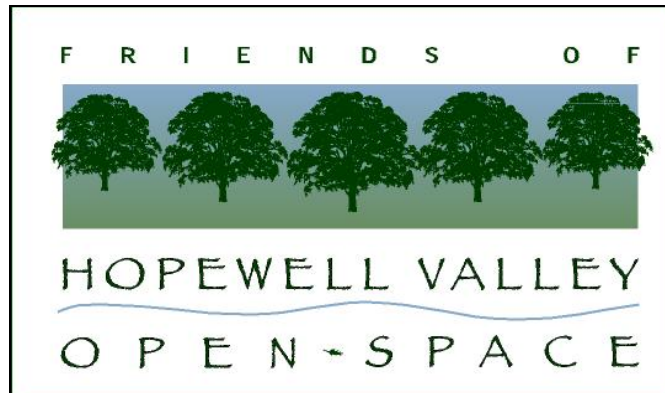


Hopewell Valley Community Stewardship Plan

March 2012

Prepared by
Friends of Hopewell Valley Open Space



Our Stewardship Vision:

Foster ecological health in the Hopewell Valley through cooperative stewardship efforts among conservation partners and all landowners

Introductory Information

Project Area:	Approximately 38,600 acres
Municipalities/County:	Hopewell Township, Hopewell Borough, Pennington Borough / Mercer County
FoHVOS Lands:	Preserves: 30 (1,970 acres) – See Appendix W Private Easements: 16 (802 acres)
NJDEP Watershed Management Areas:	Central Delaware (WMA 11), Millstone (WMA 10)
Wildlife Action Plan Conservation Zone:	Central Piedmont Plains (#14)
Named Waterways:	<u>Delaware River</u> : Connected Waterways - Delaware & Raritan Canal, Fiddler’s Creek, Jacobs Creek including Woolsey Brook, Moore Creek, Shabakunk Creek (initially drains to Assunpink Creek outside of Hopewell Valley) <u>Stony Brook</u> (ultimately drains to Millstone River and Raritan River outside of Hopewell Valley): Connected Waterways - Baldwins Creek, Cleveland Brook, Honey Branch, Woodsville Brook, Beden Brook
Broad Habitat Types:	Forest - 11,536 acres (30% of Hopewell Valley) Woodland - 1,761 acres (5% of Hopewell Valley) Shrubland - 3,023 acres (8% of Hopewell Valley) Meadow - 546 acres (1% of Hopewell Valley) Open Water - 704 acres (2% of Hopewell Valley) All Natural Cover Types - 17,534 (45% of Hopewell Valley)
Numbers of Special Conservation Species ¹ :	Total Number of Special Conservation Animal Species: 63 Total Number of Special Conservation Plant Species: 19 Total Number of Special Conservation Ecological Communities: 0
	<i>Note: Categories below are not mutually exclusive.</i> Globally Rare Species: 4 animals + 1 plant = 5 Federally Endangered Species: 1 animal + 0 plants = 1 Federally Threatened Species: 0 Federally Listed Candidate Species: 0 State Endangered Species: 5 animals + 7 plants = 12 State Threatened Species: 10 animals + 9 plants = 19 State Special Concern: 22 animals + 3 plants = 25 Wildlife Action Plan Priority Animal Species: 62 Globally Rare Ecological Communities: 0 State Rare Ecological Communities: 0

¹Special conservation species have been documented in the Hopewell Valley through a formal search of the Natural Heritage Program database and other sources of information. Plant species counted as “threatened” and “special concern” (State Ranks of S2 or S3, respectively) do not have formal State Status recognition.

Large Scale
Conservation Areas:

ENSP Landscape Project (Forest Patches > 1,000 acres):
Sourland Mountain (Patch ID F40683, Rank = 4 - partially located within Hopewell Valley) - 17,500 acres; Baldpate Mountain (Patch ID F32109, Rank = 3) - 9,500 acres; Rocky Hill (Patch ID 7315, Rank = 4, partially located within Hopewell Valley) - 2,400 acres; Pennington Mountain (Patch ID F31965, Rank = 2) - 2,000 acres; Mount Rose (Patch ID F40677, Rank = 4) - 1,900 acres

Raritan Piedmont Wildlife Habitat Partnership Sites:

Priority Forest Areas (Baldpate, Sourlands)
Priority Grassland Areas (Mercer Meadows)
Priority Riparian Areas (Stony Brook)

NJ Natural Heritage Priority Sites:

Goat Hill (894 acres, partially located within Hopewell Valley), Strawberry Hill (306 acres), Titusville (76 acres)

NJ Audubon Important Bird Areas:

Baldpate Mountain (1,100 acres), Featherbed Lane/Sourland Mountain (220 acres), Pole Farm (a.k.a. Mercer Meadows; 805 acres, partially located within Hopewell Valley)

Special Conservation
Species List:

Animals (63)

Amphibians (1)

Fowler's Toad

Birds (50)

Acadian Flycatcher, American Kestrel, American Woodcock, Bald Eagle, Baltimore Oriole, Barred Owl, Black-and-white Warbler, Black-throated Blue Warbler, Blue-winged Warbler, Bobolink, Broad-winged Hawk, Brown Thrasher, Canada Warbler, Cerulean Warbler, Chimney Swift, Cliff Swallow, Cooper's Hawk, Eastern Kingbird, Eastern Meadowlark, Eastern Screech Owl, Eastern Towhee, Eastern Wood-pewee, Field Sparrow, Grasshopper Sparrow, Gray Catbird, Great Blue Heron, Great Crested Flycatcher, Green Heron, Hooded Warbler, Indigo Bunting, Kentucky Warbler, Long-eared Owl, Louisiana Waterthrush, Northern Bobwhite, Northern Flicker, Osprey, Pine Warbler, Prairie Warbler, Red-headed Woodpecker, Red-shouldered Hawk, Ruffed Grouse, Scarlet Tanager, Sharp-shinned Hawk, Veery, Wood Duck, Wood Thrush, Worm-eating Warbler, Yellow-billed Cuckoo, Yellow-breasted Chat, Yellow-throated Vireo

Fish (3)

Bridle Shiner, Margined Madtom, Shortnose Sturgeon

Mammals (1)

Bobcat

Mussels (5)

Brook Floater, Creeper, Tidewater Mucket, Triangle Floater, Yellow Lampmussel

Reptiles (3)

Eastern Box Turtle, Spotted Turtle, Wood Turtle

Plants (19)

American Ginseng, Aunt Lucy, Buttonbush Dodder, Frank's Love Grass, Frank's Sedge, Green Violet, Low Spearwort, Lowland Fragile Fern, Ohio Spiderwort, Redbud, Slender Toothwort, Small-fruit Groovebur, Smooth Beardtongue, Spring Avens, Squirrel-corn, Twinleaf, Wild Comfrey, Willdenow's Sedge, Winged Monkey-flower

Recreational Resources: Public hiking, horseback riding and biking trails: 19
Total trail miles: 70

Plan Preparers: Elizabeth Craighead, FoHVOS Land Steward; Rachel Mackow, FoHVOS Land Steward; Michael Van Clef, FoHVOS Stewardship Director

Acknowledgements: The expertise and guidance provided by partners over the years significantly contributed to the vision, goals and content of this plan. Organizations with staff and volunteers that have routinely partnered with FoHVOS include:

Conservation Resources, Inc.
D&R Greenway Land Trust
Hopewell Township
Hopewell Township Deer Management Advisory Committee
Hopewell Township Environmental Commission
Hopewell Township Open Space Advisory Committee
Mercer County Park Commission
NJDEP – Division of Fish & Wildlife
NJDEP – Division of Fish & Wildlife (ENSP)
NJDEP – Division of Parks and Forestry
New Jersey Invasive Species Strike Team
Raritan Piedmont Wildlife Habitat Partnership
Stony Brook – Millstone Watershed Association
United States Fish & Wildlife Service
USDA – Natural Resource Conservation Service
Washington Crossing Audubon Society

Executive Summary

Our vision is to foster ecological health in the Hopewell Valley through cooperative stewardship efforts among conservation partners and all landowners. FoHVOS owns or co-owns thirty preserves encompassing nearly 2,000 acres. While significant, our preserves represent only 5% of the Hopewell Valley. This realization has spurred us to develop numerous partnerships with governmental, non-profit and private landowners throughout the Valley and contributes to broad goals and specific strategies discussed in this plan (See Acknowledgements above). Only through concerted and coordinated effort will we be able to preserve and enhance the natural heritage of the Hopewell Valley.

The purpose of this plan is to carefully define conservation values, threats to their health, and strategies to mitigate identified threats. This plan provides guidance to FoHVOS staff and informs our interactions with partners and all landowners throughout the Hopewell Valley. In addition, the plan provides ample sources of reference material for staff, partners, and researchers that can guide conservation efforts.

The Hopewell Valley covers 38,600 acres across three municipalities in Mercer County, New Jersey (Hopewell Township, Hopewell Borough and Pennington Borough). Natural areas account for approximately 45% of the land cover – remaining cover includes urban (28%), agricultural lands (26%) and mines (1%). Natural areas include forest and woodlands (34% of total land cover), shrubland (8%), meadow (1%) and open water (2%).

The Hopewell Valley features a number of large conservation areas (either wholly or partially located in Hopewell Valley). These areas include three New Jersey Natural Heritage Priority Sites, three New Jersey Audubon Important Bird Areas, and five large forest patches ranging in size from 1,900 to 17,500 acres. The Valley provides habitat for a diversity of animals including 35 species of mammals, 106 birds, 27 reptiles, 23 amphibians, 35 fish, 57 dragonflies/damselflies, 94 butterflies and 10 mussels. There are 229 woody plant species documented in Mercer County.

A total of 82 rare and priority species are known to occur in the Hopewell Valley. This includes 63 animals and 19 plants. Species include the globally rare and federally endangered Shortnose Sturgeon – additional globally rare species include two mussels (Yellow Lampmussel, Brook Floater), one fish (Bridle Shiner) and one plant (American Ginseng). State rare species include 12 listed as endangered, 13 listed as threatened and 25 listed as special concern.

The primary threats to conservation values include: 1) overabundant white-tailed deer, 2) invasive species and 3) impacts to soil from past agricultural activities. The interplay of these primary threats combines to seriously degrade natural areas, necessitating stewardship activities to maintain and enhance conservation values.

The five primary stewardship goals include: 1) Reduce impacts of white-tailed deer, 2) Strategic invasive species control, 3) Broad habitat management & restoration, 4) Rare species management, and 5) Foster community support for stewardship. The intention of these efforts is promoting the recovery of our forests, shrublands and meadows by reducing negative human impacts. See “Primary Stewardship Goals and Strategies” on the next page for additional details.

FoHVOS and many conservation partners have already made significant strides toward effective stewardship of the Hopewell Valley. However, the scope of human impacts on natural areas is extraordinary. Achievement of our vision is reliant on coordinated, cooperative efforts among federal, state, county, and municipal governments, conservation groups, community organizations, private landowners and the general public. Successful implementation of this plan will provide a concrete example of community-based stewardship that can be broadly applied throughout New Jersey.

Primary Stewardship Goals and Strategies

Strategies are detailed in Section IV, Table 14 and Appendices 1 through 26 (FoHVOS preserve plans). Anticipated accomplishments are quantified over the 10-year plan implementation period. The percentage of total FoHVOS staff and volunteer level-of-effort (LOE) is provided for each goal.

Goal #1. Reduce Impacts of White-tailed Deer (10% of total LOE).

- Strategy 1A: Community Deer Management - Participation in the Hopewell Township Deer Management Advisory Committee toward implementation of the Hopewell Township Deer Management Plan, which includes five deer impact reduction goals covering human health, economic and ecological impacts. Strategy sets include eleven strategies relating to improvement of hunting access and efficacy along with measures to avoid deer impacts. *Accomplishment*: 75% improvement in all measured deer impacts.
- Strategy 1B: FoHVOS Deer Management Program (DMP) - Ongoing implementation of preserve-level deer management programs. The DMP includes all preserves where hunting activity is feasible and aims to reduce deer population growth by focusing on the harvest of antlerless deer. *Accomplishment*: 75% improvement of measured forest health impacts

Goal #2. Strategic Invasive Species Control (27% of total LOE)

- Strategy 2A: Early Detection & Rapid Response for Newly Emerging Invasive Species - Serve as the Central Region Coordinator of the New Jersey Invasive Species Strike Team to prevent the spread of newly emerging invasive species. *Accomplishment*: Multiple, See Table 14.
- Strategy 2B: Strategic Control of Widespread Invasive Species - Provide control of widespread invasive species in the Hopewell Valley by focusing control efforts on nascent populations and high priority sites. *Accomplishment*: Multiple, See Table 14.

Goal #3. Broad Habitat Management & Restoration (19% of total LOE)

- Strategy 3A: Forest Habitat - Perform forest restoration on degraded lands, focus activities in areas within existing large forest patches. Research and implement use of forestry practices and prescribed fire to improve forest health. *Accomplishment*: Restore 61 acres & maintain existing restorations (16 acres)
- Strategy 3B: Early Successional Habitat - Perform meadow and shrubland restoration on degraded lands and maintain existing areas, focus activities outside of priority forest areas to foster contiguous forest cover. *Accomplishment*: Restore meadows (22 acres) and shrublands (5 acres); maintain existing and restored meadows (140 acres); Partner with Mercer County to restore Pole Farm meadows & grasslands (ca. 450 acres)

Goal #4. Rare Species Management (6% of total LOE)

- Strategy 4A: Locate and assess ecological health of highest priority species (e.g., globally rare and state endangered species), develop and implement species-specific stewardship plans to maintain and improve populations. *Accomplishment*: Monitor and steward 9 rare species

Goal #5. Foster Community Support for Stewardship (38% of total LOE)

- Strategy 5A: Private Lands Stewardship Program - Encourage landowners to implement stewardship practices on their properties; provide recommendations and assistance to landowners. *Accomplishment*: Enroll and support 800 active participants
- Strategy 5B: Citizen Science Program - Support existing programs such as 4th of July Butterfly Count, Christmas Bird Count and e-Bird Surveys; recruit individuals to assist with FoHVOS ecological monitoring program. *Accomplishment*: Active partnership through 3,500 FoHVOS staff and volunteer hours
- Strategy 5C: Education, Outreach and Public Access - Efforts that complement and supplement existing efforts; provide guided walks and presentations; provide access to FoHVOS preserves to facilitate direct engagement with nature. *Accomplishment*: Multiple, See Table 14.

Table of Contents

Introductory Information	i
Executive Summary	iv
Primary Stewardship Goals and Strategies	v
Table of Contents	vi
List of Tables, Figures, Maps and Appendices	vii
I. Overview.....	1
Introduction.....	1
Stewardship Vision and Goals	1
Physical Features	2
Climate.....	2
Geology and Soils.....	3
Waterways	6
Landscape Context.....	6
Land Use History	6
Land Cover	6
Protected Lands.....	8
Roadways.....	8
Social Context.....	9
Partnerships.....	9
II. Conservation Values.....	11
Introduction.....	11
Ecological Values Assessment.....	11
Landscape-scale Priorities	11
Ecological Communities	14
Flora.....	14
Fauna.....	15
Rare Species.....	15
III. Challenges	17
Introduction.....	17
Background on Significant Threats to Conservation Values	17
White-tailed Deer Overabundance.....	17
Invasive Species.....	19
Altered Soils from Past Agricultural Activity.....	21
Evaluation of White-tailed Deer Impacts in the Hopewell Valley.....	22
Evaluation of Invasive Species Impacts in the Hopewell Valley.....	32
Evaluation of Past Agricultural Activity Impacts in the Hopewell Valley	36
Additional Challenges.....	36
IV. Goals and Strategies	37
Introduction.....	37
Goal #1: Reduce Impacts of White-tailed Deer	43
Goal #2: Strategic Invasive Species Management.....	43
Goal #3: Broad Habitat Management and Restoration	44
Goal #4: Rare Species Management.....	45
Goal #5: Foster Community Support for Stewardship.....	45
Additional Goals and Strategies.....	47
Literature Cited	48

List of Tables, Figures, Maps & Appendices

List of Tables

Table 1.	Bedrock Types of the Hopewell Valley	3
Table 2.	Soil Types of the Hopewell Valley	4
Table 3.	Soil Characteristics of the Hopewell Valley	5
Table 4.	Detailed Land Cover Classes of the Hopewell Valley (2007).....	7
Table 5.	Summary of Roadways of the Hopewell Valley	8
Table 6.	Population of the Hopewell Valley	9
Table 7.	Landscape Project Patch Ranks and Sizes of the Hopewell Valley	12
Table 8.	Summary of Rare and Priority Species of the Hopewell Valley	16
Table 9.	Forest Health Monitoring Results for the Hopewell Valley	24
Table 10.	Summary of Invasive Species Distribution on FoHVOS Preserves.....	33
Table 11.	List of Invasive Species and Their Relative Infestation Levels on FoHVOS Preserves	34
Table 12.	Summary of Emerging Invasive Species in the Hopewell Valley.....	35
Table 13.	Level of Effort Estimates by Primary Stewardship Goal	37
Table 14.	Stewardship Tasks and Accomplishments for the 10-year Plan Implementation Period.....	38

List of Figures

Figure 1.	Average Precipitation and Temperatures for the Hopewell Valley.....	2
Figure 2.	Broad Land Cover Classes of the Hopewell Valley (2007).	7
Figure 3.	Historic and Current New Jersey Deer Population Estimates.	17
Figure 4.	Deer Population Growth Factors and Impacts.....	18
Figure 5.	New Jersey Deer Population Size and Harvest Data.....	19
Figure 6.	Forest Health Monitoring - Sentinel Seedling Results for the Hopewell Valley.	25
Figure 7.	Forest Health Monitoring - Forest Secchi Results for the Hopewell Valley.....	26

List of Maps

Map 1.	Topography of the Hopewell Valley
Map 2.	Bedrock Geology of the Hopewell Valley
Map 3.	Soil Types of the Hopewell Valley
Map 4-1.	Soil Characteristics of the Hopewell Valley – Farmland Importance Class
Map 4-2.	Soil Characteristics of the Hopewell Valley – Erodible Land Class
Map 4-3.	Soil Characteristics of the Hopewell Valley – Hydric Class
Map 4-4.	Soil Characteristics of the Hopewell Valley – Drainage Class
Map 4-5.	Soil Characteristics of the Hopewell Valley – Bedrock Depth Class
Map 4-6.	Soil Characteristics of the Hopewell Valley – Stone Cover Class
Map 4-7.	Soil Characteristics of the Hopewell Valley – Groundwater Depth Class
Map 4-8.	Soil Characteristics of the Hopewell Valley – Slope Class
Map 5.	Watersheds and Waterways of the Hopewell Valley
Map 6.	Historic Aerial Photography of the Hopewell Valley (circa 1930)
Map 7.	Historic and Current Forest Cover Overlap in the Hopewell Valley
Map 8.	Land Cover of the Hopewell Valley (2007)
Map 9.	Protected Lands of the Hopewell Valley
Map 10.	Roadways and Railways of the Hopewell Valley
Map 11.	Ecological Values Assessment of the Hopewell Valley
Map 12.	Landscape Project Patch Ranks of the Hopewell Valley

- Map 13. Landscape Project Patch Sizes of the Hopewell Valley
- Map 14. Landscape Project Bald Eagle and Wood Turtle Habitat of the Hopewell Valley
- Map 15. RPWHP Priority Focal Areas in the Hopewell Valley
- Map 16. Large Forest Patches of the Hopewell Valley
- Map 17. New Jersey Audubon Important Bird Areas of the Hopewell Valley
- Map 18. New Jersey Natural Heritage Program Priority Sites of the Hopewell Valley
- Map 19. Forest Health Monitoring Sites in the Hopewell Valley (2006 - 2012)
- Map 20. Invasive Species on FoHVOS Preserves - Number of Species per Patch
- Map 21. Invasive Species on FoHVOS Preserves - Infestation Severity per Patch
- Map 22-1. Invasive Species on FoHVOS Preserves – *Acer palmatum* (Japanese Maple)
- Map 22-2. Invasive Species on FoHVOS Preserves – *Acer platanoides* (Norway Maple)
- Map 22-3. Invasive Species on FoHVOS Preserves – *Ailanthus altissima* (Tree-of-Heaven)
- Map 22-4. Invasive Species on FoHVOS Preserves – *Alliaria petiolata* (Garlic Mustard)
- Map 22-5. Invasive Species on FoHVOS Preserves – *Artemisia vulgaris* (Common Mugwort)
- Map 22-6. Invasive Species on FoHVOS Preserves – *Arthraxon hispidus* (Small Carpgrass)
- Map 22-7. Invasive Species on FoHVOS Preserves – *Berberis thunbergii* (Japanese Barberry)
- Map 22-8. Invasive Species on FoHVOS Preserves – *Cardamine impatiens* (Narrow-leaved Bittercress)
- Map 22-9. Invasive Species on FoHVOS Preserves – *Catalpa bignonioides* (Northern Catalpa)
- Map 22-10. Invasive Species on FoHVOS Preserves – *Celastrus orbiculatus* (Asiatic Bittersweet)
- Map 22-11. Invasive Species on FoHVOS Preserves – *Centurea* sp. (Knapweed species)
- Map 22-12. Invasive Species on FoHVOS Preserves – *Cirsium arvense* (Canada Thistle)
- Map 22-13. Invasive Species on FoHVOS Preserves – *Dipsacus sylvestris* (Teasel)
- Map 22-14. Invasive Species on FoHVOS Preserves – *Eleaegnus umbellata* (Autumn Olive)
- Map 22-15. Invasive Species on FoHVOS Preserves – *Euonymus alata* (Winged Burning Bush)
- Map 22-16. Invasive Species on FoHVOS Preserves – *Iris pseudoacris* (Yellow Iris)
- Map 22-17. Invasive Species on FoHVOS Preserves – *Lespedeza cuneata* (Chinese Bushclover)
- Map 22-18. Invasive Species on FoHVOS Preserves – *Ligustrum obtusifolium* (Border Privet)
- Map 22-19. Invasive Species on FoHVOS Preserves – *Lonicera japonica* (Japanese Honeysuckle)
- Map 22-20. Invasive Species on FoHVOS Preserves – *Lonicera maackii* (Amur Honeysuckle)
- Map 22-21. Invasive Species on FoHVOS Preserves – *Lonicera morrowii* (Morrow’s Honeysuckle)
- Map 22-22. Invasive Species on FoHVOS Preserves – *Lysimachia nummularia* (Moneywort)
- Map 22-23. Invasive Species on FoHVOS Preserves – *Lythrum salicaria* (Purple Loosestrife)
- Map 22-24. Invasive Species on FoHVOS Preserves – *Malus toringo* (Toringo Crabapple)
- Map 22-25. Invasive Species on FoHVOS Preserves – *Microstegium vinimeum* (Japanese Stiltgrass)
- Map 22-26. Invasive Species on FoHVOS Preserves – Non-native Cool Season Grasses
- Map 22-27. Invasive Species on FoHVOS Preserves – *Phalaris arundinacea* (Reed Canary Grass)
- Map 22-28. Invasive Species on FoHVOS Preserves – *Phragmites australis* (Common Reed)
- Map 22-29. Invasive Species on FoHVOS Preserves – *Polygonum cuspidatum* (Japanese Knotweed)
- Map 22-30. Invasive Species on FoHVOS Preserves – *Polygonum perfoliatum* (Mile-a-Minute)
- Map 22-31. Invasive Species on FoHVOS Preserves – *Pyrus calleryana* (Callery Pear)
- Map 22-32. Invasive Species on FoHVOS Preserves – *Ranunculus ficaria* (Lesser Celandine)
- Map 22-33. Invasive Species on FoHVOS Preserves – *Robinia pseudoacacia* (Black Locust)
- Map 22-34. Invasive Species on FoHVOS Preserves – *Rosa multiflora* (Multiflora Rose)
- Map 22-35. Invasive Species on FoHVOS Preserves – *Rubus pheonculus* (Wineberry)
- Map 22-36. Invasive Species on FoHVOS Preserves – *Securigera varia* (Crown Vetch)
- Map 22-37. Invasive Species on FoHVOS Preserves – *Viburnum dilatatum* (Linden Viburnum)
- Map 22-38. Invasive Species on FoHVOS Preserves – *Viburnum sieboldii* (Siebold’s Viburnum)
- Map 22-39. Invasive Species on FoHVOS Preserves – *Wisteria floribunda* (Japanese Wisteria)

List of Appendices

- Appendix A. Hopewell Valley Ecological Values Calculations
- Appendix B. Ecological Communities of the New Jersey Piedmont
- Appendix C. Woody Plants of Mercer County
- Appendix D. Mammals of Mercer County
- Appendix E. Breeding Birds of Hopewell Valley
- Appendix F. Reptiles of Mercer County
- Appendix G. Amphibians of Mercer County
- Appendix H. Freshwater Fish of Hopewell Valley
- Appendix I. Dragonflies and Damselflies of Mercer County
- Appendix J. Butterflies of Mercer County
- Appendix K. Freshwater Mussels of Mercer County
- Appendix L. Rare and Priority Species of Hopewell Valley
- Appendix M. Natural History of Rare and Priority Animal Species
- Appendix N. Natural History of Rare and Priority Plant Species
- Appendix O. ENSP Rare and Priority Animal Species Fact Sheets
- Appendix P. Photographs of Rare and Priority Species
- Appendix Q. Overview of Invasive Species Control
- Appendix R. Species-level Invasive Plant Control Guidelines
- Appendix S1. Forest Health Monitoring Protocols
- Appendix S2. Ecological Community Monitoring Method Detail
- Appendix S3. Ecological Community Monitoring Data Sheet
- Appendix T. FoHVOS Preserves - Habitat Goals for Early Successional Lands
- Appendix U. FoHVOS Preserves - Mowing Requirements
- Appendix V. FoHVOS Preserves - Monitoring Report Form
- Appendix W. FoHVOS Preserves - Preserve Information
- Appendix X. FoHVOS Preserves - Land Cover Data (2007)
- Appendix Y1. FoHVOS Preserves - Soil Type Data
- Appendix Y2. FoHVOS Preserves - Soil Characteristics Data

The following appendices contain Preserve Stewardship Plans containing site-specific information and stewardship recommendations for lands owned by Friends of Hopewell Valley Open Space:

- Appendix 1. Albahary and Grossman Preserves
- Appendix 2. Arena Preserve
- Appendix 3. Arno and Pogorzelski Preserves
- Appendix 4. Eames Preserve
- Appendix 5. Elks Preserve
- Appendix 6. Franz Preserve
- Appendix 7. Genovesi Preserve
- Appendix 8. Gomez Preserve
- Appendix 9. Guastella Preserve
- Appendix 10. Heritage Preserve
- Appendix 11. Hollystone Preserve
- Appendix 12. Huber Preserve
- Appendix 13. Krech Preserve
- Appendix 14. Kulak and Lawrence Preserves
- Appendix 15. Lipp/Lewellen Preserve
- Appendix 16. Mount Preserve
- Appendix 17. Nayfield Preserve
- Appendix 18. Nexus Preserve
- Appendix 19. Perkins Preserve
- Appendix 20. Skyview and Garfi Preserves
- Appendix 21. Stephens Preserve
- Appendix 22. Ted Stiles Preserve at Baldpate Mountain Preserve
- Appendix 23. Thompson Preserve
- Appendix 24. Vales Preserve
- Appendix 25. Vogler Preserve
- Appendix 26. Weidel Preserve

Section I. Overview

Introduction

This plan section describes the overarching vision and goals that guide FoHVOS' stewardship activities and provides context to inform stewardship throughout the Hopewell Valley. Individual sub-sections describe physical features (i.e., climate, geology, soils, waterways), landscape context (i.e., land use history, land cover, protected lands, roadways), social context and partnerships. The purpose of this plan is to carefully define conservation values, threats to their health, and strategies to mitigate identified threats. This plan provides guidance to FoHVOS staff and informs our interactions with partners and all landowners throughout the Hopewell Valley. In addition, the plan provides ample sources of reference material for staff, partners, and researchers that can guide conservation efforts.

Stewardship Vision and Goals

The vision of Friends of Hopewell Valley Open Space is to foster ecological health in the Hopewell Valley through cooperative stewardship efforts among conservation partners and all landowners. FoHVOS owns or co-owns thirty preserves encompassing nearly 2,000 acres. While significant, our preserves represent only 5% of the Hopewell Valley. This realization has spurred us to develop numerous partnerships with governmental, non-profit and private landowners throughout the Valley and contributes to broad goals and specific strategies discussed in this plan (See Acknowledgements above). Only through concerted and coordinated effort will we be able to preserve and enhance the natural heritage of the Hopewell Valley.

Our overarching stewardship goal is to promote the recovery of our forests, shrublands and meadows by reducing negative human impacts. Accordingly, we define stewardship as “mitigating human impacts on natural systems”.

Stewardship goals are guided by analyses of the natural and human context of the Hopewell Valley (See Section I), identification of conservation values (See Section II) and their threats (See Section III). The five primary stewardship goals include: 1) reduce impacts of white-tailed deer, 2) strategic invasive species management, 3) broad habitat management & restoration, 4) rare species management, and 5) foster community support for stewardship (See “Primary Stewardship Goals and Strategies” on page v, Section IV, and FOHVOS Preserve plans located in Appendices 1 through 26 for details).



Wood Anemone and Trout Lily at the Heritage Preserve. Photo taken by R. Mackow.

Stewardship Discussion

'Nature manages itself' is commonly heard from those that feel stewardship of natural lands is inappropriate. In some cases, this is based upon a simplistic understanding of natural systems and the forces that create or maintain them. Some proponents of this view fail to acknowledge that there are many indirect impacts of human activities on natural systems (e.g., introductions of non-native species, irreversible fragmentation of natural areas that support deer population growth, profound alteration of soils from past agricultural use, etc.). Other proponents of this view suggest that nature will have to balance itself within the framework established by human activities and that we should not intervene further. Finally, there are well-qualified experts including some experienced natural historians and research professors that understand that our knowledge of natural systems is incomplete and suggest that stewardship should not be practiced until we learn more about natural systems and how they will react to particular management regimes.

In contrast, proponents of stewardship proceed from the viewpoint that human activities directly and indirectly shape the remainder of our natural world and that there is an obligation to intervene to promote ecological health and avoid further losses of biodiversity. In short, stewardship may be defined as 'the mitigation of human impacts on natural systems'. Stewards feel that action is required when human impacts severely threaten ecological health, thereby consciously reducing human impacts through management strategies and actions.

In most cases, stewards strive for short-term interventions that correct natural systems with declining trajectories. Examples of short-term interventions include significant reductions of the white-tailed deer population (i.e., culling) and control of nascent populations of invasive species. In other cases, the continuing needs of the human population require that active management be perpetual (e.g., creation and maintenance of early successional habitats because catastrophic wildfires must be suppressed or a continuing Deer Management Programs to maintain a smaller deer herd).

In general, there are relatively few compromises available to proponents of the extremes of these two opposing viewpoints. However, most individuals realize that a balance is possible, especially when stewardship is coupled with careful monitoring or designed research experiments that provide greater insights to practice adaptive management. Overall, stewardship strategies should seek to utilize minimal human intervention to foster ecological health and stimulate research to provide a better understanding of the natural world.

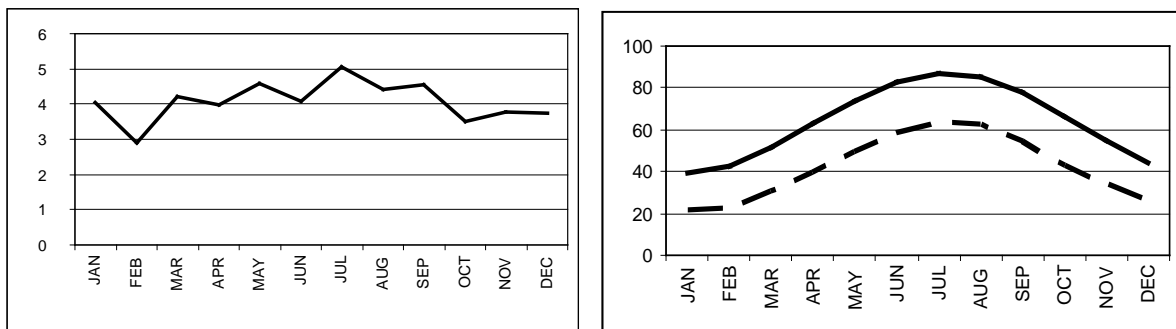
Physical Features

Climate

Climate data was obtained from the Office of the State Climatologist, Rutgers University (<http://climate.rutgers.edu>). The data is from the Lawrenceville, New Jersey Station and represents averages from 1971 to 2000. Overall, the area receives approximately 48 inches of precipitation per year with an average daily temperature of 53° Fahrenheit. The growing season is approximately 240 days and typically ranges from March 20 to November 20 (Collins and Anderson 1989). Additional climate information can be found in the Hopewell Township Environmental Resource Inventory (DVRPC 2010).

Figure 1. Average Precipitation and Temperatures for the Hopewell Valley

Note: Precipitation in inches, temperatures provided as minimum (dashed line) and maximum (solid line)



Geology and Soils

The Hopewell Valley is located within the Piedmont physiographic region, which covers approximately 20 percent of the state. The geology of the area has its origins in events of the Triassic and Jurassic Periods (240 to 140 million years ago). It is characterized as a low rolling plain underlain by sedimentary rocks with a series of higher ridges composed of harder igneous rocks from prehistoric lava flows and diabase intrusive rocks (e.g., Sourland Mountain, Baldpate Mountain). The elevation within the Piedmont generally ranges from 300-400 feet above sea level, but ranges from 547 feet at High Mountain, Wayne Township, Passaic County to sea level at Newark Bay. The topography of the Hopewell Valley is depicted in Map 1.

The Hopewell Valley is underlain by five types of bedrock (Table 1, Map 2). The following descriptions are from the US Geological Survey (www.usgs.gov/geology/state). The Passaic Formation is the most common type in the Hopewell Valley. It is predominantly red beds consisting of argillaceous siltstone; silty mudstone; argillaceous, very fine grained sandstone; and shale; mostly reddish-brown to brownish-purple, and grayish-red that are typically 10-23 feet thick. The Passaic Formation – Gray Beds occur as thin seams within the larger Passaic Formation. They are 7-23 feet thick gray-bed sequences and contain shale to siltstone. The Jurassic Diabase occurs as several distinct patches in the Hopewell Valley. It is predominantly medium- to fine-grained diabase and dikes of fine-grained diabase; dark-greenish-gray to black. It is dense, hard, sparsely fractured rock. The Lockatong Formation occurs in the northern and southern portions of the Hopewell Valley. It is predominantly silty, dolomitic or analcime-bearing argillite; laminated mudstone; silty to calcareous, argillaceous very fine grained sandstone and pyritic siltstone; and minor silty limestone, mostly light- to dark-gray, greenish-gray, and black. This bedrock is highly resistant to erosion, which allows formation of cliffs, outcrops, rocky slopes and waterfalls. Argillite is also non-porous to water, which leads to flooding, stream bank erosion from increased runoff during storm events and loss of stream flow in dry periods through reduced groundwater recharge that would serve as base flow. The Stockton Formation occurs as a single band in the northern portion of the Hopewell Valley. It is predominantly medium- to coarse-grained, light-gray, light-grayish-brown, or yellowish- to pinkish-gray arkosic sandstone and medium- to fine-grained, violet-gray to reddish-brown arkosic sandstone; with lesser reddish to purplish-brown, silty mudstone, argillaceous siltstone, and shale.

Table 1. Bedrock Types of the Hopewell Valley

Bedrock Type	Total Acres	Percent of Hopewell Valley
Passaic Formation	22,970	59.5
Lockatong Formation	7,742	20.1
Jurassic Diabase	2,971	7.7
Passaic Formation - Gray Bed	2,639	6.8
Stockton Formation	2,289	5.9
Totals	38,611	100

The Hopewell Valley contains 93 unique soil types. The ten most common soil types account for just over 50% of the land area, while the 25 most common soil types account for over 75% of the land area (See Table 2, Map 3). Additional soil information can be found in the Hopewell Township Environmental Resource Inventory (DVRPC 2010).

Table 2. Common Soil Types of the Hopewell Valley

Soil Symbol	Soil Mapping Unit	Total Acres	Percent of Hopewell Valley
BucB	Bucks silt loam, 2 to 6 percent slopes	6,158	16.0
PeoB	Penn channery silt loam, 2 to 6 percent slopes	2,513	6.5
ChcB	Chalfont silt loam, 2 to 6 percent slopes	2,292	5.9
QukB	Quakertown silt loam, 2 to 6 percent slopes	1,613	4.2
RehB	Reaville silt loam, 2 to 6 percent slopes	1,520	3.9
REFB	Readington and Abbottstown silt loams, 2 to 6 percent slopes	1,424	3.7
PeoC	Penn channery silt loam, 6 to 12 percent slopes	1,423	3.7
BoyAt	Bowmansville silt loam, 0 to 2 percent slopes, frequently flooded	1,169	3.0
DOZA	Doylestown and Reaville variant silt loams, 0 to 2 percent slopes	1,045	2.7
BucB2	Bucks silt loam, 2 to 6 percent slopes, eroded	974	2.5
BucC2	Bucks silt loam, 6 to 12 percent slopes, eroded	914	2.4
RorAt	Rowland silt loam, 0 to 2 percent slopes, frequently flooded	887	2.3
KkoC	Klinesville channery loam, 6 to 12 percent slopes	778	2.0
DOZB	Doylestown and Reaville variant silt loams, 2 to 6 percent slopes	743	1.9
LegE	Legore gravelly loam, 18 to 30 percent slopes	723	1.9
ChcA	Chalfont silt loam, 0 to 2 percent slopes	706	1.8
NehCb	Neshaminy silt loam, 6 to 12 percent slopes, very stony	706	1.8
BucA	Bucks silt loam, 0 to 2 percent slopes	634	1.6
LDXB	Lawrenceville and Mount Lucas silt loams, 2 to 6 percent slopes	611	1.6
ChcB2	Chalfont silt loam, 2 to 6 percent slopes, eroded	610	1.6
KkoE	Klinesville channery loam, 18 to 35 percent slopes	591	1.5
WATER	Water	543	1.4
ChcC2	Chalfont silt loam, 6 to 12 percent slopes, eroded	456	1.2
REFA	Readington and Abbottstown silt loams, 0 to 2 percent slopes	452	1.2
NehB	Neshaminy silt loam, 2 to 6 percent slopes	451	1.2

The characteristics of all soils are summarized in Table 3 and depicted on Maps 4-1 through 4-8. The following is a brief summary of soil attributes in the Hopewell Valley: Nearly 85% of the Hopewell Valley has important farmland values; the majority of the Valley contains lands that are highly erodible (about 17%) or potentially erodible (about 73%); nearly 90% of the Valley's soils are considered non-hydric; just over half of Valley soils are considered somewhat excessively or well drained while nearly one-third are considered somewhat poorly to poorly drained; less than 5% of the Valley has shallow bedrock depths of less than two feet, approximately half of the Valley has bedrock depths of 2-4 feet and nearly 40% has bedrock depths greater than four feet; less than 10% of the Valley has steep slopes.

Detailed data on soil types and characteristics on FoHVOS preserves is located in Appendices Y1 and Y2, respectively.

Table 3. Soil Characteristics of the Hopewell Valley

Attribute	Description	Total Acres	Percent of Hopewell Valley
Farmland Importance Class	No Designation	5,446	14.1
	Prime Farmland	16,964	44.0
	Farmland of Statewide Importance	13,795	35.8
	Farmland of Local Importance	1,788	4.6
	Farmland of Unique Importance	0	0.0
	Water or NA or Not available	543	1.4
Erodible Land Class	Not highly erodible land	3,337	8.7
	Potentially erodible land	28,071	72.8
	Highly erodible land	6,584	17.1
	Water or NA or Not available	543	1.4
Hydric Class	Non-hydric soil	34,692	90.0
	Hydric soil	3,301	8.6
	Water or NA or Not available	543	1.4
Drainage Class	Poorly Drained	3,224	8.4
	Somewhat Poorly Drained	7,733	20.1
	Moderately Well Drained	4,906	12.7
	Well Drained	20,694	53.7
	Somewhat Excessively Drained	1,370	3.6
	Water or NA or Not available	609	1.6
Bedrock Depth Class	< 1	11	0.0
	1-2	1,552	4.0
	2-3	10,573	27.4
	3-4	11,240	29.2
	>4	14,550	37.8
	Water or NA or Not available	609	1.6
Stone Cover Class	0	36,099	93.7
	< 2	1,660	4.3
	70	222	0.6
	100	11	0.0
	Water or NA or Not available	543	1.4
Groundwater Depth Class	< 1	7,449	19.3
	1-2	4,758	12.3
	2-3	3,808	9.9
	3-4	0	0.0
	>4	164	0.4
	Water or NA or Not available	22,357	58.0
Slope Class	< 5	27,988	72.6
	5-10	7,393	19.2
	10-15	0	0.0
	15-20	839	2.2
	> 20	1,695	4.4
	Water or NA or Not available	620	1.6

Waterways

The Hopewell Valley lies within two Watershed Management Areas - Central Delaware (WMA 11) and Millstone (WMA 10) and their associated waterways (See Map 5). The Delaware River forms the western border of the Hopewell Valley. Waterways that ultimately drain to the Delaware River include: Delaware & Raritan Canal, Fiddler's Creek, Jacobs Creek including Woolsey Brook, Moore Creek, Shabakunk Creek (initially drains to Assunpink Creek outside of Hopewell Valley). Waterways that drain to the Stony Brook (which ultimately drains to Millstone River and Raritan River outside of Hopewell Valley) include: Baldwins Creek, Cleveland Brook, Honey Branch, Woodsville Brook, and Beden Brook. Additional waterways information can be found in the Hopewell Township Environmental Resource Inventory (DVRPC 2010).

Landscape Context

Land Use History

Historical trends in forest cover were reported in *The Woodlands of Hopewell Valley* (White 1990). The predominant land cover had been agricultural with small woodlots for over 150 years. In 1883, woodlands covered approximately 11% of Hopewell Valley (suspected to be the lowest historical forest cover). This percentage increased to 19% by 1943 and was 17% in 1989. Median size of woodlots was relatively stable for a long period of time (1883 - 14 acres, 1943 - 15 acres, 1989 - 15 acres).

Historic aerial photography of the Hopewell Valley (circa 1930) is provided in Map 6. In 1930, approximately 5,450 acres or 14% of the Hopewell Valley had forest cover (Map 7). This number is similar to that reported by White (1990) in 1883, which may suggest that these areas were never tilled (many of these areas are likely to have been woodlots managed to provide firewood). The majority of these 1930's forests remain in forest cover to the present – approximately 4,500 acres of current forest cover occurred as forest in 1930 (Map 7). Field observations of these older forests often suggest resistance to infestations of invasive species and they sometimes support native herbs and shrubs that are uncommon in forests that had received agricultural tilling in the past. Some of the older forest patches are highlighted in FoHVOS preserve stewardship plans found in Appendices 1 through 26. Current forest and woodland cover is approximately 13,300 acres, therefore approximately two-thirds are growing on former agricultural lands and one-third are 'old forest'.

Land Cover

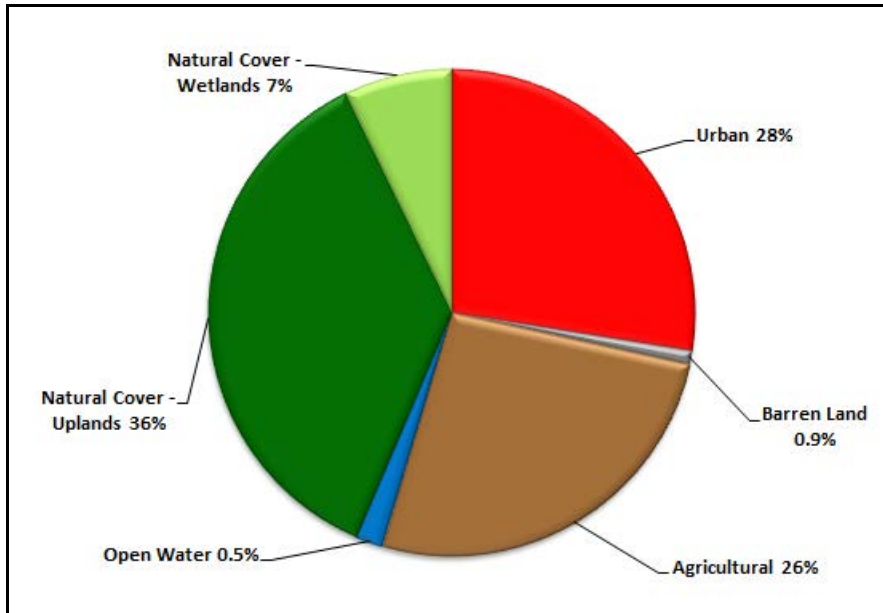
The land cover of the Hopewell Valley consists of approximately half natural cover and half urban or agricultural cover (Table 4, Figure 2, Map 8). Although natural cover is significant, it is highly fragmented by other land uses, which limits the occurrence of sensitive species that require large blocks of contiguous natural cover (e.g., grasslands or forest). There are five larger forest patches greater than 1,000 acres that lie wholly or partially within the Hopewell Valley. These areas include: Sourland Mountain (17,500 acres), Baldpate Mountain (9,500 acres), Rocky Hill (2,500 acres), Pennington Mountain (2,000 acres), and Mount Rose (1,900 acres) – See Section II for details.

The majority of all natural cover in the Hopewell Valley is forest (over 73% of natural cover). Earlier successional communities account for the remaining 27% of natural cover - woodlands (3%), shrublands (17%), meadows (3%), and open water (4%). Detailed land cover data by preserve and their immediate vicinity are found in Appendix X. Additional land cover information can be found in the Hopewell Township Environmental Resource Inventory (DVRPC 2010).

Table 4. Detailed Land Cover Classes of the Hopewell Valley (2007)

Description	Acres	% of Hopewell Valley Acres	% of HV Natural Cover Acres
Upland Habitat Totals	14049	36.4	80.1
Coniferous Forest (> 50% canopy) - Upland	772	2.0	4.4
Deciduous Forest (> 50% canopy) - Upland	8427	21.8	48.1
Coniferous Woodland (10-50% canopy) - Upland	324	0.8	1.8
Deciduous Woodland (10-50% canopy) - Upland	1402	3.6	8.0
Scrub/Shrub (< 10% canopy, > 25% shrub cover) - Upland	2727	7.1	15.6
Meadows (< 25% shrub cover) - Upland	397	1.0	2.3
Wetland Habitat Totals	2782	7.2	15.9
Coniferous Forest (> 50% canopy) - Wetland	18	0.0	0.1
Deciduous Forest (> 50% canopy) - Wetland	2319	6.0	13.2
Coniferous Woodland (10-50% canopy) - Wetland	0	0.0	0.0
Deciduous Woodland (10-50% canopy) - Wetland	0	0.0	0.0
Scrub/Shrub (< 10% canopy, > 25% shrub cover) - Wetland	296	0.8	1.7
Meadows (< 25% shrub cover) - Wetland	149	0.4	0.8
Open Water	704	1.8	4.0
Urban Cover	10617	27.5	N/A
Barren Land	357	0.9	N/A
Agricultural Cover	10101	26.2	N/A
Total Natural Cover Acres	17535	45.4	
Total Hopewell Valley Acres	38610		

Figure 2. Broad Land Cover Classes of the Hopewell Valley (2007)



Protected Lands

Hopewell Valley has significant land under permanent protection and/or public ownership (12,670 acres or 33% of the land area – See Map 9). Approximately 30% of protected lands occur as private easements (farmland or conservation). The State of New Jersey, Mercer County, Hopewell Township, Friends of Hopewell Valley Open Space, Stony Brook Millstone Watershed Association, D&R Greenway Land Trust and New Jersey Conservation Foundation own lands within the Hopewell Valley.

The largest protected lands include the Ted Stiles Preserve at Baldpate Mountain (and adjacent lands owned by Mercer County), Washington Crossing State Park, Mercer Meadows/Rosedale Park/Curlis Lake, and Stony Brook Millstone Watershed Reserve. There is also a significant amount of contiguous to semi-contiguous land owned by several entities in the Sourland Mountain area north of Hopewell Borough (includes lands owned by D&R Greenway, Mercer County, NJ Department of Environmental Protection and Friends of Hopewell Valley Open Space). Additional protected lands information can be found in the Hopewell Township Environmental Resource Inventory (DVRPC 2010).

Roadways

The Hopewell Valley contains 225 miles of roadways (Table 5, Map 10). Nearly 70% of roadways are local roads. The majority of these local road miles are found within dense developments, but there are many with relatively heavy traffic patterns that connect larger roads and constitute fragmentation features for particular species (e.g., amphibians). County highways (500 and 600 level) total over 45 miles. These county roads create significant fragmenting features on the landscape. Two state highways total 15 miles. These include State Highway 29 (parallels the Delaware River) and State Highway 31 (roughly bisects the Hopewell Valley running north-south). Interstate Highway 95 has a short segment in the southern portion of the Valley.

There is a single rail line in the Hopewell Valley – the Trenton CSX Line. This freight line runs from Trenton to Somerset, including 9 miles in the Hopewell Valley (Map 10). Additional roadways and transportation information can be found in the Hopewell Township Environmental Resource Inventory (DVRPC 2010).

Table 5. Summary of Roadways of the Hopewell Valley

Route Type	Road Miles	Percent of Total Road Miles	Named Roadways
Interstate Highway	5.2	2	Interstate Highway 95
State Highway	14.9	7	State Highways 29, 31
County Highway - 500 Level	23.4	10	County Routes 518, 546, 569, 579
County Highway - 600 Level	22.2	10	County Routes 601, 611, 612, 623, 624, 625, 631, 632, 637, 640, 647, 654
Local Roads	152.3	68	334 named local roads
Highway Interchanges	6.7	3	27 interchanges
Totals	224.7	100	

Social Context

The Hopewell Valley consists of three municipalities located in northern Mercer County, New Jersey - Hopewell Township, Pennington Borough and Hopewell Borough. The boundaries of both Pennington Borough and Hopewell Borough lie entirely within the outer boundaries of Hopewell Township. Somerset and Hunterdon Counties adjoin Hopewell Township. Hunterdon County municipalities include West Amwell and East Amwell, which are located north of Hopewell Township. Montgomery Township (Somerset County) lies along Hopewell Township’s northeast boundary. Additional bordering municipalities in Mercer County include Princeton Township (along southeast boundary) along with Lawrence Township and Ewing Township which are located along the southern boundary. The Delaware River forms the western boundary shared with Pennsylvania.

The majority of the Hopewell Valley still retains its rural character despite large increases in its population (400% population increase since 1940). Recent population growth has been significant and its woodlands and agricultural fields are increasingly becoming mixed with residential development (30% population increase from 1990 to 2000).

Table 6 below summarizes basic demographic statistics for Hopewell Township, Pennington Borough, Hopewell Borough, New Jersey, and the United States. In general, Hopewell Valley municipalities differ from the state by having significantly greater wealth and lower population densities. Median income is significantly greater than the state median. The two boroughs have significantly greater population densities than the state, but Hopewell Township’s density is four times lower than the state. Additional social context information can be found in the Hopewell Township Environmental Resource Inventory (DVRPC 2010).

**Table 6. Population of the Hopewell Valley
Source: 2000 & 2010 U.S. Census**

Category	Hopewell Township	Pennington Borough	Hopewell Borough	New Jersey	United States
Land Area (square miles)	58.6	1	0.7	7,417	3,537,438
Population	17,304	2,585	1,922	8,791,894	307,006,556
Population Density (per square mile)	295	2,585	2,745	1,185	8.7
# of Housing Units*	5,498	1,013	813	3,524,954	129,949,960
Median Household Income*	\$93,640	\$90,366	\$77,270	\$68,342	\$50,221
Population Below Poverty Line - %*	1.1	2.4	0	9.4	14.3

* Municipality data for 2010 Census is unavailable, 2000 Census data reported

Partnerships

The formation of strong partnerships is essential to successfully implement the Hopewell Valley Community Stewardship Plan. FoHVOS is eager to work with conservation partners and private or public landowners throughout the Hopewell Valley. In 2012, FoHVOS will initiate programs to build partnerships including our Citizen Science Program and Private Lands Stewardship Program (see Section IV). Examples of existing partnerships are provided below:

FoHVOS has performed or assisted with forest health monitoring protocols (e.g., Sentinel Seedlings, Forest Secchi – See Section IV) with NJ Division of Parks & Forestry – Washington Crossing State Park,

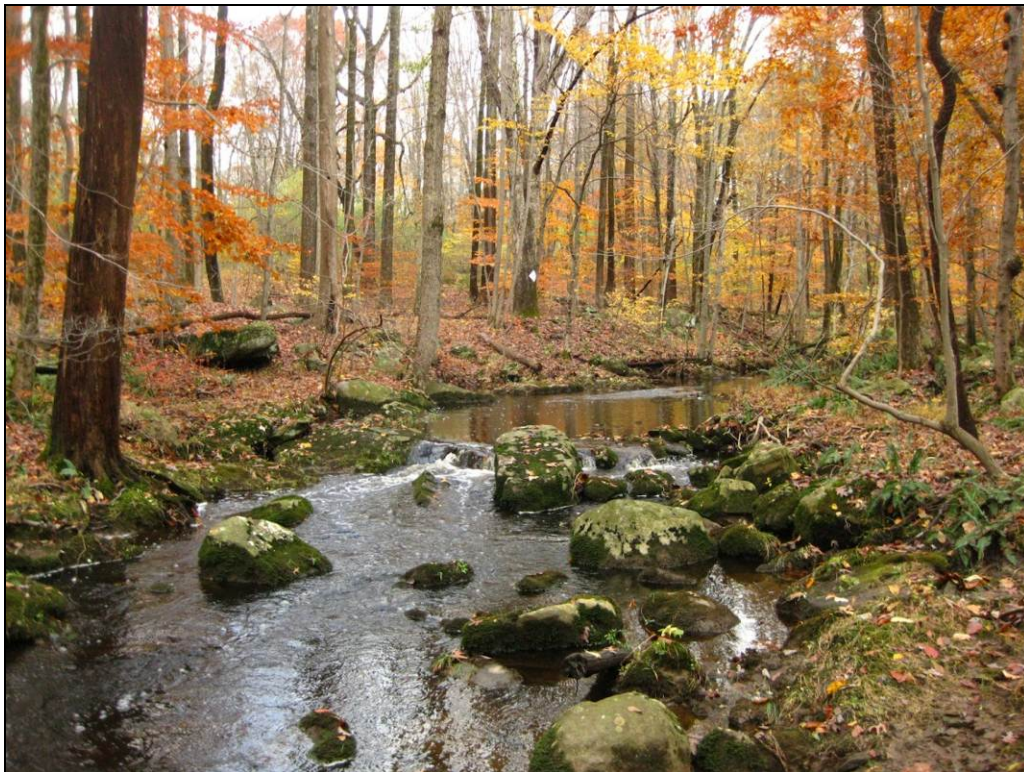
Mercer County, D&R Greenway Land Trust, Stony Brook Millstone Watershed Association and several private landowners.

The New Jersey Invasive Species Strike Team (NJISST) and FoHVOS have established a partnership to eradicate or contain emerging invasive species. FoHVOS acts as the NJISST Central Region Coordinator and provides expertise, training, supervision of seasonal interns and NJISST partner support activities across six counties (Hunterdon, Mercer, Middlesex, Monmouth, Somerset, and Union).

FoHVOS is the co-owner of eight preserves where we regularly interact with conservation partners. Preserves include the Ted Stiles Preserve at Baldpate Mountain and the Hollystone Preserve (co-owned with Mercer County, NJ Division of Parks & Forestry, and Hopewell Township), the Eames and Nayfield Preserves (co-owned with Division of Parks & Forestry - Washington Crossing State Park), Kulak Preserve (co-owned with D&R Greenway Land Trust) and the Gomez, Vales and Vogler Preserves (co-owned with Hopewell Township).

FoHVOS has a long-standing partnership with Hopewell Township through the Clean Communities Program and will continue to coordinate semi-annual (Spring & Fall) roadside trash clean up events. In addition, FoHVOS coordinates Clean Community events with stream cleanup dates administered by the Stony Brook Millstone Watershed Association to maximize efficiency of trash disposal.

FoHVOS is a contributing partner of the Raritan Piedmont Wildlife Habitat Partnership (RPWHP). RPWHP performed analyses and developed plans to protect the most significant forest, grassland and riparian habitats in central New Jersey.



Stony Brook at the Lawrence Preserve. Photo taken by R. Mackow.

Section II. Conservation Values

Introduction

This section provides a description of conservation values within the Hopewell Valley. Landscape-scale priorities are identified (i.e., large, contiguous habitat patches), along with descriptions of ecological communities (a.k.a. plant communities), catalogs of flora and fauna and documented rare and priority species.

Ecological Values Assessment

FoHVOS staff performed an ‘Ecological Values Assessment’. The goal of this analysis was to rapidly rank portions of the Hopewell Valley based upon all conservation values available through GIS (Geographic Information System) along with consideration of urban land cover which is generally associated with threats to conservation values.

Conservation value ranking criteria included contiguous habitat patch size, presence of ‘old forest’, presence of rare plants, presence of rare animals and delineated landscape scale patches important for the conservation of rare and common animals (e.g., Important Bird Areas). Explanations of scoring/ranking procedures are provided in Appendix A. We utilized the NJ Natural Heritage Program statewide grid system to assign scores. This was the finest available GIS source for rare plant data and is an appropriate scale to assign other conservation values listed above. Ultimately, each grid area received an overall score as well as a percentile ranking class (i.e., 0-25th percentile, 26-50th, 51-75th and > 75th percentile), which is provided in Map 11.

This evaluation assisted FoHVOS staff in determining areas of relative conservation value with the highest likelihood of long-term ecological health utilizing the lowest amount of long-term stewardship resources (i.e., areas that produce the “most bang for the buck”). Areas scoring in the greater than 75th percentile class include Baldpate Mountain and the Sourland Mountain area north of Hopewell Borough.

Landscape-scale Priorities

New Jersey Wildlife Action Plan and Landscape Project

The Hopewell Valley is part of the Central Piedmont Plains as described in the New Jersey Wildlife Action Plan (NJDEP 2008), which provides the following description of the region:

“The Central Piedmont Plains is second largest zone in the state and lies at the “waistline” of New Jersey, consisting of Mercer County, southern portions of Somerset and Middlesex counties and western Monmouth County (west of Highway 34). This region includes the Assunpink Wildlife Management Area (WMA), Delaware & Raritan Canal and Six Mile Run, Sourland Mountain Preserve, and Pigeon Swamp State Park and Forest. Extensive farmed areas and grasslands, fragmented woodlands, tidal freshwater marshes, and housing developments characterize the Central Piedmont Plain, and about half of the entire area is considered suitable for wildlife of concern. Large agricultural/grassland complexes span this zone along the Mercer-Middlesex border south to Assunpink WMA and include cropland, pasture, and agricultural wetlands. The Sourland Mountain Preserve, Assunpink WMA, and Pigeon Swamp State Park and Forest contain sizeable deciduous forest tracts. The largest wetlands in this zone occur east of the Delaware & Raritan Canal State Park. This zone is unique because it is a transition area between the hardwood forests of northern New Jersey and the deciduous-coniferous forests of the Pinelands. Preserving connectivity of terrestrial and riparian habitats is a primary goal here. Forest patches (upland,

wetland and riparian) totaling approximately 67,500 hectares (261 square miles) in the Central Piedmont Plains, range in size from 0.2 hectare (half an acre) to over 7,000 hectares (27 square miles, Sourland Mountain Preserve), and are a high-priority habitat type in this landscape. Over 36,000 hectares (138.9 square miles) of early-succession habitat (grasslands, old fields, agriculture), with patch sizes ranging from half an acre to nearly 2,000 hectares (7.7 square miles, East Amwell Township), provide habitat for all of New Jersey’s endangered and threatened grassland birds. Most of these areas are agricultural lands, but there are also 11 airports that provide grassland habitat for species of conservation concern. Approximately 8,500 hectares (32.8 square miles) of emergent wetlands exist in the Central Piedmont Plains. Most of these areas are small pockets of scattered wetlands, but larger expanses exist along the Raritan River estuary and in Assunpink WMA.”

The Landscape Project is a product of the New Jersey Department of Environmental Protection, Division of Fish & Wildlife, Endangered and Nongame Species Program (ENSP). The Landscape Project prioritizes sites based upon the biodiversity significance of animal species utilizing patches of habitat. Habitat patches are ranked from 1 (lowest) to 5 (highest). Patch ranks are based upon the level of rarity of the rarest species found within the patch. A rank of ‘5’ signifies patches containing federally endangered and threatened species, Rank 4 patches contain state endangered species, Rank 3 patches contain state threatened species, Rank 2 patches contain state species of concern, and Rank 1 patches have suitable habitat for rare animals, but do not contain confirmed occurrences. The Landscape Project has identified over 28,000 acres of priority habitat occupied by state listed rare animal species (Table 7 and Map 12).

In addition to habitat patch ranks, patch sizes are provided by the Landscape Project. A summary of habitat patch sizes is provided in Table 7 and depicted in Map 13. These patches are separated by type including: upland forest, wetland forest, grassland and emergent wetland (not depicted separately). The largest forest patches and the most significant grassland habitat patch are described below under “Raritan Piedmont Wildlife Habitat Partnership”.

Finally, the Landscape Project provides spatial information for particular rare animals. The Hopewell Valley provides approximately 1,100 acres of Bald Eagle foraging habitat and nearly 5,700 acres of Wood Turtle habitat – See Map 14.

Table 7. Landscape Project Patch Ranks and Sizes of the Hopewell Valley

Patch Ranks	Total Acres	Percent of Hopewell Valley	Patch Size Category	Number of Patches	Total Acres	Percent of Hopewell Valley
5	0	0.0	> 1000	5	10602	27.5
4	6811	17.6	250-1000	20	6288	16.3
3	5295	13.7	100-250	32	4021	10.4
2	15915	41.2	25-100	104	4340	11.2
1	1305	3.4	10-25	158	2316	6.0
None	9274	24.0	< 10	1096	2767	7.2
Total	38600	100	None	N/A	8266	21.4
			Total	1415	38600	100

Raritan Piedmont Wildlife Habitat Partnership

The Raritan Piedmont Wildlife Habitat Partnership (RPWHP) performed regional analyses to select the highest priority forest patches, grassland patches and waterways in central New Jersey (In Preparation). All RPWHP priority focal areas are depicted in Map 15.

RPWHP selected large forest patches because long-term ecological health of forest communities is strongly dependent upon habitat patch size. Small forest patches are unlikely to support successful breeding by the most area-demanding forest interior birds (e.g., Kentucky Warbler, Hooded Warbler), but they are important stop-over habitat (spring and fall resting and feeding) for all migratory species such as Cerulean Warbler, Hermit Thrush, and Black-throated Blue Warbler.

Eleven forest focal areas were selected, including two wholly or partially within the Hopewell Valley: Sourland Mountain (includes focal areas totaling 17,500 acres) and Baldpate Mountain (9,500 acres). These two areas in the Hopewell Valley are also aligned with the highest ranked grid areas from the ecological values assessment (see above). Three additional large forest areas (i.e., > 1,000 acres) located wholly or partially within the Hopewell Valley include: Rocky Hill (2,500 acres), Pennington Mountain (2,000 acres), and Mount Rose (1,900 acres) – See Map 16. However, these three additional areas are much more heavily fragmented than forest areas selected as RPWHP forest focal areas.

The highest priority riparian systems were also identified by RPWHP. In the Hopewell Valley, the Stony Brook was selected as priority (approximately 8 stream miles). Protection of the stream includes a 1,500 foot buffer on either side of the stream center line. The total Hopewell Valley area within this buffer is approximately 2,800 acres.

Priority focal grassland bird habitat patches were also identified by RPWHP. In the Hopewell Valley, the Pole Farm (a.k.a. Mercer Meadows) was selected as a RPWHP priority area (See description below under Important Bird Areas).

Important Bird Areas

New Jersey Audubon has identified three Important Bird Areas totaling 2,125 acres in the Hopewell Valley (See Map 17). Sites include Baldpate Mountain (1,100 acres), Featherbed Lane/Sourland Mountain (220 acres) and Pole Farm / Mercer Meadows (805 acres – partially located outside of the Hopewell Valley). The following information is primarily taken from Frank (2010):

Featherbed Lane: This site has been used for long-term avian research by Hannah Suthers since 1969. A matrix of habitats including late successional forest, climax forest, forested wetland, shrublands and meadows exist at the site. Over 70 species are documented breeders. In addition, nearly 50 species overwinter and the site provides migratory stopover habitat for over 80 species.

Baldpate Mountain: The site is the largest contiguous forest habitat in the Hopewell Valley. Deciduous forest cover dominates the site, providing nesting and migratory stopover habitat for a wide range of bird species. Importantly, the site provides nesting habitat for area demanding forest interior birds such as Kentucky and Hooded Warblers that have very limited habitat elsewhere in the Hopewell Valley.

Pole Farm: The site is located in Hopewell Township and Lawrence Township. The site contains large areas of early successional habitat including meadows and shrubland. These areas support a number of species specialized to these habitats. Patches of forest and forested wetlands also occur at the site. The

Pole Farm also provides important wintering habitat for species such as Northern Harriers, Northern Saw-whet Owls, Long-eared Owls and Short-eared Owls.

New Jersey Natural Heritage Priority Sites

Natural Heritage Priority sites are areas designed to protect significant areas for rare plants and ecological communities. In the Hopewell Valley, priority sites include Goat Hill (894 acres), Strawberry Hill (306 acres) and Titusville (76 acres) – See Map 18. The following descriptions are primarily taken from Office of Natural Lands Management (1999):

Goat Hill: The site is ranked “B4” (moderate biodiversity significance). It is located in Hunterdon County (West Amwell Township & Lambertville) and Mercer County (Hopewell Township). The site includes steep, wooded hillside diabase community. Three state-listed endangered species have been documented at the site, including Pale Indian Plantain and two other species.

Strawberry Hill: The site is ranked “B4” (moderate biodiversity significance). It is located entirely within Hopewell Township. The site includes steep, wooded hillside diabase community. The site contains eight rare species including the largest statewide population of Redbud. Additional species include American Ginseng, Green Violet, Ohio Spiderwort, Slender Toothwort, Small-fruit Groovebur, Twinleaf and Wild Comfrey.

Titusville: The site is ranked “B4” (moderate biodiversity significance). It is located entirely within Hopewell Township. The site includes alluvial river shore community of the Delaware River. One state-listed endangered species has been documented at the site.

Ecological Communities

Ecological communities are unique assemblages of plant species that form the basis of animal communities; therefore stewardship of healthy ecological communities fosters healthy populations of various elements of our fauna. Breden et al. (2001) describe ecological communities in New Jersey using the National Vegetation Classification system. The classification system utilizes increasingly narrow groupings starting with Formation (broad climate, soil moisture and plant growth form), Alliance (predominant species that provide overall plant community structure) and Association (dominant and co-dominant species including representatives of all major plant growth forms – a.k.a. “ecological communities”). Although field surveys often provide observations of ecological communities that do not easily fit pre-determined types, the Breden system provides a useful ‘handle’ to describe communities. It is important to note that Breden does not describe successional ecological communities.

Appendix B contains a list of potential ecological communities found in Gettysburg Piedmont (Section 221Da), which includes the Hopewell Valley. In summary, there are 20 named ecological communities including 10 forest types, 1 shrubland and 9 herbaceous communities.

Flora

The Hopewell Valley supports 229 species of woody plants (See Appendix C). This includes 104 species of trees, 101 shrubs, 6 sub-shrubs (very small woody species that resemble herbaceous plants) and 18 vines. Approximately 75% of woody species are native to New Jersey, while the remaining 25% are non-native species (32 non-native species are considered widespread or emerging invasive species). There are no lists of herbaceous species for the Hopewell Valley or Mercer County, but the number of species is likely to be greater than 1,000.

Fauna

The Hopewell Valley provides habitat for a diversity fauna including 35 species of mammals (Appendix D), 106 birds (Appendix E), 27 reptiles (Appendix F), 23 amphibians (Appendix G), 35 fish (Appendix H), 57 dragonflies/ damselflies (Appendix I), 94 butterflies/moths (Appendix J), and 10 mussels (Appendix K).

Rare Species

A list of rare and priority species documented in the Hopewell Valley are provided in Appendix L and summarized in Table 8. Sources of this information included the Hopewell Township Environmental Resource Inventory (DVRPC 2010), Natural Heritage requests for selected FoHVOS preserves included in our Forest Stewardship Plan, fish species lists provided by NJ Department of Fish & Wildlife (S. Crouse, personal communication) and Birds of New Jersey (Walsh et al. 1999), which provides breeding locations of all bird species in New Jersey.

Appendix M and N provide natural history information for animals and plants, respectively. Appendix O contains all available ENSP fact sheets for rare animals. Appendix P provides photographic identification aides for rare and priority species.



American Ginseng in fruit. Photo taken by M. Van Clef.

Table 8. Summary of Rare and Priority Species of the Hopewell Valley

Note: Categories below are not mutually exclusive.

Taxa	Number of Species	Globally Rare (G1, G2 or G3)	Federally Listed (Endangered, Threatened or Candidate)	State Listed (Endangered, Threatened or Special Concern)	State Ranked (S1, S2 or S3)	Wildlife Action Plan Priority Species	All Rare or Priority Species
Amphibian	1	0	0	1	1	1	Fowler's Toad
Bird	50	0	0	25	25	50	Acadian Flycatcher, American Kestrel, American Woodcock, Bald Eagle, Baltimore Oriole, Barred Owl, Black-and-white Warbler, Black-throated Blue Warbler, Blue-winged Warbler, Bobolink, Broad-winged Hawk, Brown Thrasher, Canada Warbler, Cerulean Warbler, Chimney Swift, Cliff Swallow, Cooper's Hawk, Eastern Kingbird, Eastern Meadowlark, Eastern Screech Owl, Eastern Towhee, Eastern Wood-pewee, Field Sparrow, Grasshopper Sparrow, Gray Catbird, Great Blue Heron, Great Crested Flycatcher, Green Heron, Hooded Warbler, Indigo Bunting, Kentucky Warbler, Long-eared Owl, Louisiana Waterthrush, Northern Bobwhite, Northern Flicker, Osprey, Pine Warbler, Prairie Warbler, Red-headed Woodpecker, Red-shouldered Hawk, Ruffed Grouse, Scarlet Tanager, Sharp-shinned Hawk, Veery, Wood Duck, Wood Thrush, Worm-eating Warbler, Yellow-billed Cuckoo, Yellow-breasted Chat, Yellow-throated Vireo
Fish	3	2	1	2	2	3	Bride Shiner, Margined Madtom, Shortnose Sturgeon
Mammal	1	0	0	1	1	1	Bobcat
Mussel	5	2	0	5	5	4	Brook Floater, Creeper, Tidewater Mucket, Triangle Floater, Yellow Lampmussel
Reptile	3	0	0	3	3	3	Eastern Box Turtle, Spotted Turtle, Wood Turtle
Plant	19	1	0	7	19	N/A	American Ginseng, Aunt Lucy, Buttonbush Dodder, Frank's Love Grass, Frank's Sedge, Green Violet, Low Spearwort, Lowland Fragile Fern, Ohio Spiderwort, Redbud, Slender Toothwort, Small-fruit Groovebur, Smooth Beardtongue, Spring Avens, Squirrel-corn, Twinleaf, Wild Comfrey, Willdenow's Sedge, Winged Monkey-flower
Totals	82	5	1	44	56	62	

Section III. Challenges

Introduction

Threats to conservation values include direct and indirect effects caused by human activities. This section focuses on three significant factors that impact ecological health – white-tailed deer overabundance, invasive species and soil alterations from past agricultural activities. Each of these factors degrades ecological health, but they are also interrelated and collectively lead to severe impacts. In isolation, deer overabundance is the most severe threat, followed by invasive species and continuing impacts of altered soils from past agricultural use.

Background on Significant Threats to Conservation Values

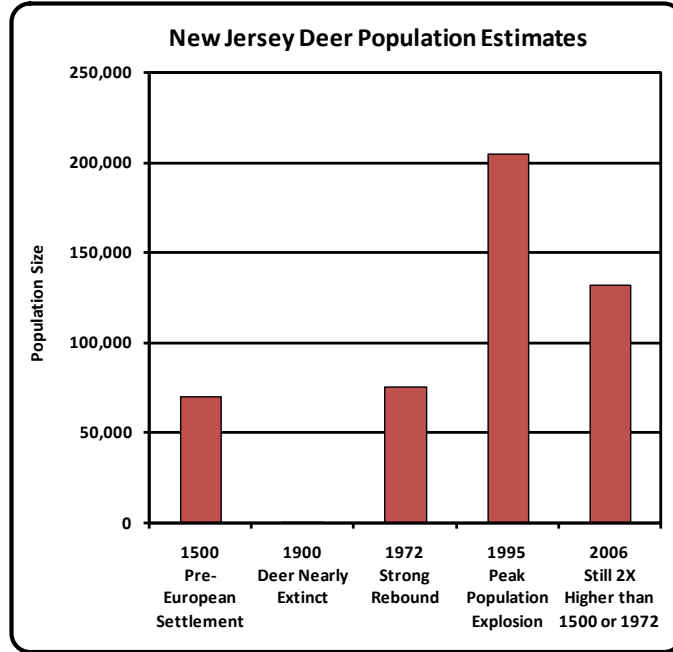
Degraded forests in New Jersey generally exhibit one of two ‘syndromes’. The first is the “Empty Forest Syndrome” where all native species have been removed from the forest understory by overabundant deer. These forests also have very low invasive species cover, except where canopy gaps provide additional light resources. This syndrome is usually associated with areas that have never been in agricultural production (as determined by mature forest cover in 1930 aerial photography – See Section I). The second syndrome is the “Infested Forest Syndrome”, which includes dense invasive species cover and small amounts of native cover that is severely browsed by deer. This syndrome is associated with: 1) upland forests with past agricultural use that has dramatically altered soil characteristics, 2) many wetland forests regardless of past land use, and 3) many riparian forests, especially where unnaturally high water flow events create severe and repeated physical disturbances.

White-tailed Deer Overabundance

White-tailed deer are the single largest challenge to meeting our conservation goals as evidenced by very intense browse throughout most of the Hopewell Valley. Most native shrubs and woody seedlings typically show severe browse damage. Older shrubs show a distinct browse line to approximately 4.5 feet above ground and an absence of younger stems to replace older stems that naturally die with age. Some key shrub species with severe browse include Maple-leaved Viburnum and Spicebush, which should form dense thickets under the canopy of older forests. Although there are many woody seedlings representing a variety of species in forests of the Hopewell Valley (e.g., oak, hickory, ash, cherry, Spicebush, etc.), they are usually either very small (i.e., less than six inches) or heavily browsed. Herb growth is sparse (excluding Japanese stiltgrass) throughout the Hopewell Valley. Although it is often difficult to directly observe browse damage on herbaceous species (they usually are eaten whole or desiccate quickly upon being browsed), heavy browse damage can be detected on observable species (e.g., Jewelweed, White Wood Aster, Wreath Goldenrod), which suggests that deer are severely impacting the native herb layer.

Statewide deer population size has varied significantly over the last one hundred years (Figure 3). Historical analyses estimate the pre-European colonization deer herd to be about 70,000 in New Jersey (McCabe and McCabe 1984). Unregulated commodity hunting throughout the 1800’s nearly drove deer to extinction and conservation efforts through new regulations allowed a rebound to historic population sizes by 1972. However, the deer population grew to 3X its historic level by 1995 and serious declines in the health of forests were observed during that same time period. More recent measures have reduced the deer population, but current levels are still 2X greater than pre-European estimates.

Figure 3. Historic and Current New Jersey Deer Population Estimates



The root causes of deer overabundance include forest fragmentation, creation of supplemental feeding opportunities and insufficient deer management (Figure 4). In addition, it is believed that the sex ratio of New Jersey’s deer herd is significantly higher than 1:1 and may reach as high as 15:1 in particular locations (personal communications with hunters and wildlife professionals). The skewed sex ratio allows deer populations to grow rapidly following seasonal reductions (i.e., the overall population drops significantly - by over 30% following hunting season - but rebounds dramatically after birthing occurs in spring). The reduction of population size from 1995 to 2006 appears to be the result of greater overall harvest size along with harvesting a greater proportion of antlerless deer (Figure 5). These figures suggest that deer herd reduction requires harvesting greater than 40% of the overall population with greater than 60% of the total harvest being antlerless deer.

Figure 4. Deer Population Growth Factors and Impacts

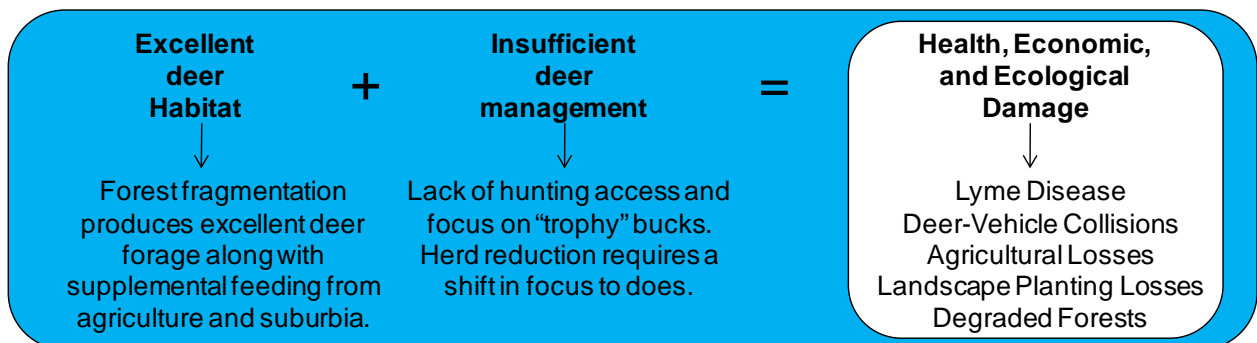
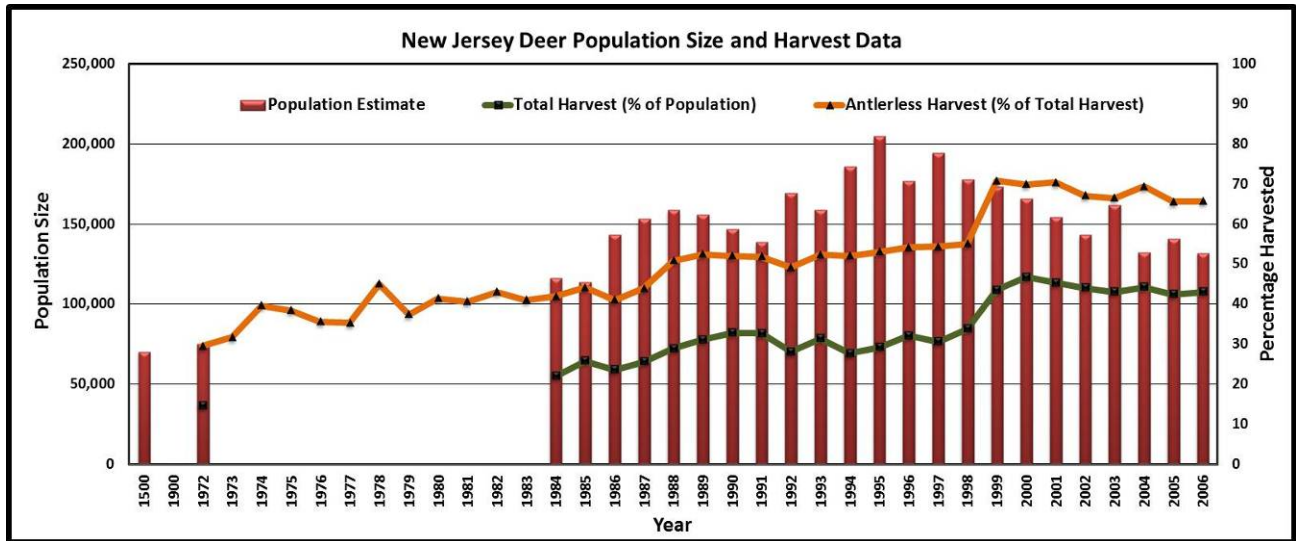


Figure 5. New Jersey Deer Population Size and Harvest Data



The current statewide deer population cannot support healthy forests (and creates significant human health and economic impacts – See Hopewell Valley Deer Management Task Force, 2010). A healthy forest consists of a canopy of tall, mature trees, a sub-canopy of smaller tree species and an understory of tree saplings & seedlings, shrubs and herbs. Generally, deer prefer to eat native plants over non-native invasive plants leading to further degradation of our forests by allowing invasive species to proliferate. The combination of elevated deer numbers and their preference for native plants has led to degradation of New Jersey’s forests by eliminating native understory growth and reducing the abundance of animals that require those plants for their survival. Although the ‘correct’ number of deer may vary depending upon site and regional conditions, the goal of healthy forest communities that support a diversity of plants and animals is universal.

Invasive Species

Humans have introduced non-native species, both intentionally and unintentionally, to parts of the world outside of their natural range. Only a small percentage of these introduced species become invasive, which is formally defined by the National Invasive Species Council as “a species that is 1) non-native (or alien) to the ecosystem under consideration and 2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health” (NISC 2001). The financial impacts of invasive species are enormous. Pimentel et al. (2005) estimate an annual cost of \$120 billion dollars to agriculture, forestry and recreation. In addition, invasive species are considered the greatest threat to global biodiversity after outright habitat destruction (Wilcove et al. 1998).

From nature’s perspective, this problem is relatively new with the first problems becoming apparent in the 1950’s (Elton 1958). Accelerating infestations have only been occurring over the last 30 - 50 years in New Jersey with our most serious invasive species originating from areas with similar temperate climates (i.e., Europe and Asia).

Invasive Plants - In addition to being less palatable to deer, invasive plant species appear to have left behind many of their native pests and pathogens, which checked them in their native habitats. In general, invasive plants are ‘weedy’ - maturing quickly, producing large seed crops, and having tolerance to a variety of disturbed or human-altered growing conditions. Overall, there are nearly 1,000 non-native plants in New Jersey. There are currently 31 widespread invasive plants and 79 emerging or potentially

invasive plants in New Jersey (see New Jersey Invasive Species Strike Team, www.njisst.org). Unfortunately, the rate of new plant introduction continues to rise. Snyder and Kaufman (2004) estimate fifty new plant introductions to New Jersey over the last twenty-five years (these are species with individuals growing in natural or semi-natural areas outside of human cultivation). There are no estimates of the area infested by invasive plants in New Jersey, but it is likely that hundreds of thousands of acres are impacted.

Some of our most notorious invasive plants include Japanese Barberry, Japanese Stiltgrass and Garlic Mustard. Although widespread invasive species cause severe harm, many are likely to be significantly reduced through ecological control exerted by taller, shade tolerant native species if deer populations are reduced. Among the emerging invasive plant species, a new set of species provides a more significant threat to forests than our existing invasive plants. These new species would be resistant to ecological control by native species because they very tall (12-20 feet), shade tolerant (can establish under closed forest canopy), and produce large amounts of bird dispersed seed capable of quickly reaching new locations. The five most troubling species are Oriental Photinia, Common Buckthorn, Siebold's Viburnum, Linden Viburnum and Japanese Aralia.

Invasive Animals, Pests and Pathogens - Invasive animals, pests and pathogens cause significant harm to native ecosystems. There are currently 32 widespread invasive species and 23 emerging or potentially invasive species in New Jersey (see New Jersey Invasive Species Strike Team, www.njisst.org). Our most widespread invaders (with impacts in parentheses) include: several earthworm species (all earthworms in New Jersey are non-native and severely alter native soils), Brown-headed Cowbird (nest parasite of many birds including forest interior birds - impacts are highest in fragmented forests), Feral Cats (kill large numbers of birds), European Starling (nest competition, primarily in human-dominated areas), House Sparrow (nest competition, primarily in human-dominated areas), Asian Tiger Mosquito (human pest and unknown ecological damage), Rusty Crayfish (alter aquatic communities), House Finch (nest site competition, primarily in human-dominated areas), Asiatic Clam (impact aquatic systems), and Red-eared Slider (competes with native turtles, especially painted turtles).

The most troubling emerging or potentially invasive animal species include Feral Hog, Zebra and Quagga Mussels, Mute Swan, and Nutria, which all cause significant damage in the region. Feral Hogs have been noted in several locations across New Jersey with a significant population in Gloucester County that is being targeted for eradication by the NJ Division of Fish & Wildlife. This species causes severe harm to forest communities in other parts of eastern North America and is a considerable new threat to New Jersey. Zebra and Quagga Mussels cause significant harm to freshwater systems (zebra mussel has been documented in eastern Pennsylvania). Large populations of Mute Swan impact native waterfowl populations and Nutria compete with native wildlife and alter wetland communities.

Some of the most notorious pest and pathogen invaders include Chestnut Blight, Hemlock Woolly Adelgid and Gypsy Moth. Chestnut Blight has reduced the once dominant American Chestnut to a transient understory tree that rarely produces fruit, Hemlock Woolly Adelgid has killed over half of the state's Eastern hemlocks (ca. 13,000 acres destroyed) with most remaining trees in poor health, and Gypsy Moth periodically ravages oaks leading to localized death of mature trees (including many 300+ year old trees at Hutchinson Memorial Forest). The Gypsy Moth is the subject of an intensive treatment program that utilizes a bacterium called *Bacillus thuringiensis* to mitigate their impacts and they are also partially controlled by a naturally occurring fungus. The Gypsy Moth Suppression Program consists of a voluntary cooperative between the NJ Department of Agriculture, US Department of Agriculture, NJ Department of Environmental Protection, county agencies and municipalities. Treatments are performed via aerial spraying.

Other important widespread invasive pathogens include Dutch Elm Disease (continuing to cause damage, but mature American Elm and Slippery Elm are still common), Beech Bark Disease (causing tree death throughout the state) and Dogwood Anthracnose (causing damage to Flowering Dogwood). Butternut Canker is also widespread. While the native Butternut has never been common in New Jersey, isolated patches may be negatively impacted.

There are a number of emerging and potential pests and pathogens that may impact the Hopewell Valley in the future. Emerging species already present in New Jersey include Asian Long Horned Beetle (subject of an intensive eradication program), Viburnum Leaf Beetle (discovered in 2009, has potential to severely impact species such as Maple-leaved Viburnum, Arrowwood, and other Viburnum species as evidenced in New York state over the past 10 years), and Bacterial Leaf Scorch (BLS). BLS may infest species within the red oak group (e.g., Red Oak, Scarlet Oak, Black Oak, Pin Oak). Currently, BLS is associated with street trees and other ornamental plantings (40% of recently tested trees were infested across the state), but spread into more natural settings appears to be occurring in southern New Jersey (J. Arsenault, personal communication).

Imminent threats include Emerald Ash Borer which has been spreading east and south from the Midwest (recently discovered in Maryland, Pennsylvania, Virginia and Missouri and subject of ongoing searches in New Jersey) and Sudden Oak Death (SOD). The NJ Department of Agriculture was quick to respond to the unintentional introduction of SOD in Cape May in 2004 (introduced via contaminated nursery stock from California). Surveys were conducted for SOD and no infections have been found in wild plants, but there is continued threat of additional introductions to New Jersey. Other potential threats include Pine Flat Bug, Asian Gypsy Moth, Eurasian Nun Moth, Dutch Elm Disease 2, Phytophthora Root Rot, European Oak Bark Beetle, and two species of Ambrosia Beetle.



Asian Longhorn Beetle



Emerald Ash Borer

Photo Source: Forestry Images / The Bugwood Network, <http://www.forestryimages.org/>

Altered Soils from Past Agricultural Activity

Natural plant communities growing on former agricultural areas are often beset with infestations of invasive plants due to alteration of soils. It is not uncommon to find clear demarcations of infestations in

forest habitat (e.g., one side of stone wall or stream is severely infested while the other side is minimally infested). Anecdotally, these demarcations are correlated with former agricultural areas as shown in 1930 historical aerial photography. Presumably, areas showing forest cover in 1930 had never been plowed. It appears reasonable to assume that formerly tilled areas are much more susceptible to invasion than untilled areas. However, land uses occurring between 1930 and present day should be considered (e.g., intense forestry activities in the context of an overabundant deer population).

Native forest soils consist of a series of layers. The “O Horizon” is the top layer and consists of fresh and incompletely decomposed organic matter (i.e., leaves and humus). The next layer is the “A Horizon”, which consists of mineral soil mixed with organic material leached down from the O Horizon. The remaining horizons (E, B and C) are defined by chemical leaching and accumulation of minerals over time and contain little or no organic material. Bedrock is located under the C Horizon.

Formerly tilled agricultural soils are quite different than native soils. In general, all soil horizons within one foot of the surface have been mixed into a uniform and unnatural soil horizon. In addition, traditional agricultural activities (e.g., repeated tilling, application of lime and phosphorous, utilization of heavy machinery) create long-term soil changes including loss of organic matter, elevated pH, increased amounts of calcium and phosphorous, and compaction from machinery causing poor water infiltration. These changes also induce fundamental changes in nitrogen cycles and composition of soil microorganism species composition. All of these changes have implications for seed germination and root growth. Although many common native species can grow on these altered soils, it appears that weedy invasive species are most aggressive under these conditions.

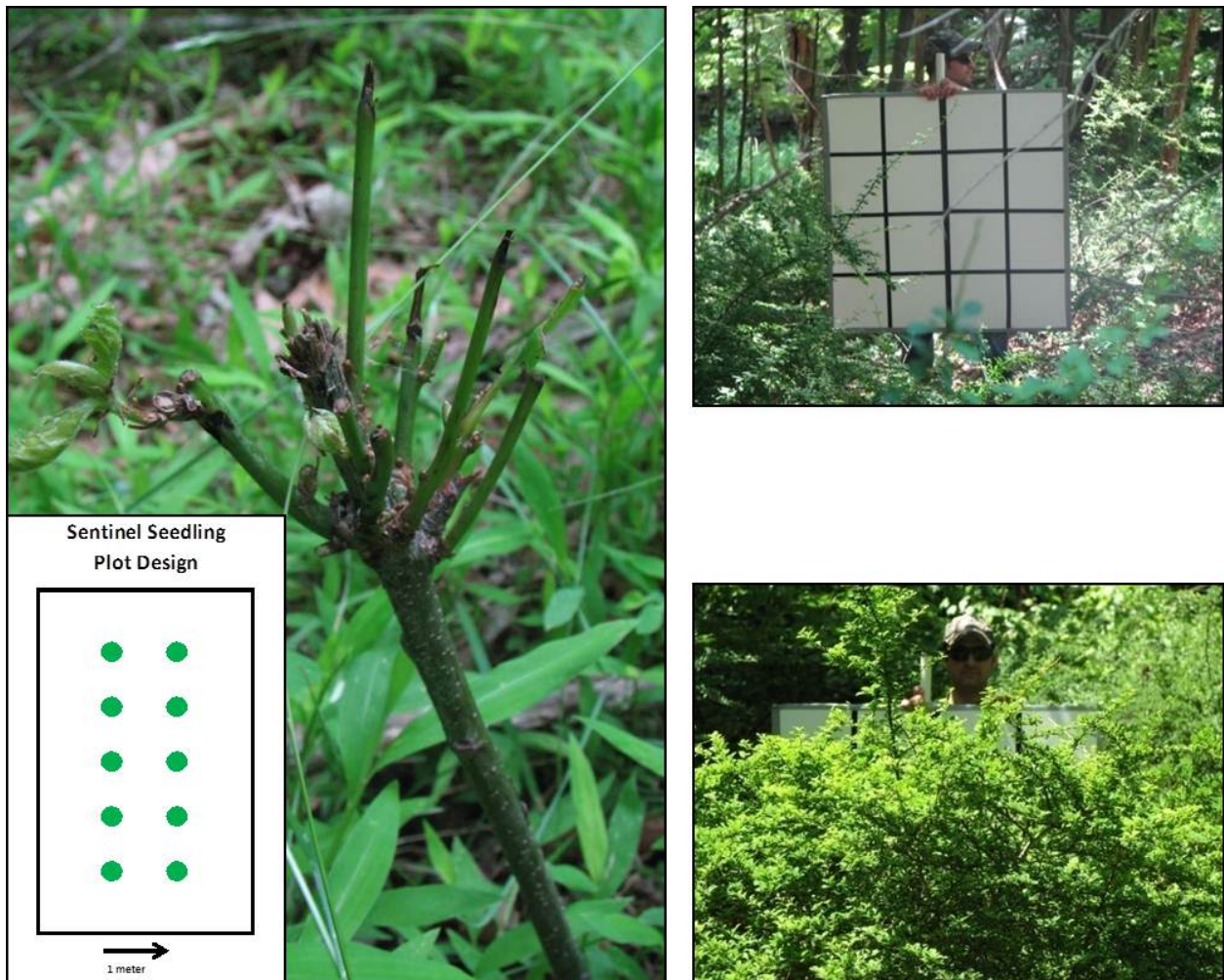
The impact of earthworms is also associated with former agricultural activity, but adjacent unplowed forest soils are often infested. Over time, earthworms mix and eliminate the top soil horizons and virtually eliminate the O Horizon and change soil microorganism species composition. In addition to changing physical properties of the soil (i.e., removing the O Horizon), earthworms change the natural nitrogen cycle. The result is the conversion of nitrogen into a form more readily used by plants, but this increased availability also increases leaching of nitrogen out of the soils. In addition, this change in nitrogen availability causes a shift in soil microorganisms from being dominated by fungi to being dominated by bacteria. This change may impact roots of many native plants that can be physically connected to particular soil fungi (called mycorrhizal fungi) in a symbiotic relationship that allows plants to absorb particular nutrients from the soil.

The combined impacts of past agricultural tilling, alone or in concert with changes induced by invasive earthworms, are profound. However, it is important to note that even though impacted forests may not achieve perfect health, substantial improvements in most New Jersey forests can be obtained (primarily by reducing deer browse pressure on native plants that have the ability to thrive in these altered soil conditions).

Evaluation of White-tailed Deer Impacts in the Hopewell Valley

White-tailed deer have had a significant negative impact on forest health in the Hopewell Valley. Native tree regeneration in natural forest canopy gaps is not occurring. Instead, less palatable invasive shrubs (e.g., Japanese Barberry) and grasses (e.g., Japanese Stiltgrass) are filling forest gaps. The current trajectory would lead to continued elimination of forest cover over the coming decades as mature native trees naturally fall due to various factors such as storms and disease. Also important is the severe browsing of native tree seedlings, shrubs and herbs in the forest understory. The majority of Hopewell Valley forests contain little or no understory vegetation that would provide vital habitat for a variety of animals (exceptions where relatively healthy, but still significantly impaired, forests occur include portions of Baldpate Mountain, Sourland Mountain and Mount Rose).

FoHVOS, along with conservation partners including cooperating private landowners, has conducted forest health monitoring in the Hopewell Valley since 2006. The two primary methods have included the “Sentinel Seedling” and “Forest Secchi” protocols developed by M. Van Clef, Ph.D. (See Appendix S1). The Sentinel Seedling protocol is designed to measure the current deer browse intensity on planted tree seedlings. The Forest Secchi protocol is designed to measure woody plant density below 4.5 feet (typical maximum deer browse height). A total of 20 Hopewell Valley sites have been included in the effort (See Map 19) – an additional 16 sites have been measured in other portions of central and northern New Jersey. Results are provided in Table 9 and Figures 6 & 7. Hopewell Valley sites exhibit poor forest health (average native understory cover = 19% and the goal is 70%) and most show limited immediate promise of improvement (average sentinel seedling browse = 57% and the goal is only 10%). In general, Hopewell Valley sites are similar to other measured sites in New Jersey, but Hopewell Valley sites have nearly double the amount of invasive species.



Forest health monitoring protocols showing Sentinel Seedling plot design and browsed oak seedling (left) and Forest Secchi showing gridded white board used to measure forest understory density.

Table 9. Forest Health Monitoring Results for the Hopewell Valley

Site Name	Site Manager	Season	Plots Discovered (%)	% Seedlings Browsed			Woody Understory Cover			Canopy Cover
				Deer Browse	Other Browse	Total Browse	Native Cover	Non - Native Cover	Total Cover	
16 sites outside of Hopewell Valley			99	59	1	60	20	16	32	91
Arena	FoHVOS	2007/2008	100	58	0	58	2	0	2	95
Baldpate Mountain	Mercer County et al.	2007/2008	97	59	7	66	22	64	78	87
Curlis Lake	Mercer County	2010/2011	100	53	1	54	12	3	13	98
Eames	FoHVOS	2007/2008	100	81	2	83	10	22	27	91
Elks	FoHVOS	2006/2007	100	82	0	82	10	11	20	98
Gomez	Hopewell Twp	2007/2008	100	74	0	74	12	54	62	82
Heritage	FoHVOS	2007/2008	90	25	0	25	39	9	40	92
Hollystone	Mercer County et al.	2010/2011	100	42	11	53	3	16	19	97
Kuser Easement	Private (FoHVOS)	2009/2010	93	47	3	49	21	74	86	91
Lawrence & Stephens	FoHVOS, D&R Greenway	2007/2008	100	77	0	77	42	15	47	98
Mercer Park NW	Mercer County	2008/2009	93	48	2	50	25	4	29	92
Nayfield 2006	FoHVOS	2006/2007	100	62	1	63	20	20	38	99
Nayfield 2010	FoHVOS	2010/2011	100	18	1	19	20	27	38	95
Newhouse Easement	Private (FoHVOS)	2008/2009	100	70	1	71	15	49	59	96
Northern Stony Brook - Upland	D&R Greenway	2008/2009	75	23	0	23	55	16	63	99
Northern Stony Brook - Wetland	D&R Greenway	2008/2009	100	33	3	35	29	37	59	99
Preston Easement	FoHVOS	2008/2009	100	62	10	72	6	25	29	97
Regan Property	Private (FoHVOS)	2009/2010	100	71	7	79	6	24	28	92
SBMWA	SBMWA	2007/2008	100	63	11	74	28	37	58	94
Skyview	FoHVOS	2008/2009	100	57	8	65	13	60	67	90
Thompson	FoHVOS	2006/2007	100	70	11	81	13	70	80	84
Washington Crossing SP	Division of Parks & Forestry	2009/2010	100	71	1	72	9	42	50	88
HV AVERAGES			98	57	4	60	19	31	45	93
HV Minimum Values			75	18	0	19	2	0	2	82
HV Maximum Values			100	82	11	83	55	74	86	99

Figure 6. Forest Health Monitoring - Sentinel Seedling Results for the Hopewell Valley

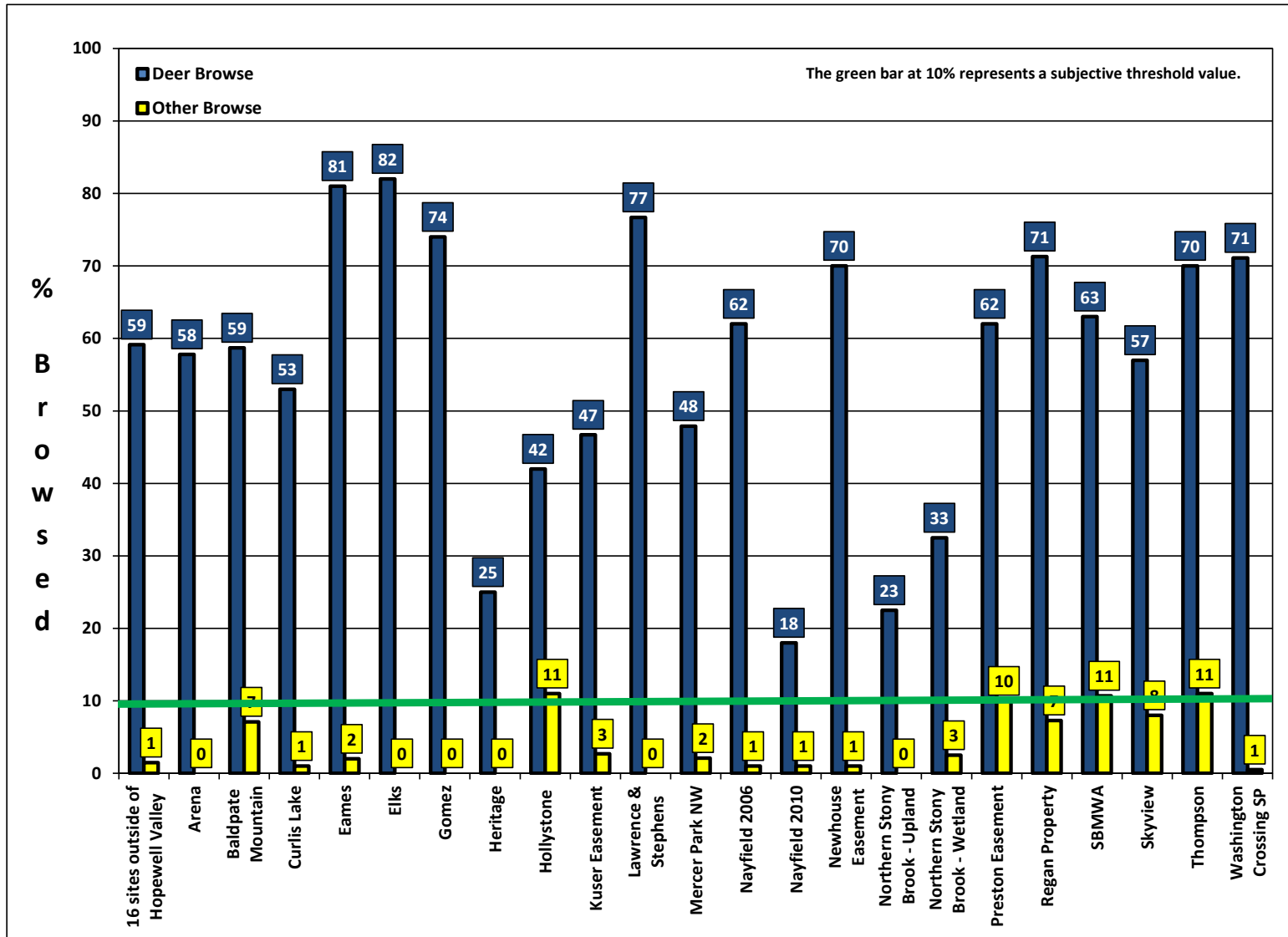
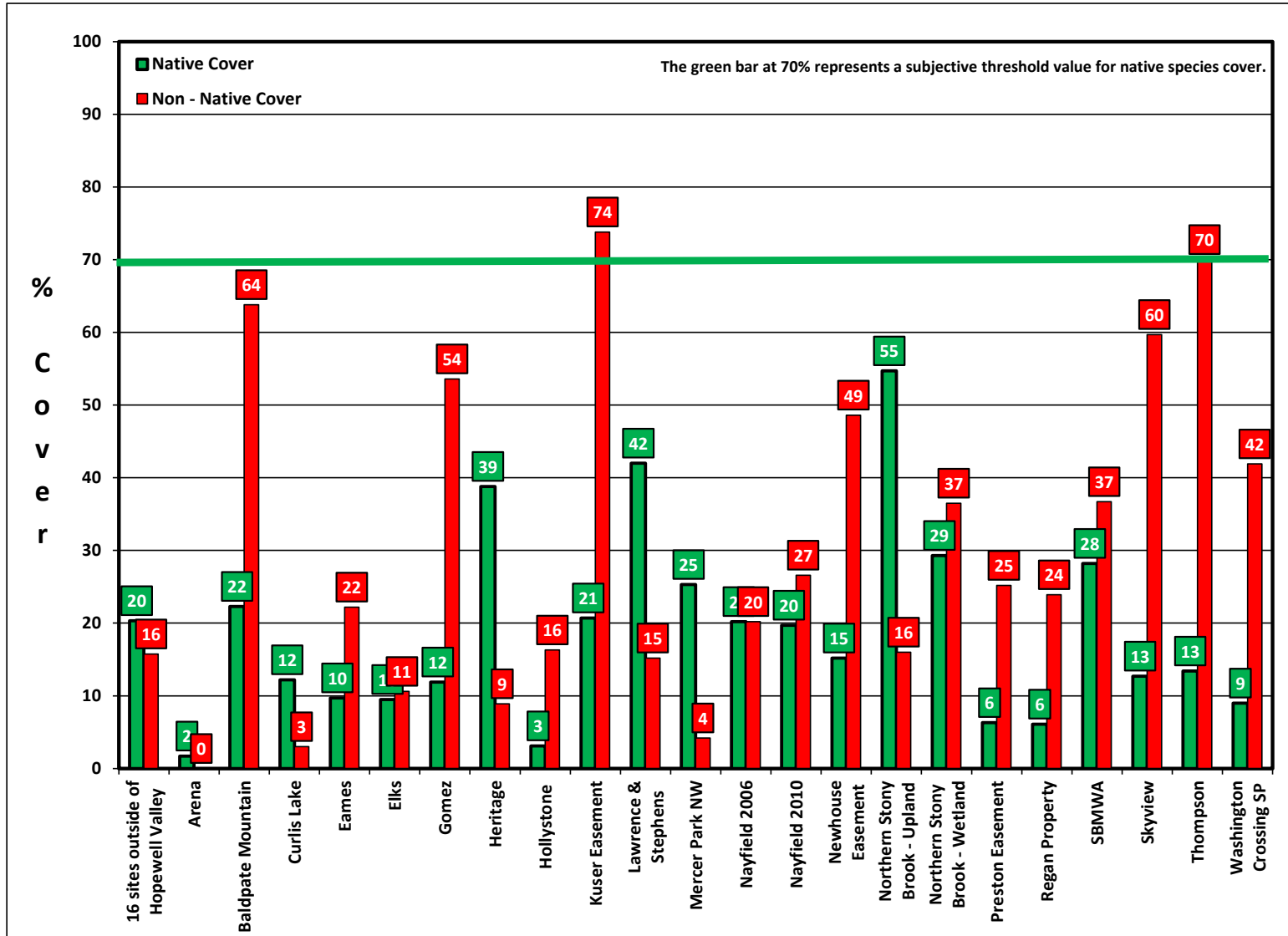


Figure 7. Forest Health Monitoring – Forest Secchi Results for the Hopewell Valley



A series of photographs with captions are provided to highlight deer impacts to forest health:



The Good...



The Bad...



and The Ugly!

A healthy forest would resemble the top photo, which is filled with a dense native understory providing ecological control of invasive species (See Section IV). Middle photo shows an understory almost completely devoid of plants due to severe deer browse ('Empty Forest Syndrome'). Lower photo shows a dense infestation of several invasive species ('Infested Forest Syndrome').



Native Spicebush showing a browse line (above) – notice the umbrella-like growth with no leaves below 4.5 feet. The ‘crew cut effect’ (below) showing deer browse on all new stems that would eventually replace taller stems. If this trend continues, the shrub layer of this forest located at Mount Rose will be completely destroyed.



Severe deer browse damage on native forest herbs: Jack-in-the-Pulpit with browsed leaf blades above fruit cluster (top), Wreath Goldenrod (bottom left) and White Wood Aster (bottom right).



A light gap in the canopy (top) should mark the renewal of a healthy forest. Currently, invasive species that deer find largely unpalatable such as Multiflora Rose (middle), Japanese Stiltgrass (bottom left) and Japanese Barberry (bottom right) are filling canopy gaps. Regenerating native trees and shrubs are absent in canopy gaps throughout the Hopewell Valley.

Reason to imagine success...

The Deer Management Program at Baldpate Mountain is beginning to bear fruit. Native plants, freed from excessive deer browse, are outcompeting invasive plants.



Native spicebush thicket (left); Close-up of thicket showing spicebush (larger leaves) overtopping the invasive Japanese barberry (right). Dense Spicebush thickets are providing habitat for Kentucky Warbler (top middle) and Hooded Warbler (bottom middle) that find very little habitat in the Hopewell Valley or elsewhere in New Jersey.

Evaluation of Invasive Species in the Hopewell Valley

FoHVOS mapped the extent and severity of invasive plant infestations at our preserves in 2011. We consider FoHVOS preserves to be a reasonable representation of the entire Hopewell Valley and combined data from all preserves is provided in this section to approximate the overall scope of the problem in the Hopewell Valley. FoHVOS preserves account for approximately 5% of the Hopewell Valley land area.

Mapping Protocols - The method used to map invasive plants involved the delineation of mapping areas. The mapping area technique is a coarse method to broadly define the extent and intensity of invasive species infestations. Mapping areas were delineated as locations containing relatively uniform ground cover for each invasive species present within the defined area or 'patch'. Within each patch, all invasive plants were assigned a cover class score. Cover class scores included: "0": absent, "T": < 1%, "1": 1-10% ground cover, "2": 11-25% ground cover, "3": 26-50% ground cover, "4": 51-75%, and "5": 76-100% ground cover.

Overall Scope - A total of 855 unique mapped patches totaling 1,878 acres were recorded. Maps 20 and 21 depict the total number of invasive species and cumulative infestation scores by mapped patches, respectively. Detailed maps for each FoHVOS preserve are presented in Appendices 1 through 26.

Table 10 summarizes invasive species distribution and infestation severity across all FoHVOS preserves. Over 88% of the land can be considered severely infested (defined as patches with cumulative infestation cover class ≥ 4 , which is calculated by adding the cover class score of each invasive species present within a patch). Individual patches contained between zero and ten invasive species. Only 3% of the preserve land area was completely free of invasive species.



Carpet of invasive Japanese stiltgrass with 'zones of depression' showing shade intolerance under badly deer browsed native spicebush shrubs. This is a weak example of 'ecological control' (See Section IV). If deer browse pressure were reduced, then Spicebush would flourish and significantly reduce the cover of Japanese Stiltgrass.

Table 10. Summary of Invasive Species Distribution on FoHVOS Preserves

Number of Species per Patch	Total Acreage	Percent of Preserve Area
0	57	3
1	90	5
2	124	7
3	244	13
4	360	19
5	468	25
6	341	18
7	128	7
8	30	2
9	23	1
10	14	1
Totals	1878	100

Cumulative Cover Class per Patch	Cumulative Infestation Severity Class	Total Acreage	Percent of Preserve Area
0	Clean	57	3
1	Low	52	3
2	Moderate	83	4
3	Moderate	31	2
4	High	51	3
5	High	72	4
6	Very High	64	3
7	Very High	119	6
8	Very High	203	11
9	Very High	176	9
10	Very High	167	9
11	Very High	231	12
12	Very High	133	7
13	Very High	238	13
14	Very High	59	3
15	Very High	33	2
16	Very High	36	2
17	Very High	43	2
18	Very High	12	1
19	Very High	2	0
20	Very High	2	0
21	Very High	0	0
22	Very High	0	0
23	Very High	3	0
24	Very High	6	0
25	Very High	6	0
Totals		1878	100

Species Patterns - Table 11 contains data for each of the 39 invasive species mapped across all FoHVOS preserves and includes the “Relative Infestation Index Category.” This index provides a coarse characterization of both distribution and intensity of infested acreage on FoHVOS preserves. It is intended to provide a rapid assessment of species that currently have the greatest impacts. Values include ‘Very High’, ‘High’, ‘Medium’, and ‘Low’, which correspond to ranges of Infestation Index Scores derived by multiplying the number of acres where a species was present by its cover class score within mapped patches. Species labeled as ‘Very High’ are those with very widespread distributions and/or consist of very dense stands. Conversely, ‘Low’ species have limited distribution across the Hopewell Valley and/or primarily occur at low cover classes.

The distribution of each invasive species is depicted in Map 22-1 through Map 22-39. The most abundant invasive species in the Hopewell Valley include Multiflora Rose, Japanese Honeysuckle, Autumn Olive, Japanese Stiltgrass and Japanese Barberry. Other very common species include Wineberry, Non-native cool season grasses (former hayfields), Garlic Mustard, Linden Viburnum and Reed Canary Grass. There are a number of additional species that are currently less abundant, but pose significant future risk of expanding in the Hopewell Valley. These species include Winged Burning Bush, Chinese Bushclover, Common Mugwort, and Asiatic Bittersweet.

Table 11. List of Invasive Species and Their Relative Infestation Levels on FoHVOS Preserves

Scientific Name	Common Name	Infestation Index Score ¹	Relative Infestation Index Category ²	Total Acres Present	Percent of Preserve Area Present	Acreage by Percent Ground Cover Categories						
						Category 0: 0%	Category: Trace	Category 1: 1-10%	Category 2: 10-25%	Category 3: 25-50%	Category 4: 50-75%	Category 5: 75-100%
<i>Acer palmatum</i>	Japanese Maple	0.0	Low	1.2	0.1	1877.21	1.2	0.0	0.0	0.0	0.0	0.0
<i>Acer platanoides</i>	Norway Maple	1.7	Low	1.2	0.1	1877.25	0.1	0.5	0.6	0.0	0.0	0.0
<i>Ailanthus altissima</i>	Tree-of-Heaven	20.5	Low	28.4	1.5	1850.04	16.0	5.6	6.4	0.0	0.0	0.4
<i>Alliaria petiolata</i>	Garlic Mustard	625.0	Very High	392.6	20.9	1485.83	54.1	177.8	79.9	46.5	23.8	10.5
<i>Artemisia vulgaris</i>	Common Mugwort	71.8	Medium	54.5	2.9	1823.95	7.3	37.1	2.1	1.2	6.6	0.1
<i>Arthraxon hispidus</i>	Small Carpgrass	103.5	High	85.0	4.5	1793.47	7.6	54.1	21.8	0.1	1.2	0.1
<i>Berberis thunbergii</i>	Japanese Barberry	1062.6	Very High	964.5	51.3	913.98	197.9	569.5	128.3	39.8	27.8	1.2
<i>Cardamine impatiens</i>	Narrow-leaved Bittercress	46.1	Low	34.7	1.8	1843.76	4.6	17.4	11.0	0.3	1.5	0.0
<i>Catalpa bignonioides</i>	Northern Catalpa	7.7	Low	11.1	0.6	1867.36	4.1	6.3	0.7	0.0	0.0	0.0
<i>Celastrus orbiculatus</i>	Asiatic Bittersweet	49.0	Low	143.5	7.6	1734.90	107.8	23.6	11.1	1.1	0.0	0.0
<i>Centurea sp.</i>	Knapweed sp.	40.8	Low	39.8	2.1	1838.60	0.0	39.5	0.1	0.1	0.0	0.2
<i>Cirsium arvense</i>	Canada Thistle	138.0	High	104.9	5.6	1773.52	15.3	43.0	45.9	0.2	0.1	0.5
<i>Dipsacus sylvestris</i>	Teasel	17.7	Low	12.6	0.7	1865.80	3.7	0.2	8.8	0.0	0.0	0.0
<i>Eleaagnus umbellata</i>	Autumn Olive	2476.9	Very High	1345.9	71.6	532.54	206.0	451.7	322.3	150.6	147.6	67.7
<i>Euonymus alata</i>	Winged Burning Bush	97.9	Medium	310.0	16.5	1568.39	235.6	61.2	9.6	0.5	0.0	3.3
<i>Iris pseudoacris</i>	Yellow Iris	0.0	Low	0.3	0.0	1878.10	0.3	0.0	0.0	0.0	0.0	0.0
<i>Lespedeza cuneata</i>	Chinese Bushclover	96.4	Medium	62.3	3.3	1816.14	9.9	15.6	33.4	0.0	3.3	0.2
<i>Ligustrum obtusifolium</i>	Border Privet	140.7	High	260.0	13.8	1618.44	146.3	87.9	24.6	1.2	0.0	0.0
<i>Lonicera japonica</i>	Japanese Honeysuckle	3142.3	Very High	1493.2	79.5	385.19	77.4	397.7	488.3	365.3	150.8	13.8
<i>Lonicera maackii</i>	Amur Honeysuckle	5.8	Low	19.7	1.0	1858.77	15.4	2.8	1.5	0.0	0.0	0.0
<i>Lonicera morrowii</i>	Morrow's Honeysuckle	117.1	High	116.5	6.2	1761.92	32.1	63.3	12.6	6.5	1.3	0.8
<i>Lysimachia nummularia</i>	Moneywort	4.4	Low	4.4	0.2	1874.05	0.0	4.4	0.0	0.0	0.0	0.0
<i>Lythrum salicaria</i>	Purple Loosestrife	14.7	Low	20.4	1.1	1858.02	9.7	6.8	4.0	0.0	0.0	0.0
<i>Malus toringo</i>	Toringo Crabapple	78.3	Medium	166.8	8.9	1711.67	119.9	25.9	11.0	9.7	0.4	0.0
<i>Microstegium vimineum</i>	Japanese Stiltgrass	2323.1	Very High	1136.0	60.5	742.43	125.1	433.3	195.8	148.1	114.5	119.2
N/A	Non-native, cool season grass	721.5	Very High	197.8	10.5	1680.61	0.0	28.0	24.4	23.4	35.5	86.5
<i>Phalaris arundinacea</i>	Reed Canary Grass	176.0	High	104.9	5.6	1773.53	4.6	63.0	17.5	5.9	9.2	4.7
<i>Phragmites australis</i>	Common Reed	11.9	Low	15.8	0.8	1862.61	4.0	11.7	0.1	0.0	0.0	0.0
<i>Polygonum cuspidatum</i>	Japanese Knotweed	0.0	Low	3.8	0.2	1874.65	3.8	0.0	0.0	0.0	0.0	0.0
<i>Polygonum perfoliatum</i>	Mile-a-Minute	84.0	Medium	66.5	3.5	1811.89	1.2	51.5	9.1	4.8	0.0	0.0
<i>Pyrus calleryana</i>	Callery Pear	35.5	Low	17.4	0.9	1861.02	2.6	4.3	0.1	10.3	0.0	0.0
<i>Ranunculus ficaria</i>	Lesser Celandine	63.8	Medium	13.3	0.7	1865.16	0.0	0.0	0.9	0.0	0.0	12.4
<i>Robinia pseudoacacia</i>	Black Locust	10.3	Low	8.7	0.5	1869.72	0.4	6.4	1.7	0.2	0.0	0.0
<i>Rosa multiflora</i>	Multiflora Rose	4452.1	Very High	1696.4	90.3	182.05	117.1	396.3	383.1	255.6	198.8	345.5
<i>Rubus pheonculusius</i>	Wineberry	1031.5	Very High	1013.8	54.0	864.63	196.1	683.9	90.3	13.5	23.8	6.2
<i>Securigera varia</i>	Crown vetch	2.4	Low	2.4	0.1	1876.03	0.0	2.4	0.0	0.0	0.0	0.0
<i>Viburnum dilatatum</i>	Linden Viburnum	179.9	High	343.4	18.3	1535.00	206.2	109.9	19.6	0.0	7.7	0.0
<i>Viburnum sieboldii</i>	Siebold's Viburnum	0.0	Low	14.0	0.7	1864.45	14.0	0.0	0.0	0.0	0.0	0.0
<i>Wisteria floribunda</i>	Japanese Wisteria	18.0	Low	16.5	0.9	1861.90	6.1	4.6	4.1	1.5	0.2	0.0

¹ The Infestation Index Score combines the extent of acreage infested and the intensity of the infestation. It was derived by multiplying the cover class number by the number of acres within each cover class. ² The Relative Infestation Index Categories include Low, Medium, High and Very High to represent Infestation Index Scores of < 50, 50-100, 101-250 and > 250, respectively.

Emerging Invasive Species - The Hopewell Valley has a number of newly emerging invasive species. FoHVOS, in partnership with the New Jersey Invasive Species Strike Team, have searched 65 properties totaling 8,100 acres from 2008 through 2010 (approximately 21% of the Hopewell Valley). The number of detected populations and completed eradications are reported in Table 12.

Table 12. Summary of Emerging Invasive Species in the Hopewell Valley

Note: Data from 2008 - 2010

Population Size (Individuals)	Number of Detected Populations	Number of Completed Eradications	Percent Eradicated
1	364	179	49
2-10	376	188	50
11-100	130	36	28
> 100	45	2	4
Totals	915	405	44

A total of 29 different emerging invasive species have been detected in the Hopewell Valley. The most abundant of these new species include Linden Viburnum, Siebold’s Viburnum, Oriental Photinia, Japanese Wisteria, Chinese Silvergrass, Callery Pear, Wintercreeper and English Ivy. Interactive maps and associated data downloads located at www.njisst.org are available for individual sites or species in the Hopewell Valley.



Japanese Wisteria girdling a mature Tulip Poplar.
Photo taken by R. Mackow.

Evaluation of Past Agricultural Activity Impacts in the Hopewell Valley

A discussion of past agricultural activity in relation to current land cover is provided in Section I under “Land Use History” (also see background information earlier in this plan section). Anecdotal evidence suggests that areas with mature forest and a suspected lack of past agricultural soil tilling do not have significant invasive species infestations. Strong examples of this pattern occur at FoHVOS preserves (e.g., Arena, Eames, Kulak, Lipp/Lewellen and portions of Baldpate Mountain).

From our invasive species mapping, it appears that ‘young’ forests (showing forest cover in 2007, but not in 1930) tend to be more heavily infested than ‘old’ forests (showing forest cover in 1930 and 2007). FoHVOS preserves contain approximately 700 acres each of young and old forests. Young forest areas with infestation categories ranging from ‘Clean to Moderate’ were fewer than old forests (6% vs. 20%, respectively). Approximately 94% of young forests had infestation categories of ‘High’ to ‘Very High’, while 80% of old forests were heavily infested.

While the data suggests differences in the intensity of invasive species infestations, careful inspection of land use history between 1930 and 2007 is required to fully understand the impacts of past agricultural activity. It is possible that past forestry activity on Baldpate Mountain is influencing the amount of invasive species cover in areas that were never under agricultural production. In addition, further evaluation of the distribution of particular invasive species by past land use should be evaluated in our existing mapping data. For example, Multiflora Rose and other woody shrubs appear to be most aggressive on past agricultural lands, while species such as Japanese Honeysuckle appear to be able to form a very low but relatively abundant ground cover in old forests. Additionally, some old forests contain low amounts of several invasive species, which create a cumulative infestation score classified as “High” to “Very High” that is somewhat misleading (e.g., 1-10% each of several species). This ‘artifact’ of the mapping interpretation requires additional careful review to fully understand relative resistance to infestation in older forests.

Additional Challenges

All public and private land is subject to ‘undesirable activities’ that can generically be labeled as trespass. A common activity is unauthorized use of off-road vehicles. This problem usually produces local impacts, but these impacts can be severe (e.g., rutting of trails, soil erosion). Dumping of trash or lawn waste occasionally occurs along property boundaries. Unauthorized hunting (i.e., poaching) of white-tailed deer is a common occurrence for lands without permanent residents. In rare circumstances, boundary encroachments such as removal of trees create more significant problems.

Although not directly addressed in this plan, stream bank erosion is a serious problem throughout the Hopewell Valley. The combination of impervious surfaces along with other lands that provide significantly less water infiltration than natural lands (e.g., lawns, agricultural fields) leads to heavy/rapid water flow through streams. This has created steeply eroded banks on many large streams. This condition contributes to a disconnection between water bodies and their floodplains with numerous implications (e.g., reduced groundwater recharge, loss of wildlife habitat).

Section IV. Goals and Strategies

Introduction

Natural systems are generally robust in response to human-induced challenges to their health, but persistent direct and indirect human impacts require mitigation through responsible land stewardship. This section provides goals and strategies to mitigate negative human impacts on natural systems toward improving ecological health in the Hopewell Valley.

A briefly annotated listing of Primary Stewardship Goals and Strategies is provided on page v. This plan section provides background information and prioritization concepts along with specific tasks over the 10-year plan implementation period (Table 14). In addition to the broad review of conservation values and threats in the Hopewell Valley, regionally and statewide (See Sections I, II and III), FoHVOS performed a detailed review of all of our preserves within this broader context (See Appendices T and U and Appendices 1 through 26) to inform specific tasks detailed in this plan section.

Level of Effort (LOE) estimates are provided for each goal (Table 13). The available LOE is based upon an average annual staff (2,500 hours) and volunteer (1,500 hours) limit of 4,000 hours or 40,000 hours over the 10-year plan implementation period. This estimate is somewhat conservative and allows for time spent toward other important FoHVOS organizational priorities performed by stewardship staff.

Table 13. Level of Effort Estimates by Primary Stewardship Goal

Goal Number	Goal Name	Percent of Total LOE
1	Reduce Impacts of White-tailed Deer	10
2	Strategic Invasive Species Control	27
3	Broad Habitat Management and Restoration	19
4	Rare Species Management	6
5	Foster Community Support for Stewardship	38
Totals		100

The Importance of Monitoring

Monitoring is an essential discipline for stewardship (See text box on page 2). FoHVOS has conducted rapid forest health monitoring protocols (see Section III, Appendix S1) for five years to guide our Deer Management Program and assess forest health on lands owned by conservation partners and private landowners. Beginning in 2012, FoHVOS will implement additional plant community monitoring methods for all major habitat types (See Appendices S2 and S3). In addition, FoHVOS will begin to utilize the Plant Stewardship Index to evaluate the floristic quality of lands in the Hopewell Valley (See www.bhwp.org).

**STEWARDSHIP =
Mitigation of human impacts
on natural systems**

Table 14. Stewardship Tasks and Accomplishments for the 10-year Plan Implementation Period

Strategy	Task / Accomplishment	Staff LOE	Volunteer LOE	Total Staff & Volunteer LOE	Percent of Total LOE	Task by Plan Year									
						2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
1A	Contribute to successful implementation of the Hopewell Valley Deer Management Plan involving 75% reduction of deer impacts on human health, economy and ecology	1,500	0	1,500	5.0	x	x	x	x	x	x	x	x	x	x
1B	Continuing implementation resulting in a) minimum of 90% attainment of annual antlerless deer harvest goals and b) 75% reduction of deer impacts on forest health by 2021	1,500	0	1,500	5.0	x	x	x	x	x	x	x	x	x	x
2A	Serve as Central Region Coordinator for New Jersey Invasive Species Strike Team. Specific regional searching, eradication and outreach tasks determined by FoHVOS/NJISST on an annual basis.	4,000	0	4,000	10.0	x	x	x	x	x	x	x	x	x	x
2A	1) Searching: Increase initial site searches from 21% of Hopewell Valley land area (ca. 8,000 acres) to 75% (ca. 29,000 acres) by 2021. 2) Eradication: With conservation partners, eradicate a minimum of 3,000 populations of target species by 2021. Site searches and eradication of priority species throughout Hopewell Valley to be determined through an annual review process.	2,500	1,000	3,500	10.0	x	x	x	x	x	x	x	x	x	x
2A	Site: Baldpate; Target Species: Linden Viburnum - Reduce infested acreage by 90% by 2021 (2011 Baseline includes 340 infested acres)	1,000	50	1,050	2.6	x	x	x	x	x	x	x	x	x	x
2A	Site: Baldpate/ Target Species: Japanese Wisteria, Siebold's Viburnum, and Oriental Photinia. Eradicate all target species by 2015.	500	50	550	1.4	x	x		x						
2A	Site: Albahary; Target Species: Japanese Aralia. Eradicate by 2015. 2011 Baseline includes one very large population that is partially treated.	100	50	150	0.4	x	x		x						
2B	Site: Baldpate; Target Species: Winged Burning Bush. Reduce infested acreage by 90% by 2021. 2011 baseline includes 265 infested acres.	500	50	550	1.4	x		x		x		x		x	
2B	Site: Multiple FoHVOS Preserves. Species: Primarily forest species such as Asiatic Bittersweet & Winged Burning Bush that are not included under maintenance of meadow and forest restoration projects below. See Appendices 1-26 for details.	250	100	350	0.9	x	x	x	x	x	x	x	x	x	x

Table 14. Stewardship Tasks and Accomplishments for the 10-year Plan Implementation Period (continued)

Strategy	Task / Accomplishment	Staff LOE	Volunteer LOE	Total Staff & Volunteer LOE	Percent of Total LOE	Task by Plan Year									
						2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
3A	Site: Hollystone; Forest restoration through grant funding, followed by regular maintenance (Field ID 35, 36, 37, 38 = 40 acres). Complete restoration by end 2013 (per existing grant agreement).	250	850	1,100	2.8	x	x		x		x		x		x
3A	Site: Baldpate; Forest restoration through future grant funding, followed by regular maintenance (Field ID 7, 9, 14, 15, 16 = 8 acres).	100	250	350	0.9	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
3A	Site: Kulak - Lawrence; Forest restoration through grant funding, followed by regular maintenance (Field ID 43, 44 = 13 acres)	100	250	350	0.9	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
3A	Site: Baldpate; Forest restoration maintenance (Field ID 8, 12 = 8 acres). Restoration completed in 2010.	50	100	150	0.4	x		x		x		x		x	
3A	Site: Kulak - Lawrence; Forest restoration maintenance (Field ID 42 = 8 acres). Restoration completed in 2011.	50	100	150	0.4		x		x		x		x		x
3A	Research and site selection to implement pilot projects involving the use of forestry practices and prescribed fire to improve forest health	250	0	250	0.6			x	x	x		x		x	
3A	Forest health monitoring - multiple locations throughout Hopewell Valley determined on an annual basis. Approximately 10 sites will be monitored annually.	1,000	250	1,250	3.1	x	x	x	x	x	x	x	x	x	x
3B	Site: Baldpate; Shrubland Restoration through grant funding; Periodic mowing by Mercer County to maintain shrubland, Selective hand control of invasive species (Field ID 10 = 5 acres)	150	25	175	0.4	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
3B	Site: Baldpate; Meadow restoration through grant funding; Regular mowing / burning to maintain meadow, Selective hand control of invasive species (Field ID 6, 11, 13, 18 = 15.8 acres)	200	50	250	0.6	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
3B	Site: Nexus; Meadow restoration through grant funding to convert retention basins, Regular mowing / burning to maintain meadow, Selective hand control of invasive species (Field ID 48, 49 = 6 acres)	100	0	100	0.3	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

Table 14. Stewardship Tasks and Accomplishments for the 10-year Plan Implementation Period (continued)

Strategy	Task / Accomplishment	Staff LOE	Volunteer LOE	Total Staff & Volunteer LOE	Percent of Total LOE	Task by Plan Year									
						2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
3B	Site: Pole Farm; Meadow restoration through grant funding (Partnership project with Mercer County). Approximately 450 acres.	100	100	200	0.5	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
3B	Site: Arena; Regular mowing / burning to maintain meadow, Selective hand control of invasive species (Field ID 1, 2, 3 = 10 acres)	100	100	200	0.5	x		x		x		x		x	
3B	Site: Arena; Woody Species Hand Treatment (Field ID 2 = 5 acres); FoHVOS will seek grant funding to clear existing woody vegetation to significantly reduce required LOE.	150	250	400	1.0	x	x	x		x		x		x	
3B	Site: Baldpate; Regular mowing by JCP&L to maintain meadow, Selective hand control of invasive species (Field ID 4, 5 = 19 acres).	100	100	200	0.5		x		x		x		x		x
3B	Site: Eames; Regular mowing / burning to maintain meadow, Selective hand control of invasive species (Field ID 22, 23 = 6 acres)	100	25	125	0.3	x		x		x		x		x	
3B	Site: Gomez; Regular mowing / burning to maintain meadow, Selective hand control of invasive species (Field ID 27, 28, 29, 30, 31, 32 = 18 acres).	100	25	125	0.3	x		x		x		x		x	
3B	Site: Heritage; Regular mowing / burning to maintain meadow, Selective hand control of invasive species (Field ID 33, 34 = 7 acres)	100	25	125	0.3	x	x	x		x		x		x	
3B	Site: Krech; Woody invasive hand treatment to improve native shrubland development (Field ID 41 = 2 acres)	100	0	100	0.3		x		x		x		x		x
3B	Site: Nayfield; Regular mowing / burning to maintain meadow, Selective hand control of invasive species (Field ID 47 = 4 acres)	100	50	150	0.4	x		x		x		x		x	
3B	Site: Skyview - Garfi; Regular mowing / burning to maintain meadow, Selective hand control of invasive species (Field ID 50, 51, 53, 54 = 36 acres)	100	150	250	0.6	x		x		x		x		x	
3B	Site: Skyview - Garfi; Regular mowing / burning to maintain meadow, Selective hand control of invasive species (Field ID 50, 51, 53, 54 = 36 acres). FoHVOS will research the potential to clear existing woody vegetation via prescribed burning to significantly reduce required LOE.	200	300	500	1.3	x	x	x	x	x		x		x	

Table 14. Stewardship Tasks and Accomplishments for the 10-year Plan Implementation Period (continued)

Strategy	Task / Accomplishment	Staff LOE	Volunteer LOE	Total Staff & Volunteer LOE	Percent of Total LOE	Task by Plan Year									
						2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
3B	Site: Thompson; Regular mowing / burning to maintain meadow, Selective hand control of invasive species (Field ID 58, 59 = 7 acres).	100	100	200	0.5	x		x		x		x		x	
3B	Site: Vogler; Meadow restoration through grant funding, Regular mowing / burning to maintain meadow, Selective hand control of invasive species (Field ID 61 = 6 acres)	100	100	200	0.5	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
3B	Early successional habitat health monitoring - multiple locations throughout Hopewell Valley determined on an annual basis. Approximately 10 sites will be monitored annually.	500	50	550	1.4	x	x	x	x	x	x	x	x	x	x
4A	Rare Species Management (American Ginseng): Population survey; develop and implement stewardship plan	250	50	300	0.8	x			x			x			x
4A	Rare Species Management (Twinleaf): Population survey; develop and implement stewardship plan	250	50	300	0.8	x			x			x			x
4A	Rare Species Management (Green Violet): Population survey; develop and implement stewardship plan	250	50	300	0.8	x			x			x			x
4A	Rare Species Management (Redbud): Population survey; develop and implement stewardship plan	250	50	300	0.8	x			x			x			x
4A	Rare Species Management (Brook Floater): Seek assistance / recruit experts to perform population survey; develop and implement stewardship plan	200	50	250	0.6		x			x				x	
4A	Rare Species Management (Yellow Lampmussel): Seek assistance / recruit experts to perform population survey; develop and implement stewardship plan	200	50	250	0.6		x			x				x	
4A	Rare Species Management (Shortnose Sturgeon): Seek assistance / recruit experts to perform population survey; develop and implement stewardship plan	200	50	250	0.6		x			x				x	
4A	Rare Species Management (Bridle Shiner): Seek assistance / recruit experts to perform population survey; develop and implement stewardship plan	200	50	250	0.6		x			x				x	

Table 14. Stewardship Tasks and Accomplishments for the 10-year Plan Implementation Period (continued)

Strategy	Task / Accomplishment	Staff LOE	Volunteer LOE	Total Staff & Volunteer LOE	Percent of Total LOE	Task by Plan Year									
						2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
4A	Rare Species Management (Wood Turtle): Seek assistance / recruit experts to perform population survey; develop and implement stewardship plan	200	50	250	0.6	x			x			x			x
5A	Private Lands Stewardship Program: Recruit 800 landowners (approximately 10% of Hopewell Valley households) by 2021 to implement one or more stewardship practices. Assist with implementation as necessary.	2,000	1,000	3,000	3.8	x	x	x	x	x	x	x	x	x	x
5B	Citizen Science - Christmas Bird Counts: Coordinate & assist with existing efforts in the Hopewell Valley; perform CBC counts on a minimum of 10 FoHVOS preserves or other priority sites per year.	150	1,000	1,150	2.9	x	x	x	x	x	x	x	x	x	x
5B	Citizen Science - e-Bird Surveys: Establish a minimum of 10 FoHVOS preserves as registered e-Bird Survey sites; conduct a minimum of four surveys per year at each selected preserve.	150	1,000	1,150	2.9	x	x	x	x	x	x	x	x	x	x
5B	Citizen Science - 4th of July Butterfly Counts: Coordinate & assist with existing efforts in the Hopewell Valley; perform CBC counts on a minimum of 10 FoHVOS preserves or other priority sites per year.	150	1,000	1,150	2.9	x	x	x	x	x	x	x	x	x	x
5C	Maintain FoHVOS trails: Assure that trails are passable at all times, improve trail quality as allowable (e.g., addition of boardwalks, etc.), maintain trail markings, maintain / update kiosk materials twice per year, etc.	1,500	3,500	5,000	12.5	x	x	x	x	x	x	x	x	x	x
5C	Guided Hikes & Presentations: Stewardship staff conduct an average of 10 events per year and produce educational/outreach brochures, posters, articles, etc.	1,500	0	1,500	3.8	x	x	x	x	x	x	x	x	x	x
5C	Clean Communities Events: In partnership with Hopewell Township, provide two events annually (spring and fall)	500	1,000	1,500	3.8	x	x	x	x	x	x	x	x	x	x
5C	Volunteer Recruitment: Ongoing activities leading to an average of 1,500 volunteer hours per year.	500	0	500	1.3	x	x	x	x	x	x	x	x	x	x
5C	FoHVOS Preserve Monitoring and Maintenance: Ongoing activities including efforts of FoHVOS Site Stewards and staff. Maintenance tasks include boundary posting, trash removal, etc.	500	1,500	2,000	5.0	x	x	x	x	x	x	x	x	x	x
Totals		25,000	15,000	40,000	100										

Goal #1: Reduce Impacts of White-tailed Deer

The reduction of deer impacts is vital to achieving ecological health in the Hopewell Valley. Two strategies are provided below, but additional strategies (e.g., Goal #5 - Foster Community Support for Stewardship) are also critical to achieve success.

Strategy #1A: Community Deer Management

Hopewell Township has made a significant commitment to community-wide deer management. The Hopewell Valley Deer Management Task Force formed in 2009. The Task Force completed a report with specific recommendations in September 2010 (See [Hopewell Valley Deer Management Plan](#)). In 2011, the Hopewell Township Deer Management Advisory Committee (DMAC) was formed to implement Plan recommendations. The plan quantifies impacts to human health, economy and ecology of the Hopewell Valley. Specifically, five impacts were identified: 1) Lyme Disease, 2) Deer-Vehicle Collisions, 3) Agricultural Losses, 4) Landscape Planting Losses, and 5) Ecological Damage. For each impact, the goal is to reduce impacts by 75% by 2019 compared to measurable impacts recorded in 2010. To achieve these goals, three ‘Strategy Sets’ were identified. These include 1) Improvement of Hunting Access, 2) Improvement of Hunting Efficacy, and 3) Avoidance of Deer Impacts. Eleven specific strategies were identified and will be implemented by DMAC. FoHVOS is a member of the DMAC and will assist with plan implementation.

Strategy #1B: FoHVOS Deer Management Program

FoHVOS established a Deer Management Program (DMP) in 2007. Program rules are posted at the FoHVOS website (www.fohvos.org – DMP rules for other organizations can be found at www.deerinbalance.org). Currently, FoHVOS owns or co-owns 1,970 acres of preserves. With the exception of six very small preserves totaling only 12 acres, deer management occurs on all of these lands. FoHVOS directs deer management on approximately 500 acres, while partners lead deer management on nearly 1,460 acres of co-owned lands (includes over 1,300 acre program managed by Mercer County at the Ted Stiles Preserve at Baldpate Mountain and Hollystone Preserve; other partners leading programs on co-owned lands include Hopewell Township and D&R Greenway Land Trust).

The FoHVOS DMP establishes ambitious antlerless deer harvest goals to reduce the deer population. The annual goal is to harvest one antlerless deer for every five acres of land. Since program inception, the FoHVOS DMP has averaged 95% of harvest goals. However, it is important to note that ultimate effectiveness of the DMP will be evaluated by measurable improvement of forest health (See Section III, Table 9, Figures 6 & 7, Appendix S1). Currently, forest health thresholds are well below expectations but continuing efforts at FoHVOS preserves and throughout the Hopewell Valley (See Strategy #1A above) should lead to quantifiable improvements over time. As with other goals listed in the Hopewell Valley Deer Management Plan, we hope to achieve a 75% improvement over the next 10 years.

Goal #2: Strategic Invasive Species Control

A significant and persistent effort will be required to reduce the impacts of invasive species in the Hopewell Valley. An overview of invasive species control methods and species-level control recommendations are provided as Appendix Q and R, respectively.

Strategy #2A: Eradicate Emerging Invasive Species

The greatest ‘bang for the buck’ is to eradicate or contain emerging invasive species BEFORE they create ecological damage across the landscape. This strategy, known as Early Detection & Rapid Response,

represents an efficient and effective strategy to prevent damage (and minimize future stewardship costs). A summary of emerging invasive species in the Hopewell Valley is provided in Section III.

FoHVOS was a co-founder of the New Jersey Invasive Species Strike Team (www.njisst.org), which is now an independent non-profit organization. Currently, FoHVOS serves as the organization's Central Region Coordinator, which includes directing activities in Mercer, Monmouth, Middlesex, Union, Somerset and Hunterdon Counties. Through its participation, FoHVOS contributes to protecting natural areas in the Hopewell Valley and provides statewide leadership on invasive species management.

Specific tasks are detailed in Table 14. These include species-level tasks at particular locations (e.g., eradicating Japanese Aralia at the Albahary Preserve, long-term control of Linden Viburnum at Baldpate Mountain) along with a more generalized task of working throughout the Hopewell Valley using an annual review process to set site searching and eradication priorities that maximizes effectiveness.

Strategy #2B: Strategic Control of Widespread Invasive Species

Widespread invasive species cannot be controlled at the landscape level (except for rare exceptions through biological control – See Appendix Q). Site-level control of widespread invasive species must only be attempted under very restrictive conditions to avoid inefficient use of stewardship resources. Ultimately, it is hoped that successful community deer management will result in a significant reduction of the deer population that will allow native plants, freed from excessive and disproportionate deer browse, to exert ecological control over many invasive species.

FoHVOS will selectively control widespread invasive species in the Hopewell Valley. This will include controlling nascent populations in relatively 'clean areas' associated with older forests without a history of past agricultural land use. It will also include control of particular species to protect priority habitats (e.g., Tree-of-Heaven adjacent to forest restoration sites, Winged Burning Bush and Asiatic Bittersweet within forest habitat). As with emerging invasive species, FoHVOS will determine tasks based upon an annual review process to set priorities that maximizes effectiveness. This effort will be informed primarily by invasive species mapping performed by FoHVOS across all preserves in 2011 (See Section III and Appendices 1 through 26).

Goal #3: Broad Habitat Management and Restoration

This goal involves habitat-level strategies at FoHVOS preserves informed by local, regional and statewide conservation values and threats. We analyzed early successional habitat (i.e., meadows and shrublands totaling 271 acres) on FoHVOS preserves and developed habitat prescriptions (See Appendix T). Basic prescriptions include afforestation (or forest restoration) to guide meadows toward healthy forest habitat, restoration of meadows, and maintenance of meadows and shrubland (See Table 14). In some cases, our prescription is to allow succession to occur without further intervention due to lack of stewardship resources (even though this typically leads to dense infestations of invasive species).

Strategy #3A: Forest Habitat

FoHVOS will seek grant funding to restore forest on 61 acres of early successional habitat on FoHVOS preserves. This effort includes an already funded 40-acre forest restoration at the Hollystone Preserve that will be conducted with Mercer County in 2012 and 2013. In addition, we will maintain 16 acres of completed restorations performed in recent years. Forest restorations will be solely located immediately adjacent or within large forest patches identified as RPWHP Priority Forest Focal Areas (See Map 15) – other relatively large forest patches (See Map 16) are relatively fragmented and are not considered priority areas for forest restorations over the next 10 years. In general, forest restoration on degraded

post-agricultural lands will include soil restoration, deer exclusion fencing, installation of native plants, and localized treatment of invasive species.

FoHVOS will conduct research and implement plans to utilize forestry practices and prescribed fire to improve the health of existing forest habitat. These techniques have the potential to improve aspects of forest health such as increasing understory shrub density, increasing herbaceous species diversity and reducing invasive species infestations. Importantly, these techniques have the potential to be extremely cost effective and expand stewardship efforts well beyond relatively small areas that can be treated 'by hand' (e.g., herbicide spraying of invasive species). All efforts will be informed by the Forest Stewardship Plan prepared for FoHVOS and all projects will be considered 'experimental' with careful baseline and follow-up monitoring to determine the appropriateness of broader applicability in the future.

Strategy #3B: Early Successional Habitat

FoHVOS will maintain and/or restore approximately 140 acres of early successional habitat on FoHVOS preserves. Restoration of meadow habitat will be conducted at Baldpate, Nexus and Vogler Preserves pending successful grant applications (total of 22 acres). In addition, FoHVOS will seek grant funding along with Mercer County to restore the most significant grassland/meadow habitat in the Hopewell Valley - the Pole Farm (or Mercer Meadows) is part of an 800-acre Important Bird Area (See Section II).

Stewardship of early successional habitat will be focused in areas where forest habitat is relatively minimal or exists as small, highly fragmented patches. Meadows will be the primary habitat type, but five acres at Baldpate Mountain and two acres at the Krech Preserve will be managed as shrubland over the next 10 years. In general, meadow habitat requires biannual mowing to prevent establishment of trees and shrubs. Prescribed fire is a very effective and efficient method to maintain meadow habitat and FoHVOS will seek a partnership with the NJ Forest Fire Service to conduct burns. Prescribed fire could significantly reduce LOE requirements across approximately 40 acres of existing meadow habitat that is quickly become infested by invasive trees and shrubs (e.g., Arena and Skyview-Garfi Preserves). Maintenance will also include spot treatment of threatening invasive species (effort will be included under this goal/strategy).

Goal #4: Rare Species Management

Strategy #4A: Survey and Evaluation

The Hopewell Valley contains over 80 species of rare and priority animals and plants. FoHVOS efforts to survey and steward rare species will be restricted to globally rare species and those considered endangered in New Jersey (includes 9 species, see Table 14). FoHVOS staff will lead efforts for plant species and we will seek guidance and partnerships to address animal species.

Activities will include locating and performing baseline population surveys on known occurrences of rare species. An evaluation using Natural Heritage guidelines (i.e., assessing population size, condition and landscape context) will be developed for each species. This will include direct measurements of species along with important elements of their habitat required for long-term persistence. Stewardship plans will be developed and implemented for each species.

Goal #5: Foster Community Support for Stewardship

Community participation in stewardship of the Hopewell Valley is essential. This goal involves three strategies to engage residents in stewardship of their own lands, participation in the collection of scientific

data to support ongoing stewardship efforts and encouraging an understanding and interaction with the natural world.

Strategy #5A: Private Lands Stewardship Program

Private lands represent nearly 70% of the Hopewell Valley. Therefore, effective landscape scale stewardship requires private landowner participation. FoHVOS has interacted with private landowners in recent years (e.g., surveys for newly emerging invasive species, forest health monitoring). Beginning in 2012, FoHVOS will initiate a robust Private Lands Stewardship Program. The Hopewell Valley includes approximately 8,000 households. Our ultimate goal is to enroll 800 households in the Program by 2021. FoHVOS staff and volunteers will assist private landowners by providing expert advice and supporting project implementation.

The Program will include a variety of participation opportunities. For large landowners, participation may include one or more of the following: organic farming, farmland conservation plans prepared by the Natural Resources Conservation Service, deer management, Forest Stewardship Plans, invasive species control and habitat restoration. Smaller landowners will primarily be encouraged to create ‘backyard habitat’ utilizing native plants and/or signing a ‘pledge’ to not purchase invasive species.

Strategy #5B: Citizen Science

FoHVOS will initiate a Citizen Science Program in 2012. We seek to complement existing efforts on projects such as the Christmas Bird Count (National Audubon Society), 4th of July Butterfly Count (North American Butterfly Association) and eBird Site Surveys (Cornell Lab of Ornithology & National Audubon Society). This will include participation of FoHVOS staff and volunteers to assist with data collection at FoHVOS preserves and other areas throughout the Hopewell Valley. In addition, we will seek citizen scientists to assist FoHVOS with a variety of ecological community health monitoring efforts to assess effectiveness of our stewardship efforts. As we develop our citizen science program, other projects will be considered.

The Christmas Bird Count (CBC) is an over 100 year old project of the National Audubon Society. CBCs increase the knowledge of bird population trends and species distributions, allowing conservation decisions to be formulated. Counts occur within defined areas called ‘circles’ from mid-December to early January. There are currently over 2,000 circles in the western hemisphere. The Princeton Circle encompasses much of the Hopewell Valley - count compilers are from the Washington Crossing Audubon Society (Laurie Larson and Louis Beck).

The 4th of July Butterfly Count is an over 35 year project of the North American Butterfly Association. Butterflies are identified and counted within 15-mile radius circles – the Trenton Circle encompasses much of the Hopewell Valley and is coordinated by the Washington Crossing Audubon Society (Jim Springer). The survey period for 4th of July counts ranges from June 1 to July 31. In addition, counts may be conducted in the spring (January 1 to May 31) or fall (August 1 to December 31).

eBird Site Surveys were initiated 10 years ago by the Cornell Lab of Ornithology and National Audubon Society. The surveys are entered and data is made available through the internet. This global database allows communications between birders and informs avian conservation efforts. Surveyors register a site and report observations during any time of year. FoHVOS volunteer site steward Chuck Hansen reports observations from the Ted Stiles Preserve at Baldpate Mountain (Sharyn Magee also provides regular surveys to the Cornell Lab of Ornithology), Eames Preserve, Nayfield Preserve, Elks Preserve and Heritage Preserve.



The emerging invasive species, Chinese Silvergrass, is commonly used landscape plant. We would like to encourage gardeners to stop purchasing this plant and if possible, remove existing plants and replace with native species such as Indian Grass.

Strategy #5C: Outreach, Education and Public Access

This strategy includes multiple tasks that support stewardship activities in the Hopewell Valley. In 2011, FoHVOS completed the installation of seven trails and related amenities along with the Guide to Walking Trails in the Hopewell Valley. FoHVOS is dedicated to providing public access on our preserves and supporting access throughout the Hopewell Valley.

Beginning in 2012, FoHVOS staff will significantly increase outreach efforts through events, presentations and guided hikes to increase public awareness of Hopewell Valley's natural heritage. We plan to provide a minimum of 10 such opportunities per year along with regular preparation of articles and printed materials.

FoHVOS has partnered with Hopewell Township for over a decade through semi-annual roadside cleanups funded by the New Jersey Clean Communities Program. We are proud to continue this tradition, which cleans up the Hopewell Valley while providing opportunities for participants to support their favorite charities.

Additional Goals and Strategies

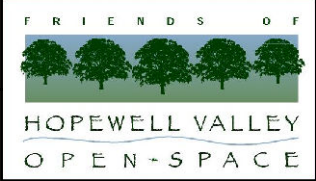
FoHVOS discourages all undesirable activities (See Section III) through regular monitoring of trails and preserve boundaries. FoHVOS created a volunteer Site Steward Program (included as a portion of Strategy #5C) that includes periodic preserve visits followed by completion of a monitoring form (see Appendix V). FoHVOS Site Stewards monitor seven preserves containing trails, while FoHVOS staff monitors all remaining preserves. Regular use of Preserves by hikers and participants in the Deer Management Program provides significant monitoring capacity to many FoHVOS preserves.

Literature Cited

- Breden, T.F., Y. Alger, K.S. Walz, and A.G. Windisch. 2001. Classification of vegetation communities of New Jersey: second iteration. NJDEP – Office of Natural Lands Management, Trenton, NJ. 230 pages.
- Collins, B.R. and K.H. Anderson. 1989. Plant Communities of New Jersey, A Study in Landscape Diversity. Rutgers University Press, New Brunswick, NJ. 287 pages.
- DVRPC. 2010. Environmental Resource Inventory for the Township of Hopewell, Mercer County, New Jersey. Delaware Valley Regional Planning Commission, Philadelphia, PA. 146 pages.
- Elton, C.S. 1958. The ecology of invasions by animals and plants. Chapman and Hall Ltd., London. 181 pages.
- Frank, C.A. 2010. Important Bird Areas of New Jersey. Edited by C.D. Tonkinson, New Jersey Audubon, Bernardsville, NJ. 324 pages.
- Hopewell Valley Deer Management Task Force. 2010. Hopewell Valley Deer Management Plan. Hopewell Township, NJ. 32 pages.
- McCabe, R.E. and T.R. McCabe. 1984. Of slings and arrows: An historical retrospection. Pages 19-72 in White-tailed deer: Ecology and management (L.K. Halls, ed.), Stackpole Books, Harrisburg, PA.
- NISC. 2001. Meeting the invasive species challenge – Management Plan. National Invasive Species Council, Washington DC. 74 pages.
- NJDEP. 2008. New Jersey Wildlife Action Plan – Revision Date: January 23, 2008. New Jersey Department of Environmental Protection, Trenton, NJ. 717 pages.
- Office of Natural Lands Management. 1999. An atlas of Natural Heritage priority sites for the preservation of biological diversity. NJDEP – Division of Parks & Forestry, Trenton, NJ.
- Pimentel, D., R. Zuniga, and D. Morrison. 2005. Update on the environmental and economic costs associated with alien-invasive species in the United States. *Ecological Economics* 52: 273-288.
- Snyder, D. and S.R. Kaufman. 2004. An overview of nonindigenous plant species in New Jersey. New Jersey Department of Environmental Protection, Division of Parks and Forestry, Office of Natural Lands Management, Natural Heritage Program, Trenton, NJ. 107 pages.
www.state.nj.us/dep/parksandforests/natural/heritage/InvasiveReport.pdf
- Walsh, J., V. Elia, R. Kane and T. Halliwell. 1999. Birds of New Jersey. New Jersey Audubon Society, Bernardsville, NJ. 704 pages.
- White, D.W. 1990. The Woodlands of Hopewell Valley, Mercer County, New Jersey. Report prepared for the Friends of Hopewell Valley Open Space. 29 pages.
- Wilcove, D.S., D. Rothstein, J. Dubow, A. Phillips, and E. Losos. 1998. Quantifying threats to imperiled species in the United States. *BioScience* 48: 607-615.

Literature cited or utilized to prepare plan appendices only

- Brand, M.A. 2007. UCONN Plant Database. <http://www.hort.uconn.edu/plants/index.html>. University of Connecticut. Accessed: September 2007.
- Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1988. *The birder's handbook*. Simon & Schuster Inc., New York. 785 pages.
- Hough, M.F. 1983. *New Jersey Wild Plants*. Harmony Press, Harmony, NJ. 414 pages.
- Launchbaugh, K. 2006. *Targeted grazing – a natural approach to vegetation management*. American Sheep Industry Association. Cottrell Printing, Centennial, CO. 199 pages.
- Martin, A.C., H.S. Zim, and A.L. Nelson. 1951. *American wildlife & plants: a guide to wildlife food habits*. Dover Publications, Inc., New York. 500 pages.
- MOBOT. 2007. Kemper Center for Home Gardening - Plant Finder. <http://www.mobot.org/gardeninghelp/plantfinder/serviceplantfinder.shtml>. Missouri Botanic Garden. Accessed: September 2007.
- Myers, R.L. 2006. *Living with fire – Sustaining ecosystems and livelihoods through integrated fire management*. The Nature Conservancy, Global Fire Initiative. Arlington, VA. 28 pages.
- Rathfon, R.A. 2006. Application timing of 20 basal bark herbicide and oil diluents combinations applied to two sizes of Amur honeysuckle. 2006 North Central Weed Science Society Proceedings 61: 189.
- Schwartz, V. and D.M. Golden. 2002. *Field guide to reptiles and amphibians of New Jersey*. NJ Division of Fish & Wildlife, Trenton, NJ. 87 pages.
- Tesauro, J. 2001. Restoring Wetland Habitats with Cows and other Livestock. A prescribed grazing program to conserve bog turtle habitat in New Jersey. *Conservation in Practice* 2 (2), 26–31.
- Tu, M., Hurd, C. & J.M. Randall. 2001. *Weed Control Methods Handbook*, The Nature Conservancy, <http://tncweeds.ucdavis.edu>, version: April 2001.
- Van Driesche, R., B. Blossey, M. Hoddle, S. Lyon, and R. Reardon. 2002. *Biological Control of invasive plants in the Eastern United States*. United States Department of Agriculture. Forest Health Technology Enterprise Team. FHTET-2002-04. Washington DC. 413 pages.
- Van Gelder, R.G. 1984. *The mammals of the state of New Jersey: a preliminary annotated list*. New Jersey Audubon Society. Occasional Paper No. 143. Bernardsville, NJ. 20 pages.
- Zerbe, F., D. Salas, and D. Williams. 2003. *Adopt-a-buffer toolkit: monitoring and maintaining restoration projects*. Delaware Riverkeeper Network. Washington Crossing, PA. 142 pages.




Hopewell Valley Community Stewardship Plan

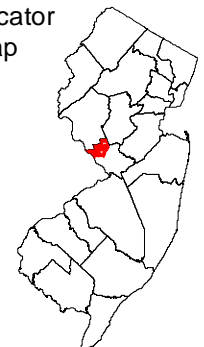
Map 1

Topography of the Hopewell Valley

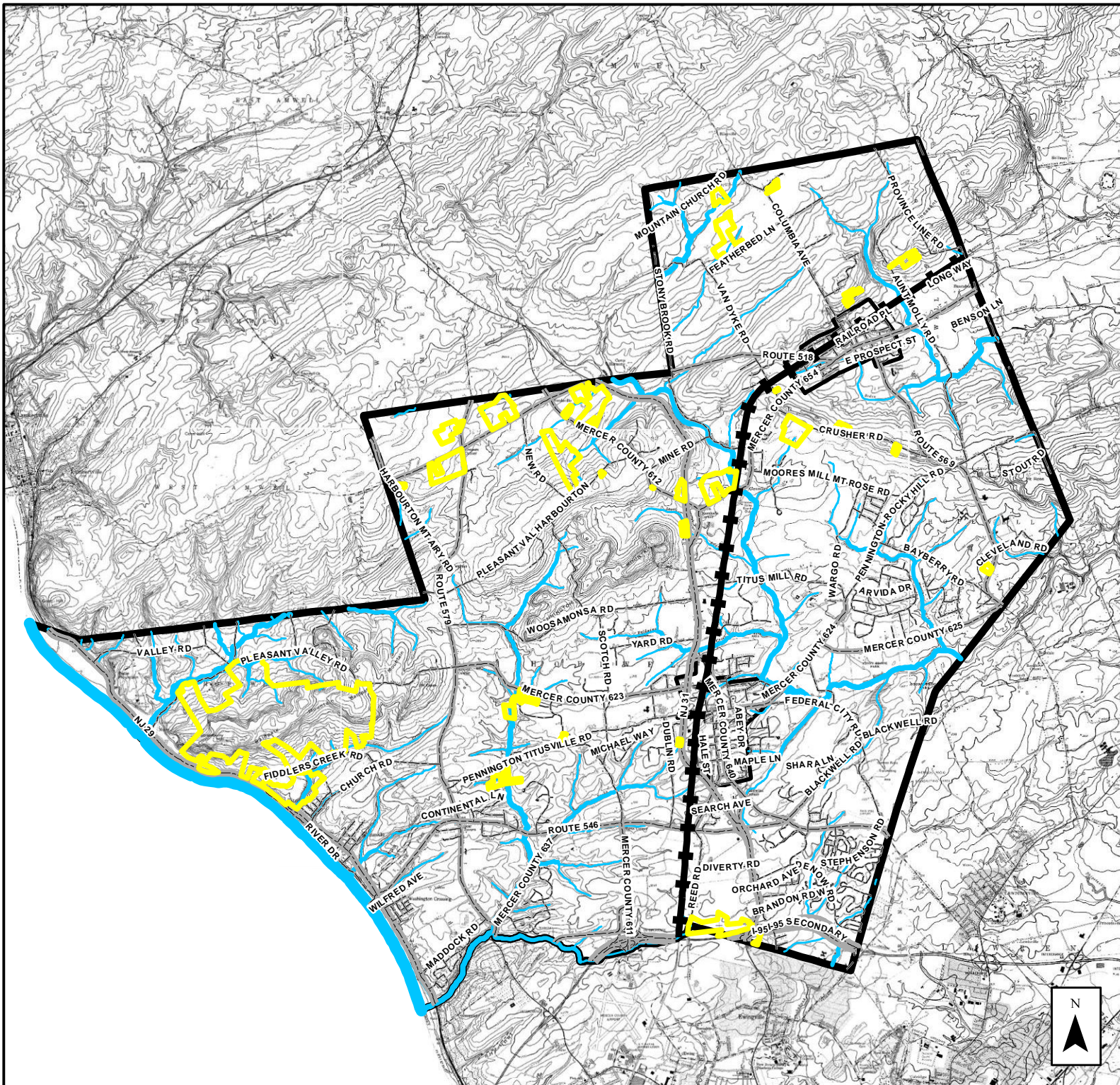
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 FoHVOS Preserves

Locator Map



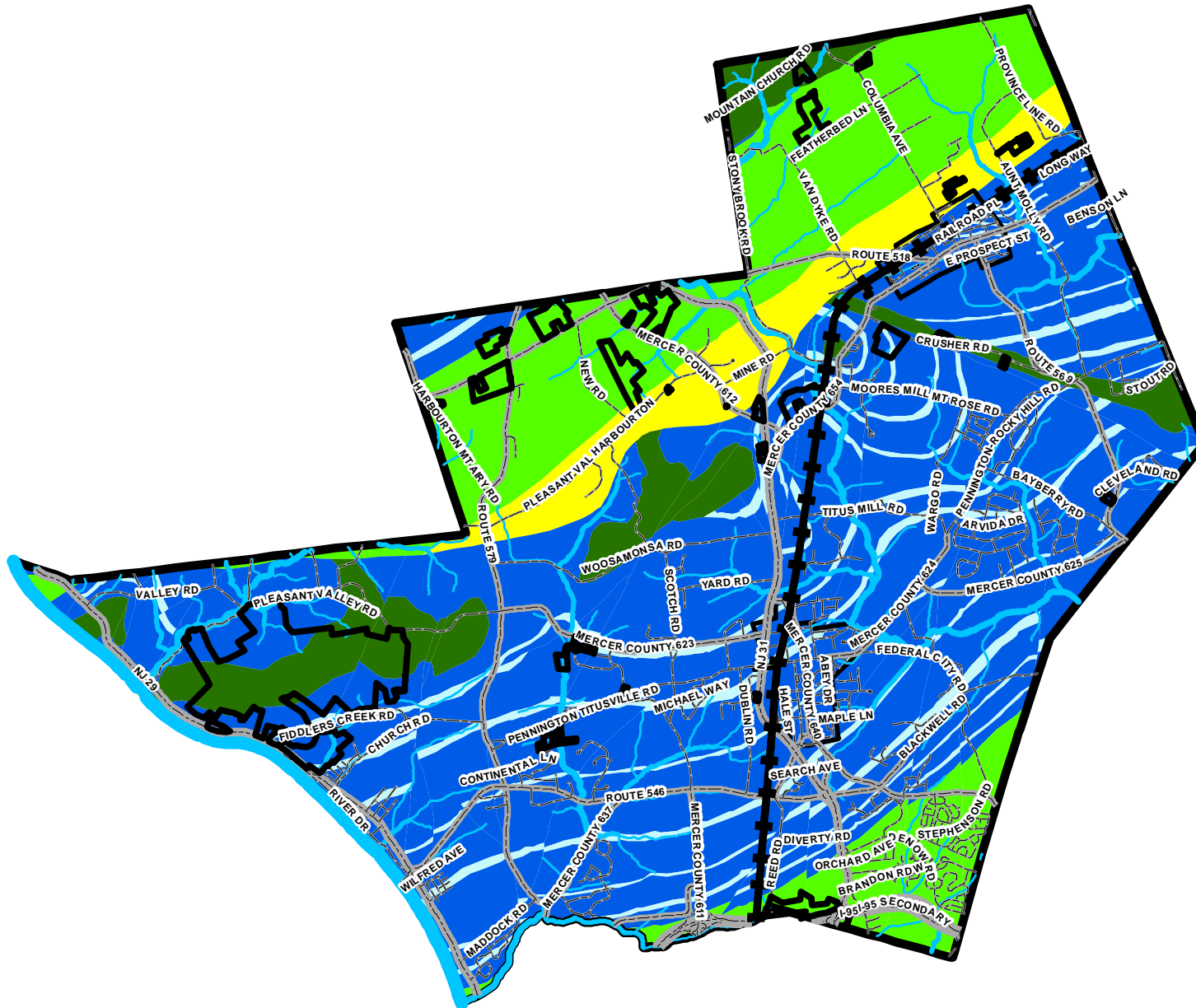
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
Hopewell Valley Community Stewardship Plan

Map 2

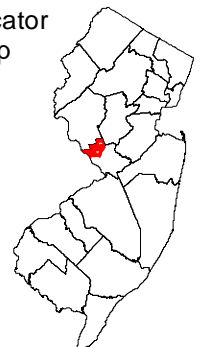
Bedrock Geology of the Hopewell Valley

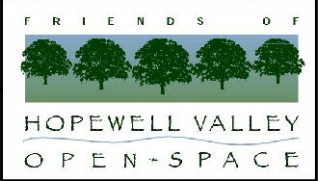


Legend

-  FoHVOS Preserves
- Bedrock Geology**
-  Jurassic Diabase
-  Lockatong Formation
-  Stockton Formation
-  Passaic Formation
-  Passaic Formation Gray bed

Locator Map





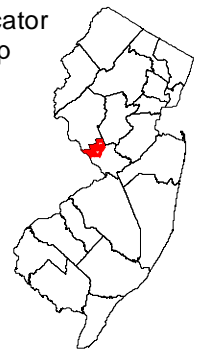
Hopewell Valley Community Stewardship Plan

Map 3

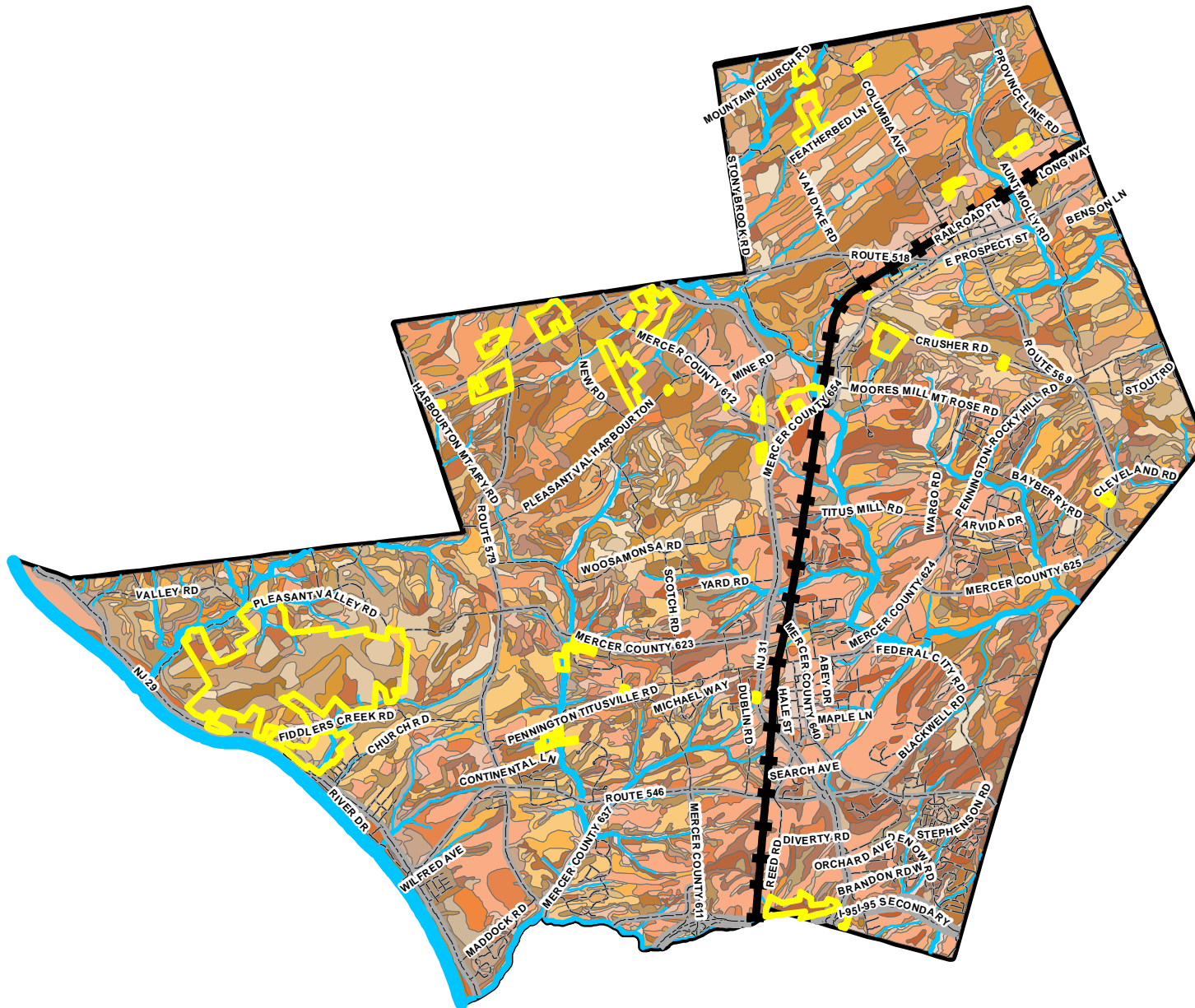
Soil Types
of the Hopewell Valley

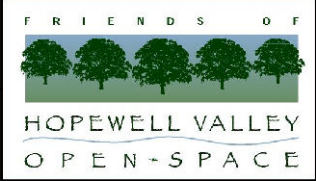
See plan text for
discussion of soil types.
See preserve maps for
details of soil types.

Locator
Map



0 1 2 Miles





Hopewell Valley Community Stewardship Plan

Map 4-1


Soil Characteristics-
Farmland Importance Class
of the Hopewell Valley

Legend


 FoHVOS Preserves


Soil Characteristics

Farmland Importance Class

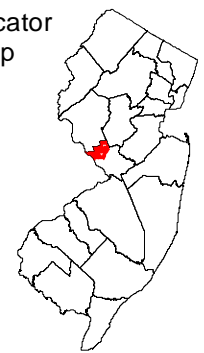
 Not rated or evaluated

 Prime Farmland

 Statewide Importance

 Local Importance

Locator
Map



0 1 2 Miles



Hopewell Valley Community Stewardship Plan

Map 4-2

Soil Characteristics- Erodible Land Class of the Hopewell Valley


Legend


 FoHVOS Preserves

Soil Characteristics

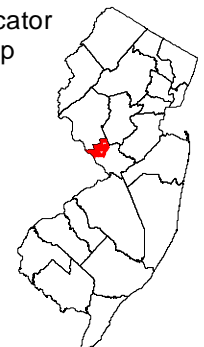
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Not rated or evaluated

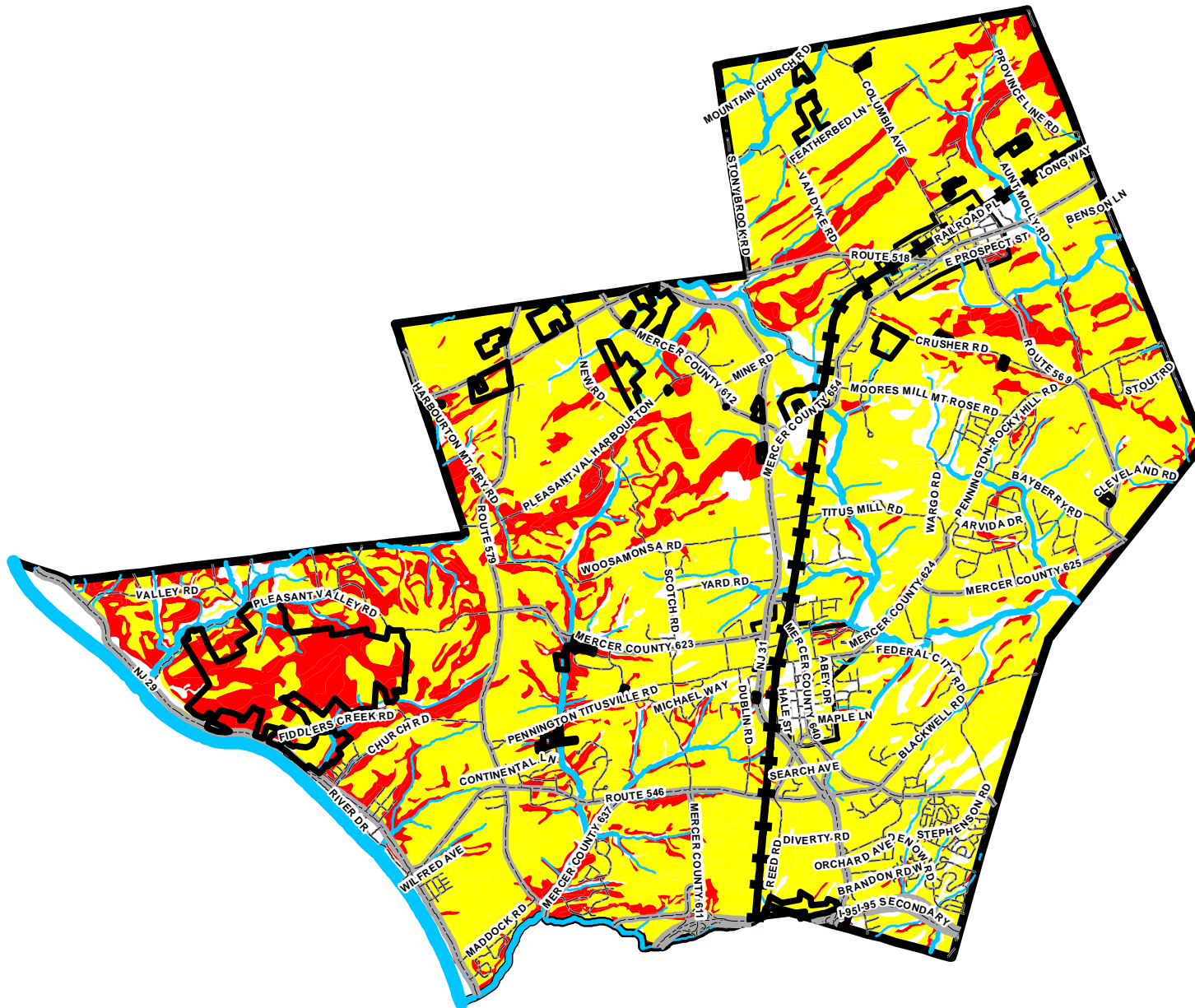
 Potentially erodible land

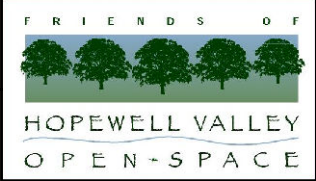
 Highly erodible land

Locator Map



0 1 2 Miles






Hopewell Valley Community Stewardship Plan Map 4-3

Soil Characteristics-
Hydric Class
of the Hopewell Valley

Legend

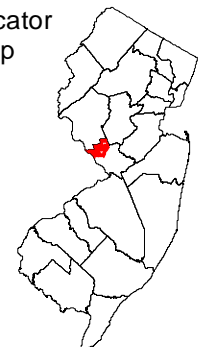
 FoHVOS Preserves

Soil Characteristics Hydric Class

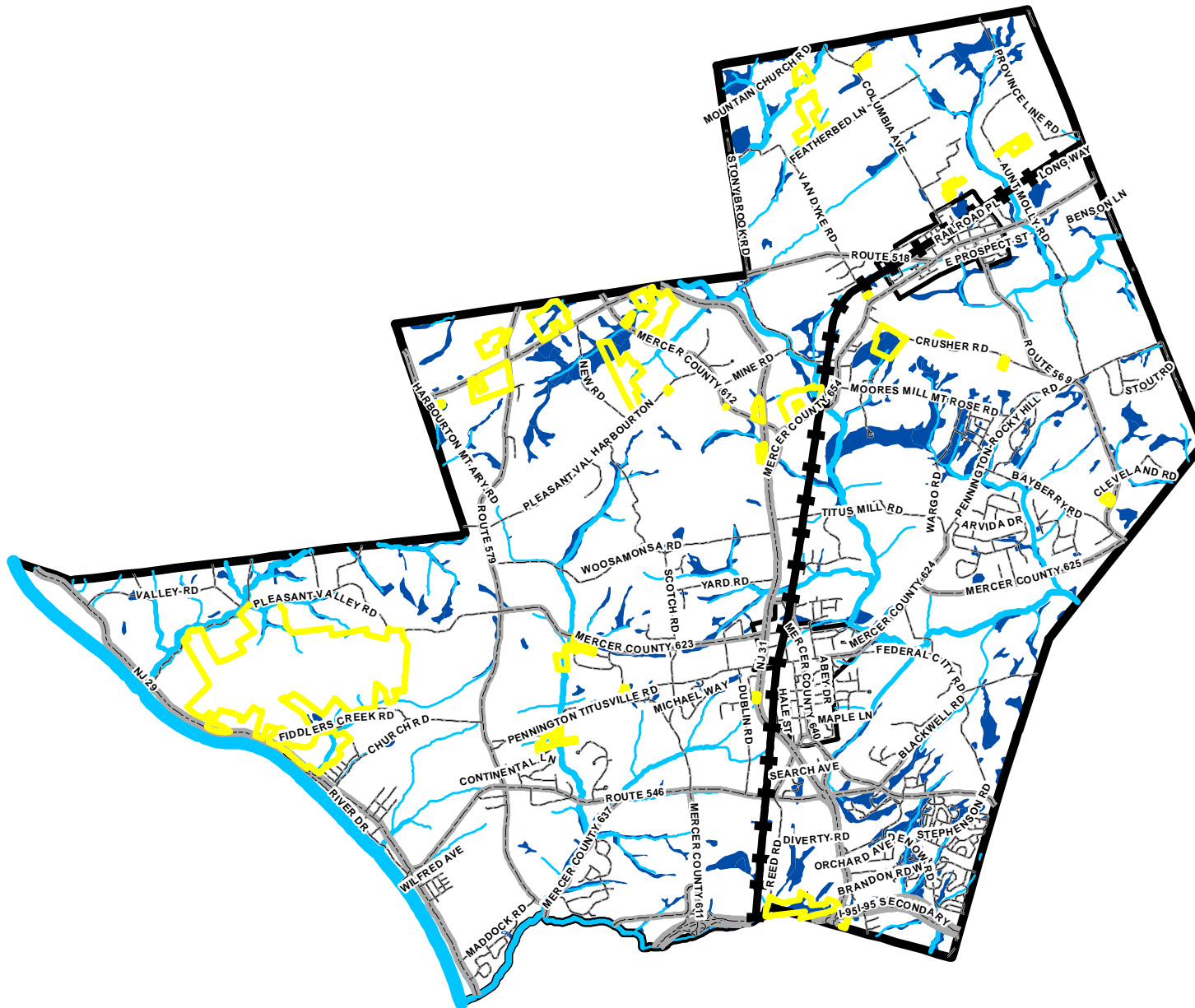
 Not rated or evaluated

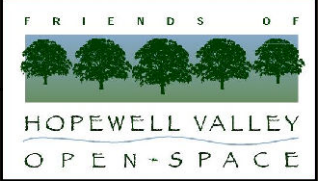
 Hydric Soil

Locator Map



0 1 2 Miles






Hopewell Valley Community Stewardship Plan

Map 4-4


Soil Characteristics- Drainage Class of the Hopewell Valley


Legend


 FoHVOS Preserves


Soil Characteristics


Drainage Class


 Not rated or evaluated

 Poorly Drained

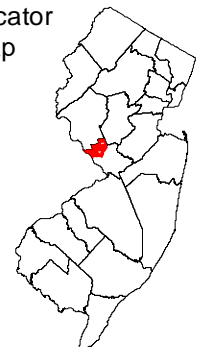
 Somewhat Poorly Drained

 Moderately Well Drained

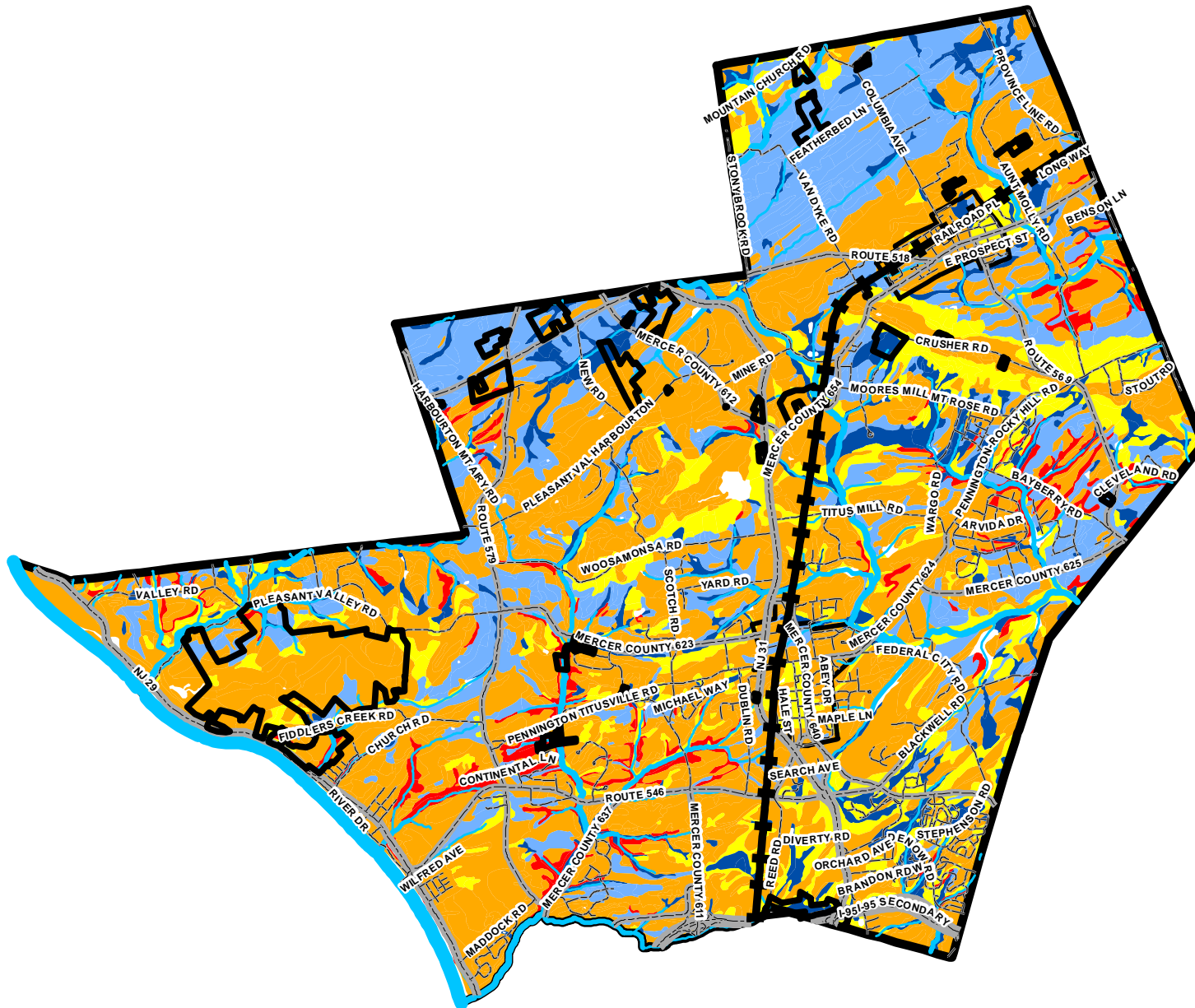
 Well Drained

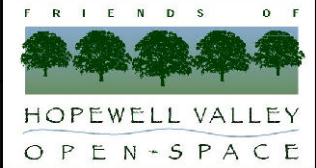
 Somewhat Excessively Drained

Locator Map



0 1 2 Miles





Hopewell Valley Community Stewardship Plan Map 4-5

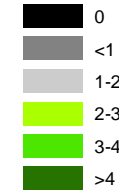
Soil Characteristics-
Bedrock Depth Class
of the Hopewell Valley

Legend

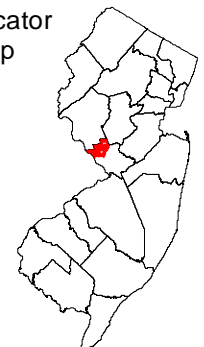
 FoHVOS Preserves

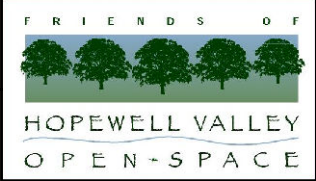
**Soil Characteristics
Bedrock Depth Class (feet)**

Not rated or evaluated



Locator
Map






Hopewell Valley Community Stewardship Plan

Map 4-6





Soil Characteristics-
Stone Cover Class
of the Hopewell Valley

Legend

 FoHVOS Preserves

Soil Characteristics

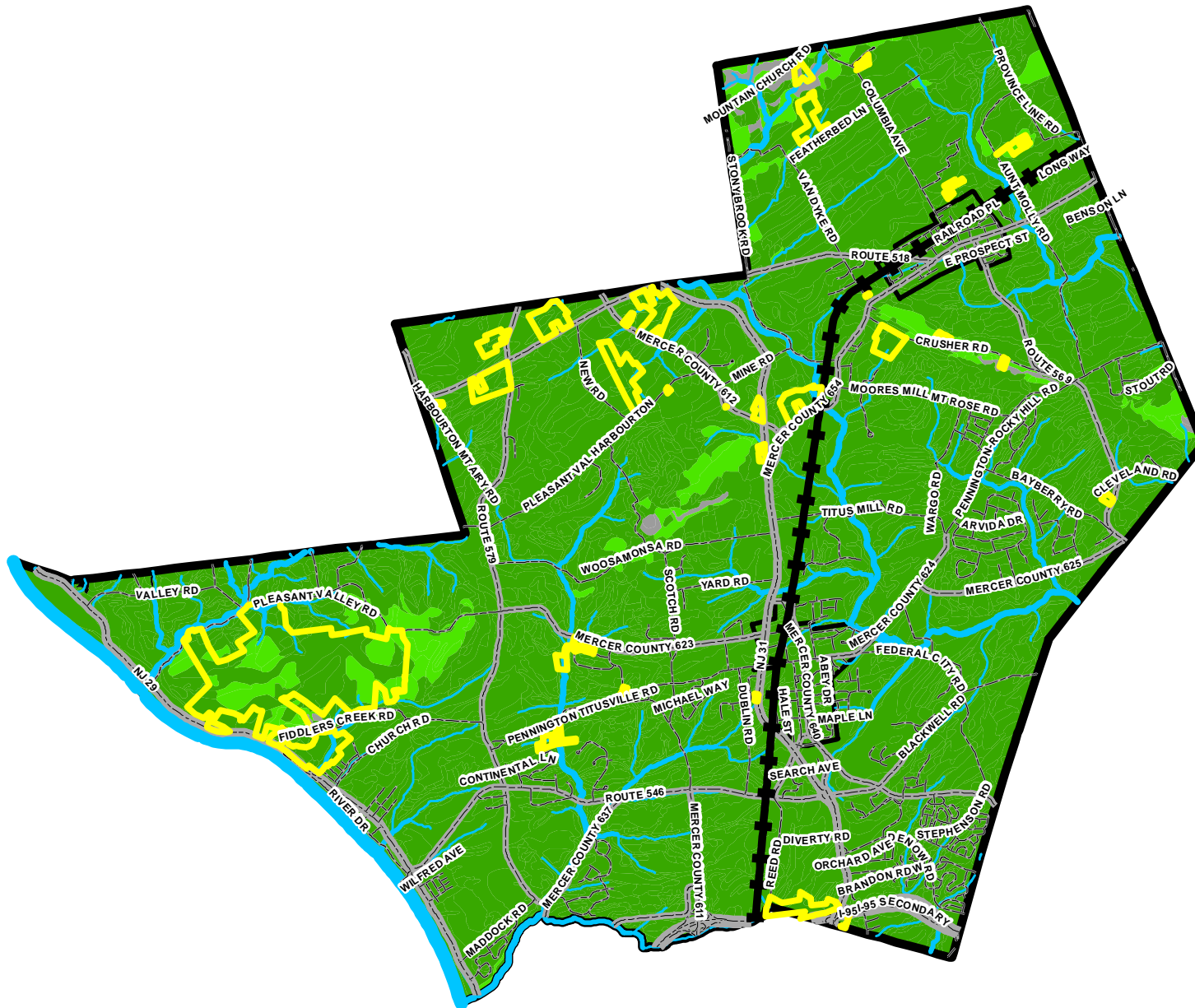
Stone Cover Class (percent)

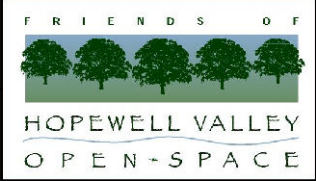
 0
 <2
 70
 100

Locator Map



0 1 2 Miles











Hopewell Valley Community Stewardship Plan

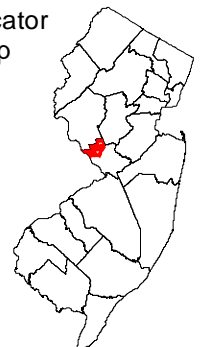
Map 4-7

Soil Characteristics- Groundwater Depth Class of the Hopewell Valley

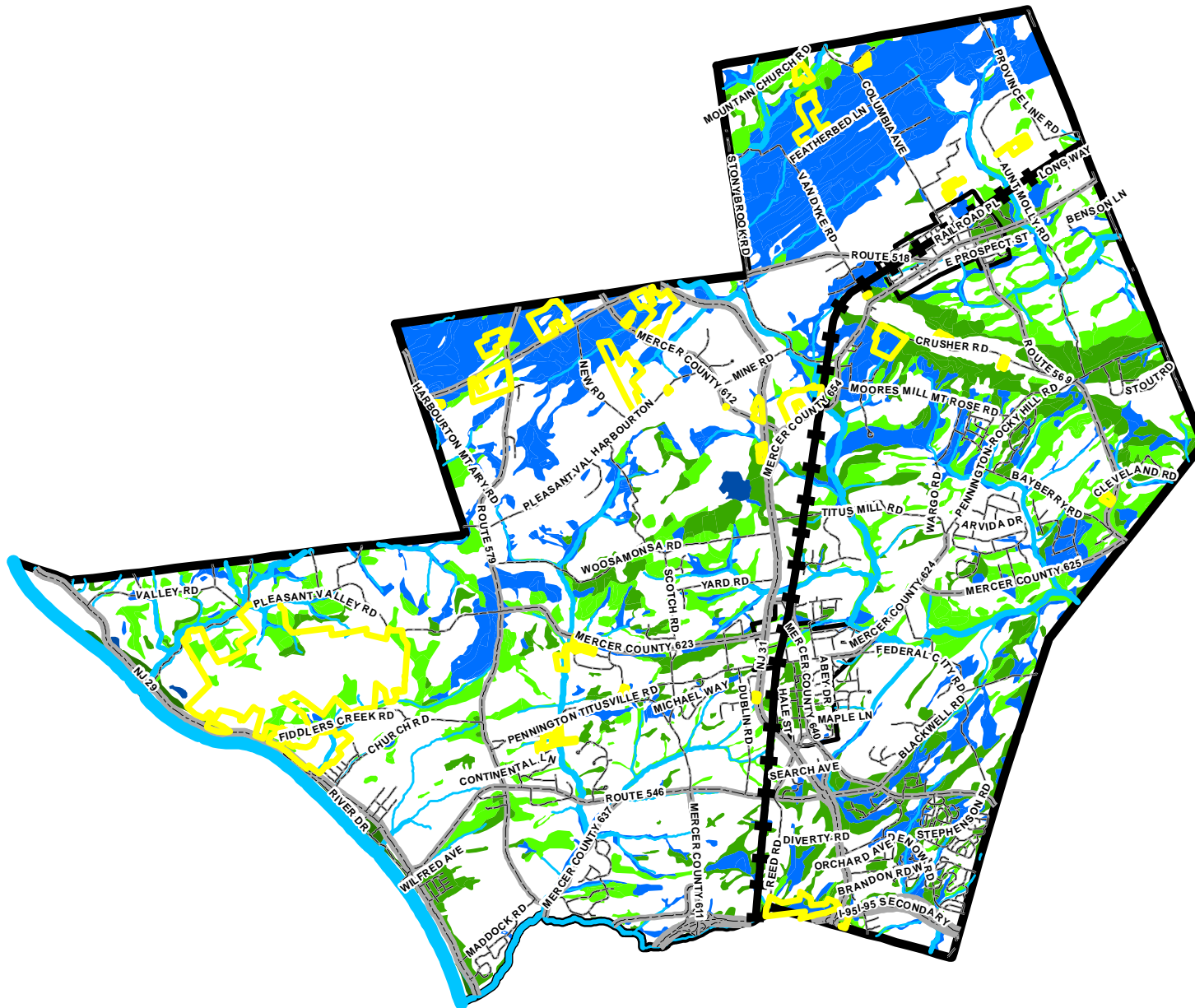
Legend

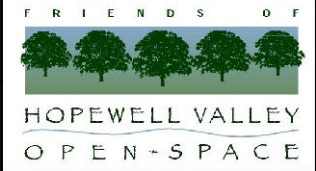
-  FoHVOS Preserves
- Soil Characteristics**
- Groundwater Depth Class (feet)**
- Not rated or evaluated
-  <1
-  1-2
-  2-3
-  3-4
-  >4

Locator Map



0 1 2 Miles





Hopewell Valley Community Stewardship Plan

Map 4-8

Soil Characteristics- Slope Class of the Hopewell Valley

Legend

FoHVOS Preserves

Soil Characteristics Slope Class (percent)

Not rated or evaluated

<5

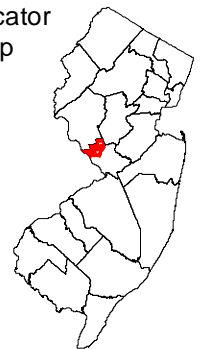
5-10

10-15

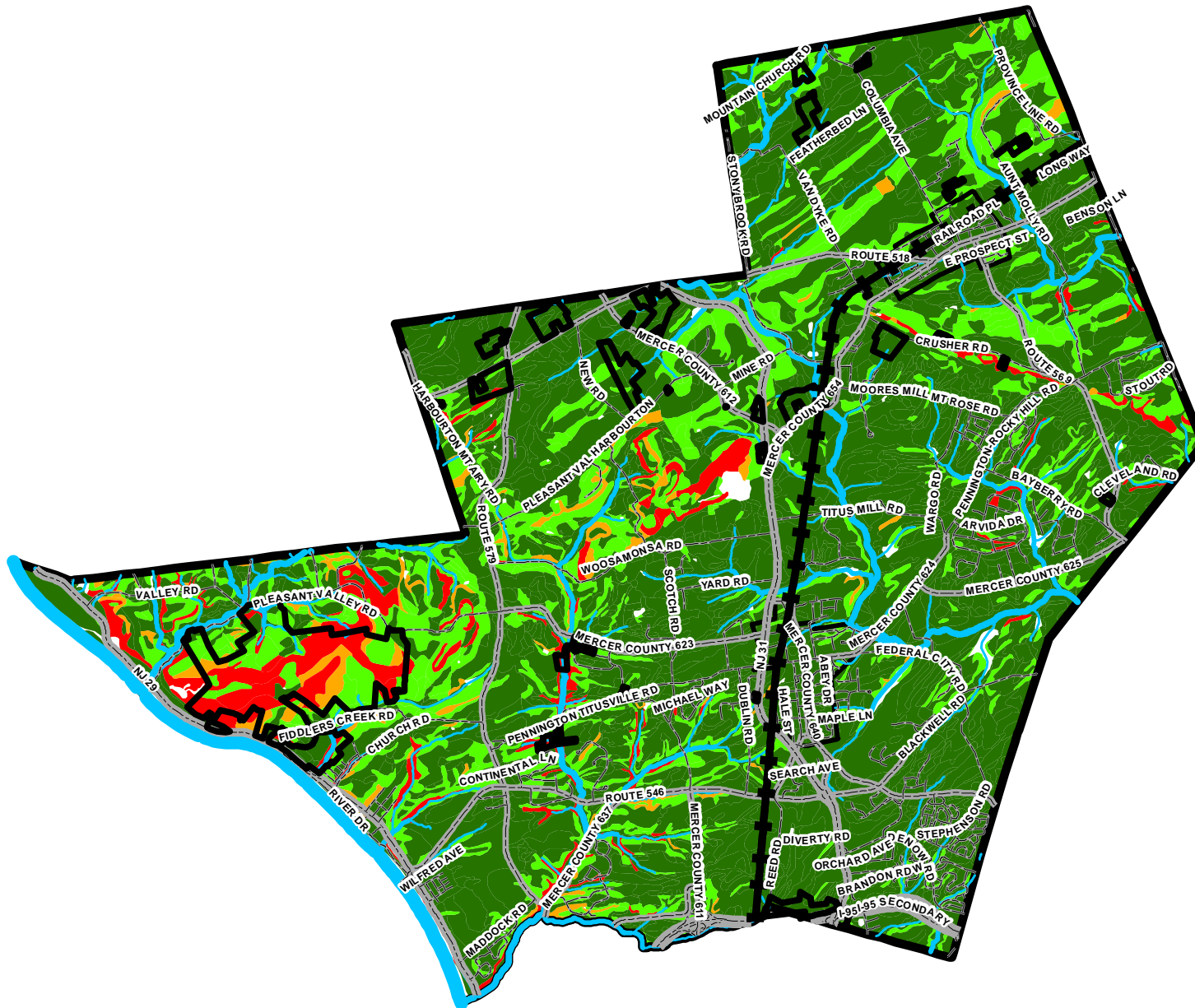
15-20

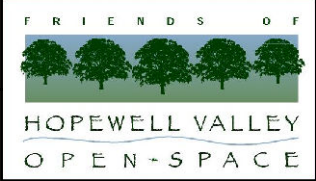
>20

Locator Map



0 1 2 Miles





Hopewell Valley Community Stewardship Plan

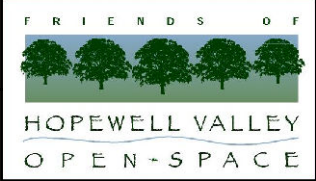
Map 6

Historic Aerial Photography (circa 1930) of the Hopewell Valley

Legend

 FoHVOS Preserves







Hopewell Valley Community Stewardship Plan

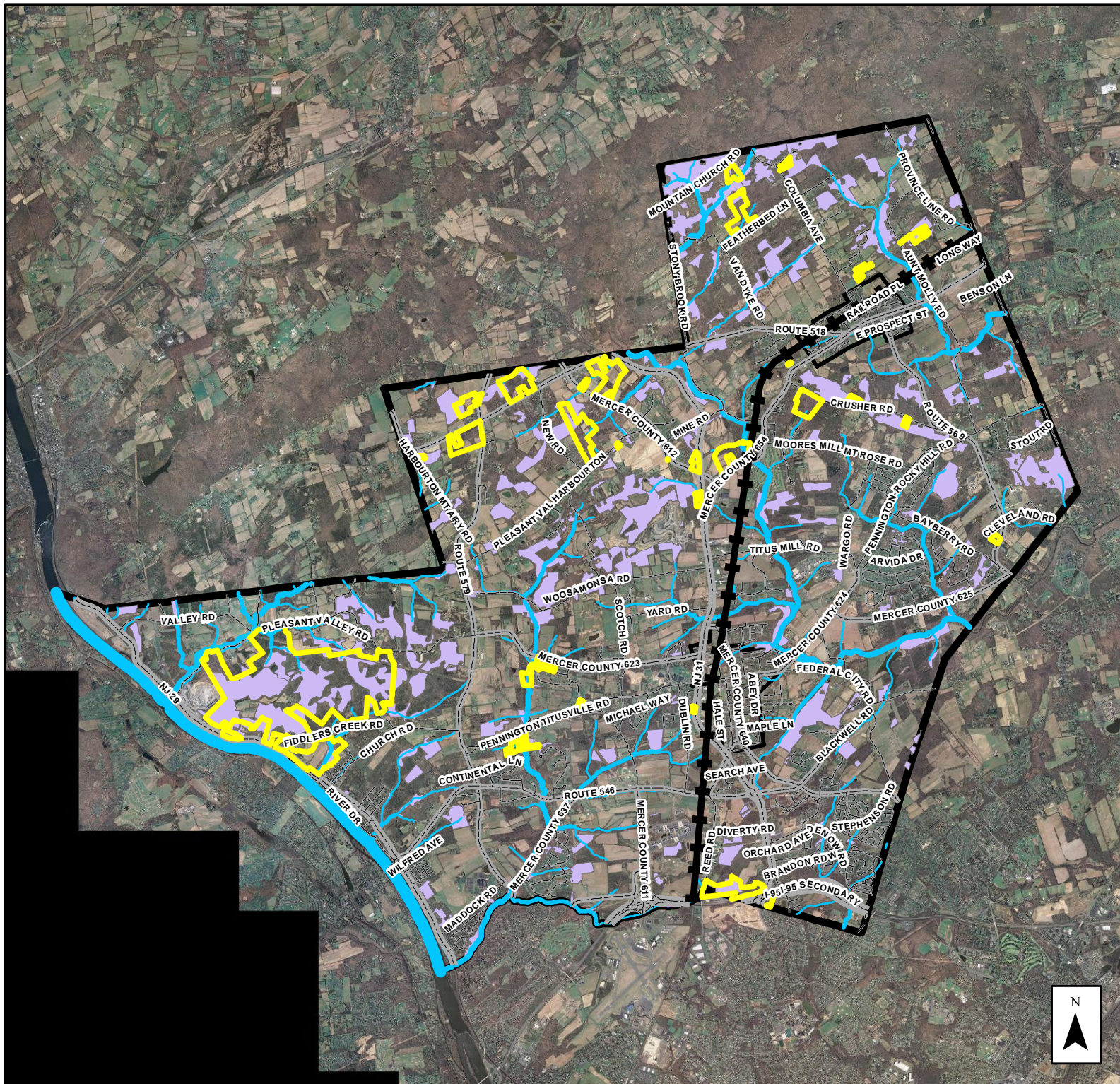
Map 7

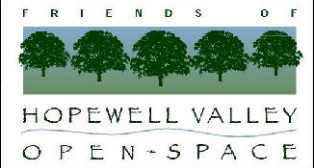
Historic and Current Forest Cover Overlap of the Hopewell Valley

Legend

-  FoHVOS Preserves
-  1930 and 2007 forest overlap

Locator Map





Hopewell Valley Community Stewardship Plan

Map 8

Land Cover Types (2007) of the Hopewell Valley

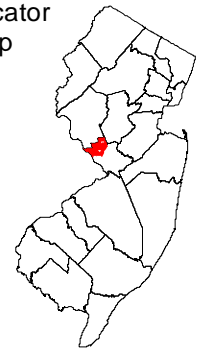
Legend

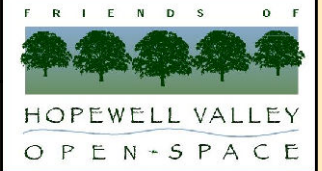
FoHVOS Preserves

Land Cover Types 2007

- Deciduous Forest
- Coniferous Forest
- Deciduous Woodland
- Coniferous Woodland
- Shrubland
- Meadow
- Open Water
- Agriculture
- Barren
- Urban

Locator Map





Hopewell Valley Community Stewardship Plan

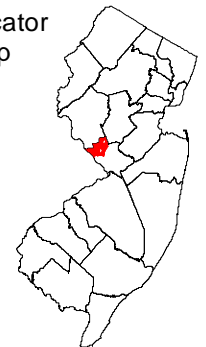
Map 9

Protected Lands
of the Hopewell Valley

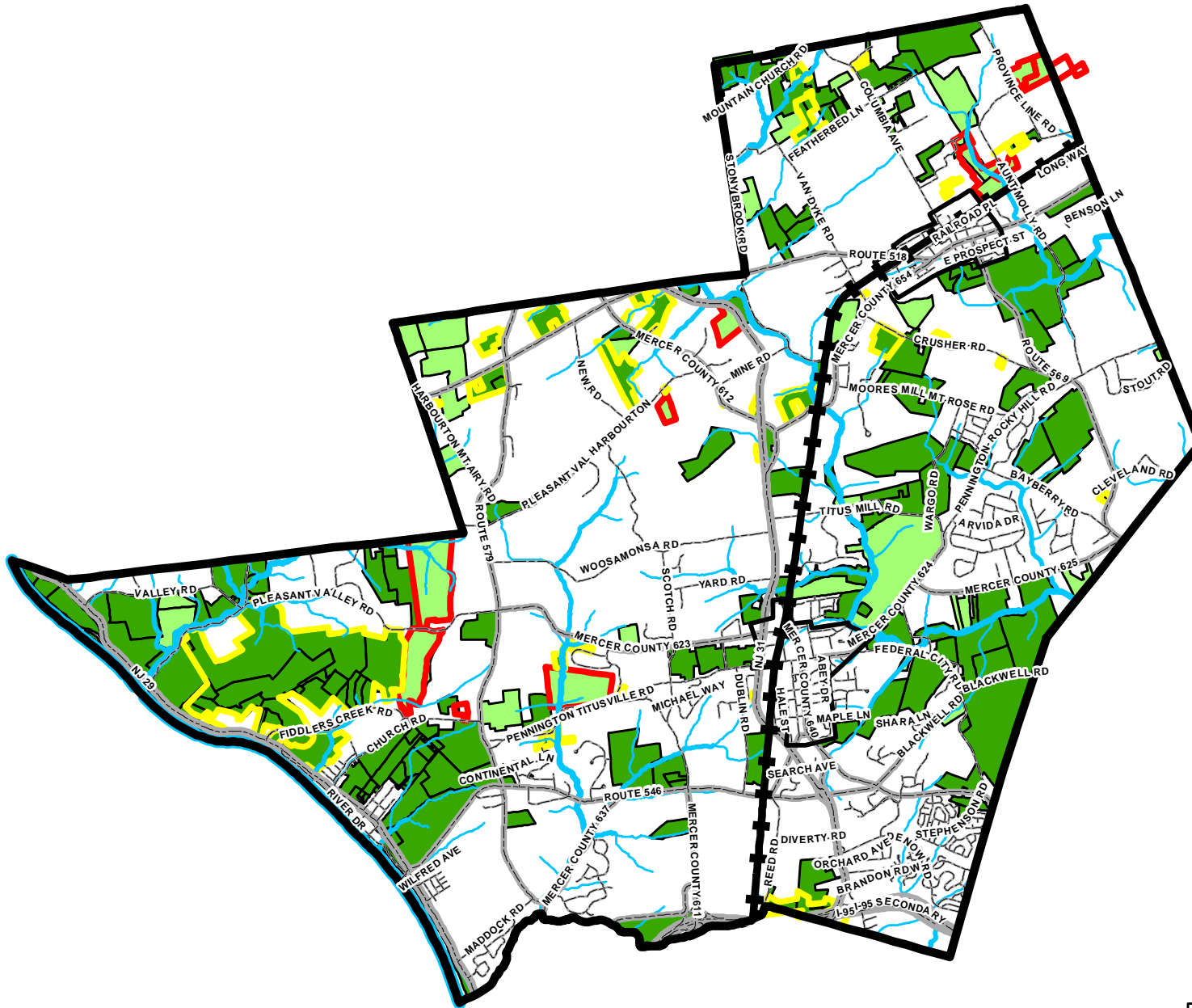
Legend

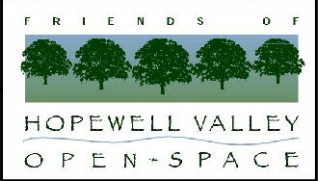
-  FoHVOS Preserves
-  FoHVOS Easements
-  Public Lands
-  Private Easements

Locator
Map



0 1 2 Miles






Hopewell Valley Community Stewardship Plan

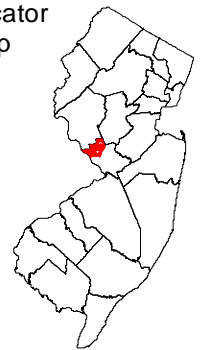
Map 10

Roadways and Railways of the Hopewell Valley

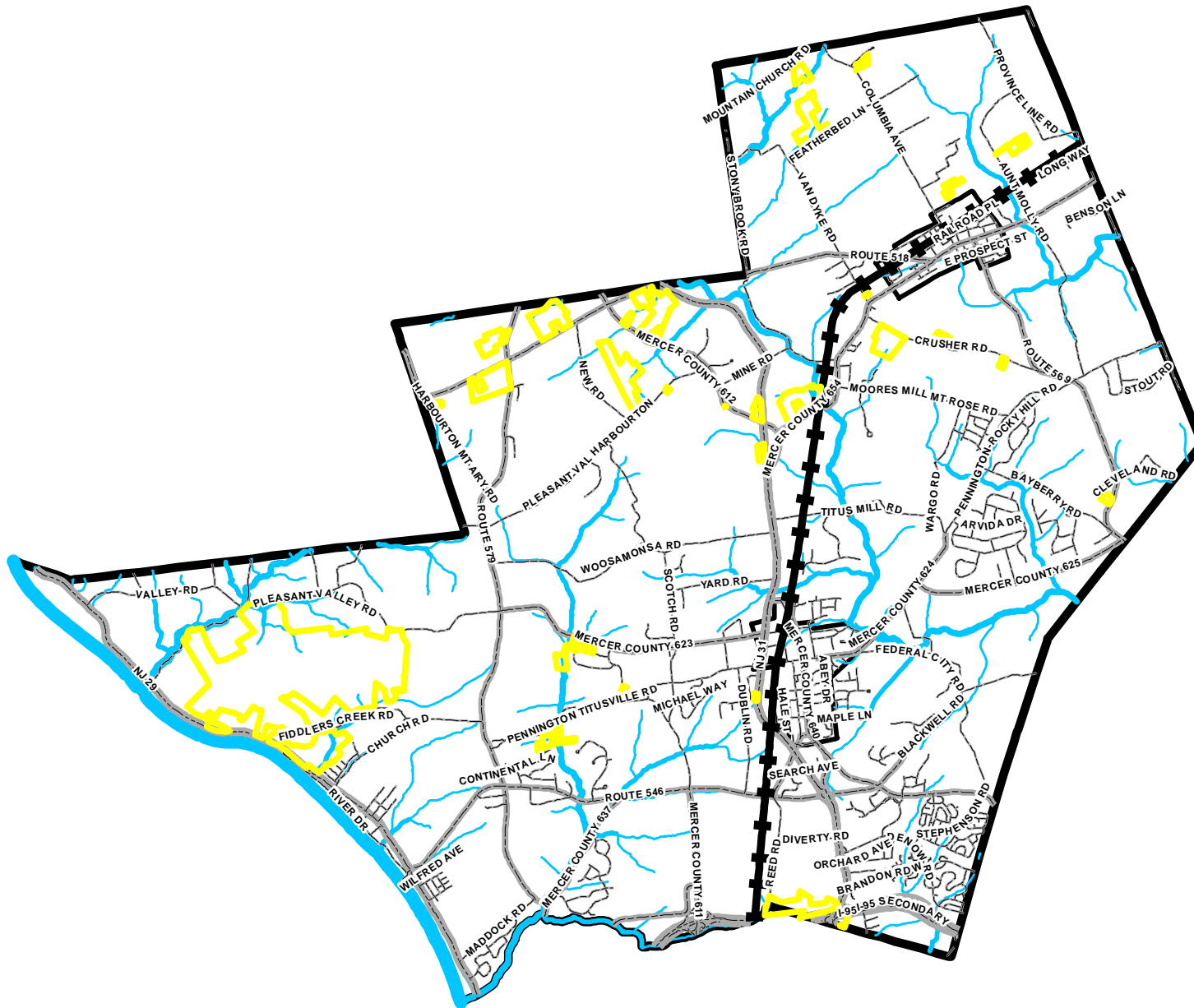
Legend

 FoHVOS Preserves

Locator Map



0 1 2 Miles


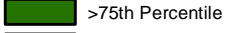
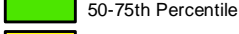
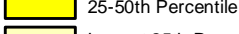
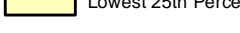


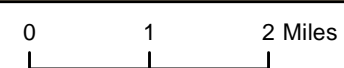
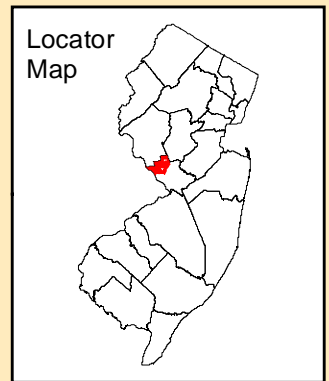
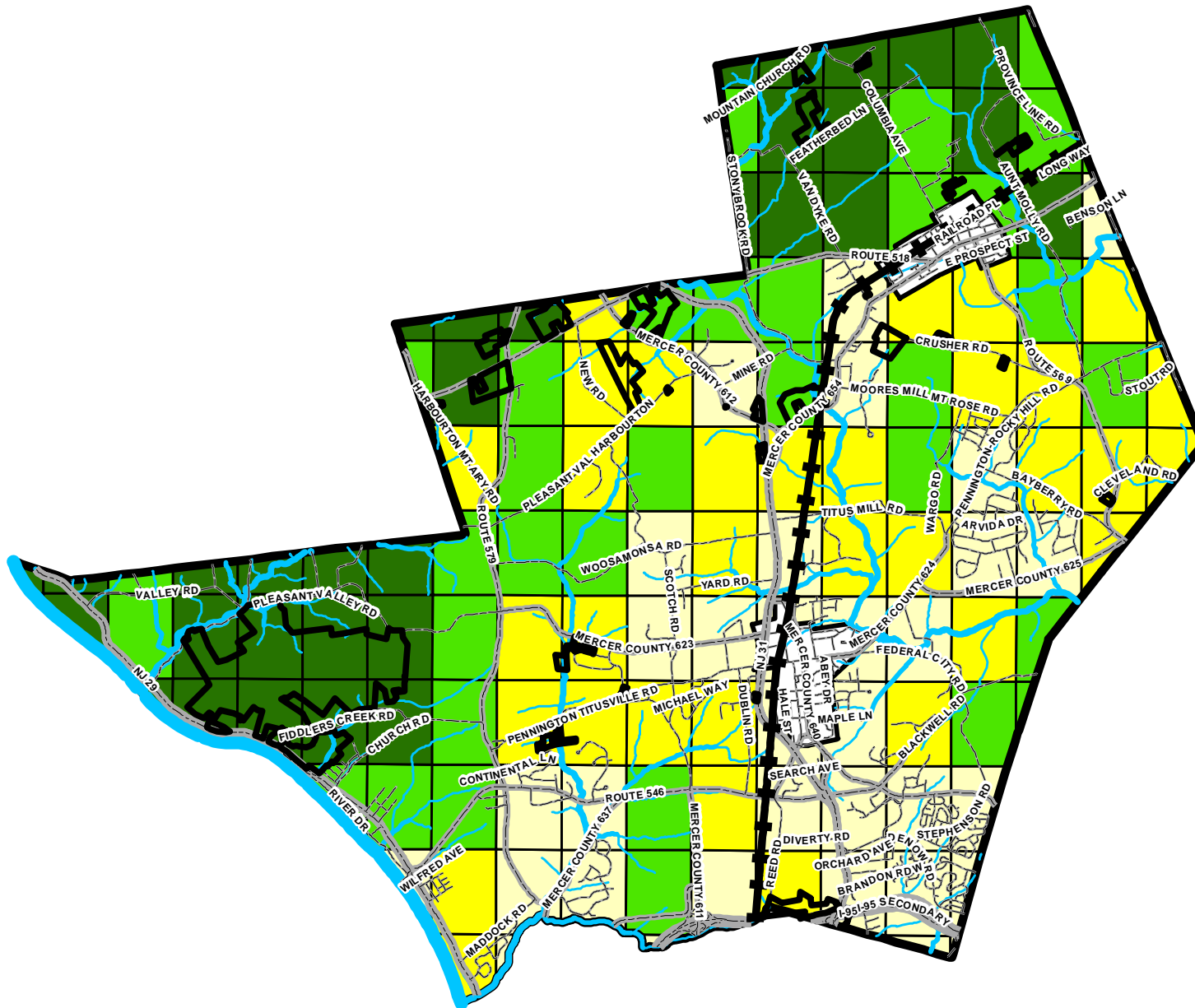
Hopewell Valley Community Stewardship Plan

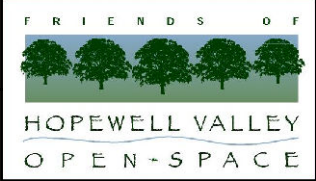
Map 11

Ecological Values Assessment of the Hopewell Valley

Legend

-  FoHVOS Preserves
- Ecological Values Summary**
-  >75th Percentile
-  50-75th Percentile
-  25-50th Percentile
-  Lowest 25th Percentile







Hopewell Valley Community Stewardship Plan Map 12

Landscape Project Patch Ranks of the Hopewell Valley

Legend

 FoHVOS Preserves

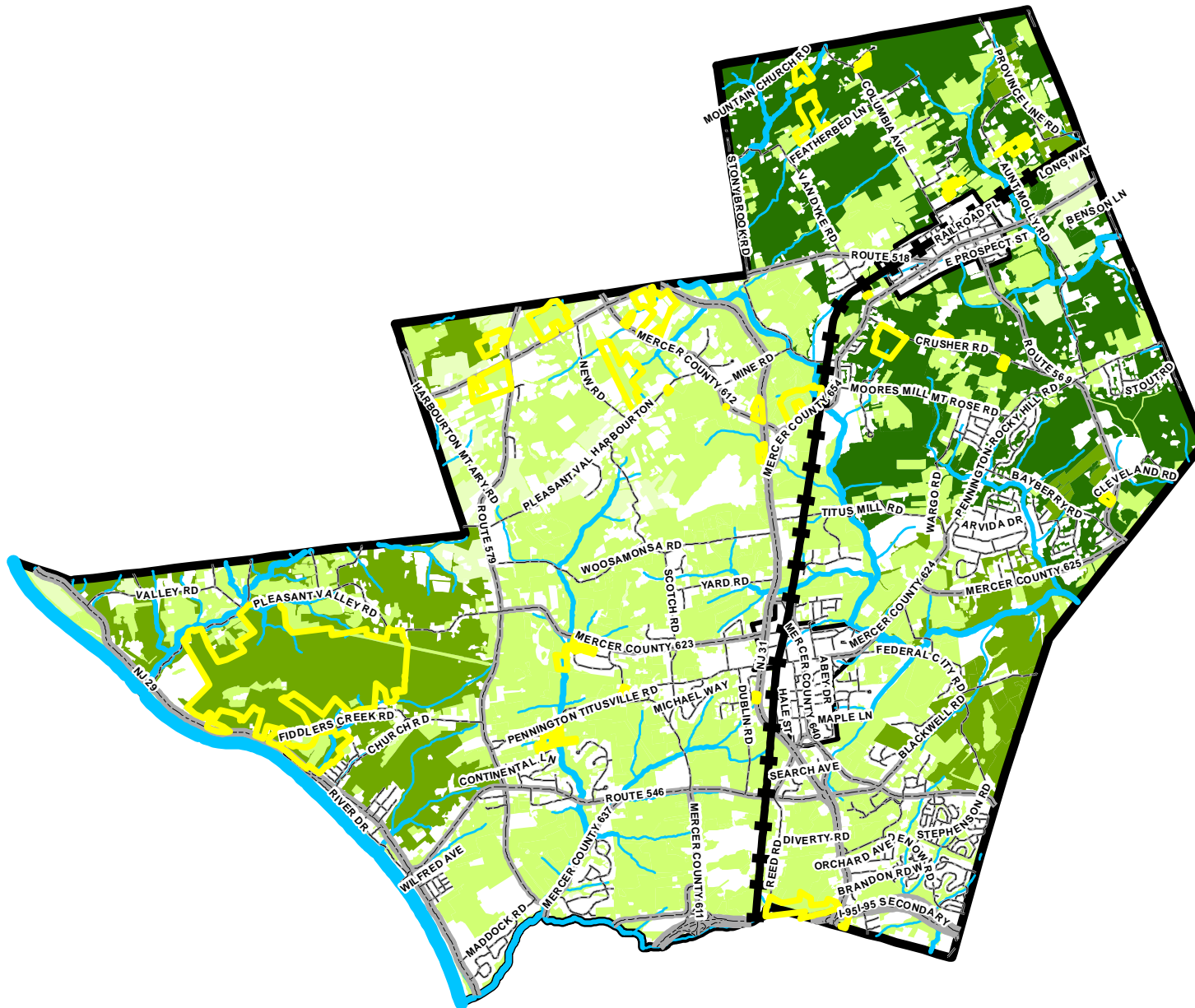
Landscape Project Habitat Ranks

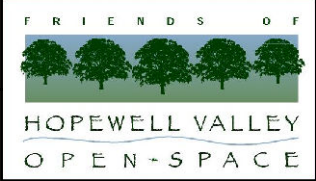
-  1 (Suitable Habitat)
-  2 (State Special Concern)
-  3 (State Threatened)
-  4 (State Endangered)

Locator Map



0 1 2 Miles










Hopewell Valley Community Stewardship Plan Map 13

Landscape Project Patch Sizes of the Hopewell Valley

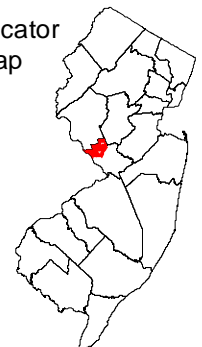
Legend

 FoHVOS Preserves

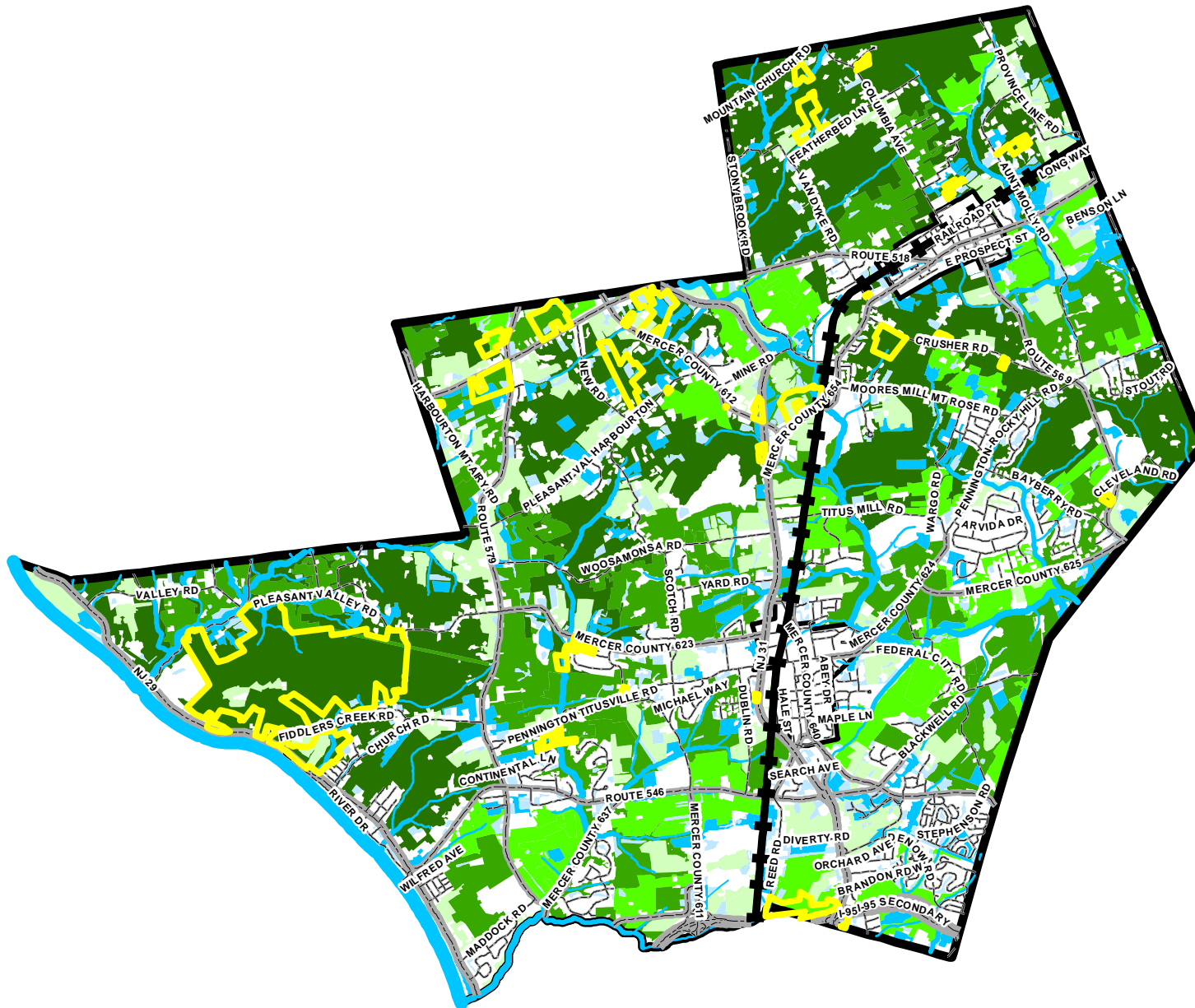
Landscape Project Patch Size

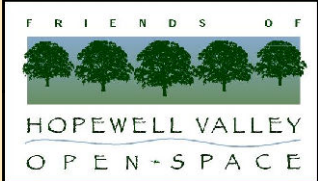
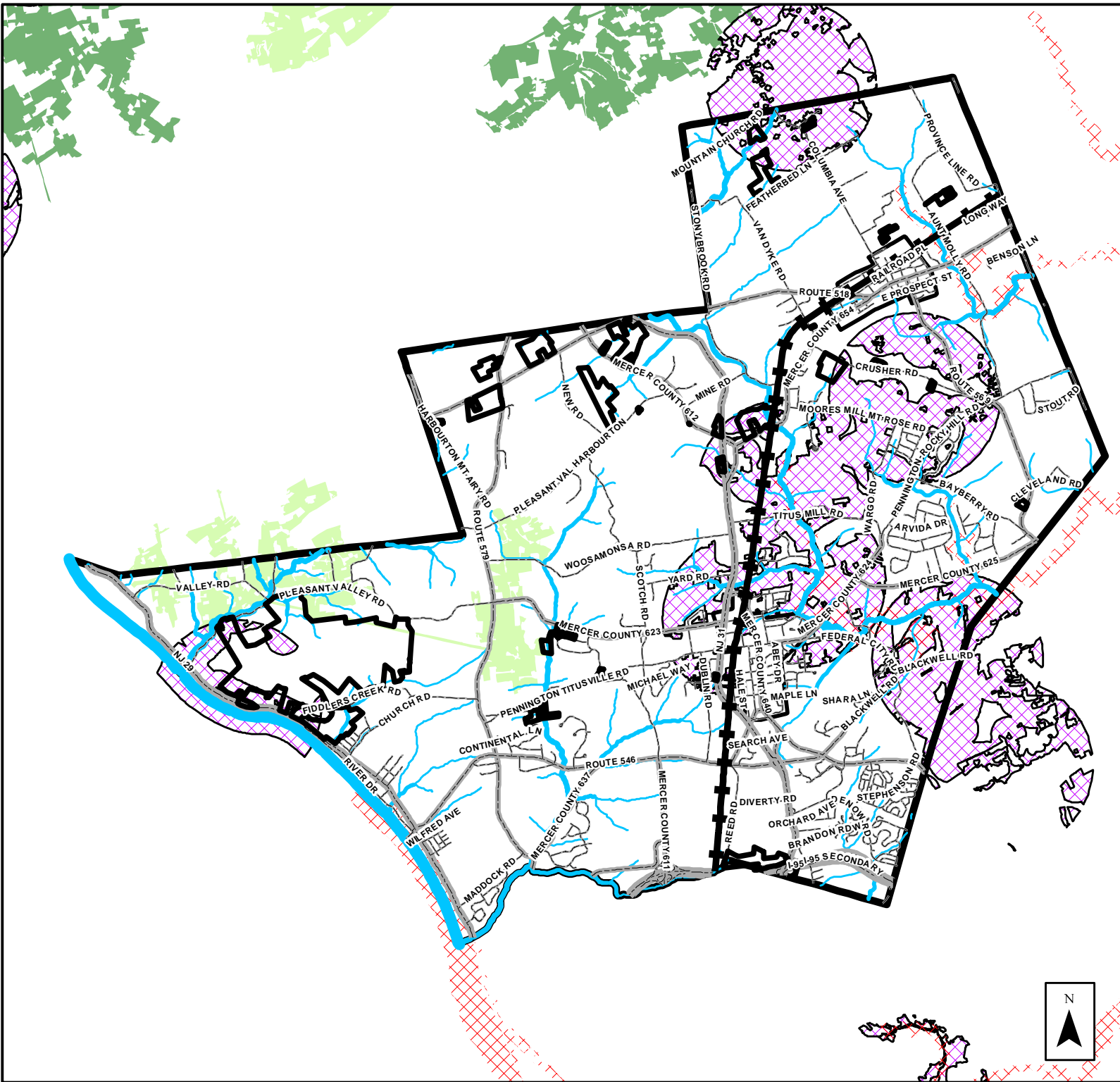
-  < 10 acres
-  10-25 acres
-  25 - 100 acres
-  100 - 250 acres
-  250 - 1000 acres
-  > 1000 acres

Locator Map



0 1 2 Miles








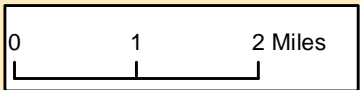
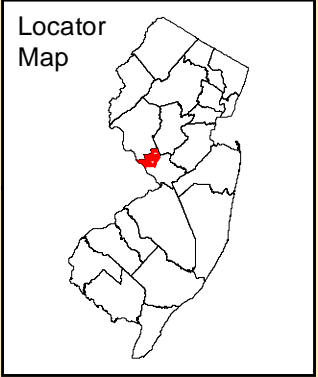


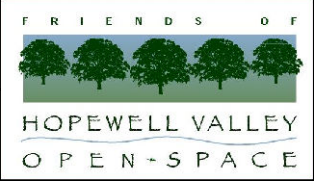
Hopewell Valley Community Stewardship Plan Map 14

Landscape Project Eagle,
Wood Turtle and
Kestral Habitat
of the Hopewell Valley

Legend

-  FoHVOS Preserves
-  Bald Eagle Foraging Habitat
-  Wood Turtle Habitat
- Kestrel Habitat Potential**
-  250-1000 Hectares - Good
-  > 1000 Hectares - Excellent









Hopewell Valley Community Stewardship Plan

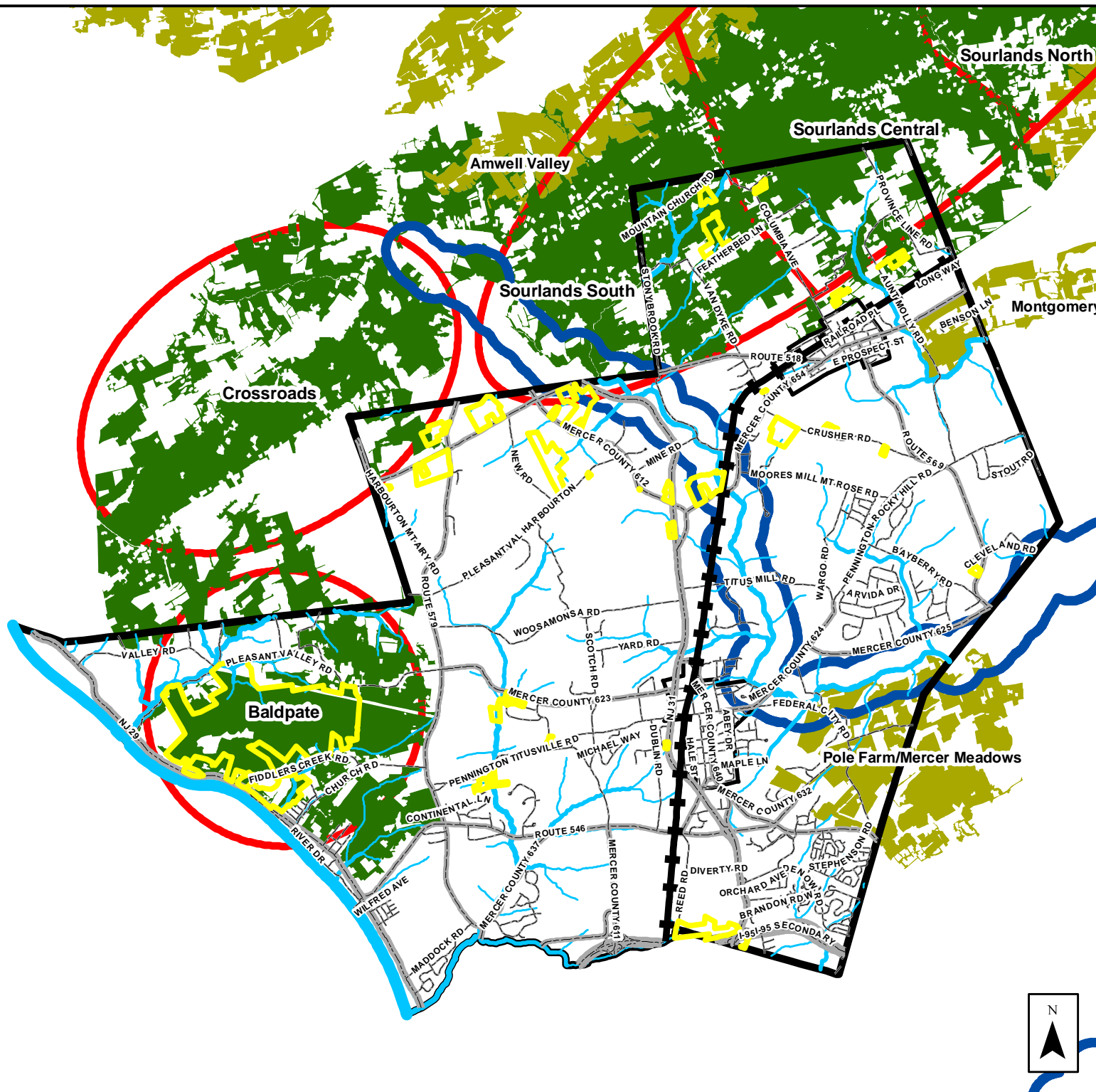
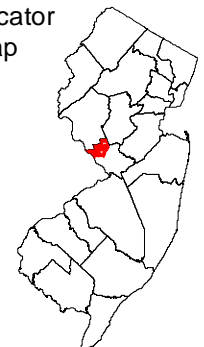
Map 15

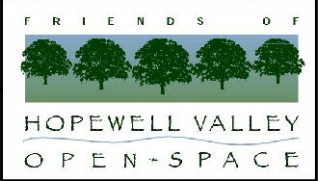
RPWHP Priority
Focal Areas

Legend

-  FoHVOS Preserves
-  RPWHP Priority Streams
-  RPWHP Forest Focal Patches
-  RPWHP Forest Focal Areas
-  RPWHP Grassland Focal Area

Locator Map







Hopewell Valley Community Stewardship Plan

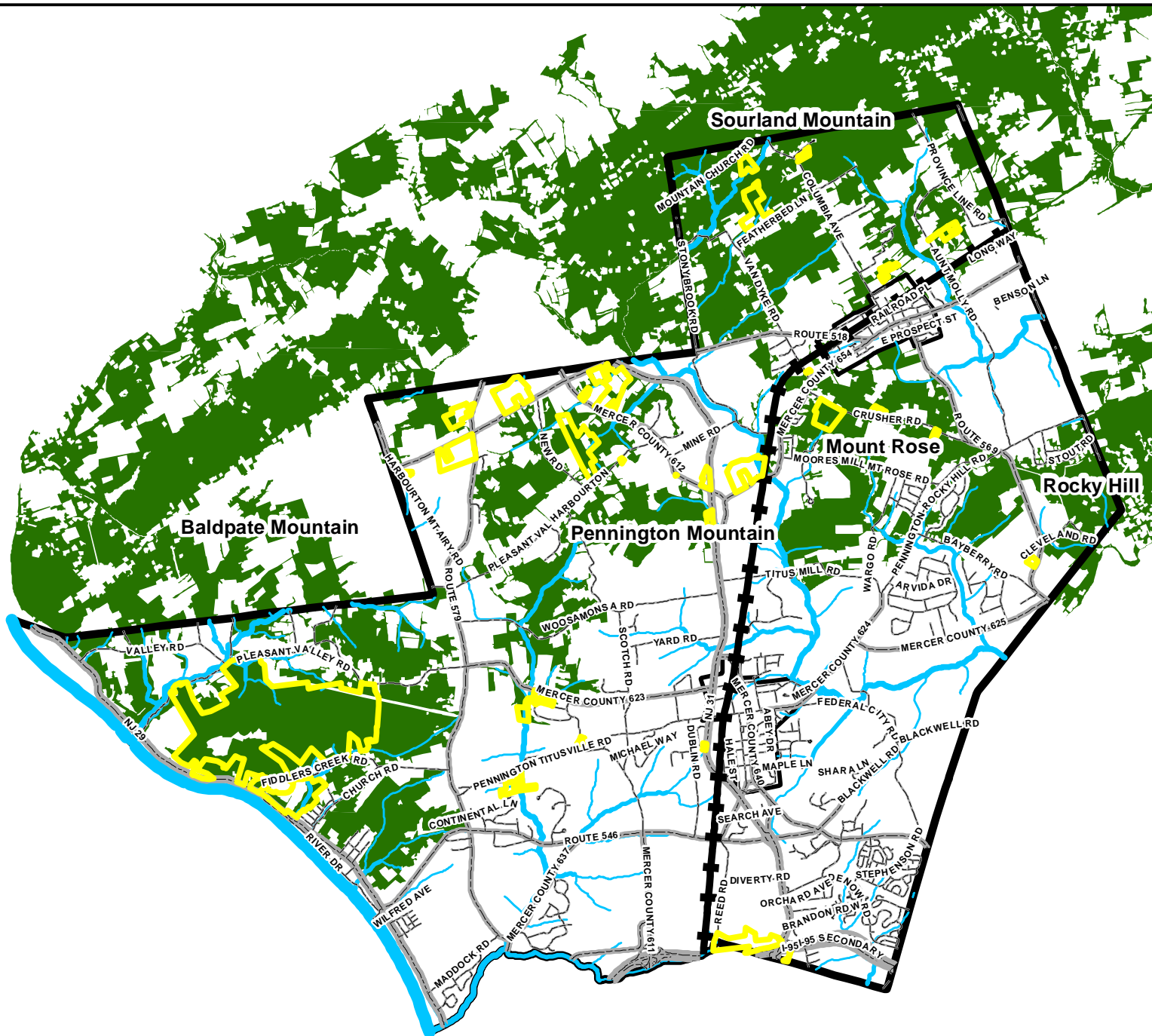
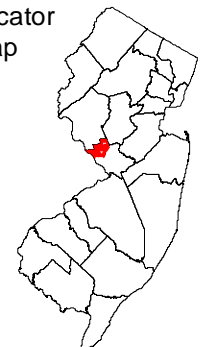
Map 16

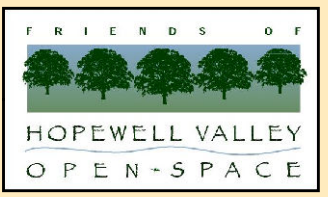
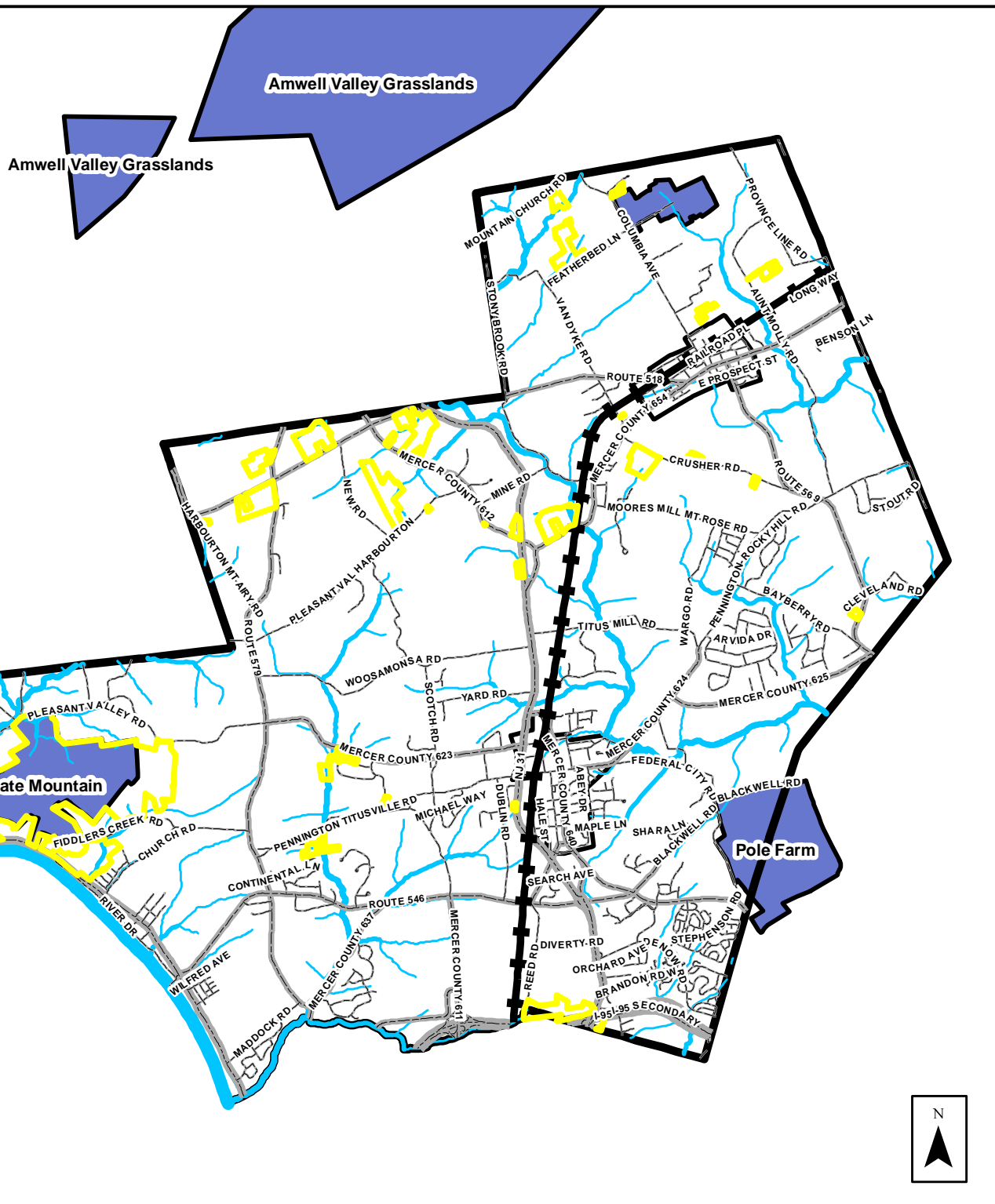
Large Forest Patches of the Hopewell Valley

Legend

-  FoHVOS Preserves
-  Hopewell Valley Large Forest Patches

Locator Map





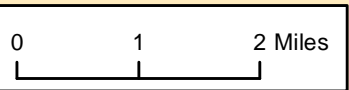
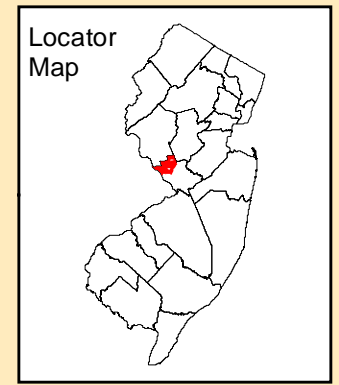
Hopewell Valley Community Stewardship Plan

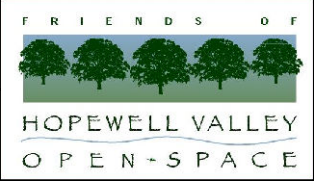
Map 17

New Jersey Audubon Important Bird Areas of the Hopewell Valley

Legend

- FoHVOS Preserves
- NJA Important Bird Areas





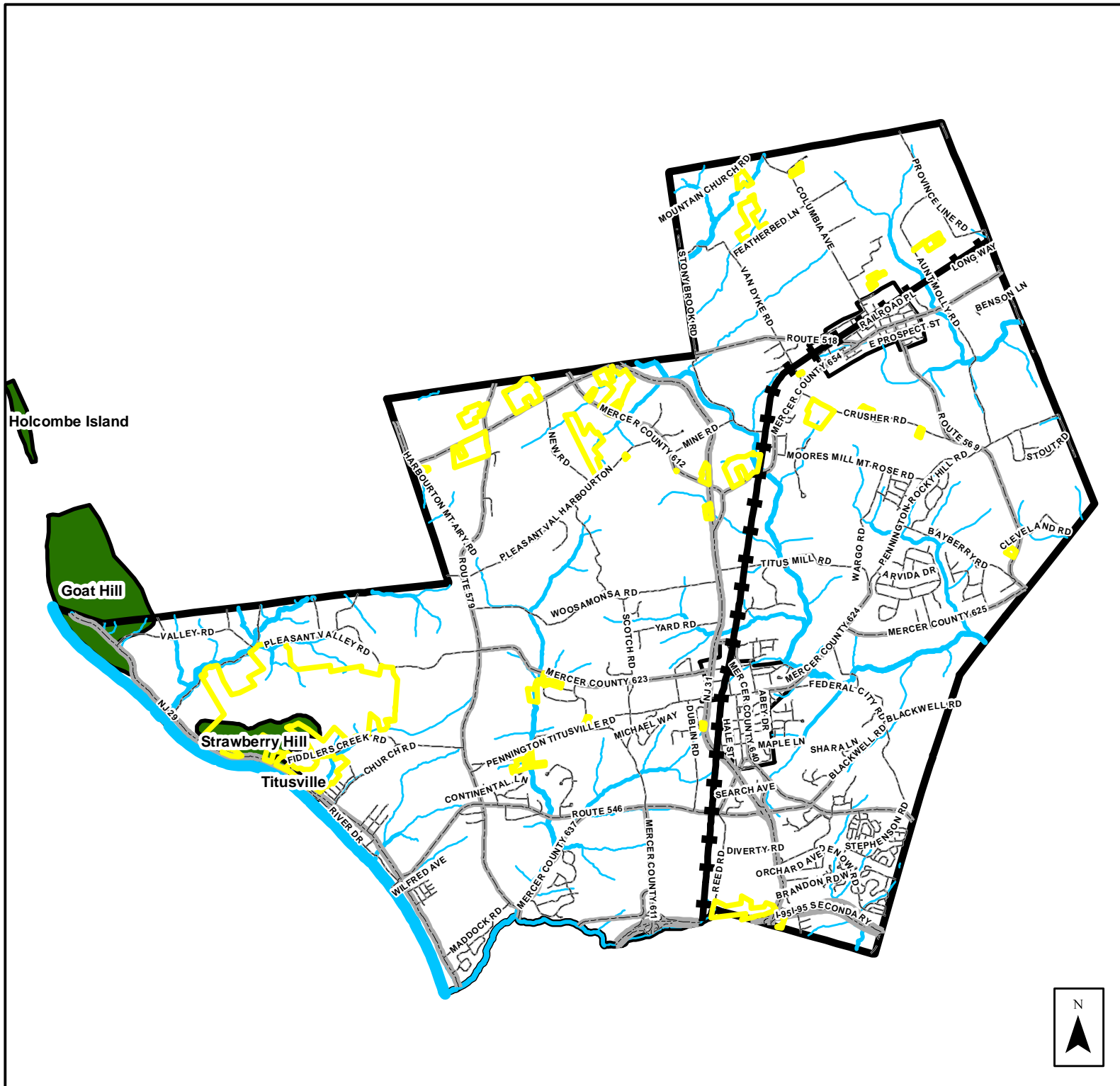
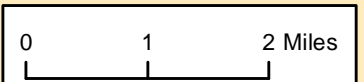
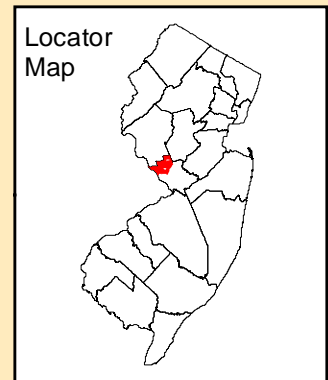


Hopewell Valley Community Stewardship Plan Map 18

New Jersey
Natural Heritage Program
Priority Sites
of the Hopewell Valley

Legend

-  FoHVOS Preserves
-  NJ Natural Heritage Priority Sites





Hopewell Valley Community Stewardship Plan

Map 19

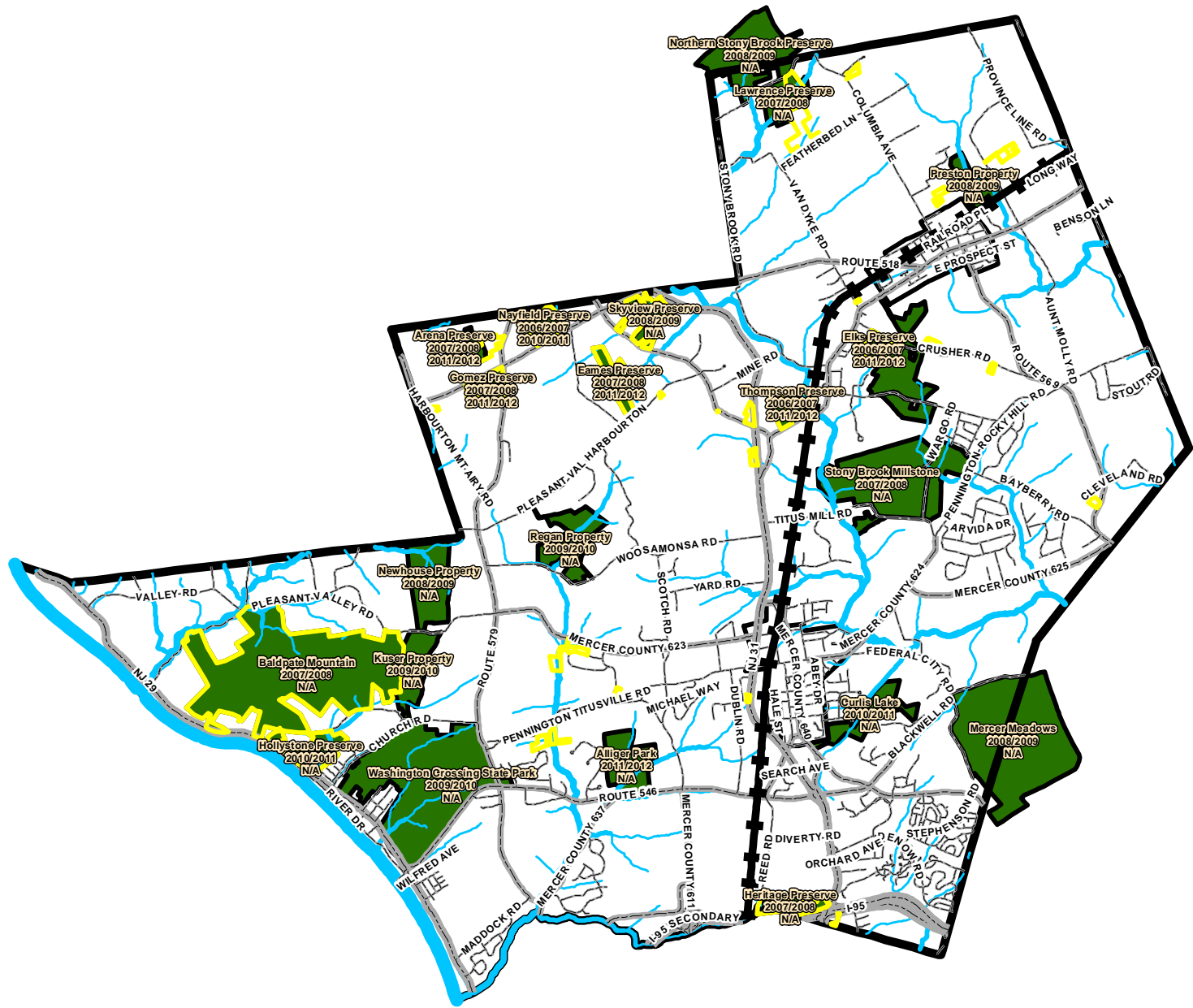
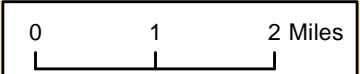
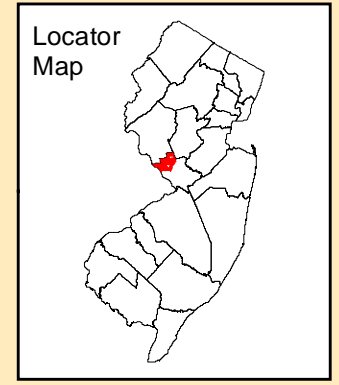
Forest Health Monitoring Sites in the Hopewell Valley (2006-2012)

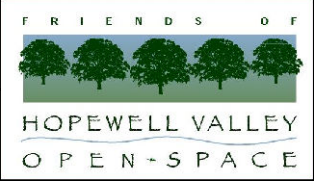
Legend

-  FoHVOS Preserves
-  Forest Health Study Areas

Forest Health Study Areas Label Key:

Site Name
 Year of Baseline Study
 Year of 2nd Measurement









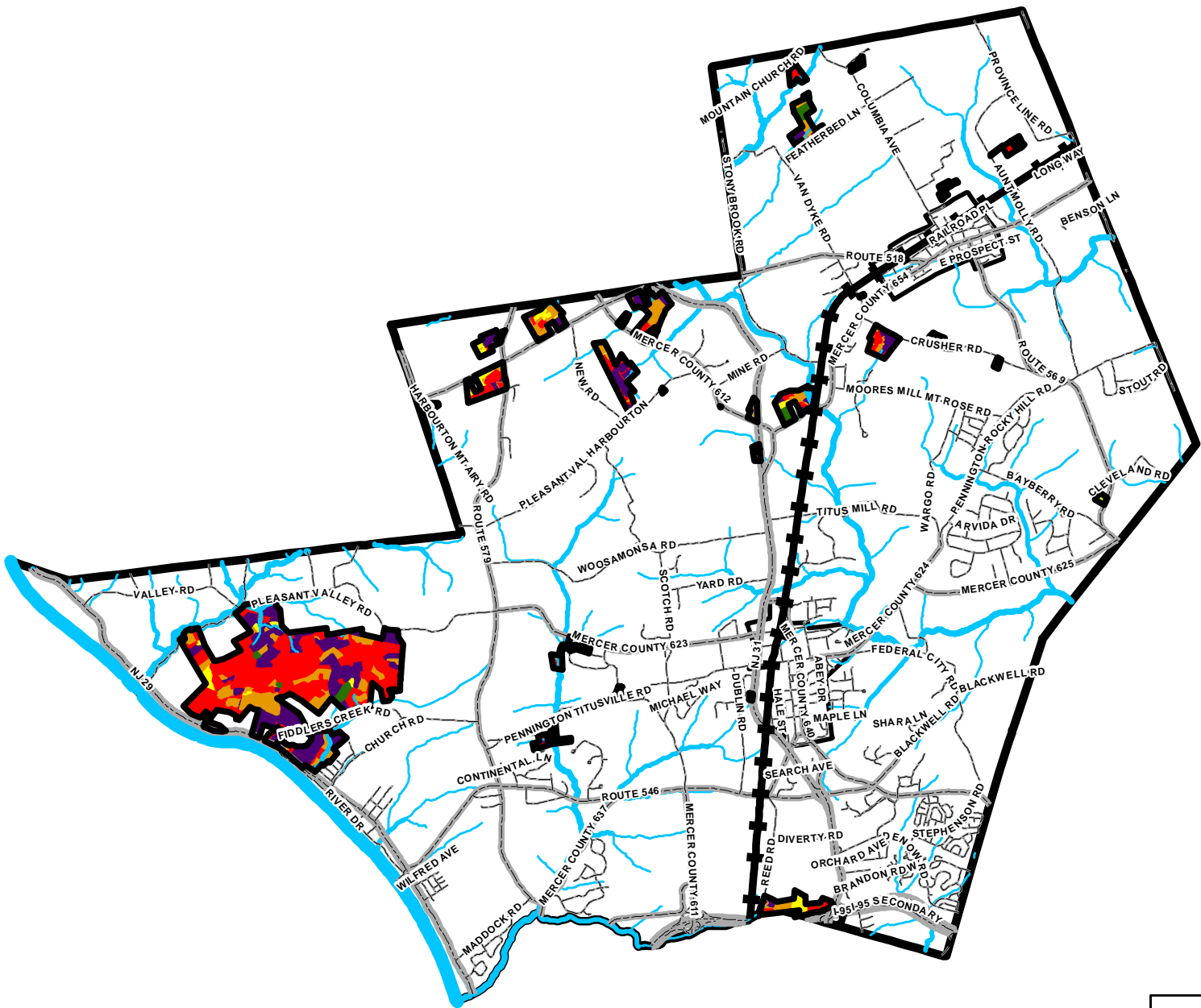
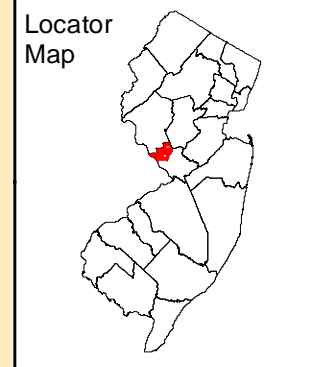


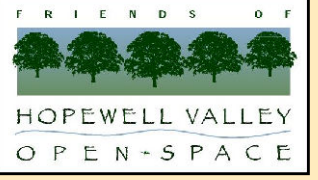
Hopewell Valley Community Stewardship Plan Map 20

**Invasive Species
on FoHVOS Preserves-
Number of Species
per Patch**

Legend

-  FoHVOS Preserves
-  No species
-  1 species
-  2 - 3 species
-  4 - 5 species
-  > 5 species



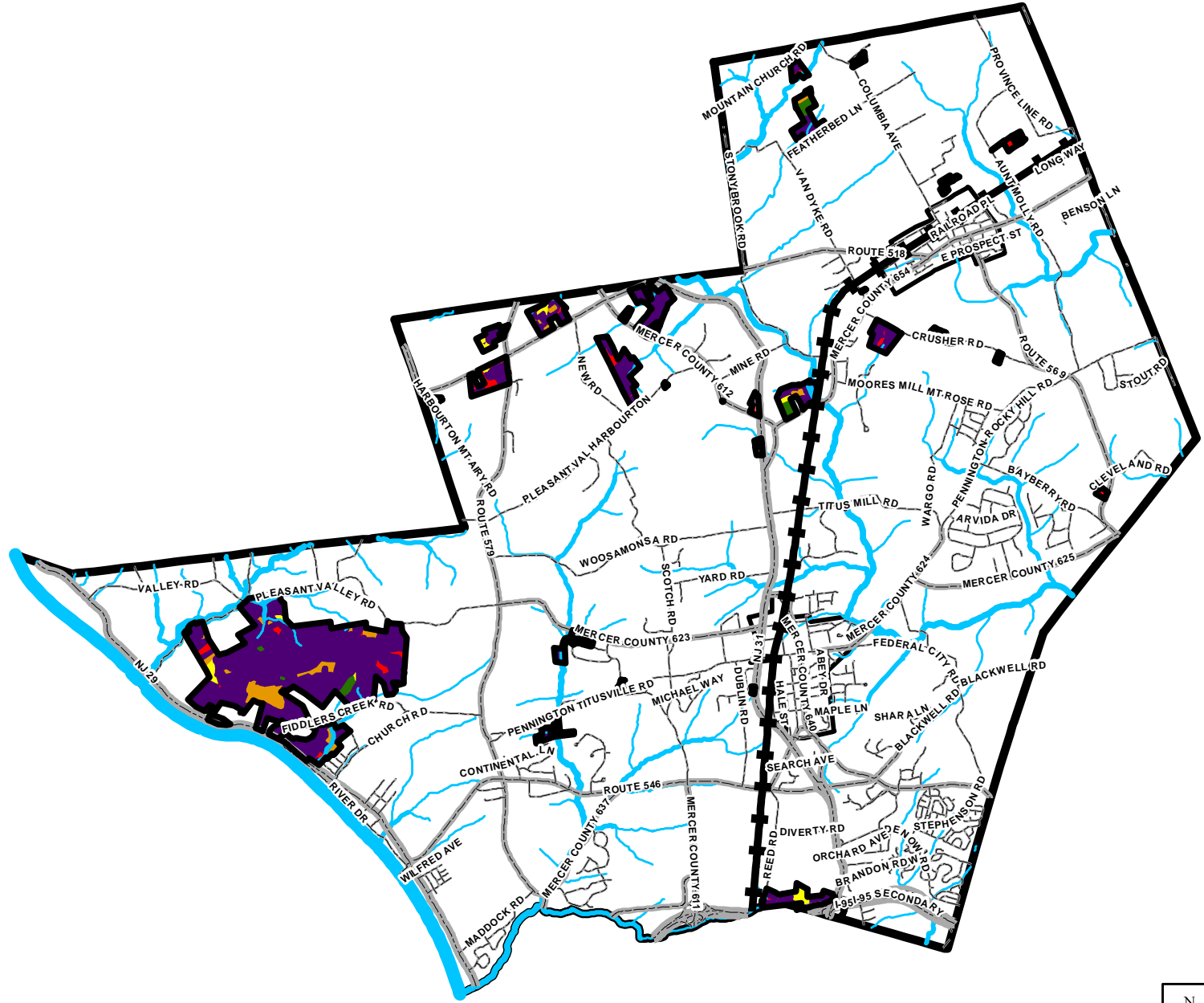
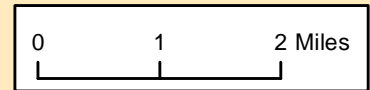
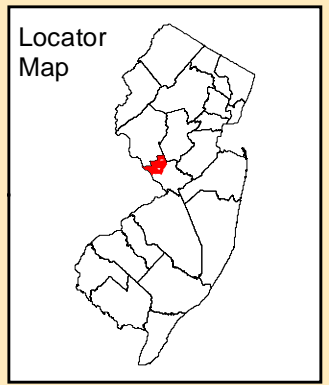


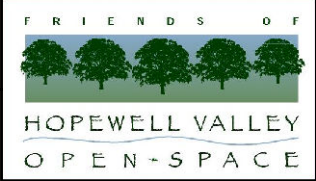
Hopewell Valley Community Stewardship Plan Map 21

**Invasive Species
on FoHVOS Preserves-
Infestation Severity
per Patch**

Legend

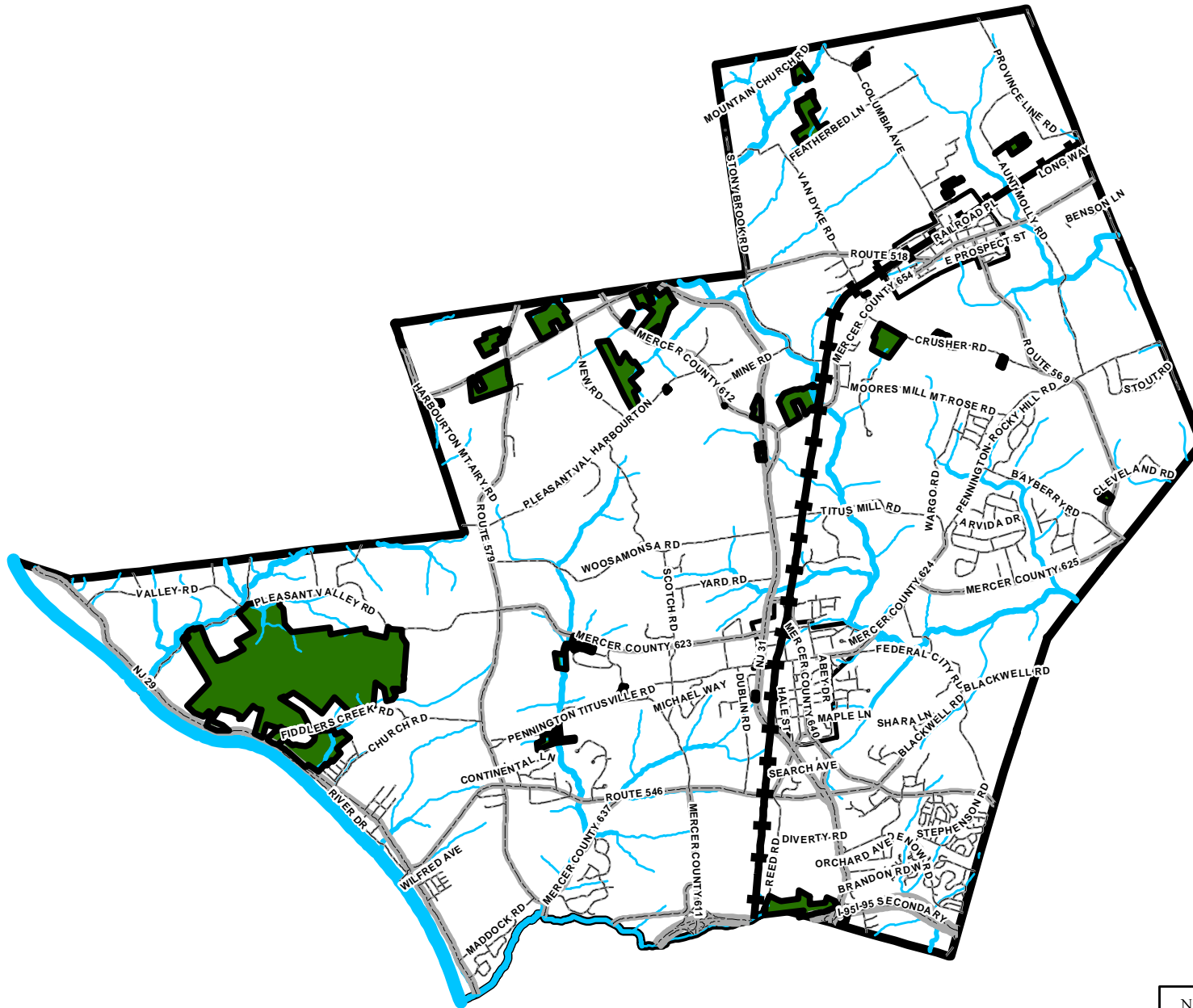
- FoHVOS Preserves
- Clean (CC=0)
- Low (CC=1)
- Moderate (CC= 2 or 3)
- High (CC=4 or 5)
- Very High (CC > 5)





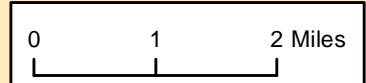
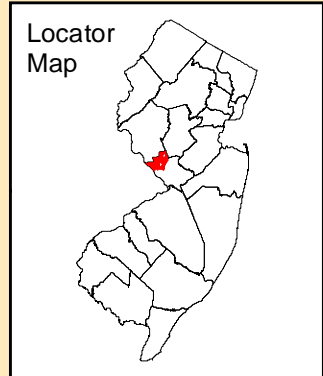
Hopewell Valley Community Stewardship Plan

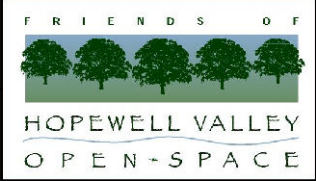
Map 22-1
 Invasive Species on FoHVOS Preserves
Acer palmatum
 (Japanese Maple)



Legend

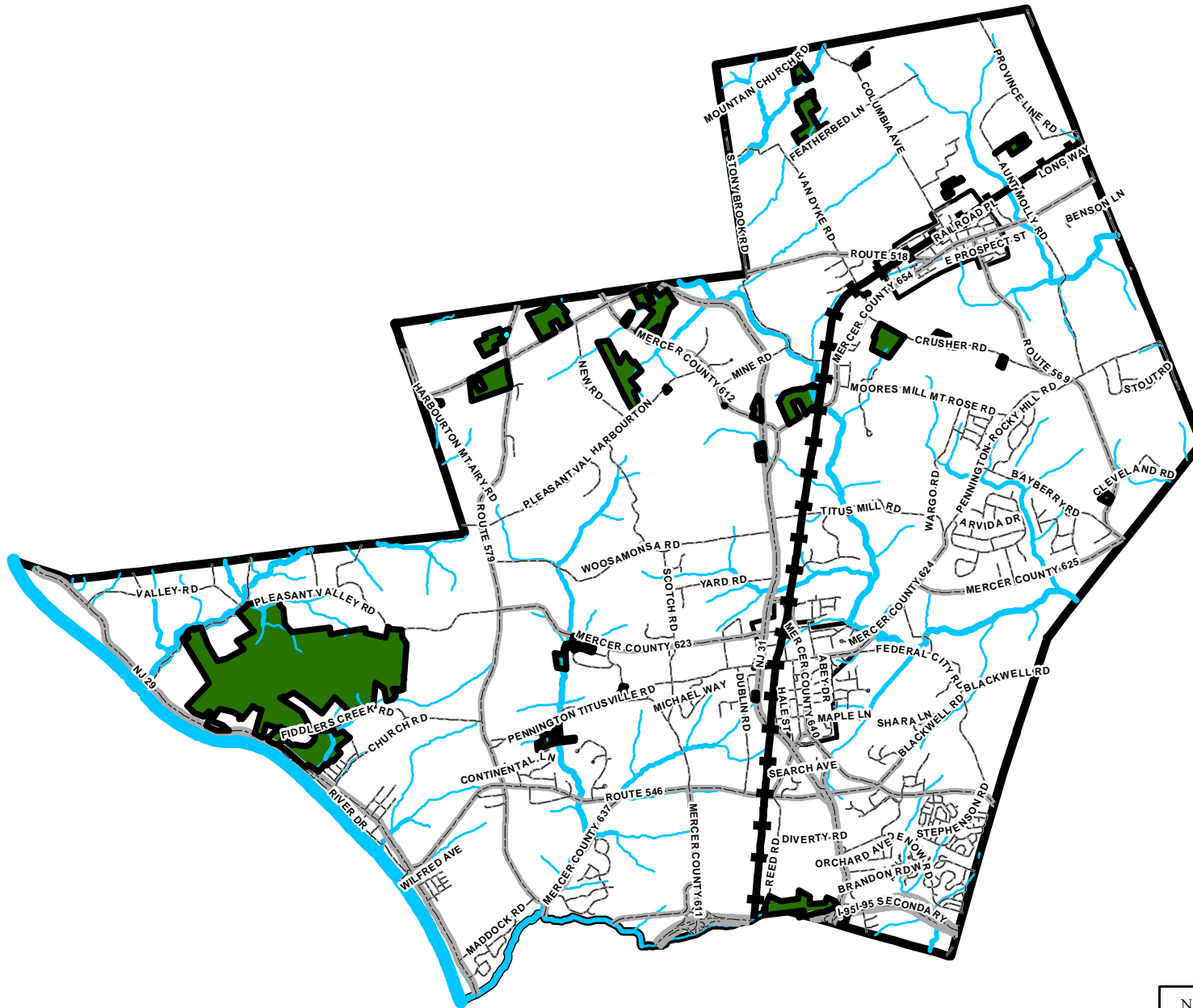
- FoHVOS Preserves
- ACPA - Japanese Maple**
- Absent
- Trace
- 1-10% Cover
- 11-25% Cover
- 26-50% Cover
- 51-75% Cover
- 76-100% Cover













Hopewell Valley Community Stewardship Plan

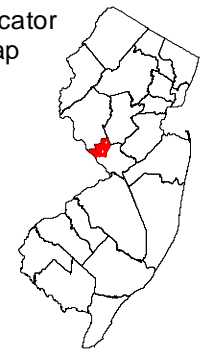
Map 22-2 Invasive Species on FoHVOS Preserves Acer platanoides (Norway Maple)

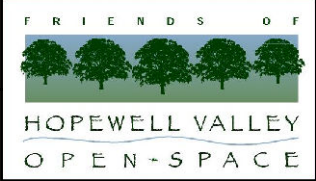


Legend

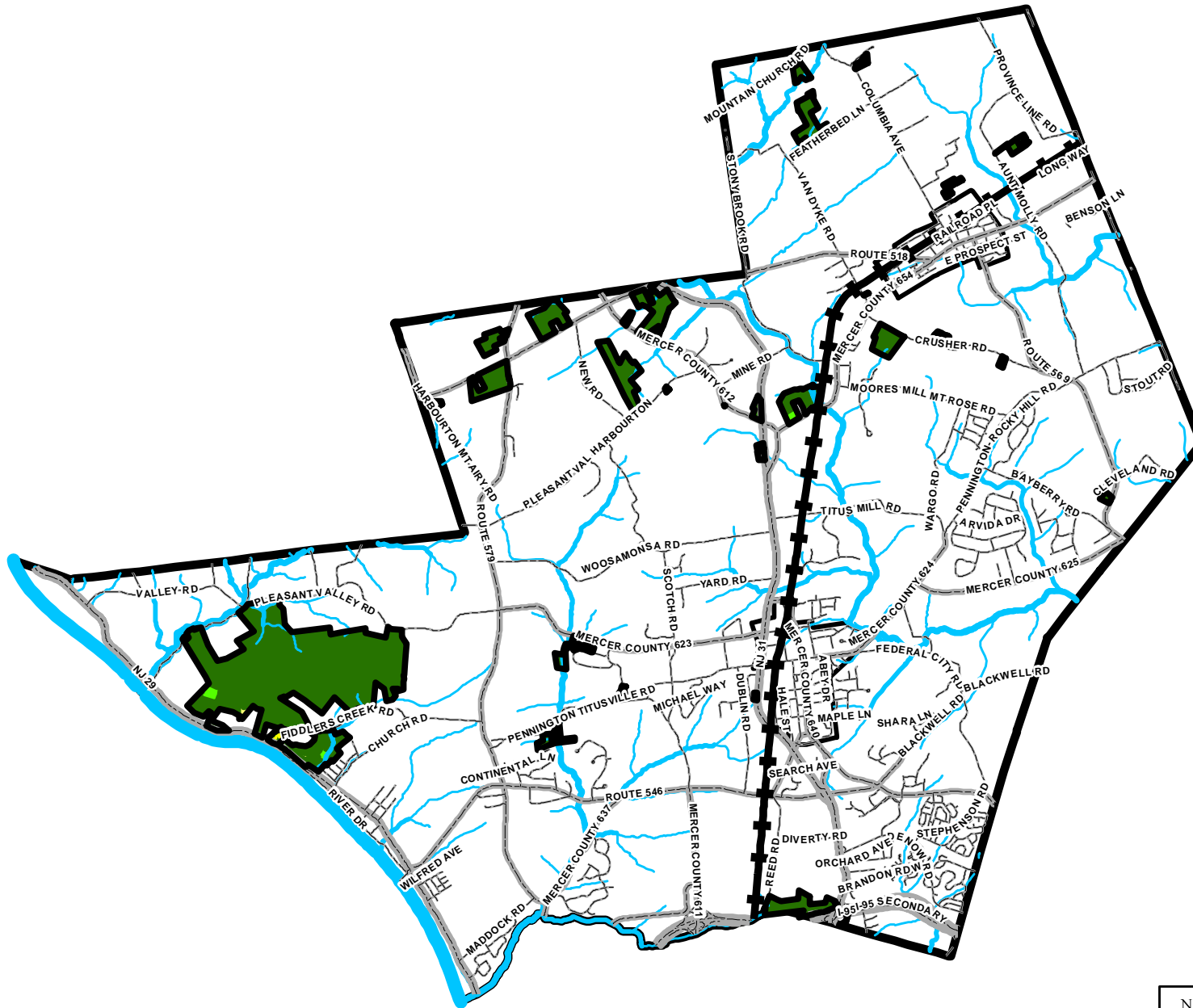
-  FoHVOS Preserves
- ACPL - Norway Maple**
-  Absent
-  Trace
-  1-10% Cover
-  11-25% Cover
-  26-50% Cover
-  51-75% Cover
-  76-100% Cover

Locator Map













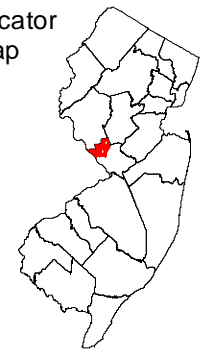
**Hopewell Valley
Community
Stewardship Plan**
Map 22-3
Invasive Species
on FoHVOS Preserves
Ailanthus altissima
(Tree-of-Heaven)

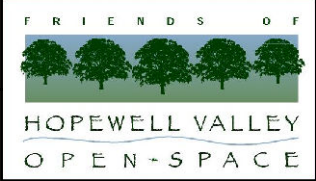


Legend

-  FoHVOS Preserves
- AIAL - Tree-of-Heaven**
-  Absent
-  Trace
-  1-10% Cover
-  11-25% Cover
-  26-50% Cover
-  51-75% Cover
-  76-100% Cover

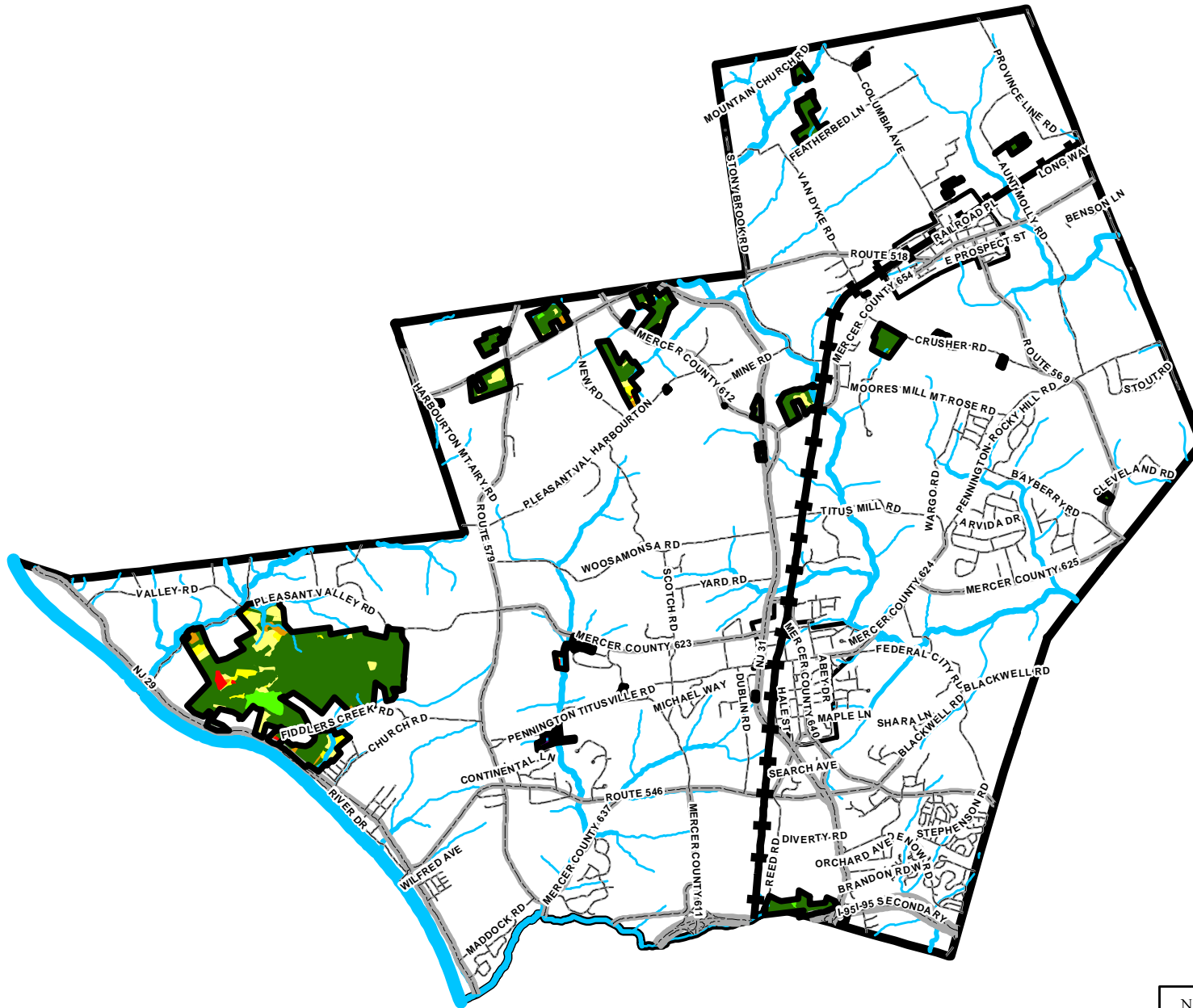
**Locator
Map**













Hopewell Valley Community Stewardship Plan

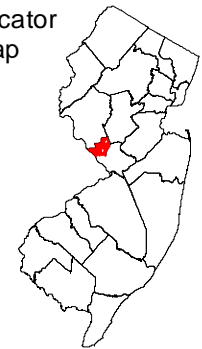
Map 22-4
 Invasive Species on FoHVOS Preserves
Alliaria petiolata
 (Garlic Mustard)



Legend

-  FoHVOS Preserves
- ALPE - Garlic Mustard**
-  Absent
-  Trace
-  1-10% Cover
-  11-25% Cover
-  26-50% Cover
-  51-75% Cover
-  76-100% Cover









Locator Map



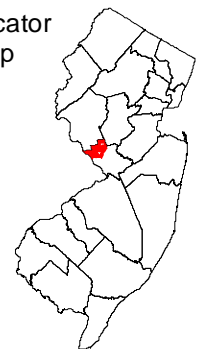
Hopewell Valley Community Stewardship Plan Map 22-5

Invasive Species
 on FoHVOs Preserves
Artemisia vulgaris
 (Common Mugwort)

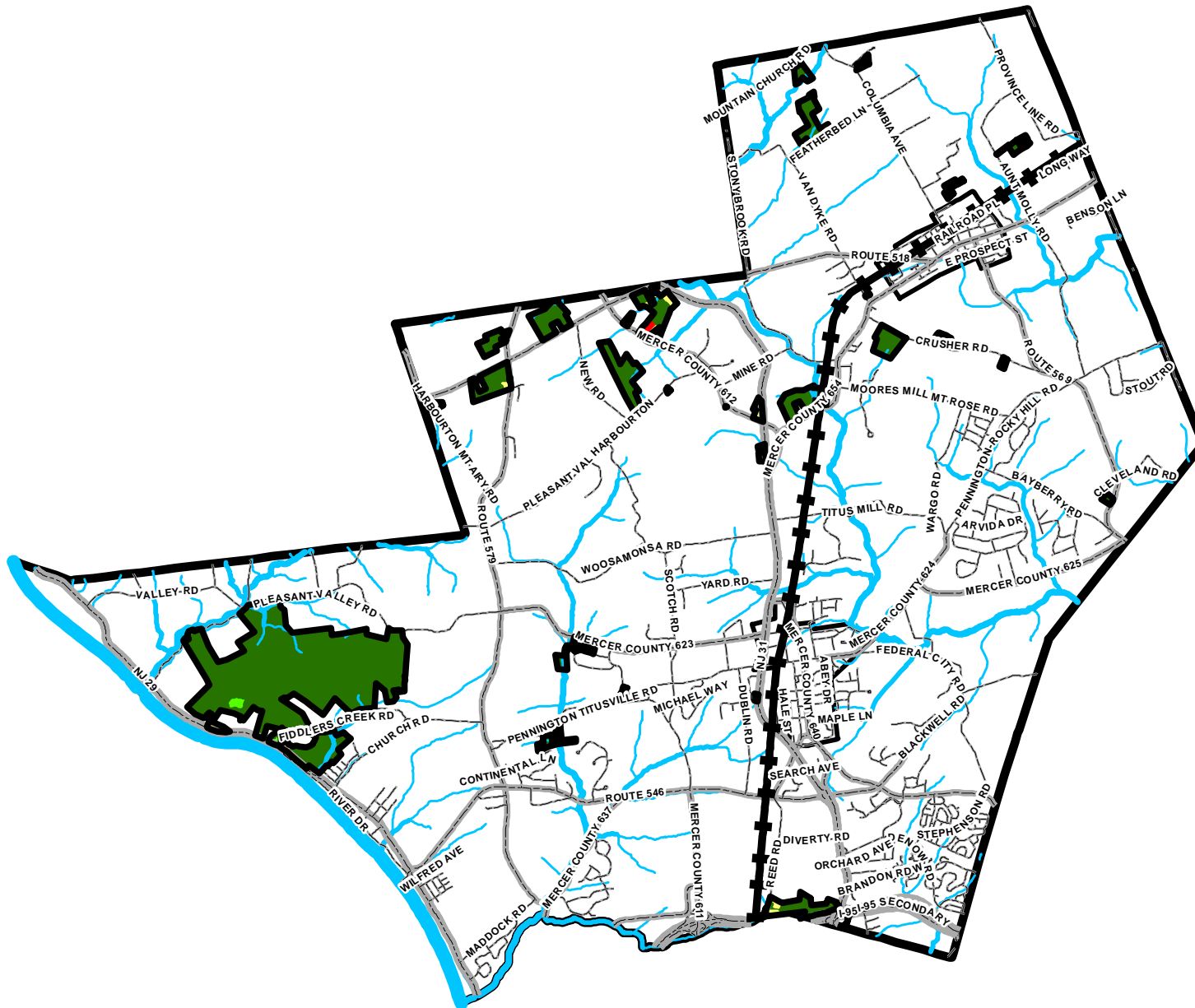
Legend

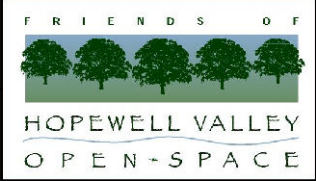
-  FoHVOs Preserves
- ARVU - Common Mugwort**
-  Absent
-  Trace
-  1-10% Cover
-  11-25% Cover
-  26-50% Cover
-  51-75% Cover
-  76-100% Cover

Locator Map



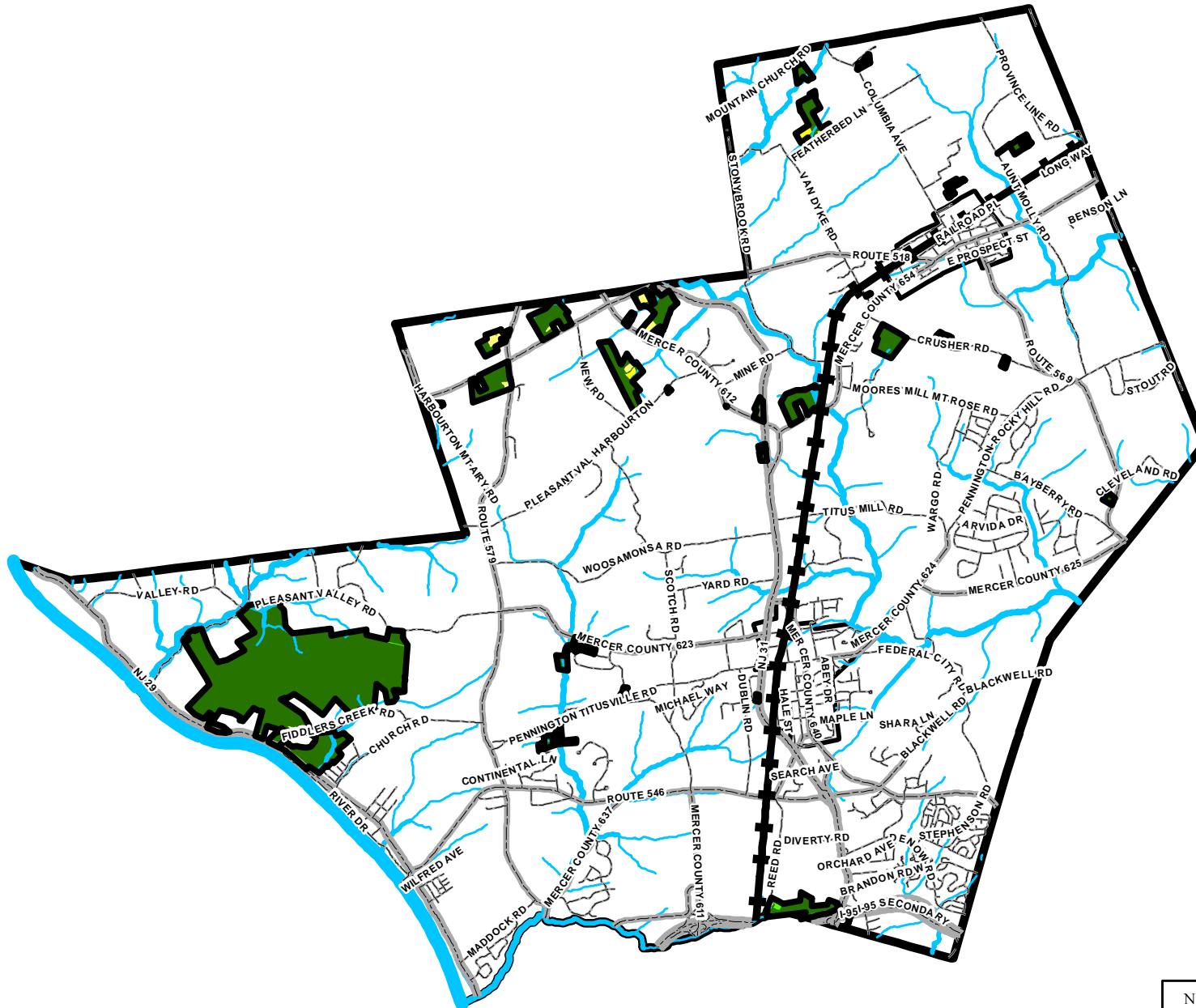
0 1 2 Miles











Hopewell Valley Community Stewardship Plan

Map 22-6
 Invasive Species
 on FoHVOS Preserves
 Arthraxon hispidus
 (Small Carpgrass)

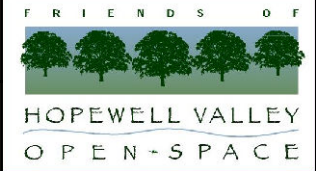


Legend

-  FoHVOS Preserves
- ARHI - Small Carpgrass**
-  Absent
-  Trace
-  1-10% Cover
-  11-25% Cover
-  26-50% Cover
-  51-75% Cover
-  76-100% Cover

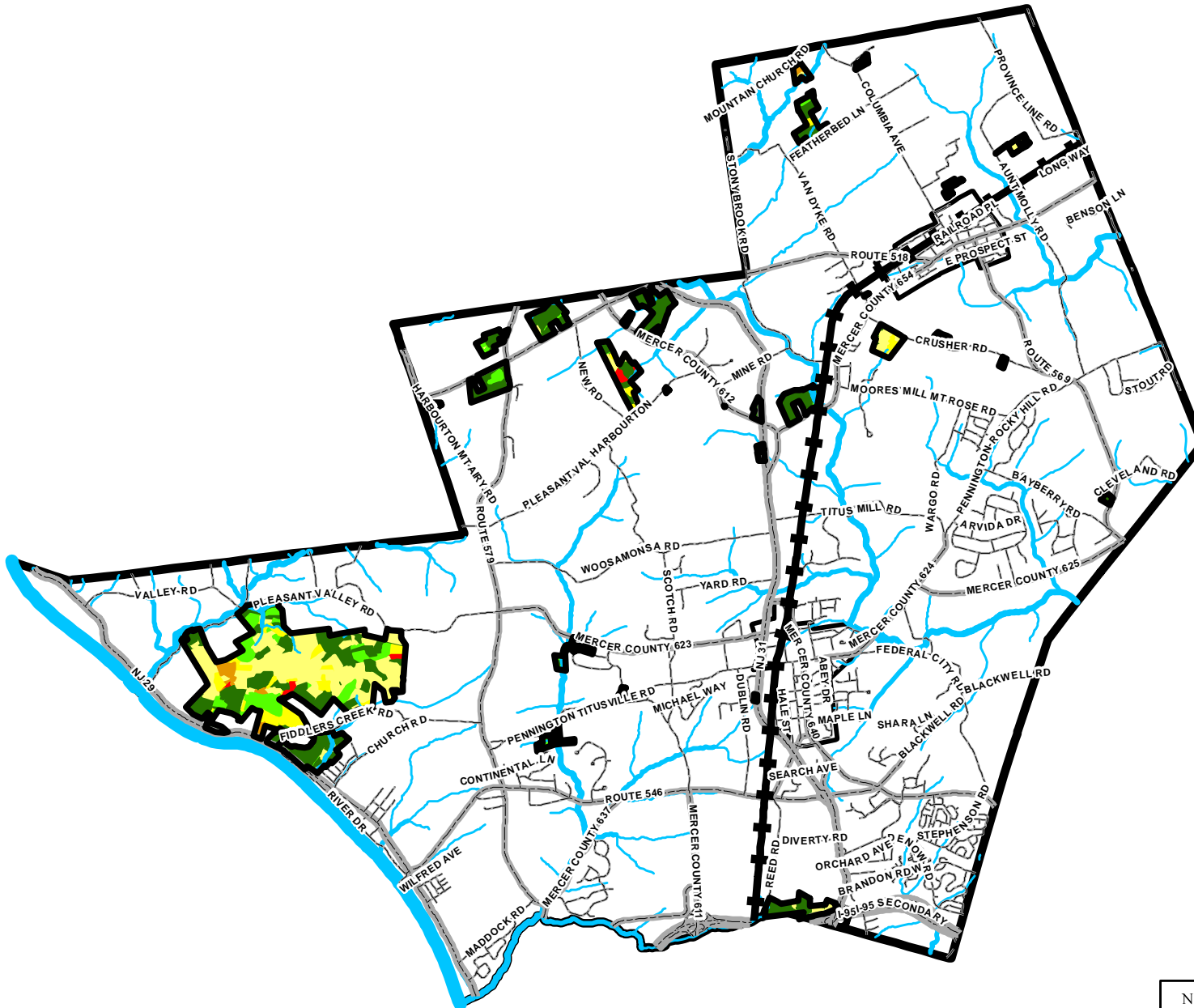
Locator Map













Hopewell Valley Community Stewardship Plan

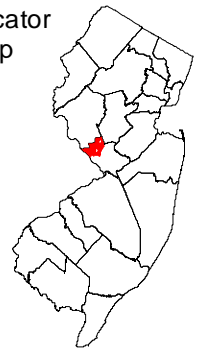
Map 22-7 Invasive Species on FoHVOS Preserves *Berberis thunbergii* (Japanese Barberry)

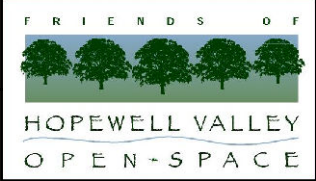


Legend

-  FoHVOS Preserves
- BETH - Japanese Barberry**
-  Absent
-  Trace
-  1-10% Cover
-  11-25% Cover
-  26-50% Cover
-  51-75% Cover
-  76-100% Cover

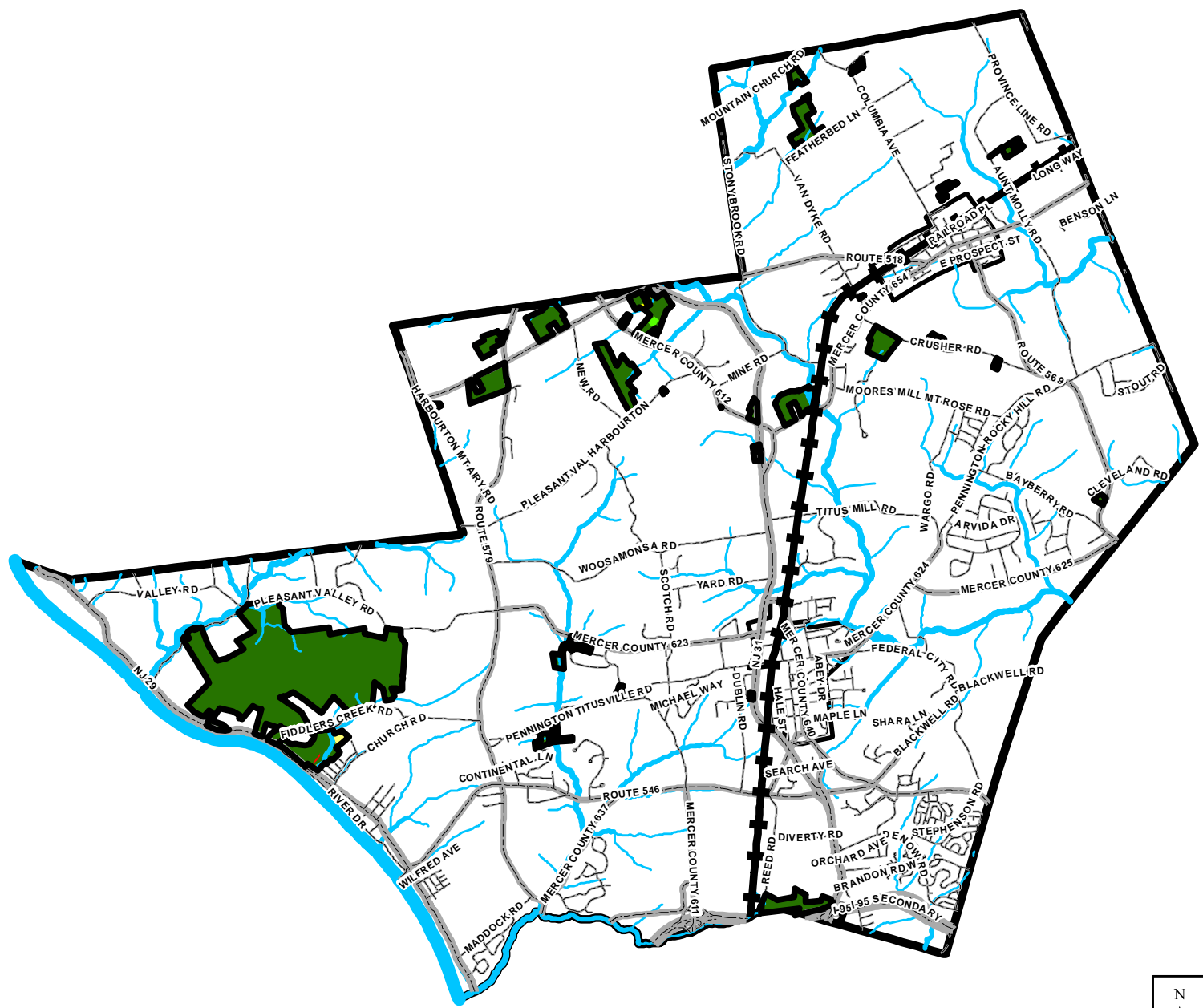
Locator Map





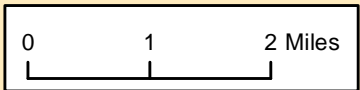
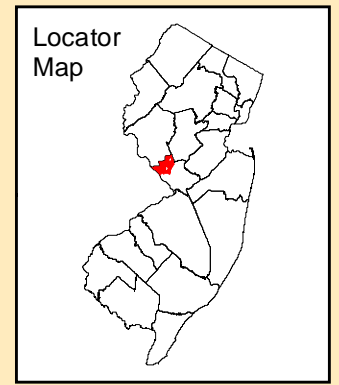
Hopewell Valley Community Stewardship Plan

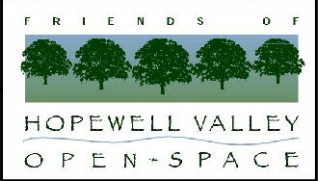
Map 22-8 Invasive Species on FoHVOS Preserves *Cardamine impatiens* (Narrow-leaved Bittercress)



Legend

- FoHVOS Preserves
- CAIM - Narrow-leaved Bittercress**
- Absent
- Trace
- 1-10% Cover
- 11-25% Cover
- 26-50% Cover
- 51-75% Cover
- 76-100% Cover













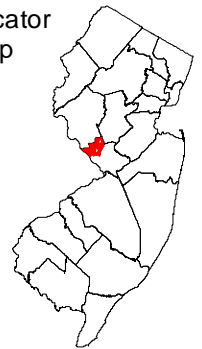
Hopewell Valley Community Stewardship Plan

Map 22-9 Invasive Species on FoHVOS Preserves *Catalpa bignonioides* (Northern Catalpa)

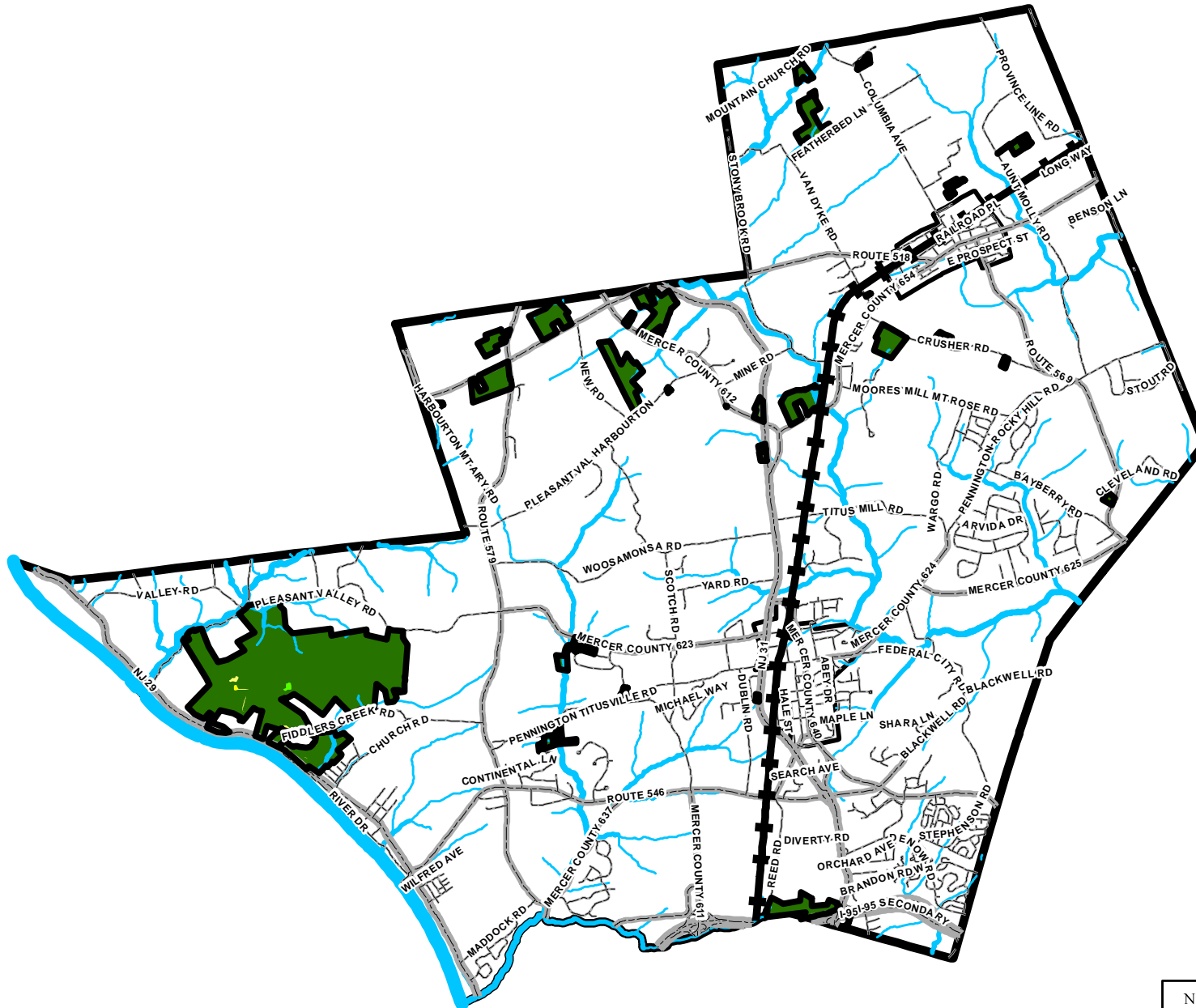
Legend

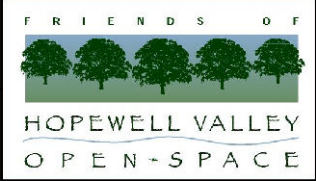
-  FoHVOS Preserves
- CABI - Northern Catalpa**
-  Absent
-  Trace
-  1-10% Cover
-  11-25% Cover
-  26-50% Cover
-  51-75% Cover
-  76-100% Cover

Locator Map



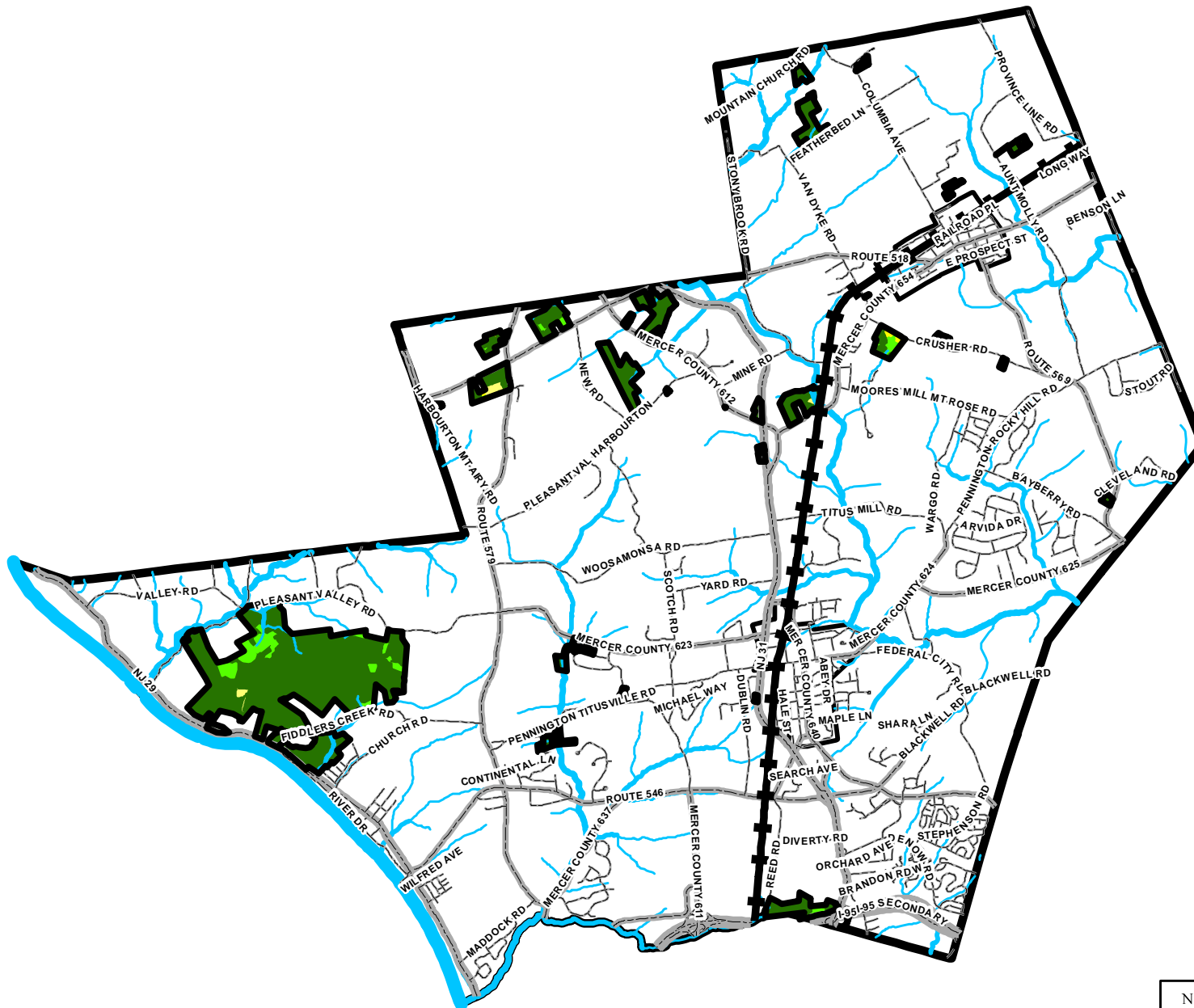
0 1 2 Miles



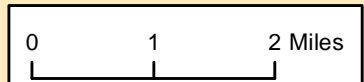
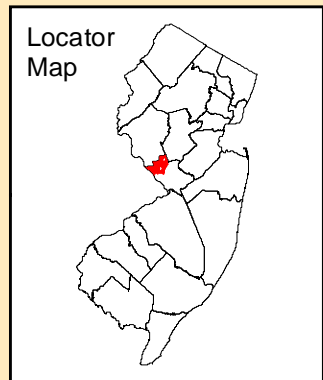


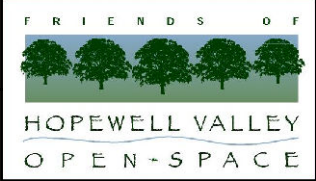
Hopewell Valley Community Stewardship Plan

Map 22-10 Invasive Species on FoHVOS Preserves *Celastrus orbiculatus* (Asiatic Bittersweet)



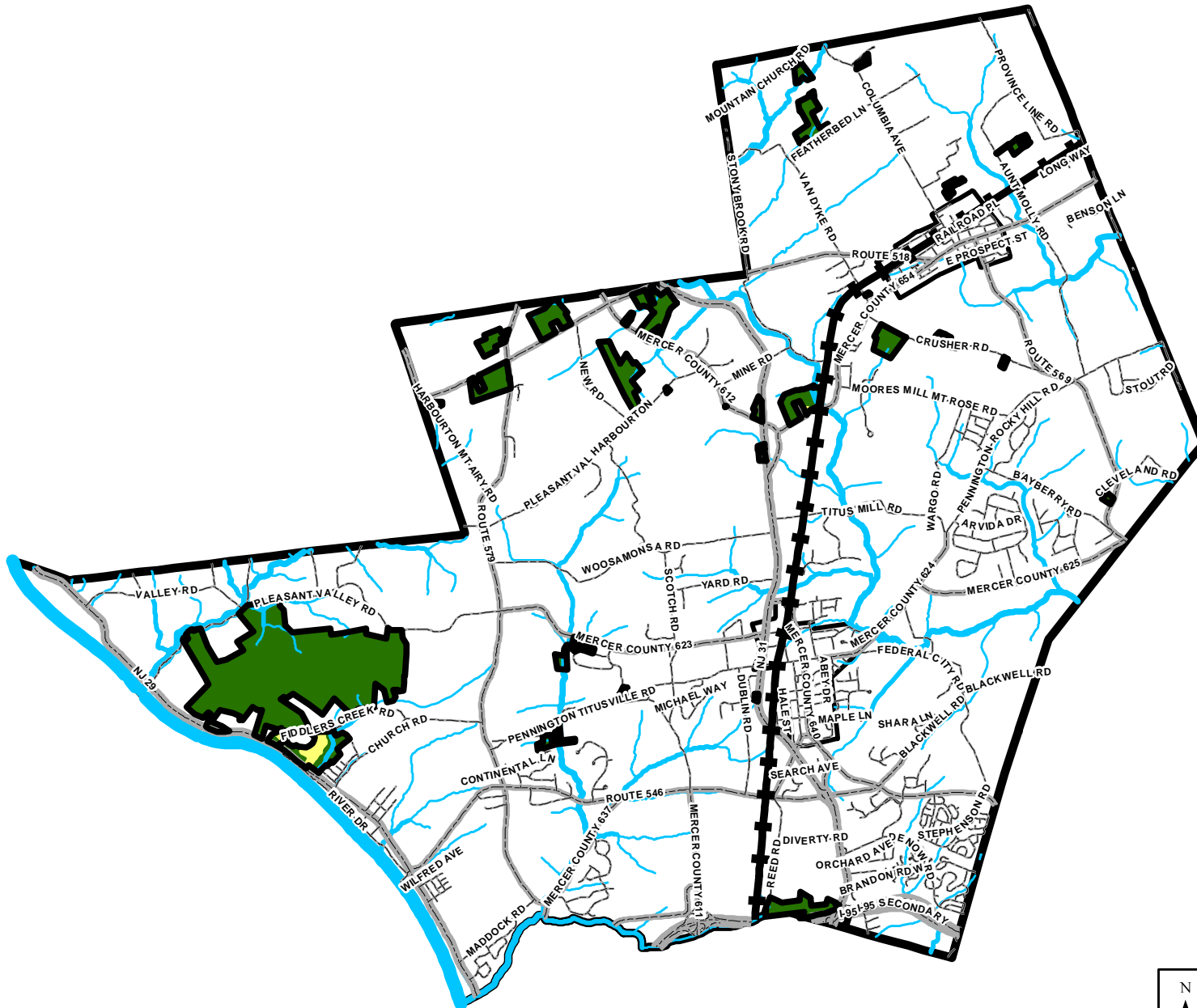
- Legend**
- FoHVOS Preserves
 - CEOR - Asiatic Bittersweet**
 - Absent
 - Trace
 - 1-10% Cover
 - 11-25% Cover
 - 26-50% Cover
 - 51-75% Cover
 - 76-100% Cover





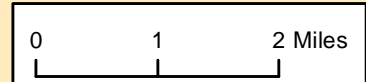
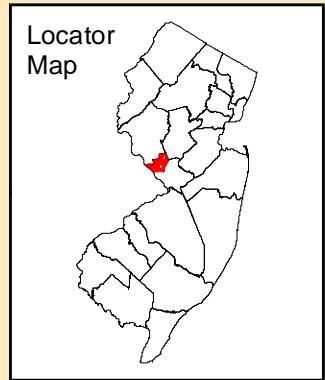
Hopewell Valley Community Stewardship Plan

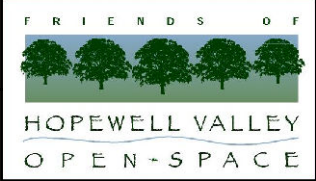
Map 22-11
 Invasive Species on FoHVOS Preserves
Centurea sp.
 (Knapweed species)



Legend

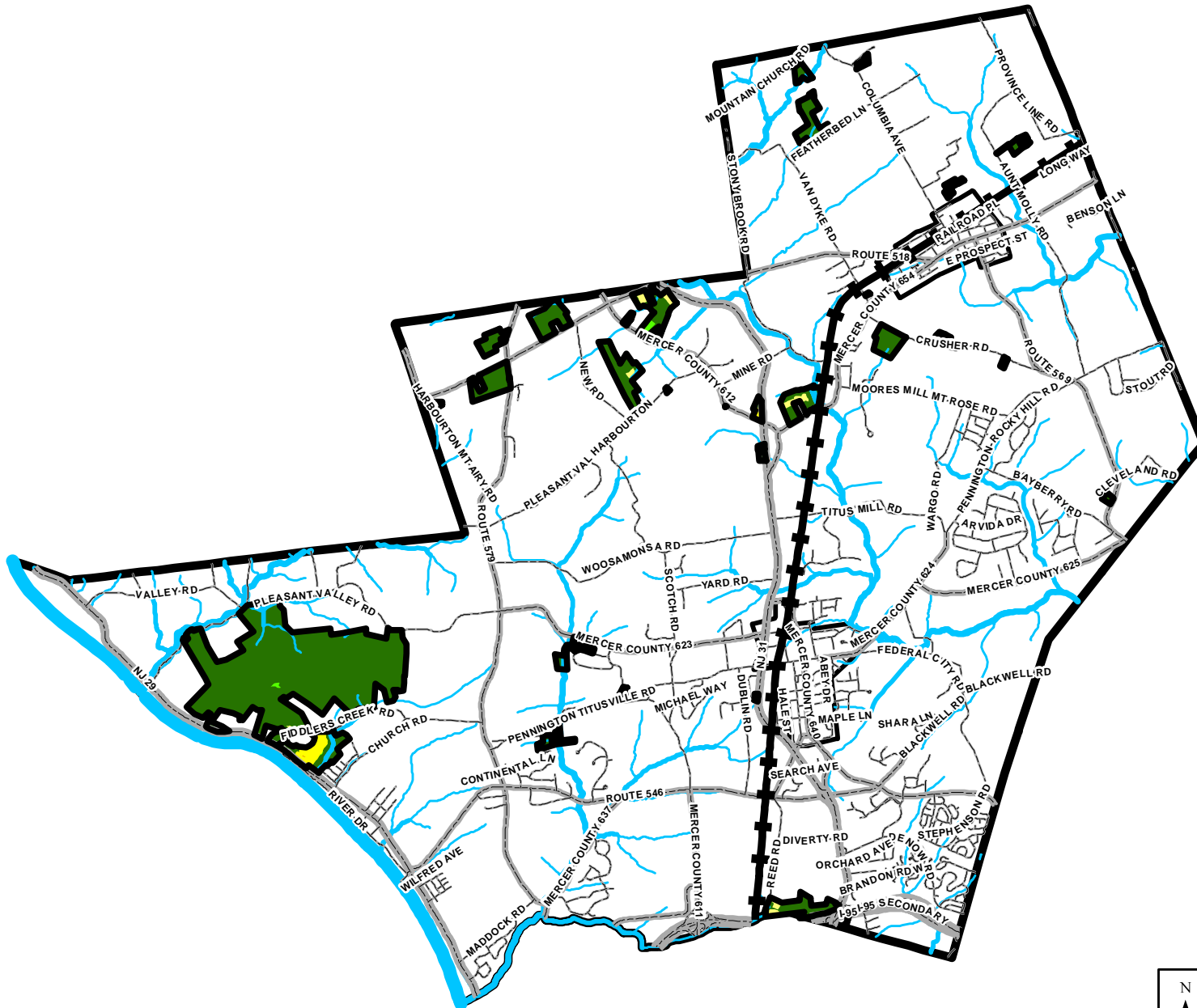
- FoHVOS Preserves
- CEXX - Knapweed sp.**
- Absent
- Trace
- 1-10% Cover
- 11-25% Cover
- 26-50% Cover
- 51-75% Cover
- 76-100% Cover













Hopewell Valley Community Stewardship Plan

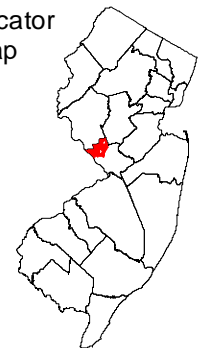
Map 22-12
Invasive Species
on FoHVOS Preserves
Cirsium arvense
(Canada Thistle)

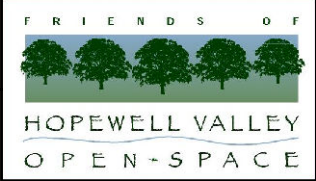


Legend

-  FoHVOS Preserves
- CIAR - Canada Thistle**
-  Absent
-  Trace
-  1-10% Cover
-  11-25% Cover
-  26-50% Cover
-  51-75% Cover
-  76-100% Cover

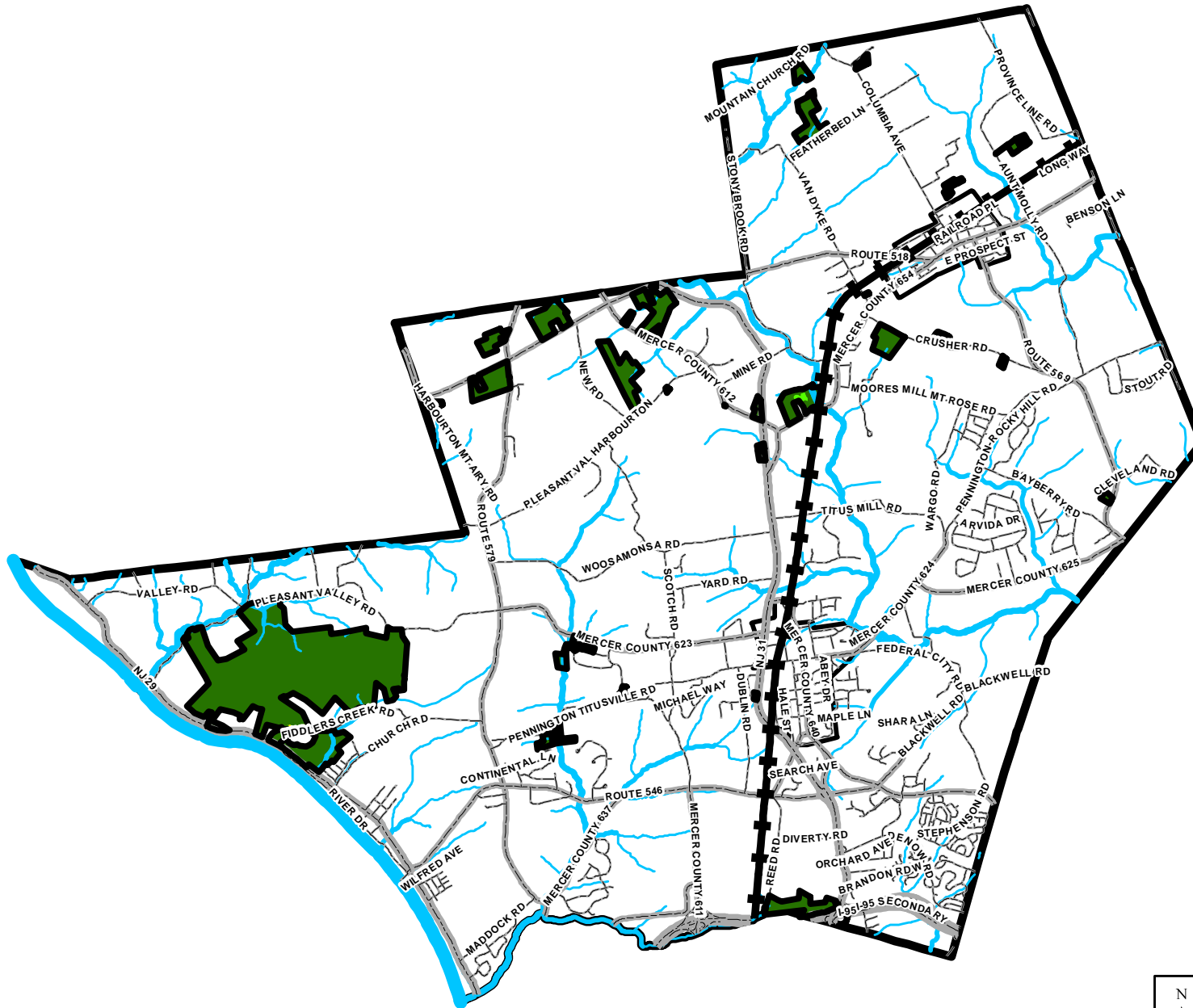
Locator Map





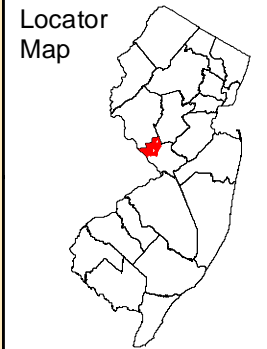
Hopewell Valley Community Stewardship Plan

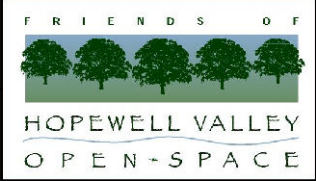
Map 22-13
 Invasive Species
 on FoHVOS Preserves
Dipsacus sylestris
 (Teasel)



Legend

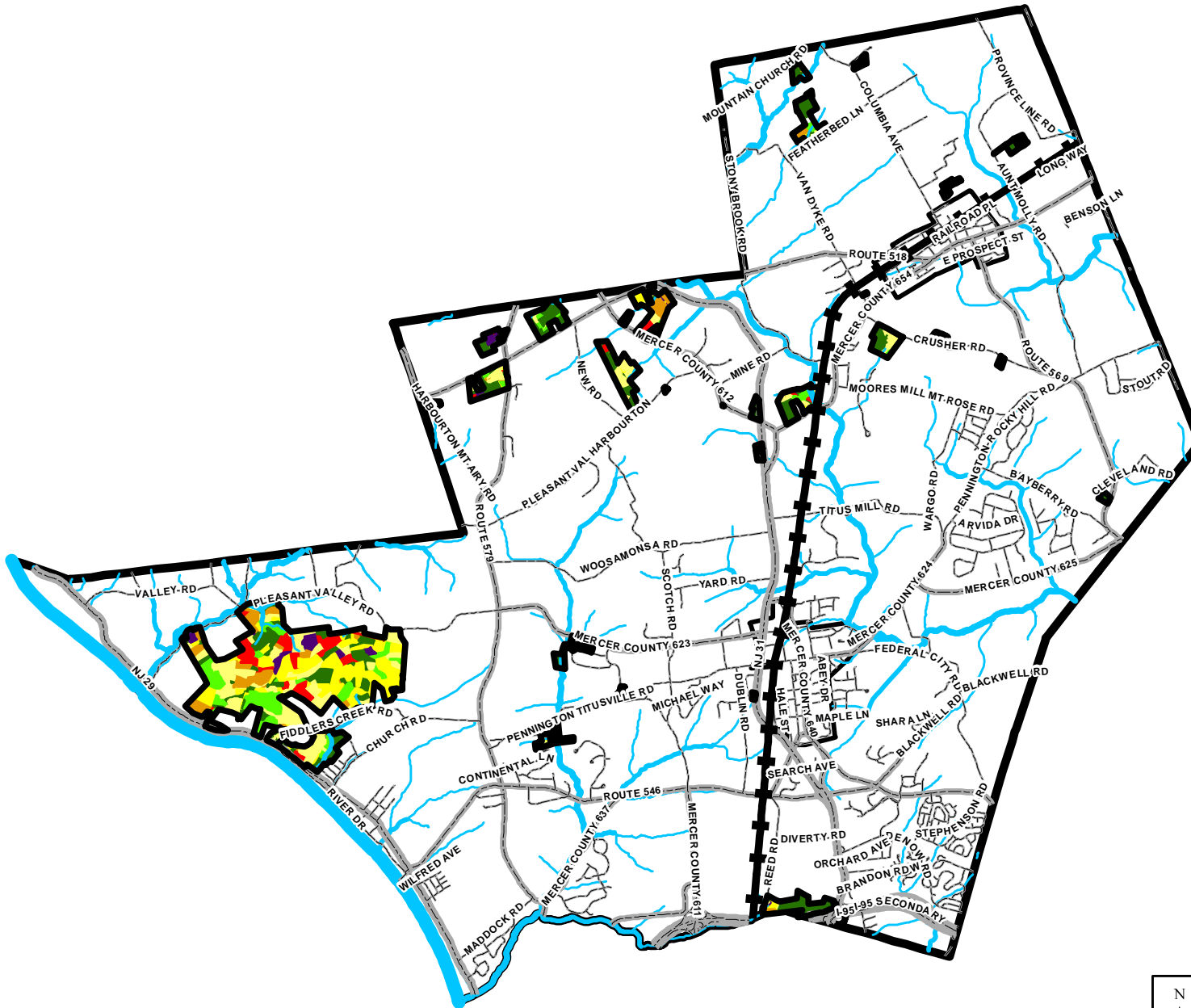
- FoHVOS Preserves
- DISY - Teasel**
- Absent
- Trace
- 1-10% Cover
- 11-25% Cover
- 26-50% Cover
- 51-75% Cover
- 76-100% Cover





Hopewell Valley Community Stewardship Plan

Map 22-14
 Invasive Species
 on FoHVOS Preserves
Eleagnus umbellata
 (Autumn Olive)

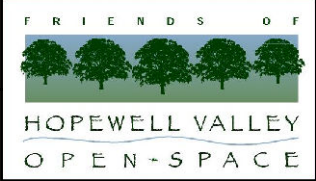


Legend

- FoHVOS Preserves
- ELUM - Autumn Olive**
- Absent
- Trace
- 1-10% Cover
- 11-25% Cover
- 26-50% Cover
- 51-75% Cover
- 76-100% Cover

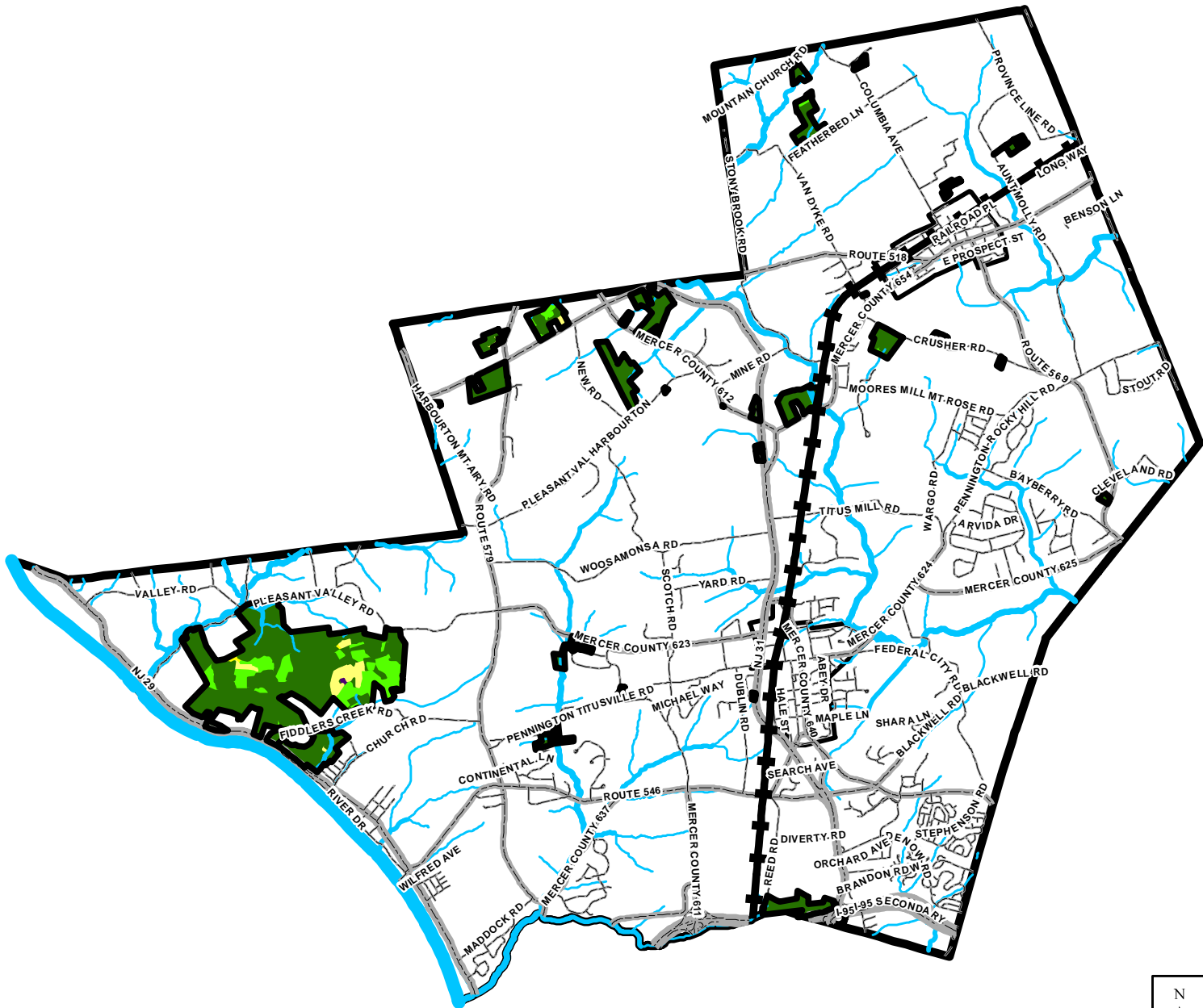
Locator Map





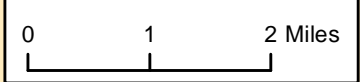
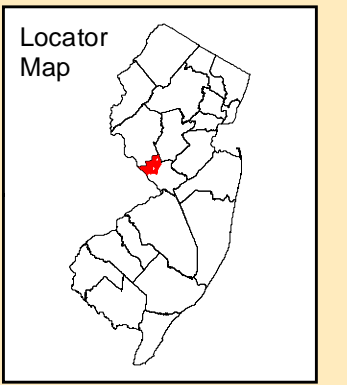
**Hopewell Valley
Community
Stewardship Plan**

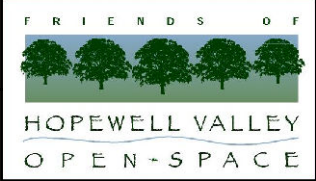
**Map 22-15
Invasive Species
on FoHVOS Preserves
Euonymus alata
(Winged Burning Bush)**



Legend

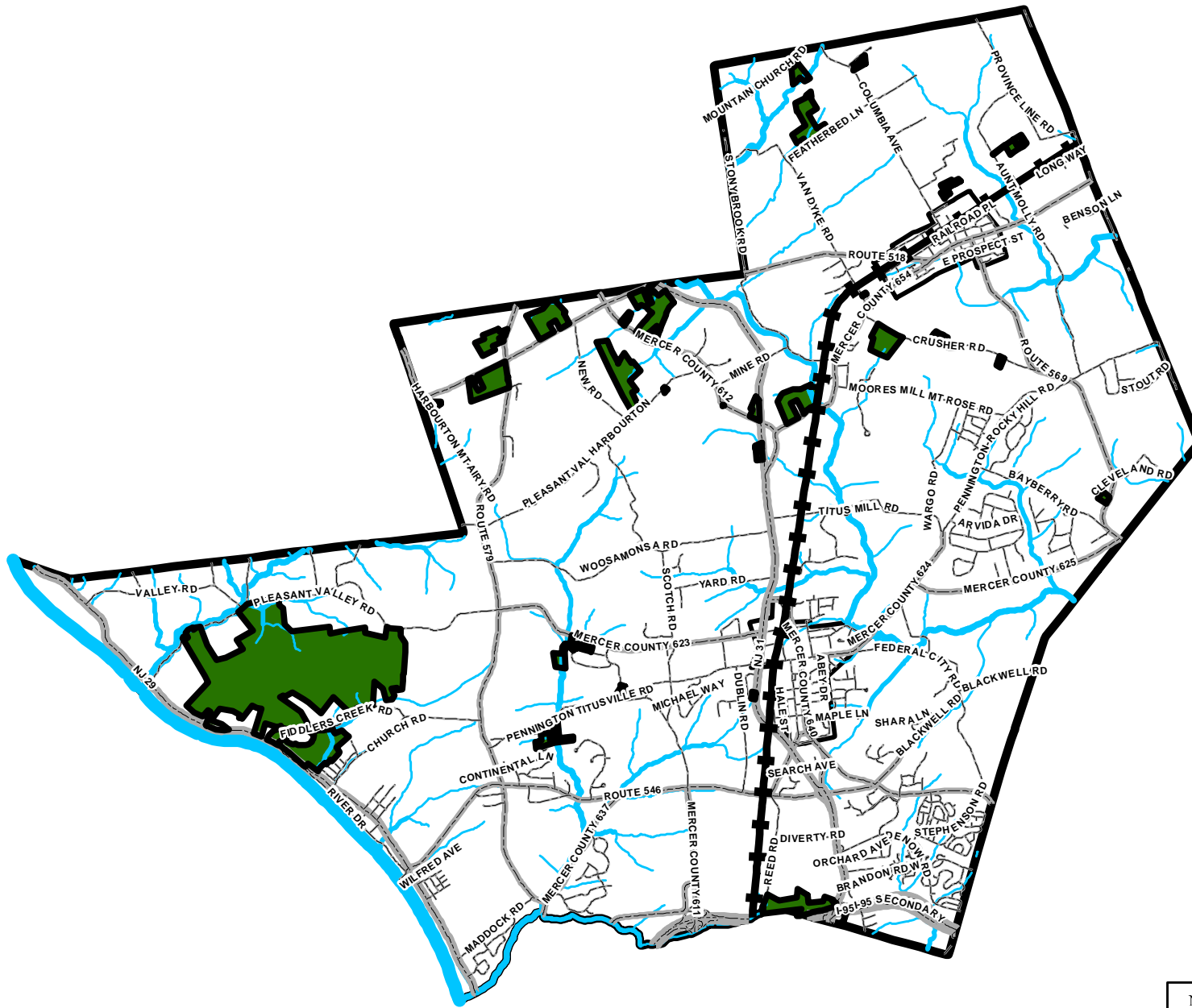
- FoHVOS Preserves
- EUAL - Winged Burning Bush**
- Absent
- Trace
- 1-10% Cover
- 11-25% Cover
- 26-50% Cover
- 51-75% Cover
- 76-100% Cover













Hopewell Valley Community Stewardship Plan

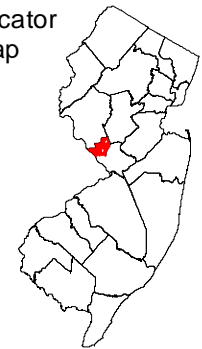
Map 22-16
Invasive Species
on FoHVOS Preserves
Iris pseudoacris
(Yellow Iris)

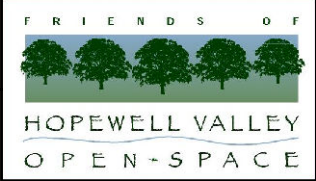


Legend

-  FoHVOS Preserves
- IRPS - Yellow Iris**
-  Absent
-  Trace
-  1-10% Cover
-  11-25% Cover
-  26-50% Cover
-  51-75% Cover
-  76-100% Cover

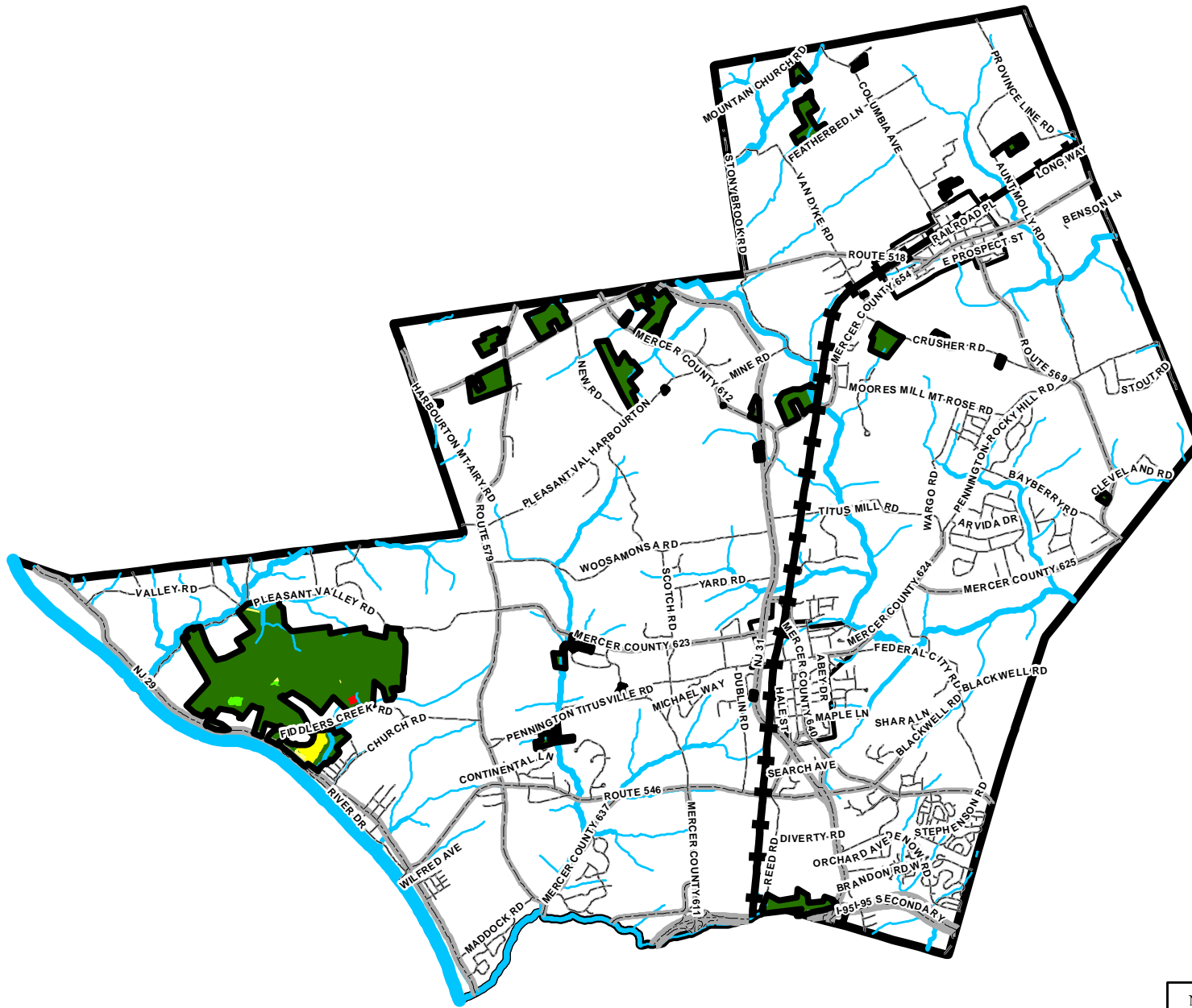
Locator Map





Hopewell Valley Community Stewardship Plan

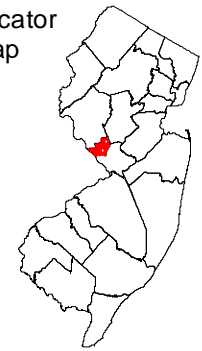
Map 22-17
 Invasive Species on FoHVOS Preserves
Lespedeza cuneata
 (Chinese Bushclover)

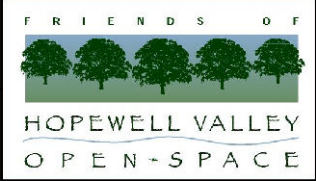


Legend

- FoHVOS Preserves
- LECU - Chinese Bushclover**
- Absent
- Trace
- 1-10% Cover
- 11-25% Cover
- 26-50% Cover
- 51-75% Cover
- 76-100% Cover

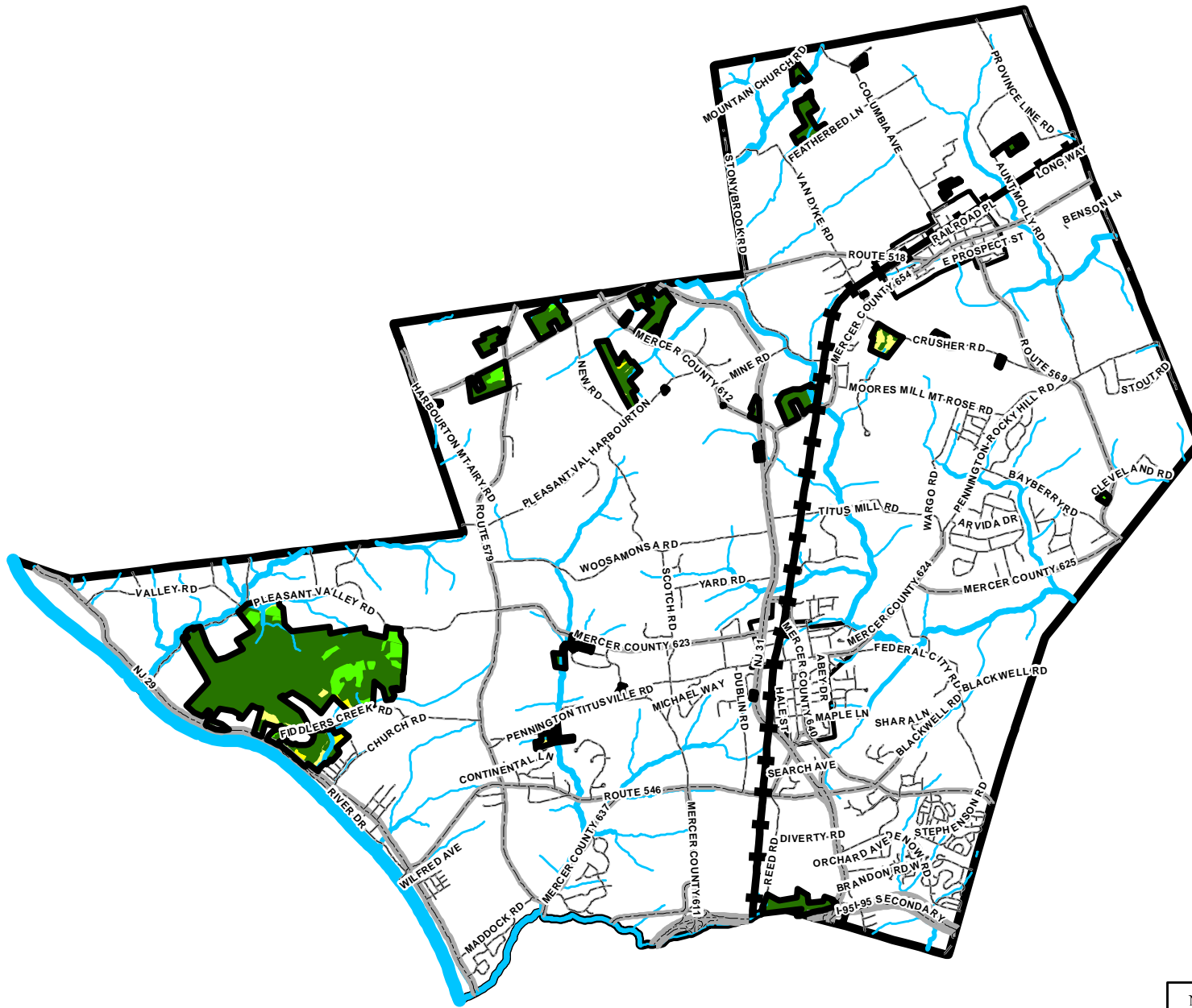
Locator Map





Hopewell Valley Community Stewardship Plan

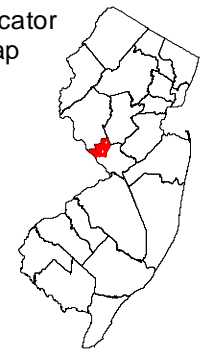
Map 22-18
 Invasive Species
 on FoHVOS Preserves
Ligustrum obtusifolium
 (Border Privet)

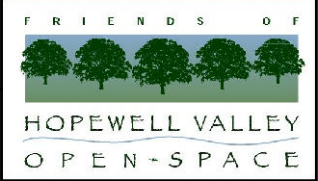


Legend

- FoHVOS Preserves
- LIOB - Border Privet**
- Absent
- Trace
- 1-10% Cover
- 11-25% Cover
- 26-50% Cover
- 51-75% Cover
- 76-100% Cover

Locator Map



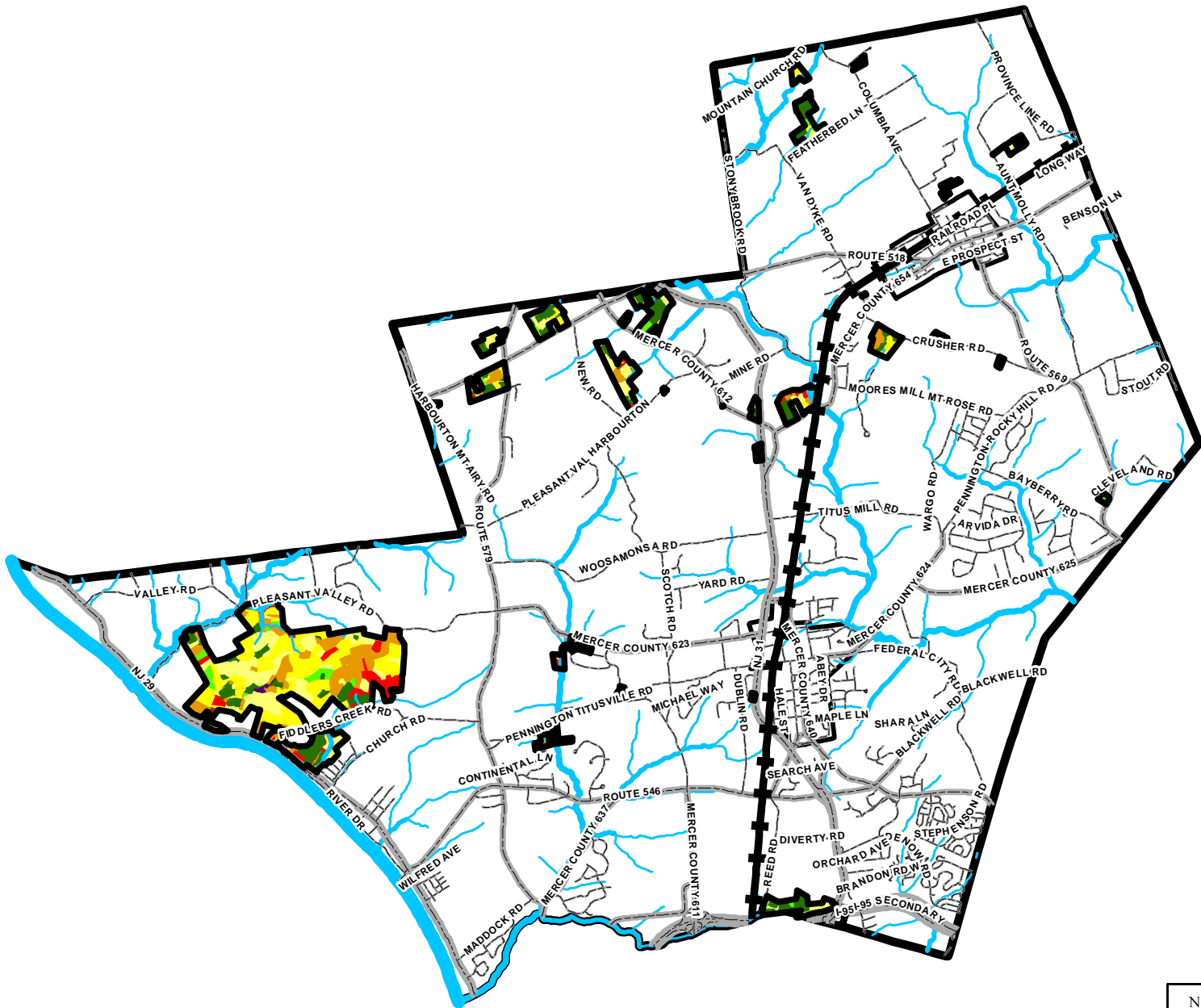
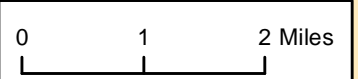
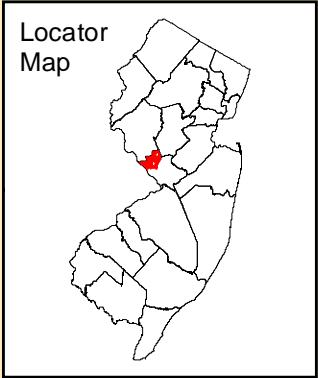


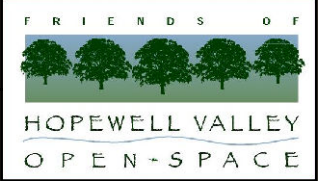
Hopewell Valley Community Stewardship Plan

Map 22-19 Invasive Species on FoHVOS Preserves *Lonicera japonica* (Japanese Honeysuckle)

Legend

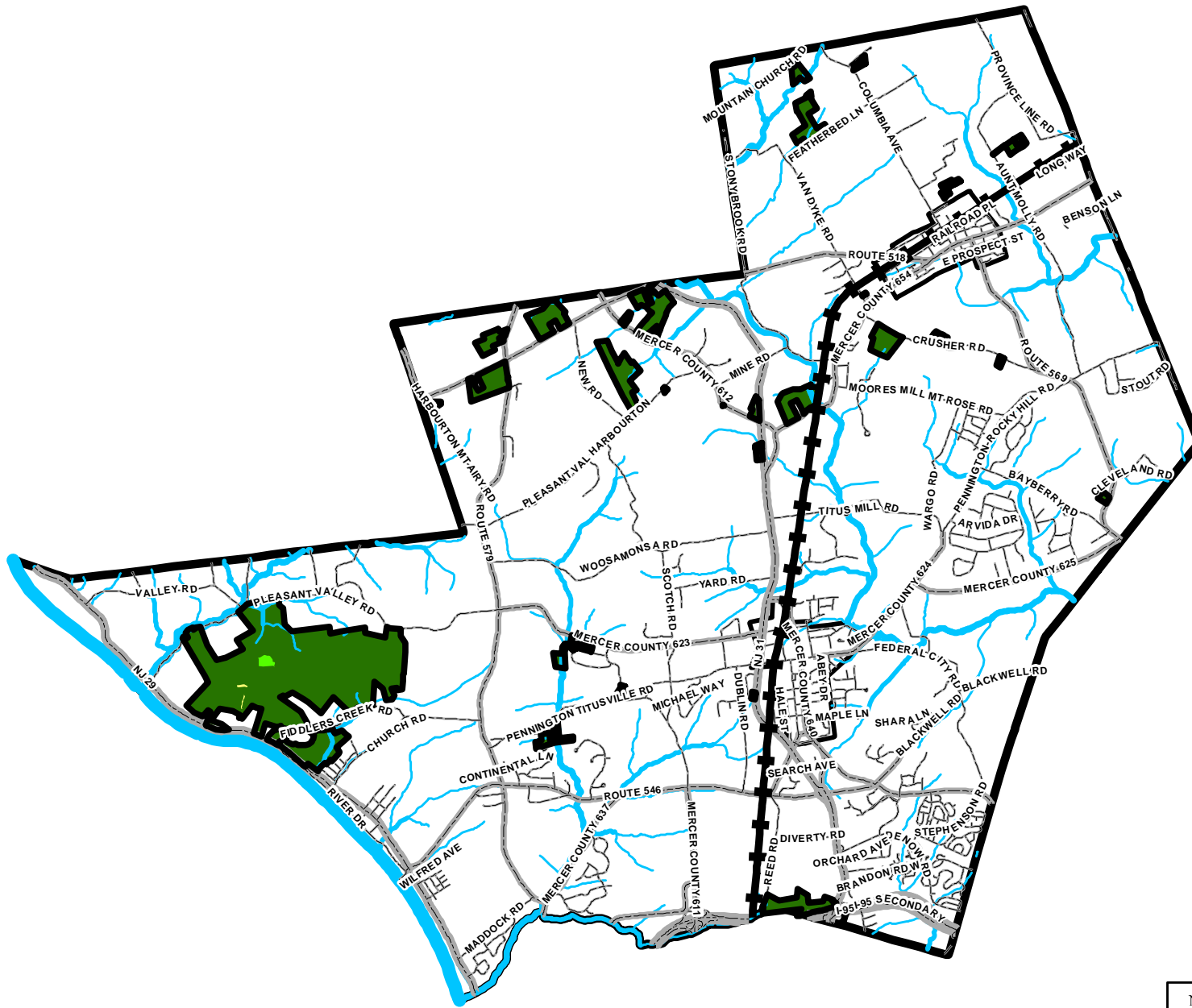
- FoHVOS Preserves
- LOJA - Japanese Honeysuckle**
- Absent
- Trace
- 1-10% Cover
- 11-25% Cover
- 26-50% Cover
- 51-75% Cover
- 76-100% Cover





Hopewell Valley Community Stewardship Plan

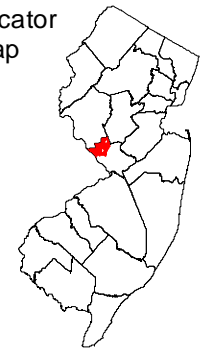
Map 22-20
 Invasive Species
 on FoHVOS Preserves
Lonicera maackii
 (Amur Honeysuckle)

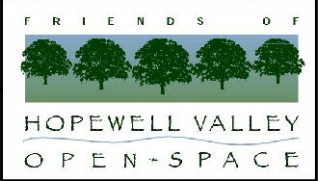


Legend

- FoHVOS Preserves
- LOMA - Amur Honeysuckle**
- Absent
- Trace
- 1-10% Cover
- 11-25% Cover
- 26-50% Cover
- 51-75% Cover
- 76-100% Cover

Locator Map



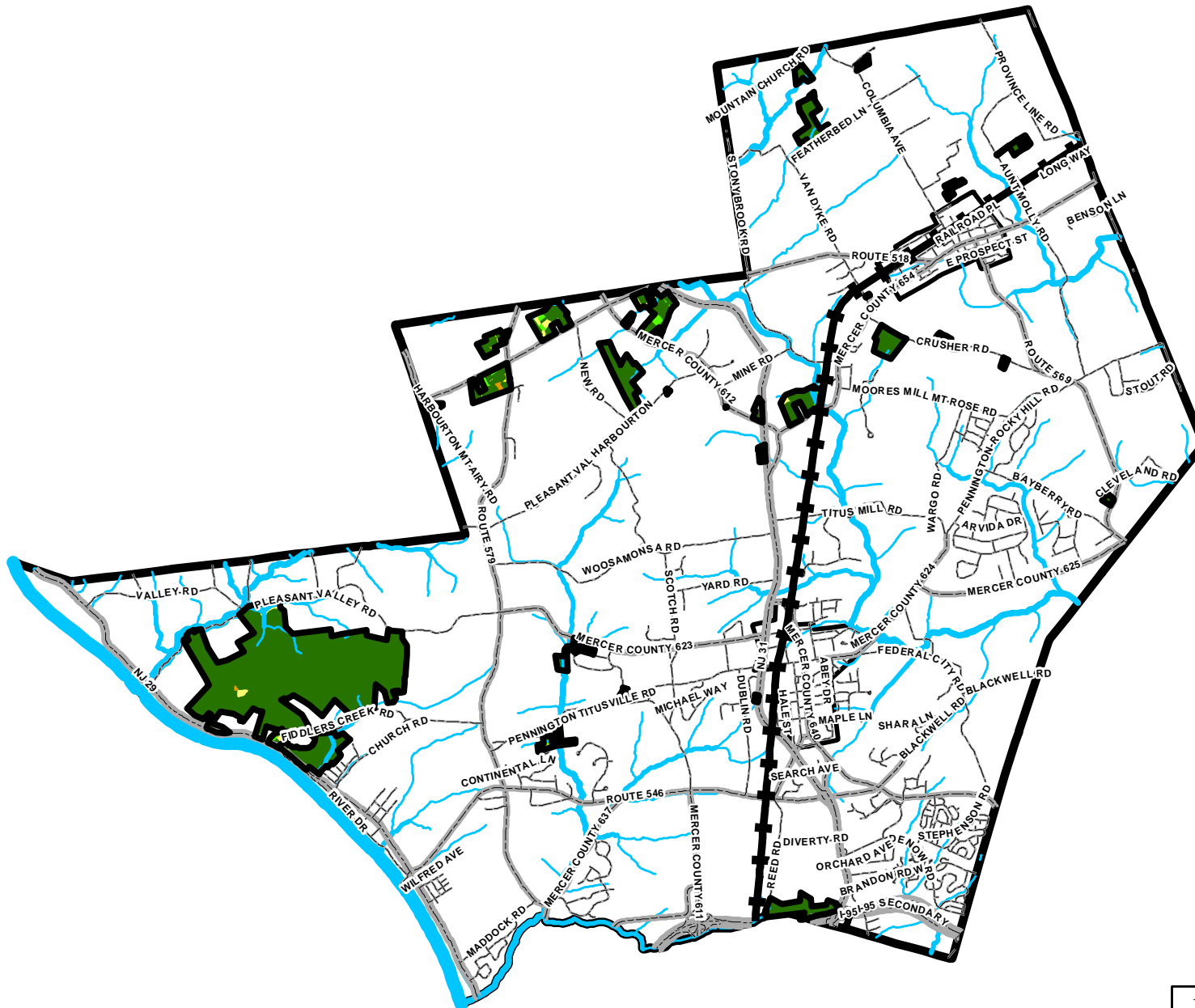
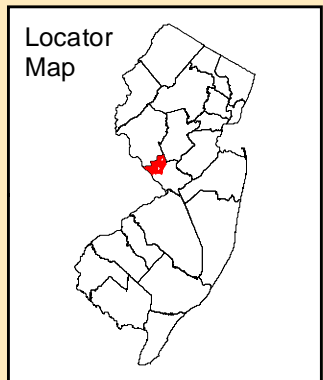


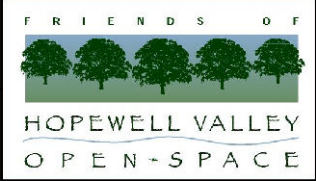
Hopewell Valley Community Stewardship Plan

Map 22-21 Invasive Species on FoHVO Preserves *Lonicera morrowii* (Morrow's Honeysuckle)

Legend

- FoHVO Preserves
- LOMO - Morrow's Honeysuckle**
- Absent
- Trace
- 1-10% Cover
- 11-25% Cover
- 26-50% Cover
- 51-75% Cover
- 76-100% Cover



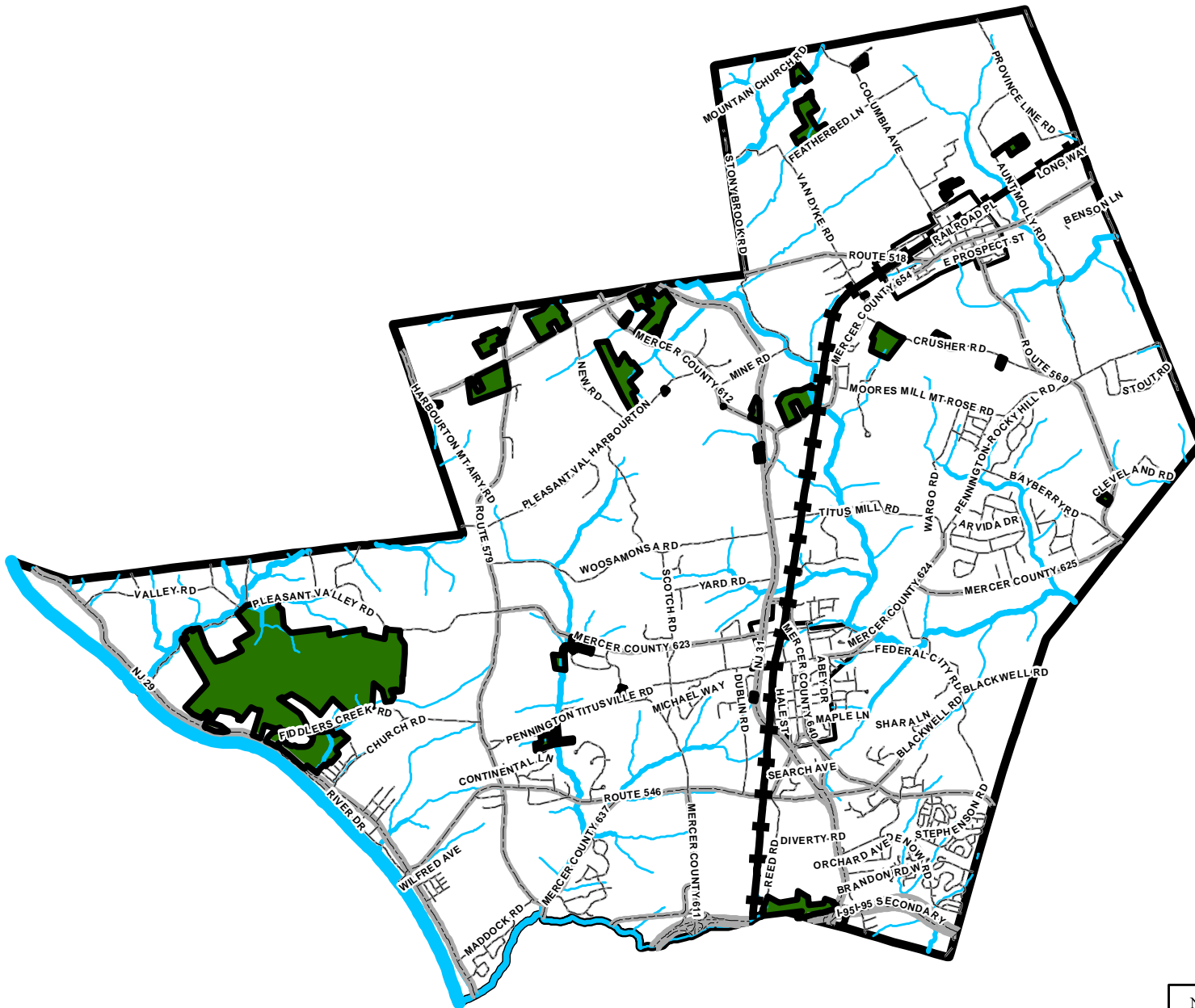
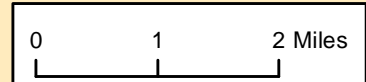
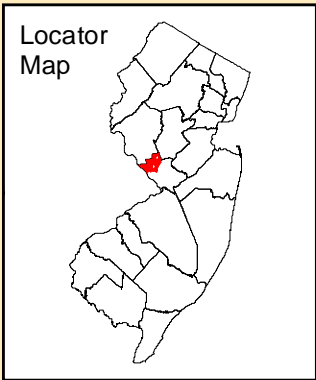


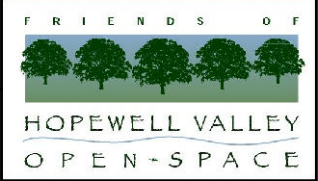
Hopewell Valley Community Stewardship Plan

**Map 22-22
Invasive Species
on FoHVOS Preserves
Lysimachia nummularia
(Moneywort)**

Legend

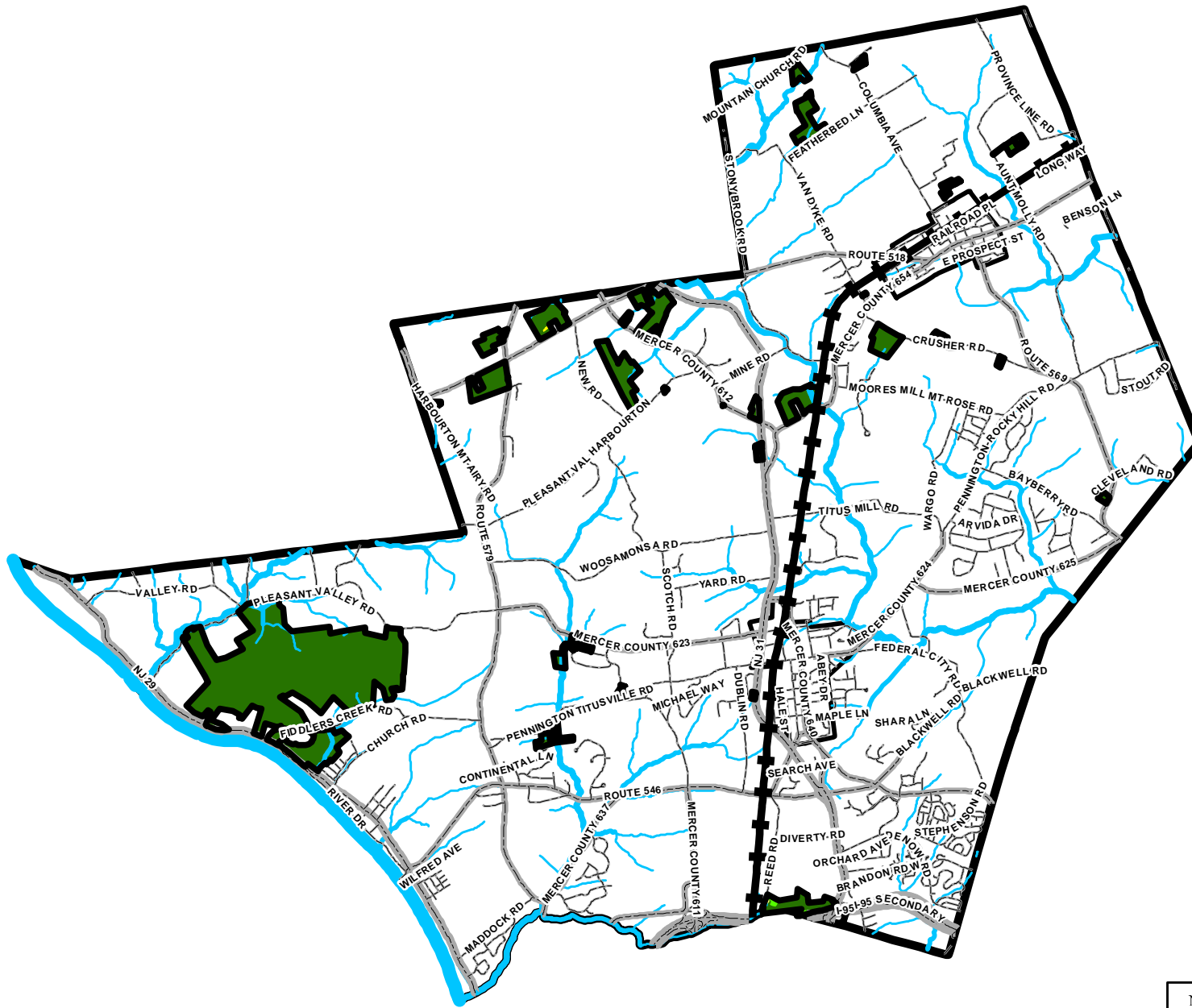
- FoHVOS Preserves
- LYNU - Moneywort**
- Absent
- Trace
- 1-10% Cover
- 11-25% Cover
- 26-50% Cover
- 51-75% Cover
- 76-100% Cover





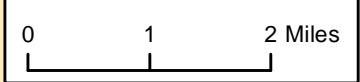
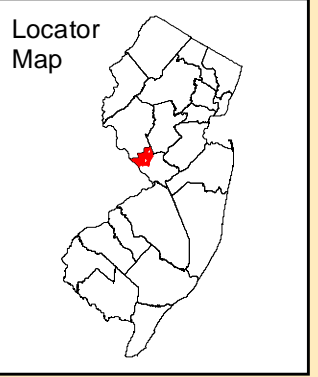
Hopewell Valley Community Stewardship Plan

Map 22-23
 Invasive Species
 on FoHVOS Preserves
Lythrum salicaria
 (Purple Loosestrife)



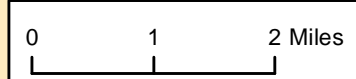
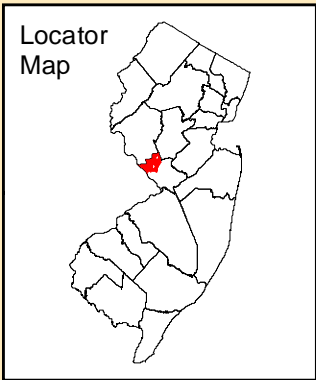
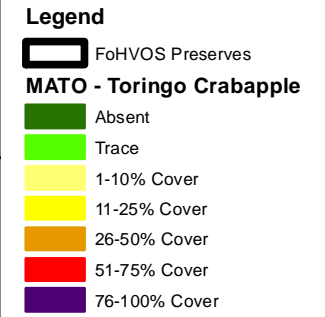
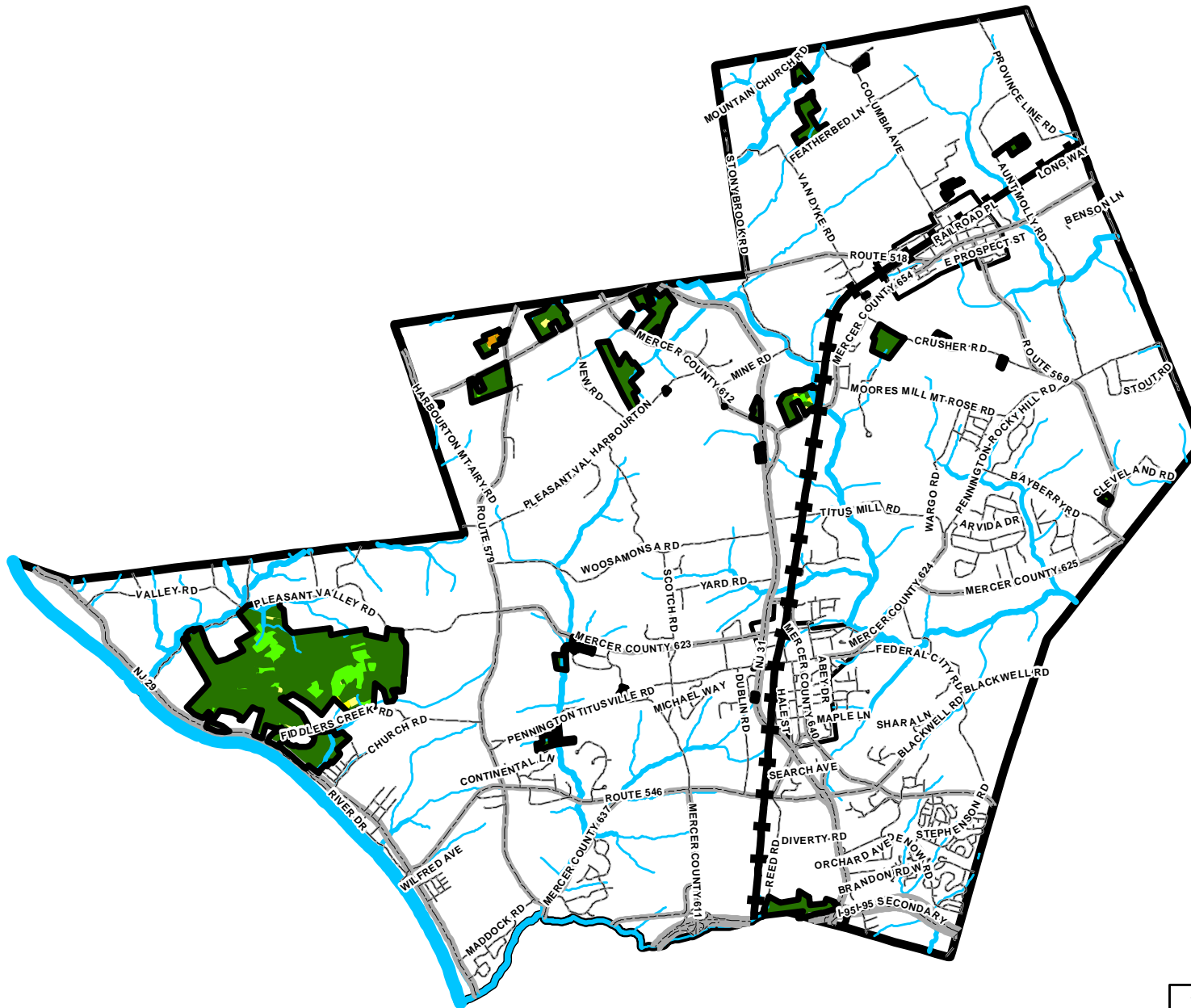
Legend

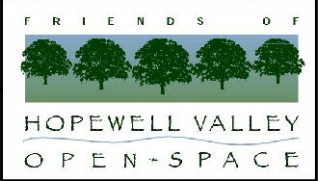
- FoHVOS Preserves
- LYSA - Purple Loosestrife**
- Absent
- Trace
- 1-10% Cover
- 11-25% Cover
- 26-50% Cover
- 51-75% Cover
- 76-100% Cover



Hopewell Valley Community Stewardship Plan

Map 22-24
 Invasive Species
 on FoHVOS Preserves
Malus toringo
 (Toringo Crabapple)



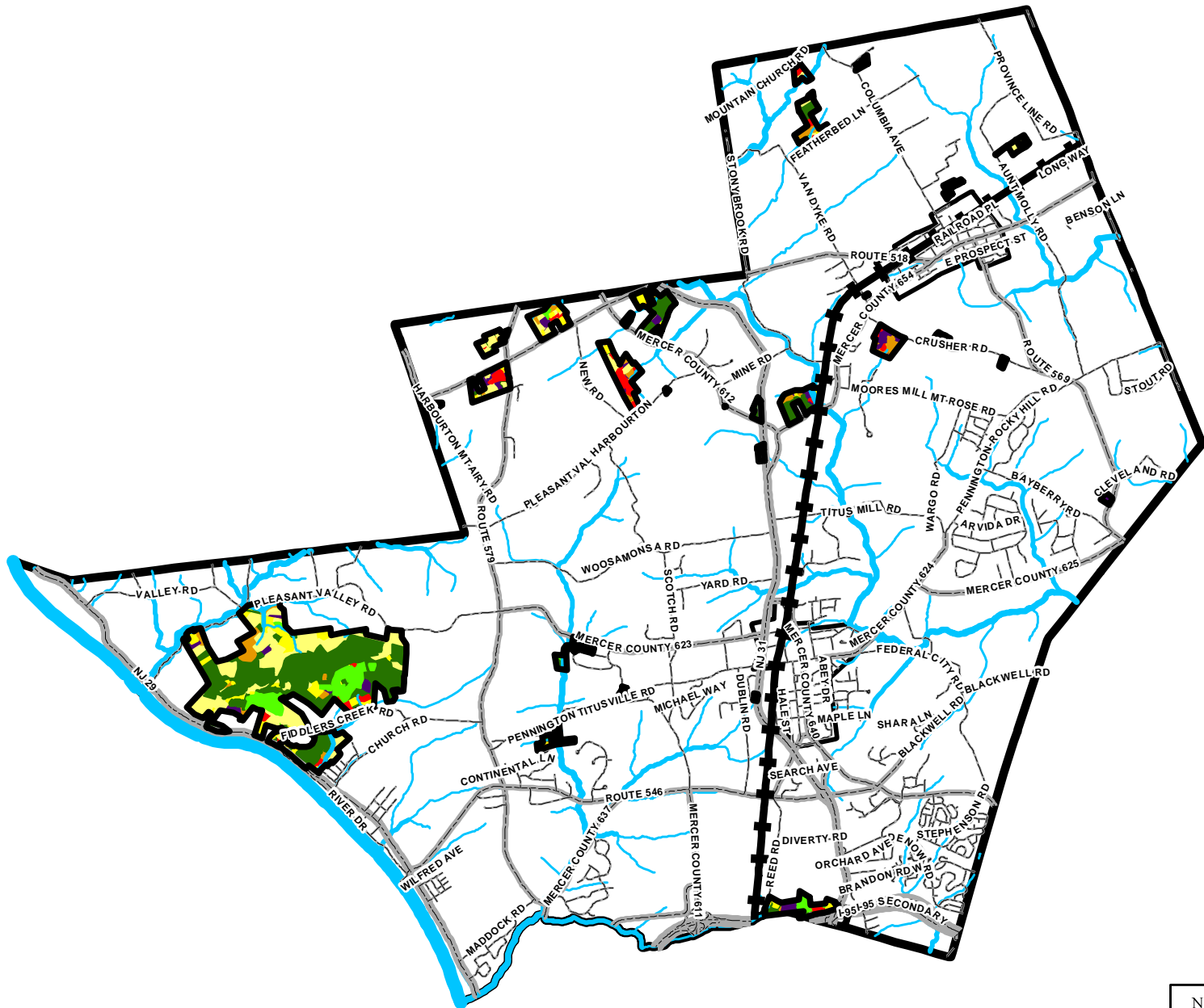
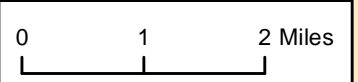
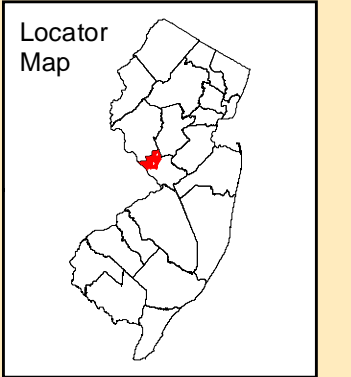


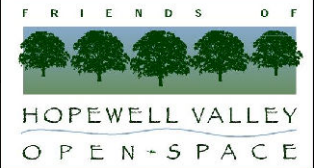
**Hopewell Valley
Community
Stewardship Plan**

**Map 22-25
Invasive Species
on FoHVOS Preserves
Microstegium vinivum
(Japanese Stiltgrass)**

Legend

- FoHVOS Preserves
- MIVI - Japanese Stiltgrass**
- Absent
- Trace
- 1-10% Cover
- 11-25% Cover
- 26-50% Cover
- 51-75% Cover
- 76-100% Cover











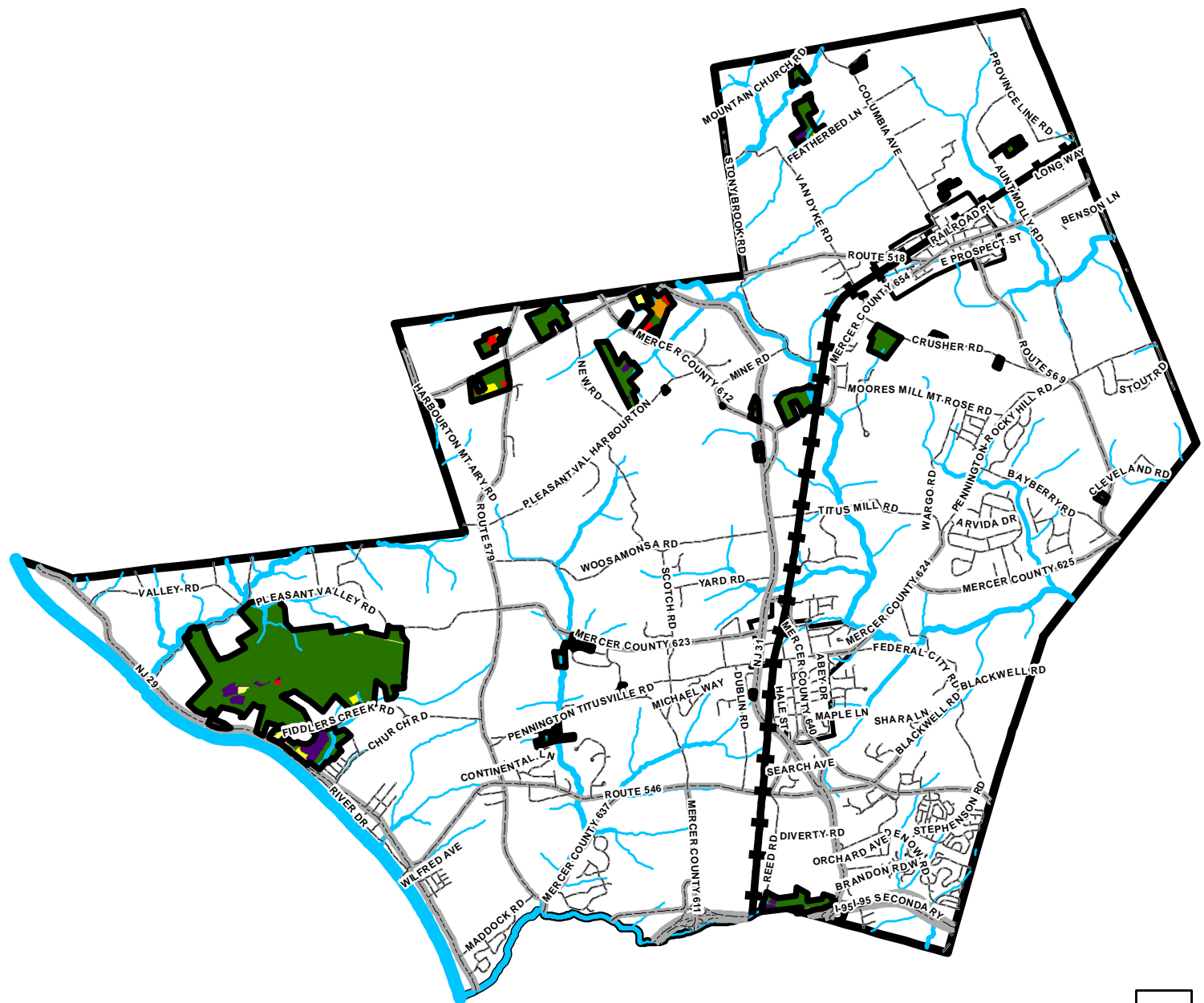
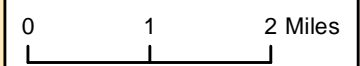
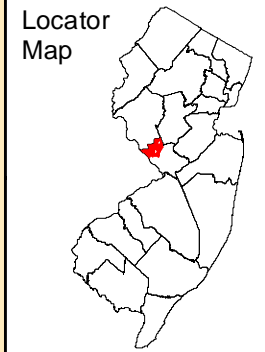


Hopewell Valley Community Stewardship Plan

Map 22-26
Invasive Species
on FoHVOS Preserves
Non-native Cool
Season Grasses

Legend

-  FoHVOS Preserves
- NNGR - Non-Native Grasses**
-  Absent
-  Trace
-  1-10% Cover
-  11-25% Cover
-  26-50% Cover
-  51-75% Cover
-  76-100% Cover



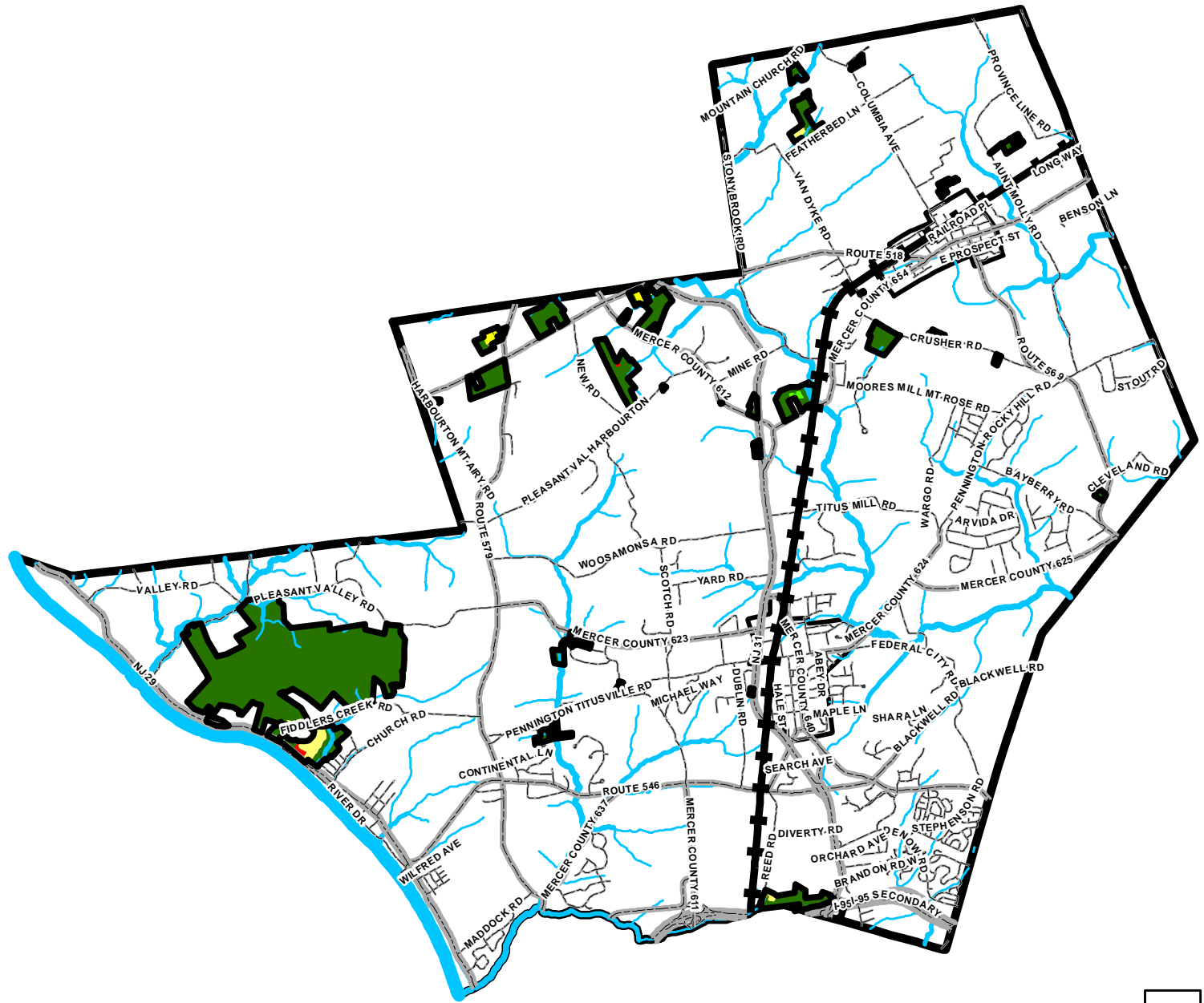
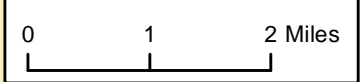
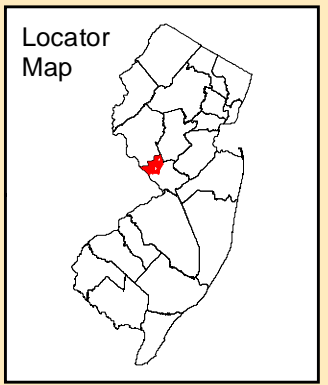


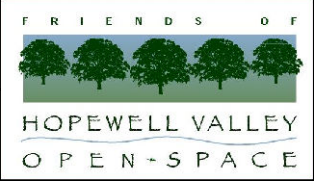
Hopewell Valley Community Stewardship Plan

Map 22-27
 Invasive Species
 on FoHVOS Preserves
Phalaris arundinacea
 (Reed Canary Grass)

Legend

- FoHVOS Preserves
- PHAR - Reed Canary Grass**
- Absent
- Trace
- 1-10% Cover
- 11-25% Cover
- 26-50% Cover
- 51-75% Cover
- 76-100% Cover





Hopewell Valley Community Stewardship Plan

Map 22-28
Invasive Species
on FoHVOs Preserves
Phragmites australis
(Common Reed)

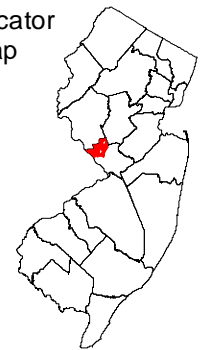
Legend

FoHVOs Preserves

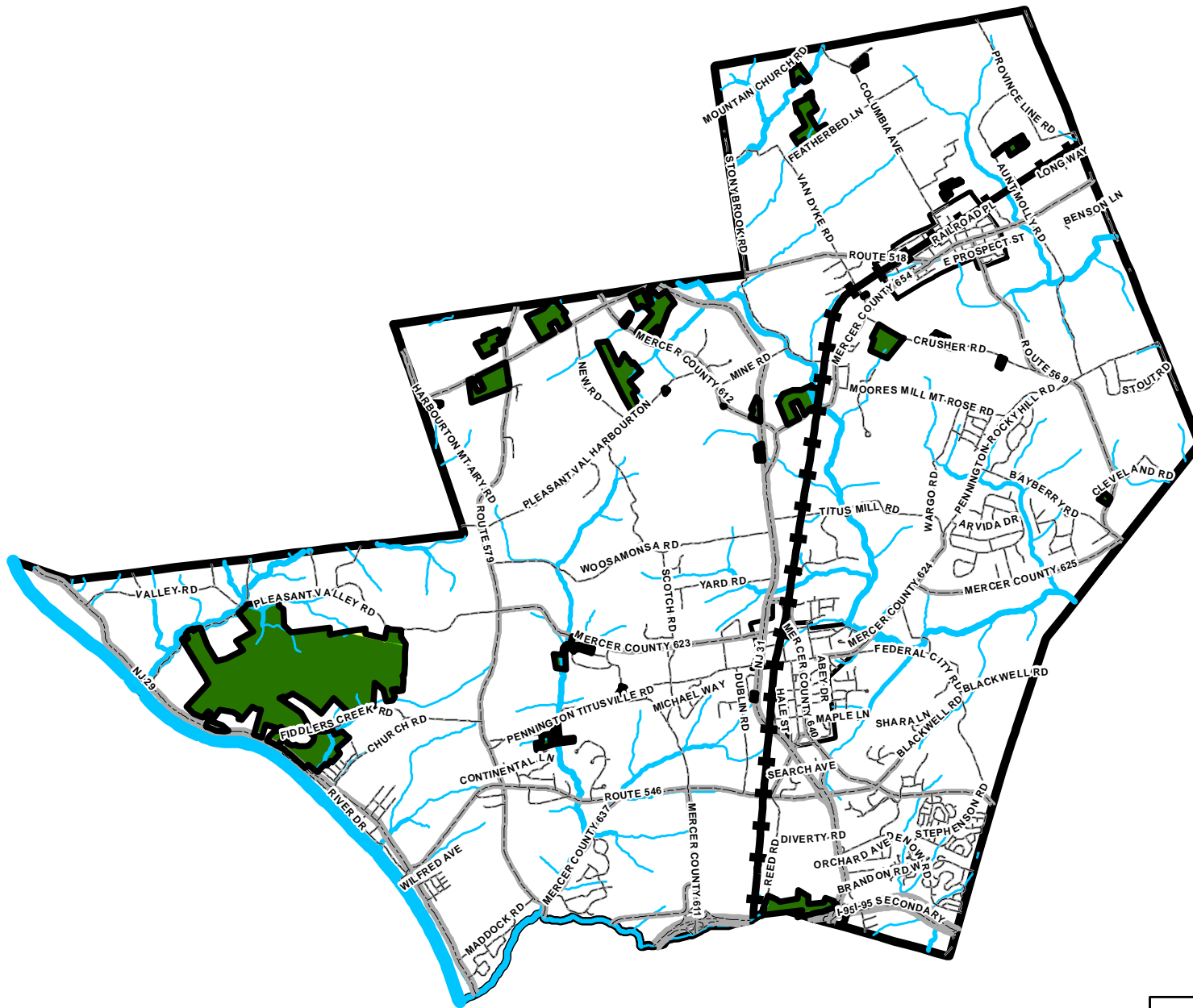
PHAU - Common Reed

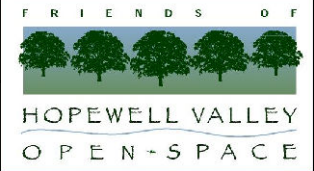
- Absent
- Trace
- 1-10% Cover
- 11-25% Cover
- 26-50% Cover
- 51-75% Cover
- 76-100% Cover

Locator Map



0 1 2 Miles



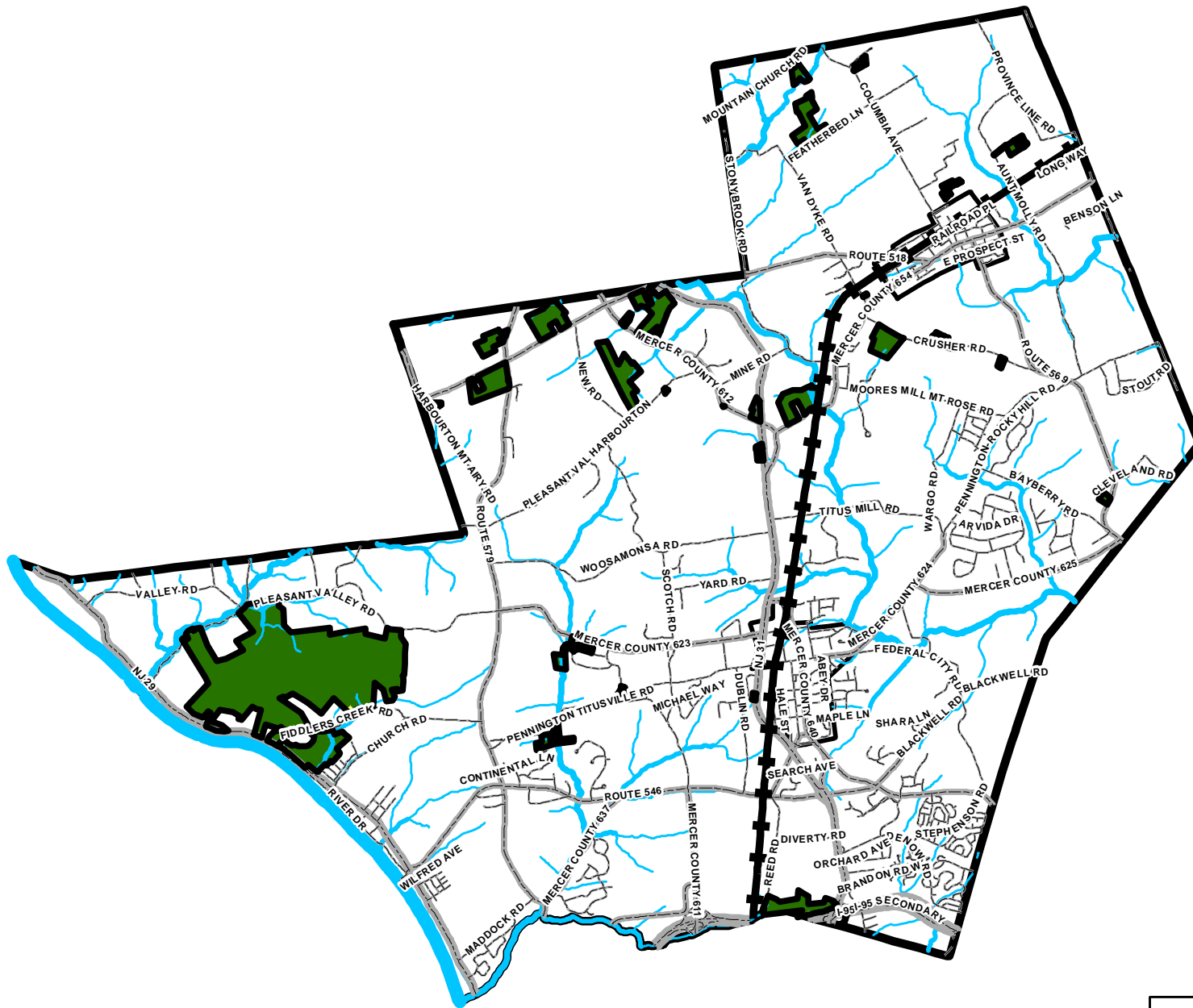


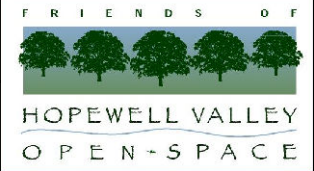
Hopewell Valley Community Stewardship Plan

Map 22-29
Invasive Species
on FoHVOs Preserves
Polygonum cuspidatum
(Japanese Knotweed)

Legend

- FoHVOs Preserves
- POCU - Japanese Knotweed**
- Absent
- Trace
- 1-10% Cover
- 11-25% Cover
- 26-50% Cover
- 51-75% Cover
- 76-100% Cover



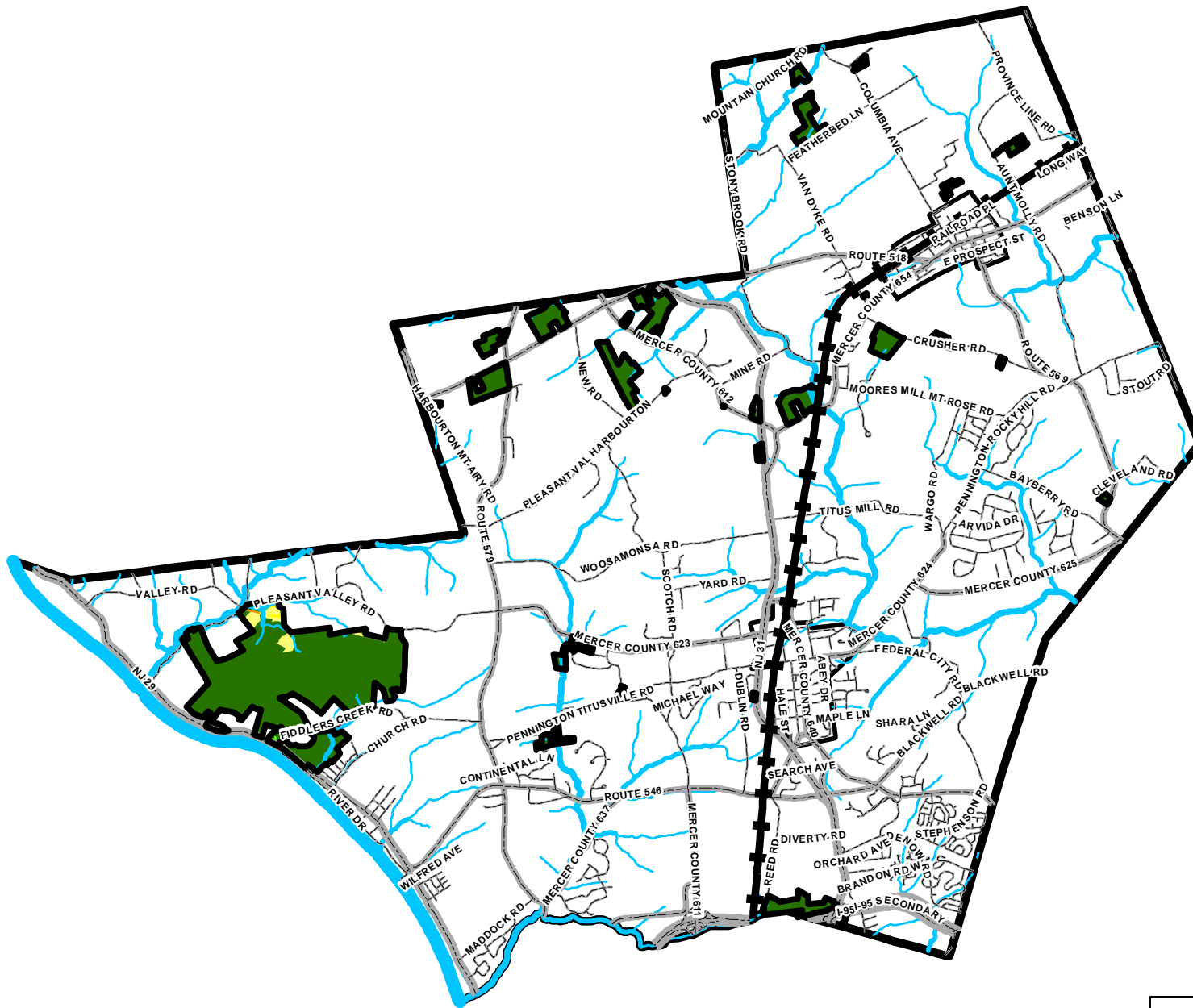
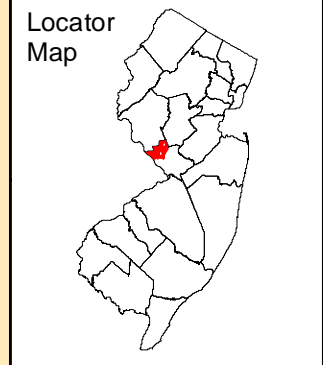


Hopewell Valley Community Stewardship Plan

Map 22-30
Invasive Species
on FoHVOS Preserves
Polygonum perfoliatum
(Mile-a-Minute)

Legend

- FoHVOS Preserves
- POPE - Mile-a-Minute**
- Absent
- Trace
- 1-10% Cover
- 11-25% Cover
- 26-50% Cover
- 51-75% Cover
- 76-100% Cover











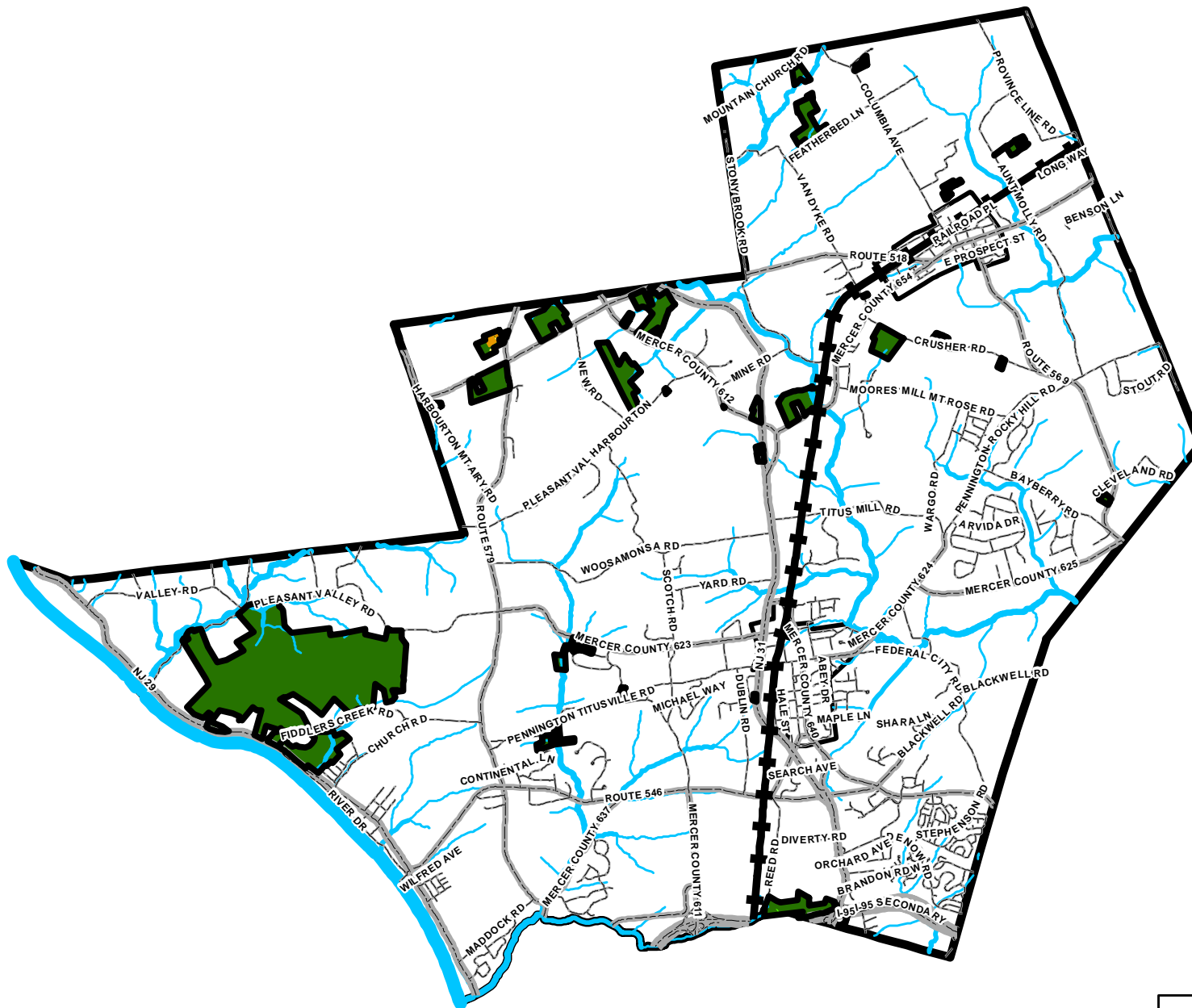
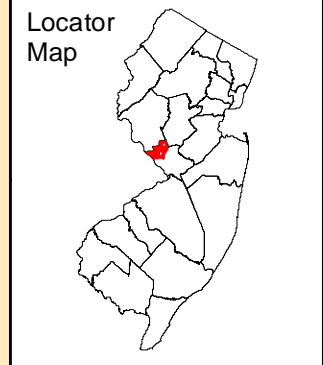


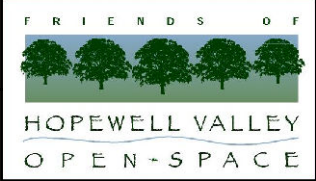
Hopewell Valley Community Stewardship Plan

Map 22-31
Invasive Species
on FoHVOS Preserves
Pyrus calleryana
(Callery Pear)

Legend

-  FoHVOS Preserves
- PYCA - Callery Pear**
-  Absent
-  Trace
-  1-10% Cover
-  11-25% Cover
-  26-50% Cover
-  51-75% Cover
-  76-100% Cover



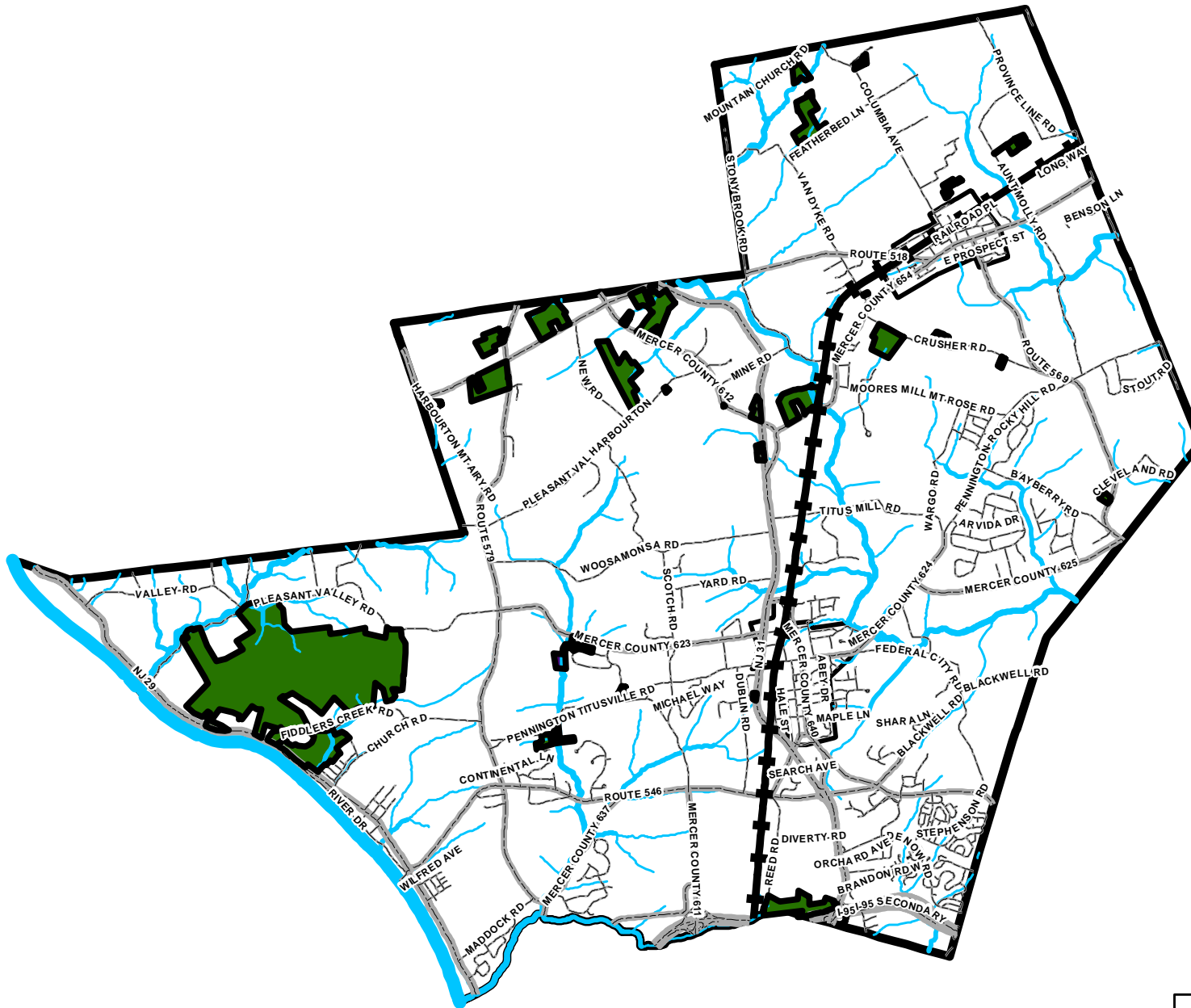
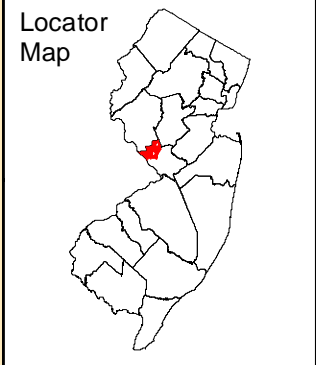


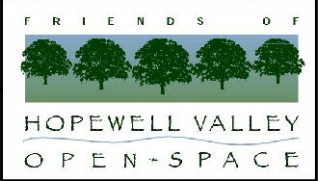
Hopewell Valley Community Stewardship Plan

Map 22-32
Invasive Species
on FoHVOs Preserves
Ranunculus ficaria
(Lesser Celandine)

Legend

- FoHVOs Preserves
- RAFI - Lesser Celandine**
- Absent
- Trace
- 1-10% Cover
- 11-25% Cover
- 26-50% Cover
- 51-75% Cover
- 76-100% Cover











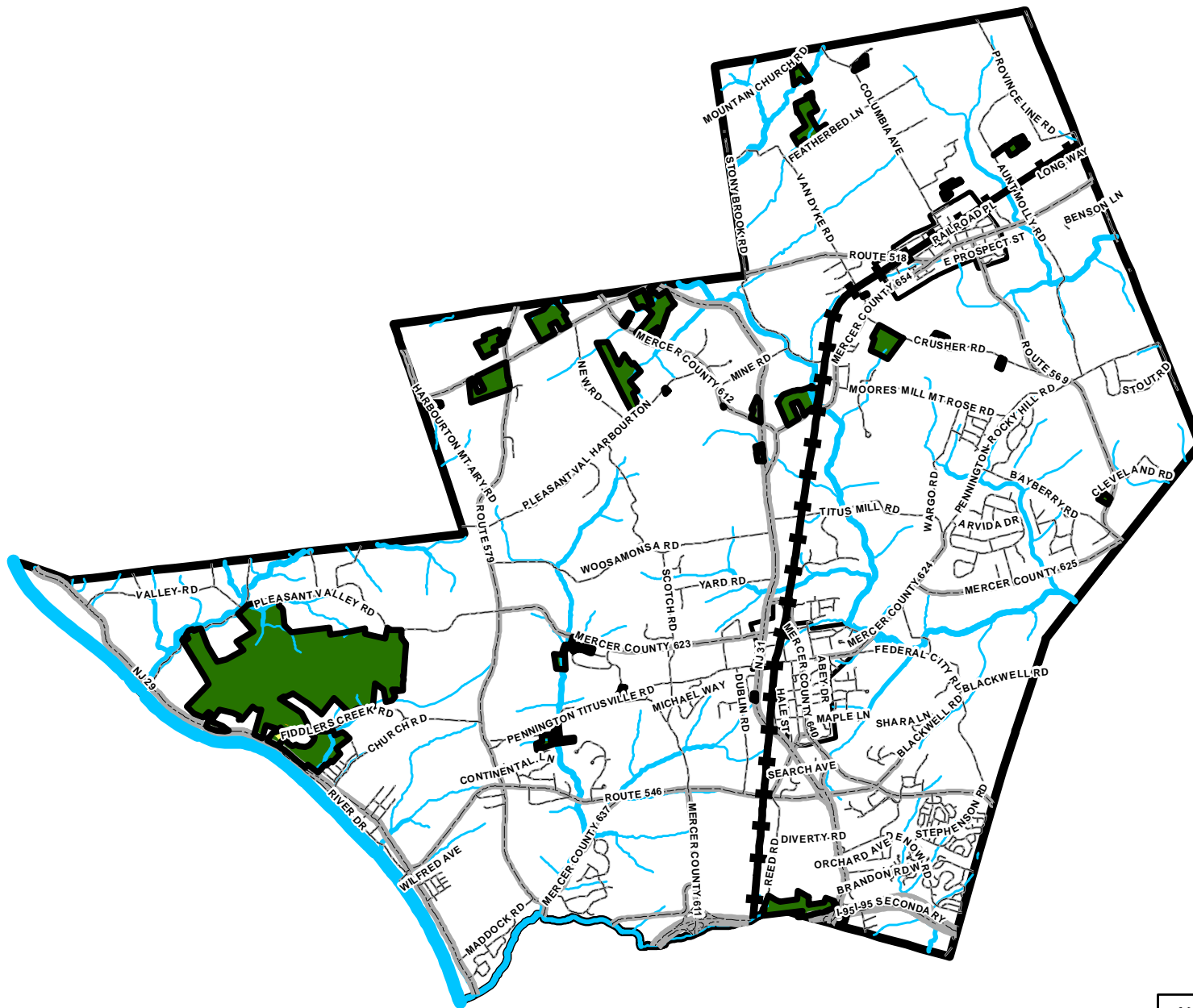


Hopewell Valley Community Stewardship Plan

Map 22-33
Invasive Species
on FoHIVOS Preserves
Robinia pseudoacacia
(Black Locust)

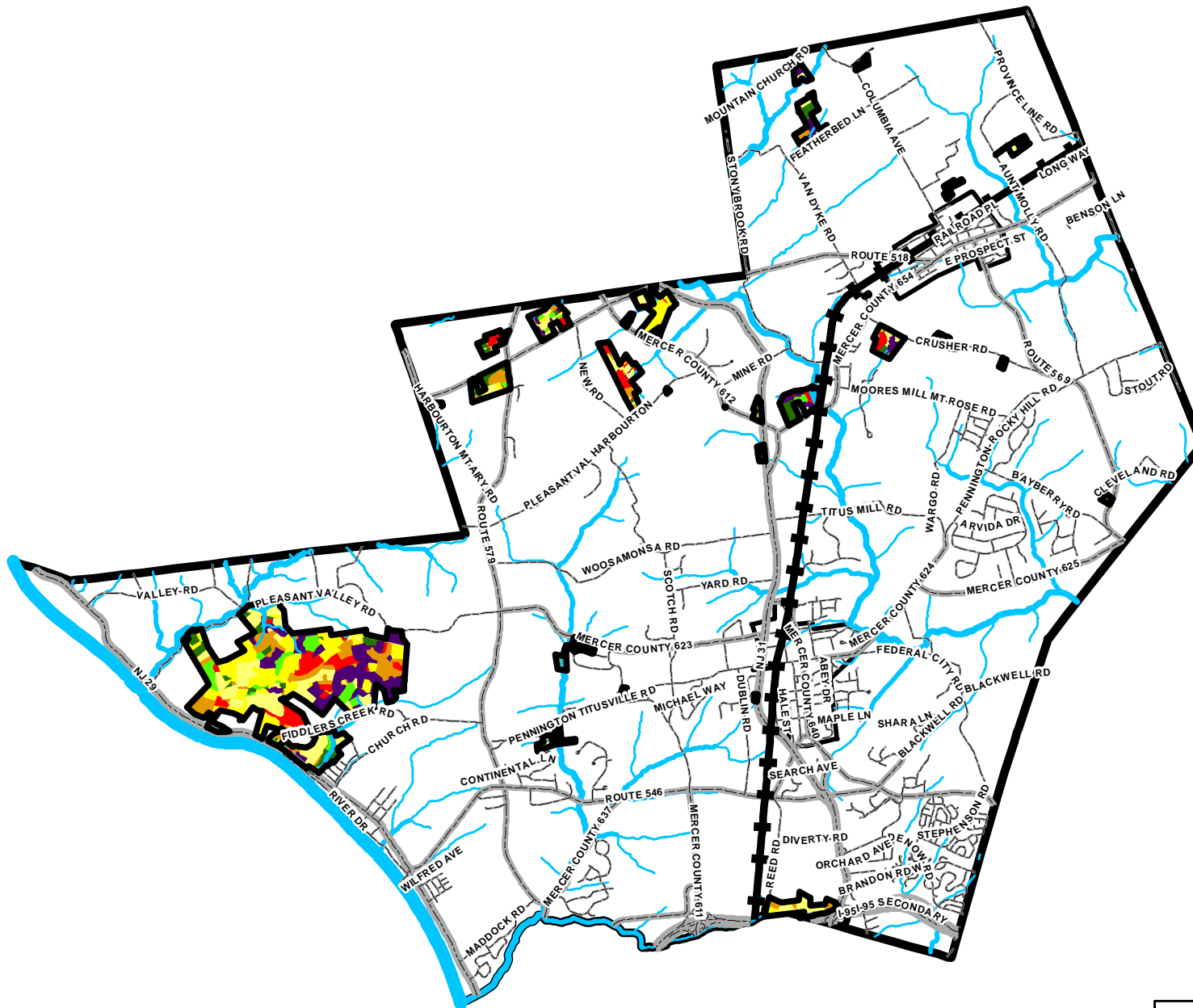
Legend

-  FoHIVOS Preserves
- ROPS - Black Locust**
-  Absent
-  Trace
-  1-10% Cover
-  11-25% Cover
-  26-50% Cover
-  51-75% Cover
-  76-100% Cover











Hopewell Valley Community Stewardship Plan

Map 22-34 Invasive Species on FoHVOs Preserves *Rosa multiflora* (Multiflora Rose)

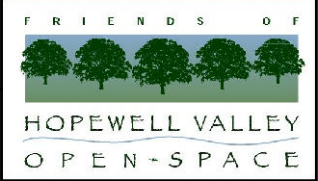


Legend

-  FoHVOs Preserves
- ROMU - Multiflora Rose**
-  Absent
-  Trace
-  1-10% Cover
-  11-25% Cover
-  26-50% Cover
-  51-75% Cover
-  76-100% Cover

Locator Map











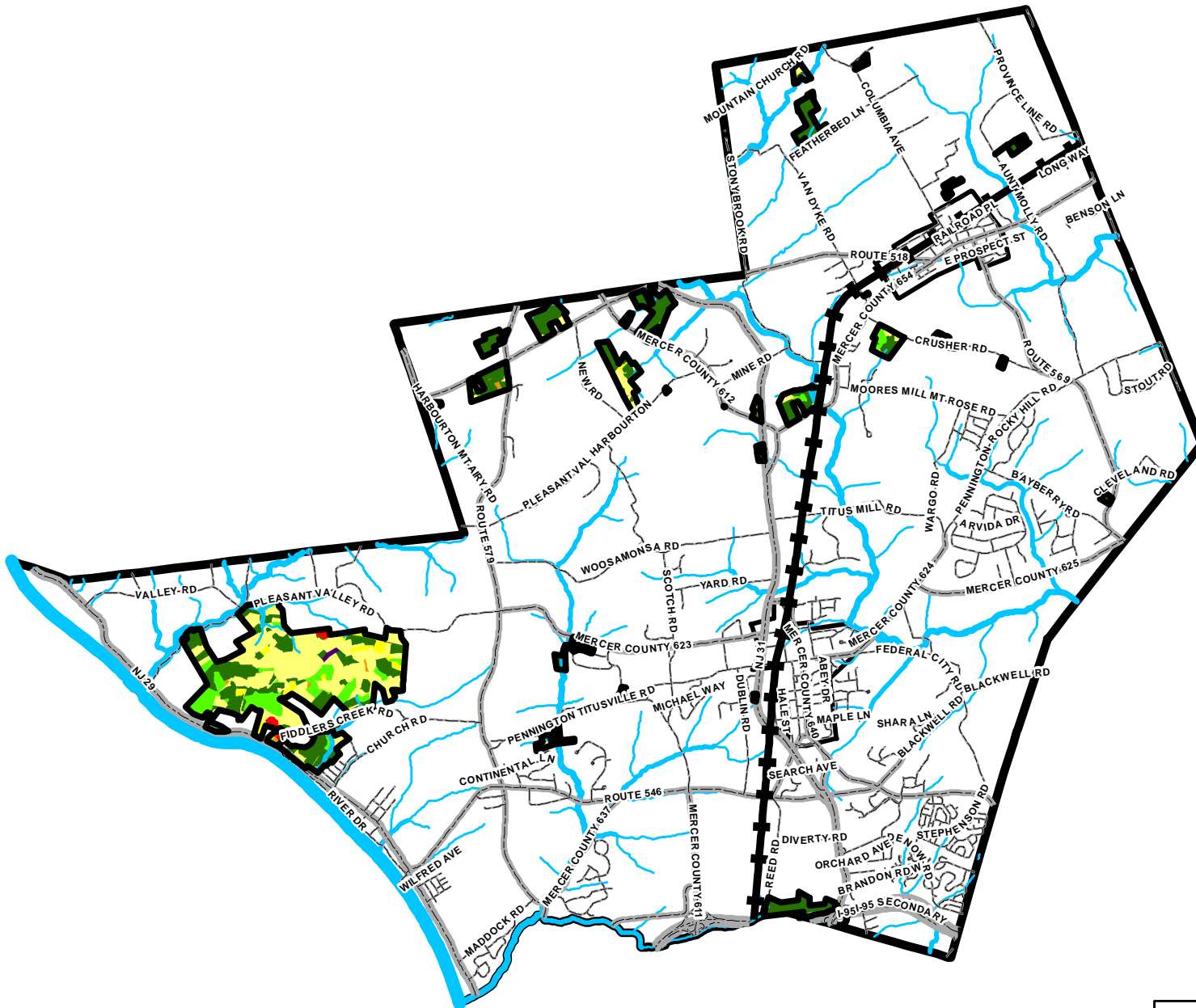


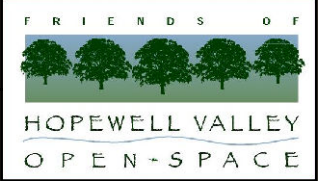
Hopewell Valley Community Stewardship Plan

Map 22-35
Invasive Species
on FoHVOs Preserves
Rubus pheoniculaisius
(Wineberry)

Legend

-  FoHVOs Preserves
- RUPH - Wineberry**
-  Absent
-  Trace
-  1-10% Cover
-  11-25% Cover
-  26-50% Cover
-  51-75% Cover
-  76-100% Cover



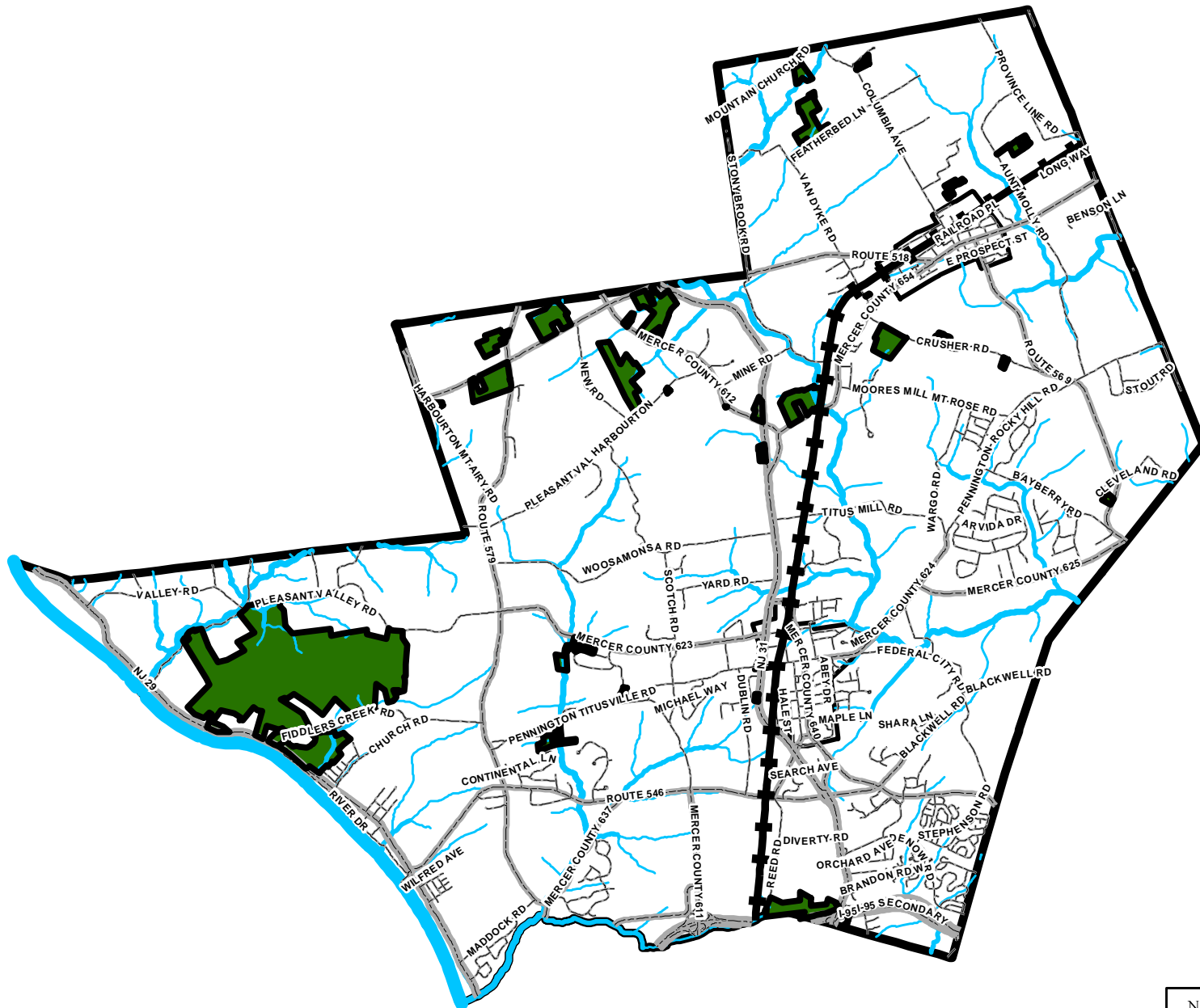


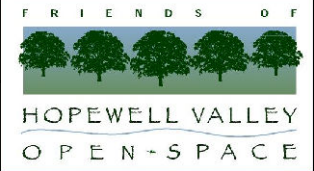
Hopewell Valley Community Stewardship Plan

Map 22-36
 Invasive Species
 on FoHVOs Preserves
Securigera varia
 (Crown Vetch)

Legend

- FoHVOs Preserves
- SEVA - Crown Vetch**
- Absent
- Trace
- 1-10% Cover
- 11-25% Cover
- 26-50% Cover
- 51-75% Cover
- 76-100% Cover













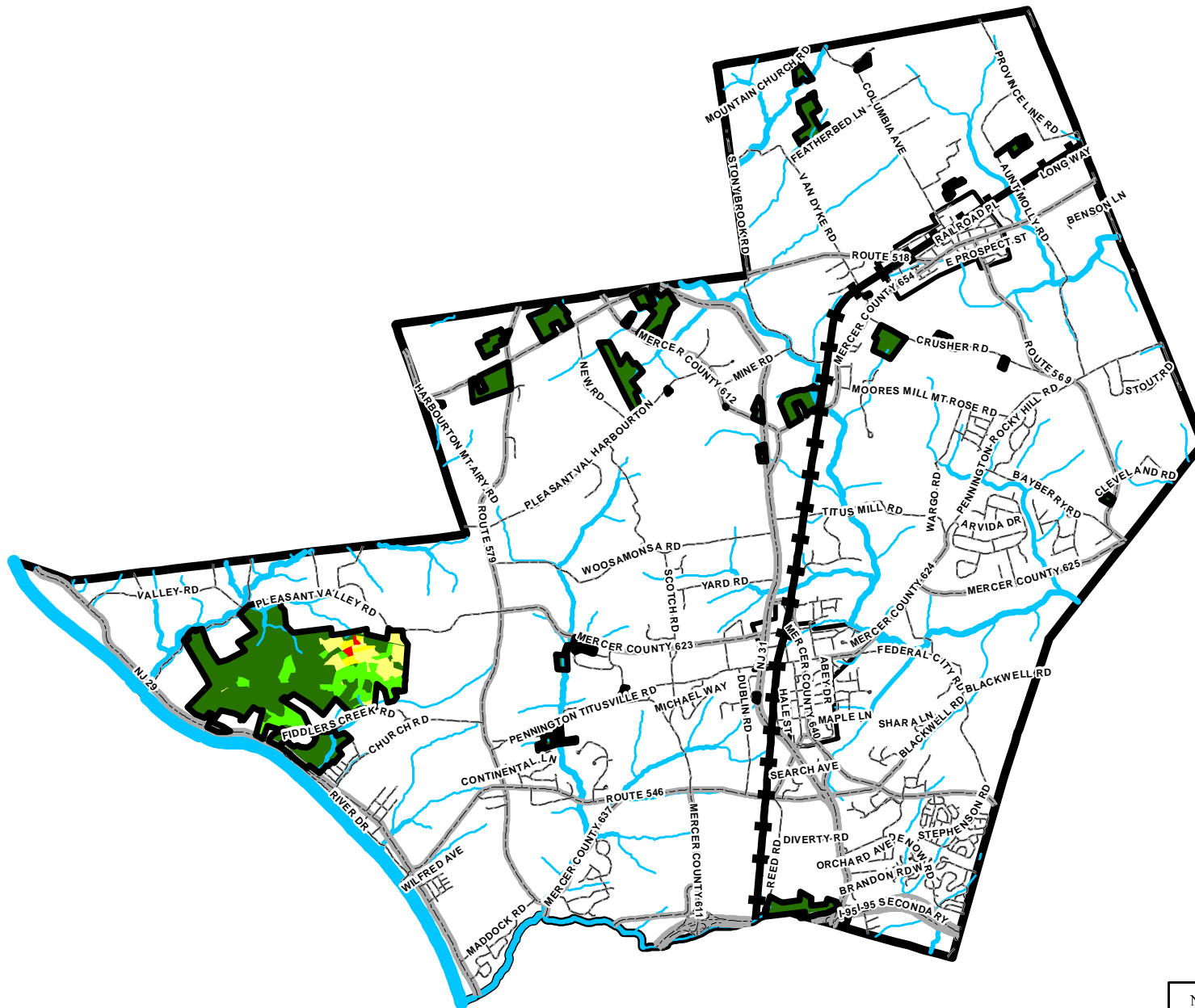
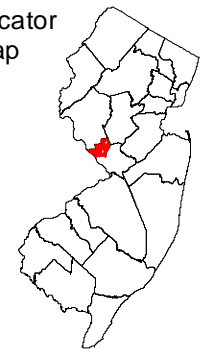
Hopewell Valley Community Stewardship Plan

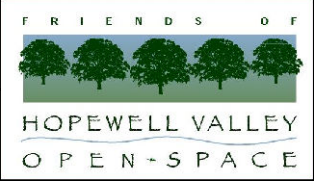
Map 22-37 Invasive Species on FoHVOs Preserves *Viburnum dilatatum* (Linden Viburnum)

Legend

-  FoHVOs Preserves
- VIDI - Linden Viburnum**
-  Absent
-  Trace
-  1-10% Cover
-  11-25% Cover
-  26-50% Cover
-  51-75% Cover
-  76-100% Cover

Locator Map













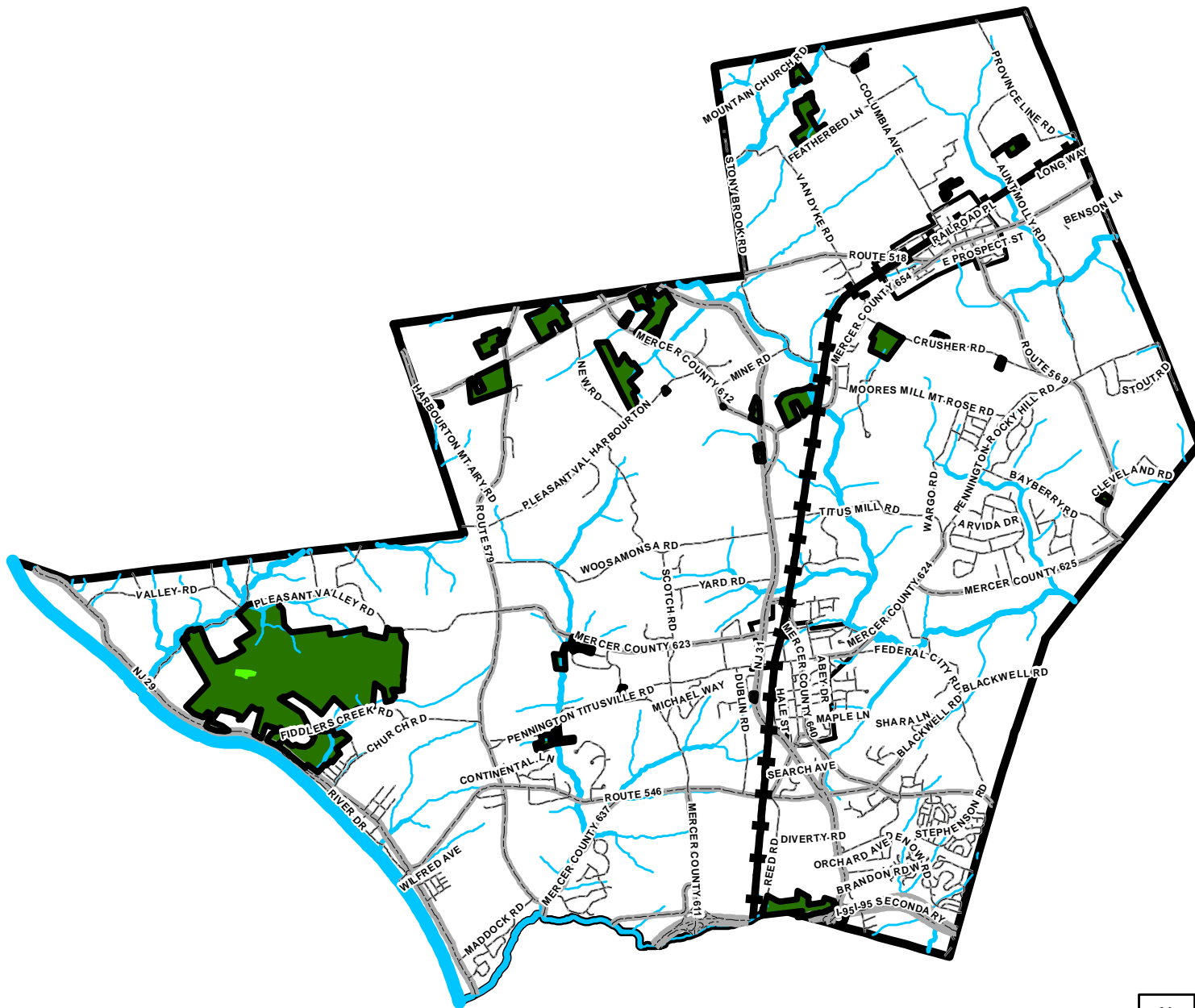
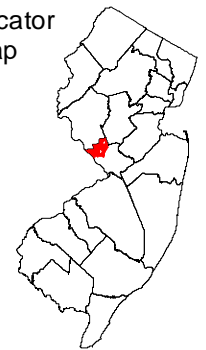
Hopewell Valley Community Stewardship Plan

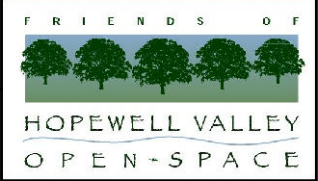
Map 22-38 Invasive Species on FoHVOS Preserves *Viburnum sieboldii* (Siebold Viburnum)

Legend

-  FoHVOS Preserves
- VISI - Siebold's Viburnum**
-  Absent
-  Trace
-  1-10% Cover
-  11-25% Cover
-  26-50% Cover
-  51-75% Cover
-  76-100% Cover

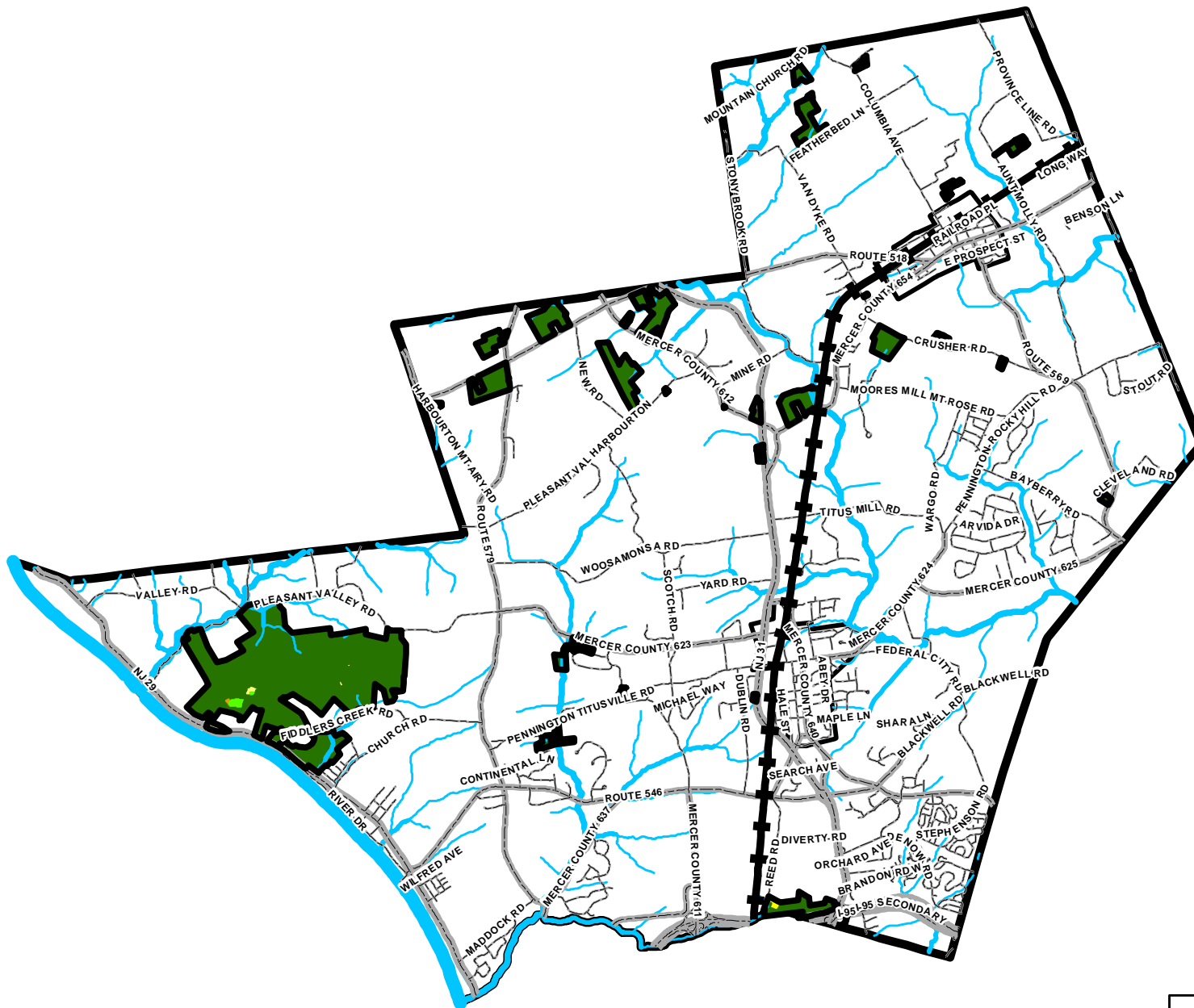
Locator Map





Hopewell Valley Community Stewardship Plan

Map 22-39
Invasive Plants
on FoHVO Preserves
Wisteria floribunda
(Japanese Wisteria)

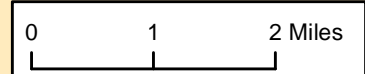


Legend

FoHVO Preserves

WIFL - Japanese Wisteria

- Absent
- Trace
- 1-10% Cover
- 11-25% Cover
- 26-50% Cover
- 51-75% Cover
- 76-100% Cover



**Appendix A. Hopewell Valley Ecological Values Calculations
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space**

Ranking Criteria Name	Ranking Criteria (GIS Headings)	Score Ranges	Score & Explanations						Note
			0	1	2	3	4	5	
Contiguous Habitat Category	CH_CAT	0-5	< 100 acres	100 - 1,000 acres	1,001 - 2,500 acres	2,501 - 5,000 acres	5,001 - 10,000 acres	> 10,000 acres	The largest block intersecting grid was used to assign value to each grid. Weight highest (value is 3X rare plant or animal scores - combined weight is 6X its own original score percentage), reduced fragmentation improves overall ecological health for a variety of reasons. Weighting factor is obviously arbitrary, but conveys the importance of contiguous habitat patches towards long-term ecological health.
1930 Forest Presence Category	OF_CAT	0-4	No 1930's forest in grid	< 25% in grid	25-50% of grid	50-75% of grid	> 75% of grid	N/A	Intersection of 1930 forest and 2002 forest cover (2002 successional areas included with Landscape Project and 2002 LU/LC "Forest" were not included). Presumes unaltered forest soils where past forest cover coincides with current forest cover.
Natural Heritage Grid Category	NH_CATE	0-4	No rare plant species present	S3 (special concern) present	S2 (state threatened) present	S1 (state endangered) present	Federally listed present	N/A	Grid assigned category based upon maximum score of rarest species within the grid.
Landscape Project Category	LP_CAT	0-4	No rare animal species present	S3 (special concern) present	S2 (state threatened) present	S1 (state endangered) present	Federally listed present	N/A	Grid assigned category based upon maximum score of contiguous habitat block that intersects the grid.
IBBA Presence	IBBA_CAT	0-1	Absent	Present	N/A	N/A	N/A	N/A	Partially redundant with Landscape Project data that accounts for occurrences of rare birds, but these areas have special significance independent of the more generic Landscape Project coverage.
Bald Eagle Foraging Habitat Presence	BEF_CAT	0-1	Absent	Present	N/A	N/A	N/A	N/A	Special significance not covered by Landscape Project coverage.
Wood Turtle Habitat Presence	WTH_CAT	0-1	Absent	Present	N/A	N/A	N/A	N/A	Special significance not covered by Landscape Project coverage.
Contiguous Habitat Score	CONT_SCORE	0-1	Converted to decimal number by dividing actual category number by maximum category number.						Maximum score = 5
Old Forest Score	OF_SCORE	0-1	Converted to decimal number by dividing actual category number by maximum category number.						Maximum score = 4
Rare Plant Score	RP_SCORE	0-1	Converted to decimal number by dividing actual category number by maximum category number.						Maximum score = 4
Rare Animal Score	RA_SCORE	0-1	Converted to decimal number by dividing actual category numbers by sum of maximum category numbers.						Maximum Score = 7 (Includes Landscape Project, IBBA, Bald Eagle, and Wood Turtle)
Ecological Value Score - Raw	EV_SCORE_RAW	0-100	Calculated using the following formula: (((CONT_SCORE*6)+OF_SCORE+RP_SCORE+RA_SCORE)/9)*100						Provides significant weight to contiguous habitat while equalizing weight of rare plant, rare animal and old forest.
Urban Cover Category	URBAN_CAT	0-4	No urban cover in grid	< 25% in grid	26-50% of grid	51-75% of grid	76-100% of grid	N/A	Performed by visual estimate. This criteria reduces ecological value for grids based upon degrading impacts of urban cover.
Urban Cover Score	URBAN_SCORE	0-87.5	Score created by calculating mid-point percentage of urban cover categories.						
Ecological Value Score - Final	EV_SCORE_FINAL	"-100" to 100	Calculated by subtracting the 'Ecological value score - Raw' by 'Urban Cover Score'						Theoretical low value is -100 with 100% urban cover and 100% when all ecological values are maximal. Actual minimum value is -87.5.
EV_Category	EV_Category	Low-Very High	Based upon Ecological Value Scores - Final: Low < 25, Medium = 25-50, High = 50-75, Very High > 75						Relative categories assigned
EV_Percentile	EV_Percentile	Percentile Ranges	Based upon Ecological Value Scores - Final: 0-25 Percentile, 25-50 Percentile, 50-75 Percentile, >75 Percentile						

**Appendix B. Ecological Communities of the New Jersey Piedmont (Gettysburg Sub-section)
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space**

Source: Classification of Vegetation Communities of New Jersey: Second Iteration, Breden et al. 2001

Community Name	Community Type	Moisture and/or Description Notes	Rank	Identifier	Page Number	Formation Name
Sugar maple-White Ash-American Basswood-Cucumber-tree / Black Cohosh Forest	Forest	mesic, rich	G?S?	CEGL006237	26	Lowland or submontane cold-deciduous forest
(Pignut hickory, Shagbark hickory)-White Ash-Oak Species Central Appalachian Forest	Forest	dry, rich	G?S?	CEGL006236	30	Lowland or submontane cold-deciduous forest
Northern Red Oak-(Pignut Hickory, Shagbark Hickory) / Eastern Hop-hornbeam / Pennsylvania Sedge Forest	Forest	dry, rich	G?S2S3?	CEGL006301	30	Lowland or submontane cold-deciduous forest
(White Oak, Northern Red Oak, Black Oak) / Flowering Dogwood / Mapleleaf Viburnum Forest	Forest	well-drained loamy sand	G?S4S5	CEGL006336	35	Lowland or submontane cold-deciduous forest
Rock Chestnut Oak-(Northern Red Oak, Black Oak) / Black Huckleberry Forest	Forest	dry to xeric	G3G5S3S4	CEGL006282	44	Lowland or submontane cold-deciduous forest
Rock Chestnut Oak-Northern Red Oak-(Pignut Hickory, Mockernut Hickory) / Black Huckleberry Forest	Forest	dry to mesic	G5?S?	CEGL006057	48	Lowland or submontane cold-deciduous forest
Northern Red Oak-Sugar Maple-American Beech / Mapleleaf Viburnum Forest	Forest	mesic	G?S?	CEGL006173	50	Lowland or submontane cold-deciduous forest
Northern Red Oak-Sugar Maple-Tuliptree Forest	Forest	mesic slopes or well-drained flats	G?S3S4	CEGL006125	50	Lowland or submontane cold-deciduous forest
Sugar Maple-Ash Species-American Basswood / Ostrich Fern-White Snakeroot Forest	Forest	floodplain, rich high-terrace	G?S2S3	CEGL006114	55	temporarily flooded cold-deciduous forest
Red Maple-(Green Ash, White Ash) / Northern Spicebush / Skunk-cabbage Forest	Forest	seasonally flooded, overland and groundwater seepage	G4G5S3S5	CEGL006406	57	Seasonally flooded cold-deciduous forest
Speckled Alder Swamp Shrubland	Shrubland	seasonally flooded, well decomposed peat or mineral	G5?S2S4	CEGL002381	101	Seasonally flooded cold-deciduous shrubland
Bluejoint-Reed Canary Grass Herbaceous Vegetation	Herbaceous Vegetation	seasonally flooded (wet meadow)	G4G5S?	CEGL005174	127	Seasonally flooded temperate or sub-polar grassland
Tussock Sedge Seasonally Flooded Herbaceous Vegetation	Herbaceous Vegetation	seasonally flooded (sedge meadow)	G?S34	CEGL004121	130	Seasonally flooded temperate or sub-polar grassland
(Softstem Bulrush, Hardstem Bulrush) Eastern Herbaceous Vegetation	Herbaceous Vegetation	deepwater marsh	G?S2S4	CEGL006275	141	Semi-permanently flooded temperate or sub-polar grassland
(Narrowleaf Cattail, Broadleaf Cattail)-(Clubrush species) Eastern Herbaceous Vegetation	Herbaceous Vegetation	marsh, graminoid marsh with emergent vegetation	G5S5	CEGL006153	144	Semi-permanently flooded temperate or sub-polar grassland
Green Arrow-arum-Lizard's-tail-Fringed Sedge / Tree Moss Herbaceous Vegetation	Herbaceous Vegetation	semi-permanently flooded (depressions)	G2?S?	CEGL007696	167	semi-permanently flooded temperate perennial forb vegetation
Water-hemp Tidal Herbaceous Vegetation	Herbaceous Vegetation	tidal (mid-level of rivershores)	G3G5S2S3	CEGL006080	168	tidal temperate perennial forb vegetation
Broadleaf Pondlily Tidal Herbaceous Vegetation	Herbaceous Vegetation	tidal (mud flats)	G?S2S3	CEGL004472	169	tidal temperate perennial forb vegetation
Mixed Forbs High Marsh Tidal Herbaceous Vegetation	Herbaceous Vegetation	tidal	G?S3	CEGL006325	170	tidal temperate perennial forb vegetation
American Eel-grass-Clasping-leaf Pondweed Herbaceous Vegetation	Herbaceous Vegetation	permanently flooded (lakes and streams)	G5S4	CEGL006196	176	permanently flooded temperate hydromorphic rooted vegetation

**Appendix C. Woody Plants of Mercer County
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space**

Source: Brooklyn Botanic Garden
<http://www.bbg.org/sci/nymf/maps/mercer.html>

Scientific Name	Common Name	Growth Type	Nativity	Invasive Status	Frequency
<i>Acer negundo</i>	boxelder	Tree	Native	N/A	Common
<i>Acer nigrum</i>	black maple	Tree	Native	N/A	Not Recorded
<i>Acer platanoides</i>	Norway maple	Tree	Non-Native	Yes	Common
<i>Acer pseudoplatanus</i>	sycamore maple	Tree	Non-Native	Yes	Frequent
<i>Acer rubrum</i>	red maple	Tree	Native	N/A	Common
<i>Acer saccharinum</i>	silver maple	Tree	Native	N/A	Frequent
<i>Acer saccharum</i>	sugar maple	Tree	Native	N/A	Common
<i>Aesculus hippocastanum</i>	horse chestnut	Tree	Non-Native	No	Not Recorded
<i>Ailanthus altissima</i>	tree-of-heaven	Tree	Non-Native	Yes	Common
<i>Albizia julibrissin</i>	mimosa	Tree	Non-Native	No	Frequent
<i>Alnus glutinosa</i>	black alder	Tree	Non-Native	Yes	Occasional
<i>Alnus incana</i>	speckled alder	Shrub	Native	N/A	Occasional
<i>Alnus serrulata</i>	smooth alder	Shrub	Native	N/A	Common
<i>Amelanchier arborea</i>	shadbush	Shrub	Native	N/A	Common
<i>Amelanchier canadensis</i>	serviceberry	Shrub	Native	N/A	Common
<i>Amelanchier stolonifera</i>	running juneberry	Shrub	Native	N/A	Not Recorded
<i>Amorpha fruticosa</i>	false indigo	Shrub	Non-Native	Yes	Frequent
<i>Ampelopsis brevipedunculata</i>	porcelainberry	Vine	Non-Native	Yes	Common
<i>Aralia spinosa</i>	Chinese angelica-tree	Tree	Non-Native	Yes	Frequent
<i>Aronia arbutifolia</i>	red chokeberry	Shrub	Native	N/A	Common
<i>Aronia melanocarpa</i>	black chokeberry	Shrub	Native	N/A	Common
<i>Aronia x prunifolia</i>	purple chokeberry	Shrub	Native	N/A	Not Recorded
<i>Asimina triloba</i>	pawpaw	Tree	Native	N/A	Rare
<i>Berberis thunbergii</i>	Japanese barberry	Shrub	Non-Native	Yes	Common
<i>Berberis vulgaris</i>	common barberry	Shrub	Non-Native	Yes	Occasional
<i>Betula lenta</i>	sweet birch	Tree	Native	N/A	Common
<i>Betula nigra</i>	river birch	Tree	Native	N/A	Occasional
<i>Betula populifolia</i>	gray birch	Tree	Native	N/A	Common
<i>Broussonetia papyrifera</i>	paper birch	Tree	Non-Native	No	Occasional
<i>Campsis radicans</i>	trumpet creeper	Vine	Native	N/A	Occasional
<i>Carpinus caroliniana</i>	ironwood	Tree	Native	N/A	Common
<i>Carya cordiformis</i>	bitternut hickory	Tree	Native	N/A	Common
<i>Carya glabra</i>	pignut hickory	Tree	Native	N/A	Common
<i>Carya ovalis</i>	sweet pignut hickory	Tree	Native	N/A	Not Recorded
<i>Carya ovata</i>	shagbark hickory	Tree	Native	N/A	Common
<i>Carya tomentosa</i>	mockernut hickory	Tree	Native	N/A	Common
<i>Castanea dentata</i>	American chestnut	Tree	Native	N/A	Frequent
<i>Castanea pumila</i>	chinquapin	Shrub	Native	N/A	Rare
<i>Catalpa bignonioides</i>	catalpa	Tree	Non-Native	No	Frequent
<i>Ceanothus americanus</i>	New Jersey tea	Shrub	Native	N/A	Not Recorded
<i>Celastrus orbiculata</i>	Asiatic bittersweet	Vine	Non-Native	Yes	Common
<i>Celastrus scandens</i>	American bittersweet	Vine	Native	N/A	Rare
<i>Celtis occidentalis</i>	hackberry	Tree	Native	N/A	Common
<i>Cephalanthus occidentalis</i>	buttonbush	Tree	Native	N/A	Frequent
<i>Cercis canadensis</i>	redbud	Tree	Native	N/A	Rare
<i>Chamaedaphne calyculata</i>	leatherleaf	Shrub	Native	N/A	Common
<i>Chimaphila maculata</i>	striped wintergreen	Sub-shrub	Native	N/A	Common
<i>Chimaphila umbellata</i>	pipessiwa	Sub-shrub	Native	N/A	Occasional
<i>Clematis terniflora</i>	Virgin's bower	Vine	Non-Native	Yes	Not Recorded

**Appendix C. Woody Plants of Mercer County
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space**

Source: Brooklyn Botanic Garden
<http://www.bbg.org/sci/nymf/maps/mercer.html>

Scientific Name	Common Name	Growth Type	Nativity	Invasive Status	Frequency
<i>Clematis virginiana</i>	Virgin's bower	Vine	Native	N/A	Frequent
<i>Clethra alnifolia</i>	sweet pepperbush	Shrub	Native	N/A	Common
<i>Comptonia peregrina</i>	sweetfern	Shrub	Native	N/A	Common
<i>Cornus alternifolia</i>	pagoda dogwood	Tree	Native	N/A	Frequent
<i>Cornus amomum</i>	silky dogwood	Shrub	Native	N/A	Common
<i>Cornus canadensis</i>	bunchberry	Sub-shrub	Native	N/A	Rare
<i>Cornus florida</i>	flowering dogwood	Tree	Native	N/A	Common
<i>Cornus foemina</i>	gray dogwood	Shrub	Native	N/A	Common
<i>Cornus sericea</i>	red-osier dogwood	Shrub	Native	N/A	Occasional
<i>Corylus americana</i>	American hazelnut	Shrub	Native	N/A	Common
<i>Corylus cornuta</i>	beaked hazelnut	Shrub	Native	N/A	Frequent
<i>Crataegus crusgalli</i>	cockspur hawthorn	Tree	Native	N/A	Common
<i>Crataegus intricata</i>	Biltmore hawthorn	Tree	Native	N/A	Common
<i>Crataegus pruinosa</i>	frosted hawthorn	Tree	Native	N/A	Rare
<i>Crataegus uniflora</i>	oneflower hawthorn	Tree	Native	N/A	Rare
<i>Deutzia scabra</i>	duetzia	Shrub	Non-Native	No	Not Recorded
<i>Diospyros virginiana</i>	persimmon	Tree	Native	N/A	Frequent
<i>Dirca palustris</i>	leatherwood	Shrub	Native	N/A	Rare
<i>Elaeagnus umbellata</i>	autumn olive	Shrub	Non-Native	Yes	Common
<i>Epigaea repens</i>	trailing arbutus	Sub-shrub	Native	N/A	Occasional
<i>Euonymus alata</i>	winged burning bush	Shrub	Non-Native	Yes	Common
<i>Euonymus americana</i>	strawberry bush	Shrub	Native	N/A	Rare
<i>Euonymus atropurpurea</i>	wahoo	Shrub	Native	N/A	Rare
<i>Euonymus europaea</i>	European spindle tree	Shrub	Non-Native	Yes	Occasional
<i>Fagus grandifolia</i>	American beech	Tree	Native	N/A	Common
<i>Fraxinus americana</i>	white ash	Tree	Native	N/A	Common
<i>Fraxinus nigra</i>	black ash	Tree	Native	N/A	Occasional
<i>Fraxinus pennsylvanica</i>	green ash	Tree	Native	N/A	Common
<i>Gaultheria procumbens</i>	wintergreen	Sub-shrub	Native	N/A	Common
<i>Gaylussacia baccata</i>	black huckleberry	Shrub	Native	N/A	Common
<i>Gaylussacia dumosa</i>	dwarf huckleberry	Shrub	Native	N/A	Rare
<i>Gaylussacia frondosa</i>	dangleberry	Shrub	Native	N/A	Common
<i>Gleditsia triacanthos</i>	honeylocust	Tree	Native	N/A	Frequent
<i>Hamamelis virginiana</i>	witchhazel	Shrub	Native	N/A	Common
<i>Hedera helix</i>	English ivy	Vine	Non-Native	Yes	Occasional
<i>Hibiscus syriacus</i>	rose-of-sharon	Shrub	Non-Native	No	Not Recorded
<i>Hydrangea arborescens</i>	wild hydrangea	Shrub	Native	N/A	Not Recorded
<i>Hypericum hypericoides</i>	St. Andrew's cross	Shrub	Native	N/A	Rare
<i>Ilex crenata</i>	Japanese holly	Shrub	Non-Native	No	Occasional
<i>Ilex glabra</i>	inkberry	Shrub	Native	N/A	Occasional
<i>Ilex laevigata</i>	smooth winterberry	Shrub	Native	N/A	Occasional
<i>Ilex opaca</i>	American holly	Tree	Native	N/A	Frequent
<i>Ilex verticillata</i>	winterberry	Shrub	Native	N/A	Common
<i>Juglans cinerea</i>	butternut	Tree	Native	N/A	Occasional
<i>Juglans nigra</i>	black walnut	Tree	Native	N/A	Common
<i>Juniperus communis</i>	common juniper	Shrub	Native	N/A	Rare
<i>Juniperus virginiana</i>	red cedar	Tree	Native	N/A	Common
<i>Kalmia angustifolia</i>	sheep laurel	Shrub	Native	N/A	Frequent
<i>Kalmia latifolia</i>	mountain laurel	Shrub	Native	N/A	Frequent

**Appendix C. Woody Plants of Mercer County
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Source: Brooklyn Botanic Garden
<http://www.bbg.org/sci/nymf/maps/mercer.html>

Scientific Name	Common Name	Growth Type	Nativity	Invasive Status	Frequency
<i>Leucothoe racemosa</i>	sweet bells	Shrub	Native	N/A	Common
<i>Ligustrum obtusifolium</i>	regal privet	Shrub	Non-Native	Yes	Common
<i>Ligustrum vulgare</i>	privet	Shrub	Non-Native	Yes	Not Recorded
<i>Lindera benzoin</i>	spicebush	Shrub	Native	N/A	Common
<i>Liquidambar styraciflua</i>	sweet gum	Tree	Native	N/A	Frequent
<i>Liriodendron tulipifera</i>	tulip poplar	Tree	Native	N/A	Common
<i>Lonicera fragrantissima</i>	fragrant honeysuckle	Shrub	Non-Native	Yes	Rare
<i>Lonicera japonica</i>	Japanese honeysuckle	Vine	Non-Native	Yes	Common
<i>Lonicera maackii</i>	Amur honeysuckle	Shrub	Non-Native	Yes	Frequent
<i>Lonicera morrowii</i>	Morrow's honeysuckle	Shrub	Non-Native	Yes	Common
<i>Lonicera sempervirens</i>	trumpet honeysuckle	Vine	Native	N/A	Occasional
<i>Lonicera tatarica</i>	Tatarian Honeysuckle	Shrub	Non-Native	Yes	Occasional
<i>Lyonia ligustrina</i>	maleberry	Shrub	Native	N/A	Common
<i>Lyonia mariana</i>	staggerbush	Shrub	Native	N/A	Common
<i>Magnolia acuminata</i>	cucumber magnolia	Tree	Non-Native	No	Rare
<i>Magnolia tripetala</i>	umbrella magnolia	Tree	Non-Native	No	Occasional
<i>Magnolia virginiana</i>	sweetbay magnolia	Tree	Native	N/A	Occasional
<i>Malus coronaria</i>	sweet crab	Tree	Native	N/A	Rare
<i>Malus sieboldii</i>	toringo crab apple	Tree	Non-Native	Yes	Rare
<i>Malus sylvestris</i>	European crab apple	Tree	Non-Native	No	Occasional
<i>Menispermum canadense</i>	moonseed	Vine	Native	N/A	Occasional
<i>Morus alba</i>	white mulberry	Tree	Non-Native	No	Common
<i>Morus rubra</i>	red mulberry	Tree	Native	N/A	Occasional
<i>Myrica pensylvanica</i>	bayberry	Shrub	Native	N/A	Common
<i>Nemopanthus mucronatus</i>	mountain holly	Shrub	Native	N/A	Rare
<i>Nyssa sylvatica</i>	black tupelo	Tree	Native	N/A	Not Recorded
<i>Ostrya virginiana</i>	hop hornbeam	Tree	Native	N/A	Frequent
<i>Parthenocissus quinquefolia</i>	Virginia creeper	Vine	Native	N/A	Common
<i>Paulownia tomentosa</i>	paulonia	Tree	Non-Native	Yes	Occasional
<i>Philadelphus coronarius</i>	mock orange	Shrub	Non-Native	No	Occasional
<i>Physocarpus opulifolius</i>	ninebark	Tree	Native	N/A	Occasional
<i>Picea abies</i>	Norway spruce	Tree	Non-Native	No	Occasional
<i>Pinus echinata</i>	short leaf pine	Tree	Native	N/A	Occasional
<i>Pinus rigida</i>	pitch pine	Tree	Native	N/A	Common
<i>Pinus strobus</i>	white pine	Tree	Native	N/A	Frequent
<i>Pinus virginiana</i>	Virginia pine	Tree	Native	N/A	Rare
<i>Platanus occidentalis</i>	American sycamore	Tree	Native	N/A	Common
<i>Populus alba</i>	white poplar	Tree	Non-Native	No	Occasional
<i>Populus deltoides</i>	cottonwood	Tree	Native	N/A	Common
<i>Populus grandidentata</i>	big tooth aspen	Tree	Native	N/A	Common
<i>Populus heterophylla</i>	swamp cottonwood	Tree	Native	N/A	Rare
<i>Populus nigra</i>	black cottonwood	Tree	Non-Native	No	Rare
<i>Populus tremuloides</i>	quaking aspen	Tree	Native	N/A	Common
<i>Prunus americana</i>	hedge plum	Tree	Native	N/A	Occasional
<i>Prunus avium</i>	sweet cherry	Tree	Non-Native	No	Frequent
<i>Prunus domestica</i>	plum	Tree	Non-Native	No	Rare
<i>Prunus serotina</i>	black cherry	Tree	Native	N/A	Common
<i>Prunus virginiana</i>	fire cherry	Tree	Native	N/A	Frequent
<i>Ptelea trifoliata</i>	hop tree	Tree	Native	N/A	Rare

**Appendix C. Woody Plants of Mercer County
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Source: Brooklyn Botanic Garden
<http://www.bbg.org/sci/nymf/maps/mercer.html>

Scientific Name	Common Name	Growth Type	Nativity	Invasive Status	Frequency
<i>Quercus alba</i>	white oak	Tree	Native	N/A	Common
<i>Quercus bicolor</i>	swamp white oak	Tree	Native	N/A	Not Recorded
<i>Quercus coccinea</i>	scarlet oak	Tree	Native	N/A	Common
<i>Quercus ilicifolia</i>	scrub oak	Shrub	Native	N/A	Common
<i>Quercus marilandica</i>	blackjack oak	Tree	Native	N/A	Occasional
<i>Quercus montana</i>	chestnut oak	Tree	Native	N/A	Common
<i>Quercus palustris</i>	pin oak	Tree	Native	N/A	Common
<i>Quercus phellos</i>	willow oak	Tree	Native	N/A	Occasional
<i>Quercus prinoides</i>	dwarf chestnut oak	Shrub	Native	N/A	Occasional
<i>Quercus rubra</i>	red oak	Tree	Native	N/A	Common
<i>Quercus stellata</i>	post oak	Tree	Native	N/A	Occasional
<i>Quercus velutina</i>	black oak	Tree	Native	N/A	Common
<i>Rhamnus cathartica</i>	common buckthorn	Shrub	Non-Native	Yes	Frequent
<i>Rhamnus frangula</i>	smooth buckthorn	Shrub	Non-Native	Yes	Frequent
<i>Rhododendron maximum</i>	great laurel	Shrub	Native	N/A	Not Recorded
<i>Rhododendron periclymenoides</i>	pinkster azalea	Shrub	Native	N/A	Frequent
<i>Rhododendron prinophyllum</i>	early azalea	Shrub	Native	N/A	Rare
<i>Rhododendron viscosum</i>	swamp azalea	Shrub	Native	N/A	Frequent
<i>Rhus aromatica</i>	fragrant sumac	Shrub	Native	N/A	Occasional
<i>Rhus copallinum</i>	winged sumac	Shrub	Native	N/A	Common
<i>Rhus glabra</i>	smooth sumac	Shrub	Native	N/A	Common
<i>Rhus hirta</i>	staghorn sumac	Shrub	Native	N/A	Common
<i>Ribes americanum</i>	Eastern black currant	Shrub	Native	N/A	Occasional
<i>Robinia hispida</i>	bristly locust	Shrub	Non-Native	No	Occasional
<i>Robinia pseudo-acacia</i>	black locust	Tree	Non-Native	Yes	Common
<i>Robinia viscosa</i>	clammy locust	Shrub	Non-Native	No	Occasional
<i>Rosa carolina</i>	Carolina rose	Shrub	Native	N/A	Common
<i>Rosa multiflora</i>	multiflora rose	Shrub	Non-Native	Yes	Common
<i>Rosa palustris</i>	swamp rose	Shrub	Native	N/A	Common
<i>Rosa virginiana</i>	Virginia rose	Shrub	Native	N/A	Frequent
<i>Rubus allegheniensis</i>	common blackberry	Shrub	Native	N/A	Common
<i>Rubus canadensis</i>	smooth blackberry	Shrub	Native	N/A	Occasional
<i>Rubus flagellaris</i>	Northern dewberry	Shrub	Native	N/A	Common
<i>Rubus hispidus</i>	swamp dewberry	Shrub	Native	N/A	Common
<i>Rubus occidentalis</i>	black raspberry	Shrub	Native	N/A	Common
<i>Rubus odoratus</i>	flowering raspberry	Shrub	Native	N/A	Frequent
<i>Rubus phoenicolasius</i>	wineberry	Shrub	Non-Native	Yes	Common
<i>Salix babylonica</i>	weeping willow	Tree	Non-Native	No	Occasional
<i>Salix bebbiana</i>	beaked willow	Tree	Native	N/A	Occasional
<i>Salix discolor</i>	pussy willow	Tree	Native	N/A	Common
<i>Salix eriocephala</i>	diamond willow	Tree	Native	N/A	Frequent
<i>Salix exigua</i>	sandbar willow	Tree	Native	N/A	Occasional
<i>Salix fragilis</i>	crack willow	Tree	Non-Native	No	Not Recorded
<i>Salix humilis</i>	upland willow	Tree	Native	N/A	Occasional
<i>Salix nigra Marsh.</i>	black willow	Tree	Native	N/A	Common
<i>Salix petiolaris</i>	meadow willow	Tree	Native	N/A	Occasional
<i>Salix purpurea</i>	basket willow	Tree	Non-Native	No	Occasional
<i>Salix sericea</i>	silky willow	Shrub	Native	N/A	Frequent
<i>Sambucus canadensis</i>	common elderberry	Shrub	Native	N/A	Common

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Friends of Hopewell Valley Open Space**

Source: Brooklyn Botanic Garden
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Scientific Name	Common Name	Growth Type	Nativity	Invasive Status	Frequency
<i>Sassafras albidum</i>	sassafras	Tree	Native	N/A	Common
<i>Smilax glauca</i>	catbrier	Vine	Native	N/A	Common
<i>Smilax rotundifolia</i>	greenbrier	Vine	Native	N/A	Common
<i>Sorbus americana</i>	American mountain-ash	Tree	Native	N/A	Rare
<i>Spiraea alba</i>	meadowsweet	Shrub	Native	N/A	Frequent
<i>Spiraea tomentosa</i>	steplebush	Shrub	Native	N/A	Not Recorded
<i>Staphylea trifolia</i>	bladdernut	Tree	Native	N/A	Frequent
<i>Symphoricarpos orbiculatus</i>	coralberry	Shrub	Native	N/A	Occasional
<i>Tilia americana</i>	American basswood	Tree	Native	N/A	Frequent
<i>Toxicodendron radicans</i>	poison ivy	Vine	Native	N/A	Common
<i>Toxicodendron vernix</i>	poison sumac	Shrub	Native	N/A	Occasional
<i>Tsuga canadensis</i>	Eastern hemlock	Tree	Native	N/A	Frequent
<i>Ulmus americana</i>	American elm	Tree	Native	N/A	Common
<i>Ulmus rubra</i>	slippery elm	Tree	Native	N/A	Frequent
<i>Vaccinium angustifolium</i>	lowbush blueberry	Shrub	Native	N/A	Common
<i>Vaccinium corymbosum</i>	highbush blueberry	Shrub	Native	N/A	Common
<i>Vaccinium macrocarpon</i>	large cranberry	Sub-shrub	Native	N/A	Occasional
<i>Vaccinium pallidum</i>	hillside blueberry	Shrub	Native	N/A	Common
<i>Vaccinium stamineum</i>	deerberry	Shrub	Native	N/A	Frequent
<i>Viburnum acerifolium</i>	maple-leaved viburnum	Shrub	Native	N/A	Common
<i>Viburnum dentatum</i>	arrowwood	Shrub	Native	N/A	Common
<i>Viburnum dilatatum</i>	linden viburnum	Shrub	Non-Native	Yes	Not Recorded
<i>Viburnum lentago</i>	nannyberry	Shrub	Native	N/A	Frequent
<i>Viburnum nudum</i>	naked witherod	Shrub	Native	N/A	Not Recorded
<i>Viburnum opulus</i>	cranberry viburnum	Shrub	Native	N/A	Occasional
<i>Viburnum prunifolium</i>	blackhaw	Shrub	Native	N/A	Frequent
<i>Viburnum rafinesquianum</i>	downy arrowwood	Shrub	Native	N/A	Occasional
<i>Viburnum sieboldii</i>	Siebold viburnum	Shrub	Non-Native	Yes	Not Recorded
<i>Vitis aestivalis</i>	summer grape	Vine	Native	N/A	Common
<i>Vitis labrusca</i>	fox grape	Vine	Native	N/A	Common
<i>Vitis riparia</i>	frost grape	Vine	Native	N/A	Common
<i>Wisteria sinensis</i>	Chinese wisteria	Vine	Non-Native	Yes	Frequent
<i>Yucca filamentosa</i>	yucca	Shrub	Native	N/A	Occasional

Nativity: Native to Metropolitan area or not
Frequency Notes: Common > Frequent > Occasional > Rare
Invasive Status: Yes = Widespread or Emerging Invasive Species

**Appendix D. Mammals of Mercer County
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space**

(Source: The Mammals of the State of New Jersey,
A Preliminary Annotated List,
Richard Van Gelder, 1984)

COMMON NAME	SCIENTIFIC NAME	STATUS
Beaver	Castor canadensis	INC
Big Brown Bat	Eptesicus fuscus	S
Black Bear	Ursus americanus	INC
Bobcat	Felis rufus	E
Brown Rat	Rattus norvegicus	I
Eastern Chipmunk	Tamias striatus	S
Eastern Cottontail	Sylvilagus floridanus	S
Eastern Coyote	Canis latrans, var.	INC
Eastern Mole	Scalopus aquaticus	S
Eastern Pipistrel	Pipistrellus subflavus	U
Gray Fox	Urocyon cinereoargenteus	S
Gray Squirrel	Sciurus carolinensis	S
House mouse	Mus musculus	I
Little Brown Bat	Myotis lucifugus	S
Long-tailed Weasel	Mustela frenata	S
Masked Shrew	Sorex cinereus	S
Meadow Jumping Mouse	Zapus hudsonius	U
Meadow Vole	Microtus pennsylvanicus	S
Mink	Mustela vison	S
Muskrat	Ondatra zibethicus	S
Opossum	Didelphis marsupialis	S
Pine Vole	Microtus pinetorum	S
Raccoon	Procyon lotor	S
Red Bat	Lasiurus borealis	S - SC
Red Fox	Vulpes vulpes	S
Red Squirrel	Tamiasciurus hudsonicus	S
River Otter	Lutra canadensis	S - GS
Short-tailed Shrew	Blarina brevicauda	S
Silver-haired Bat	Lasionycteris noctivagans	U - SC
Southern Flying Squirrel	Glaucomys volans	U
Star-nosed Mole	Condylura cristata	U
Striped Skunk	Mephitis mephitis	S
White-footed Mouse	Peromyscus leucopus	S
White-tailed Deer	Odocoileus virginianus	D
Woodchuck	Marmota monax	S

***WAP priority species are highlighted**

Species Status:

E - Endangered	S - Stable
T - Threatened	U - Undertermined
D - Decreasing	I - Introduced
INC - Increasing	P - Peripheral
SC - Special Concern	GS - Game Species

Appendix E. Breeding Bird Species of Hopewell Valley
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Source: Birds of New Jersey, Walsh et al. 1999

Common Name	Scientific Name	Species Status
Acadian Flycatcher	<i>Empidonax virescens</i>	RP
American Crow	<i>Corvus brachyrhynchos</i>	S
American Goldfinch	<i>Carduelis tristis</i>	INC
American Kestrel	<i>Falco sparverius</i>	SC
American Redstart	<i>Setophaga ruticilla</i>	INC
American Robin	<i>Turdus migratorius</i>	S
American Woodcock	<i>Philohela minor</i>	RP
Baltimore Oriole	<i>Icterus galbula</i>	RP
Barn Swallow	<i>Hirundo rustica</i>	S
Barred Owl	<i>Strix varia</i>	T
Belted Kingfisher	<i>Ceryle alcyon</i>	S
Black Vulture	<i>Coragyps atratus</i>	INC
Black-and-white Warbler	<i>Miniotilta varia</i>	RP
Black-capped Chickadee	<i>Parus atricapillus</i>	S
Black-throated Blue Warbler	<i>Dendroica caerulescens</i>	RP
Blue Jay	<i>Cyanocitta cristata</i>	D
Blue-gray Gnatcatcher	<i>Poliopitila caerulea</i>	S
Blue-winged Warbler	<i>Vermivora pinus</i>	RP
Bobolink	<i>Dolichonyx oryzivorus</i>	T
Broad-winged hawk	<i>Buteo platypterus</i>	SC
Brown Creeper	<i>Certhia americana</i>	INC
Brown Thrasher	<i>Toxostoma rufum</i>	RP
Brown-headed Cowbird	<i>Molothrus ater</i>	S
Canada Goose	<i>Branta canadensis</i>	INC
Carolina Chickadee	<i>Parus carolinensis</i>	S
Carolina Wren	<i>Thryothorus ludovicianus</i>	INC
Cedar Waxwing	<i>Bombycilla cedrorum</i>	S
Cerulean Warbler	<i>Dendroica cerulea</i>	SC
Chestnut-sided Warbler	<i>Dendroica pensylvanica</i>	S
Chimney Swift	<i>Chaetura pelagica</i>	RP
Chipping Sparrow	<i>Spizella passerina</i>	S
Cliff Swallow	<i>Hirundo pyrrhonota</i>	SC
Common Grackle	<i>Quiscalus quiscula</i>	D
Common Merganser	<i>Mergus merganser</i>	S
Common Yellowthroat	<i>Geothlypis trichas</i>	D
Cooper's Hawk	<i>Accipiter Cooperii</i>	T
Downy Woodpecker	<i>Picoides pubescens</i>	S
Eastern Bluebird	<i>Sialia sialis</i>	INC
Eastern Kingbird	<i>Tyrannus Tyrannus</i>	RP
Eastern Meadowlark	<i>Sturnella magna</i>	SC
Eastern Phoebe	<i>Sayornis phoebe</i>	S
Eastern Screech Owl	<i>Otus asio</i>	RP
Eastern Towhee	<i>Pipilo erythrophthalmus</i>	RP
Eastern Wild Turkey	<i>Meleagris gallopavo</i>	INC

Appendix E. Breeding Bird Species of Hopewell Valley
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Source: Birds of New Jersey, Walsh et al. 1999

Common Name	Scientific Name	Species Status
Acadian Flycatcher	<i>Empidonax virescens</i>	RP
Eastern Wood Pewee	<i>Contopus virens</i>	RP
European Starling	<i>Sturnus vulgaris</i>	I
Field Sparrow	<i>Spizella pusilla</i>	RP
Fish Crow	<i>Corvus ossifragus</i>	S
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	T
Gray Catbird	<i>Dumetella carolinensis</i>	RP
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	RP
Great Horned Owl	<i>Bubo virginianus</i>	S
Green Heron	<i>Butorides striatus</i>	RP
Hairy Woodpecker	<i>Picoides villosus</i>	D
Hooded Warbler	<i>Wilsonia citrina</i>	RP
House Finch	<i>Carpodacus mexicanus</i>	S
House Sparrow	<i>Passer domesticus</i>	I
House Wren	<i>troglogytes aedon</i>	S
Indigo Bunting	<i>Passerina cyanea</i>	RP
Kentucky Warbler	<i>Oporornis formosus</i>	SC
Killdeer	<i>Charadrius vociferus</i>	S
Louisiana Waterthrush	<i>Seiurus motacilla</i>	RP
Mallard	<i>Anas platyrhynchos</i>	INC
Mute Swan	<i>Cygnus olor</i>	I
No. Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	S
Northern Bobwhite	<i>Colinus virginianus</i>	RP
Northern Cardinal	<i>Cardinalis cardinalis</i>	INC
Northern Flicker	<i>Colaptes auratus</i>	RP
Northern Mockingbird	<i>Mimus polyglottos</i>	D
Northern Waterthrush	<i>Seiurus noveboracensis</i>	S
Orchard Oriole	<i>Icterus spurius</i>	S
Osprey	<i>Pandion haliaetus</i>	T
Ovenbird	<i>Seiurus aurocapillus</i>	D
Pileated Woodpecker	<i>Dryocopus pileatus</i>	D
Pine Warbler	<i>Dendroica pinus</i>	RP
Prairie Warbler	<i>Dendroica discolor</i>	RP
Purple martin	<i>Progne subis</i>	S
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	INC
Red-eyed Vireo	<i>Vireo olivaceus</i>	S
Red-shouldered Hawk	<i>Buteo lineatus</i>	E
Red-tailed Hawk	<i>Buteo jamaicensis</i>	INC
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	S
Ring-necked Pheasant	<i>Phasianus colchicus</i>	D
Rock Dove	<i>Columba livia</i>	I
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	RP
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	D
Ruffed Grouse	<i>Bonasa umbellus</i>	D

**Appendix E. Breeding Bird Species of Hopewell Valley
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space**

Source: Birds of New Jersey, Walsh et al. 1999

Common Name	Scientific Name	Species Status
Acadian Flycatcher	Empidonax vireescens	RP
Scarlet Tanager	Piranga olivacea	RP
Sharp-shinned Hawk	Accipiter striatus	SC
Song Sparrow	Melospiza melodia	D
Spotted Sandpiper	Actitis macularia	SC
tree Swallow	Tachycineta bicolor	INC
Tufted Titmouse	Parus bicolor	INC
Turkey Vulture	Cathartes aura	INC
Veery	Catharus fuscescens	SC
Warbling Vireo	Vireo gilvus	S
White-breasted Nuthatch	Sitta carolinensis	INC
White-eyed Vireo	Vireo griseus	D
Willow Flycatcher	Empidonax traillii	RP
Wood Duck	Aix sponsa	RP
Wood Thrush	Hylocichla mustelina	RP
Worm-eating Warbler	Helmitheros vermivorus	RP
Yellow Warbler	Dendroica petechia	S
Yellow-billed Cuckoo	Coccyzus americanus	RP
Yellow-breasted Chat	Icteria virens	SC
Yellow-throated Vireo	Vireo flavifrons	RP

***WAP priority species are highlighted**

Species Status:

- | | |
|----------------------|------------------------|
| E - Endangered | RP - Regional Priority |
| T - Threatened | S - Stable |
| SC - Special Concern | U - Undertermined |
| D - Decreasing | I - Introduced |
| INC - Increasing | P - Peripheral |

**Appendix F. Reptiles of Mercer County
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space**
Source: Field Guide to Reptiles and Amphibians of New Jersey
Schwartz and Golden 2002

Common Name	Scientific Name	Status	Nativity
Black Rat Snake	<i>Elaphe o. obsoleta</i>	U	Native
Bog Turtle	<i>Clemmys muhlenbergi</i>	Federally Threatened, State Endangered	Native
Common Snapping Turtle	<i>Chelydra s. serpentina</i>	S	Native
Eastern Box Turtle	<i>Terrapene c. carolina</i>	S - SC	Native
Eastern Garter Snake	<i>Thamnophis s. sirtalis</i>	S	Native
Eastern Hognose Snake	<i>Heterodon platyrhinos</i>	D	Native
Eastern Milk Snake	<i>Lampropeltis t. triangulum</i>	S	Native
Eastern Mud Turtle	<i>Kinosternon s. subrubrum</i>	U	Native
Eastern Painted Turtle	<i>Chrysemys p. picta</i>	S	Native
Eastern Ribbon Snake	<i>Thamnophis s. sauritus</i>	S	Native
Eastern Smooth Earth Snake	<i>Virginia v. valeriae</i>	U	Native
Eastern Worm Snake	<i>Carphophis a. amoenus</i>	U	Native
Five-lined Skink	<i>Eumeces fasciatus</i>	U	Native
Map Turtle	<i>Graptemys geographica</i>	U	Native
Northern Black Racer	<i>Coluber c. constrictor</i>	U	Native
Northern Brown Snake	<i>Storeria d. dekayi</i>	S	Native
Northern Copperhead	<i>Agkistrodon contortrix mokasen</i>	U - SC	Native
Northern Fence Lizard	<i>Sceloporus undulatus hyacinthinus</i>	S	Native
Northern Red-bellied Snake	<i>Storeria o. occipitomaculata</i>	S	Native
Northern Ringneck Snake	<i>Diadophis punctatus edwardsi</i>	S	Native
Northern Scarlet Snake	<i>Cemophora coccinea copei</i>	U	Native
Northern Water Snake	<i>Nerodia s. sipedon</i>	S	Native
Red-bellied Turtle	<i>Pseudemys rubriventris</i>	U	Native
Red-eared Turtle	<i>Pseudemys scripta elegans</i>	I	Non-Native
Spotted Turtle	<i>Clemmys guttata</i>	U - SC	Native
Stinkpot	<i>Sternotherus odoratus</i>	S	Native
Wood Turtle	<i>Clemmys insculpta</i>	T	Native

***WAP priority species are highlighted**

Species Status:

E - Endangered	S - Stable
T - Threatened	U - Undertermined
D - Decreasing	I - Introduced
SC - Special Concern	GS - Game Species

**Appendix G. Amphibians of Mercer County
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space**

Source: Field Guide to Reptiles and Amphibians of New Jersey
Schwartz and Golden 2002

Common Name	Scientific Name	Status	Nativity
American Toad	<i>Bufo americanus</i>	S	Native
Blue-spotted Salamander	<i>Ambystoma laterale</i>	E	Native
Bullfrog	<i>Rana catesbeiana</i>	S	Native
Four-toed Salamander	<i>Hemidactylium scutatum</i>	D	Native
Fowler's Toad	<i>Bufo woodhousii fowleri</i>	SC	Native
Green Frog	<i>Rana clamitans melanota</i>	S	Native
Long-tailed Salamander	<i>Eurycea l. longicauda</i>	T	Native
Marbled Salamander	<i>Ambystoma opacum</i>	SC	Native
New Jersey Chorus Frog	<i>Pseudacris triseriata kalmi</i>	S	Native
Northern Cricket Frog	<i>Acris c. crepitans</i>	U	Native
Northern Dusky Salamander	<i>Desmognathus f. fuscus</i>	S	Native
Northern Gray Treefrog	<i>Hyla versicolor</i>	S	Native
Northern Red Salamander	<i>Pseudotriton r. ruber</i>	D	Native
Northern Spring Peeper	<i>Hyla c. crucifer</i>	S	Native
Northern Spring Salamander	<i>Gyrinophilus p. porphyriticus</i>	SC	Native
Northern Two-lined Salamander	<i>Eurycea b. bislineata</i>	S	Native
Pickerel Frog	<i>Rana palustris</i>	S	Native
Red-backed Salamander	<i>Plethodon c. cinereus</i>	S	Native
Red-spotted Newt	<i>Notophthalmus v. viridescens</i>	S	Native
Slimy Salamander	<i>Plethodon g. glutinosus</i>	S	Native
Southern Leopard Frog	<i>Rana spenocephala</i>	S	Native
Spotted Salamander	<i>Ambystoma maculatum</i>	D	Native
Wood Frog	<i>Rana sylvatica</i>	S	Native

***WAP priority species are highlighted**

Species Status:

E - Endangered	S - Stable
T - Threatened	U - Undertermined
D - Decreasing	I - Introduced
SC - Special Concern	GS - Game Species

**Appendix H. Freshwater Fish of Hopewell Valley
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space**

Note: List contains all species known to occur in New Jersey. Presence within particular streams provided by S. Crouse, NJ Division of Fish & Wildlife

Common Name	Scientific Name	Family Name	State Status	Nativity	Hopewell Valley Presence	Hopewell Valley Presence							
						Bedens Brook	D&R Canal	Fiddlers Creek	Jacobs Creek	Moore Creek	Shabakunk Creek	Stony Brook	
Alewife	<i>Alosa pseudoharengus</i>	Clupeidae	None	Native	Yes								
American Brook Lamprey	<i>Lampetra appendix</i>	Petromyzontidae	SC	Native									
American Eel	<i>Anguilla rostrata</i>	Anguillidae	None	Native	Yes	1	1	1		1	1	1	
American Shad	<i>Alosa sapidissima</i>	Clupeidae	None	Native									
Atlantic Sturgeon	<i>Acipenser oxyrinchus</i>	Acipenseridae	SC	Native									
Banded Killifish	<i>Fundulus diaphanus</i>	Cyprinodontidae	None	Native	Yes	1		1	1	1	1	1	
Banded Sunfish	<i>Eleacanthus obesus</i>	Centrarchidae	None	Native									
Black Bullhead	<i>Ameiurus melas</i>	Ictaluridae	None	Non-Native									
Black Crappie	<i>Pomoxis nigromaculatus</i>	Centrarchidae	None	Non-Native									
Blackbanded Sunfish	<i>Eleacanthus chaetodon</i>	Centrarchidae	None	Native									
Blacknose Dace	<i>Rhinichthys atratulus</i>	Cyprinidae	None	Native	Yes	1		1	1	1		1	
Blueback Herring	<i>Alosa aestivalis</i>	Clupeidae	None	Native									
Bluegill	<i>Lepomis macrochirus</i>	Centrarchidae	None	Non-Native	Yes		1	1	1	1		1	
Bluespotted Sunfish	<i>Eleacanthus gloriosus</i>	Centrarchidae	None	Native									
Bluntnose Minnow	<i>Pimephales notatus</i>	Cyprinidae	None	Non-Native									
Bowfin	<i>Amia calva</i>	Amiidae	None	Non-Native									
Bridle Shiner	<i>Notropis bifrenatus</i>	Cyprinidae	SC	Native	Yes	1						1	1
Brook Trout	<i>Salvelinus fontinalis</i>	Salmonidae	None	Native	Yes		1				1		
Brown Bullhead	<i>Ameiurus nebulosus</i>	Ictaluridae	None	Native	Yes	1	1	1				1	1
Brown Trout	<i>Salmo trutta</i>	Salmonidae	None	Non-native	Yes			1	1				1
Chain Pickerel	<i>Esox niger</i>	Esocidae	None	Native	Yes		1						
Channel Catfish	<i>Ictalurus punctatus</i>	Ictaluridae	None	Non-Native									
Comely Shiner	<i>Notropis amoenus</i>	Cyprinidae	None	Native									
Common Carp	<i>Cyprinus carpio</i>	Cyprinidae	None	Non-Native	Yes		1					1	1
Common Shiner	<i>Luxilus cornutus</i>	Cyprinidae	None	Native	Yes	1			1	1	1	1	1
Creek Chub	<i>Semotilus atromaculatus</i>	Cyprinidae	None	Native	Yes	1		1	1	1	1	1	
Creek Chubsucker	<i>Erimyzon oblongus</i>	Catostomidae	None	Native	Yes	1	1				1	1	1
Cutlips Minnow	<i>Exoglossum maxillingua</i>	Cyprinidae	None	Native									
Eastern Mosquitofish	<i>Gambusia holbrooki</i>	Poeciliidae	None	Native									
Eastern Mudminnow	<i>Umbra pygmaea</i>	Umbridae	None	Native									
Eastern Silvery Minnow	<i>Hybognathus regius</i>	Cyprinidae	None	Native									
Fallfish	<i>Semotilus corporalis</i>	Cyprinidae	None	Native	Yes			1					
Fathead Minnow	<i>Pimephales promelas</i>	Cyprinidae	None	Non-Native									
Fourspine Stickleback	<i>Apletes quadracus</i>	Gasterosteidae	None	Native									
Gizzard Shad	<i>Dorosoma cepedianum</i>	Clupeidae	None	Native	Yes		1						
Golden Shiner	<i>Notemigonus crysoleucas</i>	Cyprinidae	None	Native	Yes	1	1	1			1	1	1
Goldfish	<i>Carassius auratus</i>	Cyprinidae	None	Non-Native	Yes		1						1
Grass Carp	<i>Ctenopharyngodon idella</i>	Cyprinidae	None	Non-Native									
Green Sunfish	<i>Lepomis cyanellus</i>	Centrarchidae	None	Non-Native	Yes							1	
Hickory Shad	<i>Alosa mediocris</i>	Clupeidae	WAP Priority	Native									
Hogchoker	<i>Trinectes maculatus</i>	Soleidae	None	Native									
Ironcolor Shiner	<i>Notropis chalybaeus</i>	Cyprinidae	None	Native									
Lake Trout	<i>Salvelinus namaycush</i>	Salmonidae	None	Non-Native									
Largemouth Bass	<i>Micropterus salmoides</i>	Centrarchidae	None	Non-Native	Yes	1	1		1				1
Longnose Dace	<i>Rhinichthys cataractae</i>	Cyprinidae	None	Native									
Longnose Gar	<i>Lepisosteus osseus</i>	Lepisosteidae	None	Native - Extirpated									
Margined Madtom	<i>Noturus insignis</i>	Ictaluridae	WAP Priority	Native	Yes				1				1
Mosquitofish	<i>Gambusia affinis</i>	Poeciliidae	None	Non-Native									
Mud Sunfish	<i>Acantharchus pomotis</i>	Centrarchidae	None	Native									
Mummichog	<i>Fundulus heteroclitus</i>	Cyprinodontidae	None	Native									
Muskellunge	<i>Esox masquinongy</i>	Esocidae	None	Non-Native									
Ninespine Stickleback	<i>Pungitius pungitius</i>	Gasterosteidae	None	Native									
Northern Hog Sucker	<i>Hypentelium nigricans</i>	Catostomidae	None	Native									
Northern Pike	<i>Esox lucius</i>	Esocidae	None	Non-Native									
Oriental Weatherfish	<i>Misgurnus anguillicaudatus</i>	Cobotidae	None	Non-Native									
Pirate Perch	<i>Aphredoderus sayanus</i>	Aphredoderidae	None	Native									
Pumpkinseed	<i>Lepomis gibbosus</i>	Centrarchidae	None	Native	Yes	1	1	1	1			1	1
Quillback	<i>Carpiodes cyprinus</i>	Cyprinidae	None	Native									

**Appendix H. Freshwater Fish of Hopewell Valley
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space**

Note: List contains all species known to occur in New Jersey. Presence within particular streams provided by S. Crouse, NJ Division of Fish & Wildlife

Common Name	Scientific Name	Family Name	State Status	Nativity	Hopewell Valley Presence								
					Bedens Brook	D&R Canal	Fiddlers Creek	Jacobs Creek	Moore Creek	Shabakunk Creek	Stony Brook		
Rainbow Smelt	<i>Osmerus mordax</i>	Osmeridae	None	Native									
Rainbow Trout	<i>Oncorhynchus mykiss</i>	Salmonidae	None	Non-Native									
Redbreasted Sunfish	<i>Lepomis auritus</i>	Centrarchidae	None	Native	Yes	1	1	1	1	1			1
Redfin Pickerel	<i>Esox americanus</i>	Esocidae	None	Native	Yes	1							1 1
Rock Bass	<i>Ambloplites rupestris</i>	Centrarchidae	None	Non-Native	Yes	1							1
Satinfin Shiner	<i>Cyprinella analostana</i>	Cyprinidae	None	Native	Yes	1	1		1				1
Sea Lamprey	<i>Petromyzon marinus</i>	Petromyzontidae	None	Native									
Shield Darter	<i>Percina peltata</i>	Percidae	WAP Priority	Native									
Shortnose Sturgeon	<i>Acipenser brevirostrum</i>	Acipenseridae	Federally and State Endangered	Native	Yes								
Slimy Sculpin	<i>Cottus cognatus</i>	Cottidae	None	Native									
Smallmouth Bass	<i>Micropterus dolomieu</i>	Centrarchidae	None	Non-Native	Yes	1						1	1
Spotfin Shiner	<i>Cyprinella spiloptera</i>	Cyprinidae	None	Native									
Spottail Shiner	<i>Notropis husdonius</i>	Cyprinidae	None	Native	Yes	1	1		1			1	1
Striped Bass	<i>Morone saxatilis</i>	Moronidae	None	Native									
Swallowtail Shiner	<i>Notropis procne</i>	Cyprinidae	None	Native	Yes	1							
Swamp Darter	<i>Etheostoma fusiforme</i>	Percidae	None	Native									
Tadpole Madtom	<i>Noturus gyrinus</i>	Ictaluridae	None	Native	Yes				1				
Tessellated Darter	<i>Etheostoma olmstedii</i>	Percidae	None	Native	Yes	1		1	1	1	1	1	1
Threespine Stickleback	<i>Gasterosteus aculeatus</i>	Gasterosteidae	None	Native									
Walleye	<i>Sander vitreus</i>	Percidae	None	Non-Native									
Warmouth	<i>Lepomis gulosus</i>	Centrarchidae	None	Non-Native									
White Catfish	<i>Ameiurus catus</i>	Ictaluridae	None	Native									
White Crappie	<i>Pomoxis alularis</i>	Centrarchidae	None	Non-Native									
White Perch	<i>Morone americana</i>	Moronidae	None	Native	Yes		1						
White Sucker	<i>Catostomus commersoni</i>	Catostomidae	None	Native	Yes	1	1	1	1	1	1	1	1
Yellow Bullhead	<i>Ameiurus natalis</i>	Ictaluridae	None	Native									
Yellow Perch	<i>Perca flavescens</i>	Percidae	None	Native	Yes		1	1					
Totals						20	18	14	16	13	15	23	

*WAP priority species are highlighted

Species Status:

- | | |
|----------------------|-------------------|
| E - Endangered | S - Stable |
| T - Threatened | U - Undertermined |
| D - Decreasing | I - Introduced |
| SC - Special Concern | GS - Game Species |

**Appendix I. Dragonflies & Damselflies of Mercer County
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space**

Source: www.njodes.com

Note: Each species has a link to its own webpage.

Common Name	Scientific Name	Status
BROAD-WINGED DAMSELS	CALOPTERYGIDAE	N/A
Sparkling Jewelwing	<i>Calopteryx dimidiata</i>	None
Ebony Jewelwing	<i>Calopteryx maculata</i>	None
American Rubyspot	<i>Hetaerina americana</i>	None
SPREADWINGS	LESTIDAE	N/A
Great Spreadwing	<i>Archilestes grandis</i>	None
Slender Spreadwing	<i>Lestes rectangularis</i>	None
Swamp Spreadwing	<i>Lestes vigilax</i>	None
POND DAMSELS	COENAGRIONIDAE	N/A
Blue-fronted Dancer	<i>Argia apicalis</i>	None
Violet Dancer	<i>Argia fumipennis violacea</i>	None
Powdered Dancer	<i>Argia moesta</i>	None
Blue-ringed Dancer	<i>Argia sedula</i>	None
Blue-tipped Dancer	<i>Argia tibialis</i>	None
Dusky Dancer	<i>Argia translata</i>	None
Azure Bluet	<i>Enallagma aspersum</i>	None
Familiar Bluet	<i>Enallagma civile</i>	None
Stream Bluet	<i>Enallagma exsulans</i>	None
Skimming Bluet	<i>Enallagma geminatum</i>	None
Orange Bluet	<i>Enallagma signatum</i>	None
Slender Bluet	<i>Enallagma traviatum</i>	None
Blackwater Bluet	<i>Enallagma weewa</i>	None
Fragile Forktail	<i>Ischnura posita</i>	None
Eastern Forktail	<i>Ischnura verticalis</i>	None
DARNERS	AESHNIDAE	N/A
Shadow Darner	<i>Aeshna umbrosa</i>	None
Common Green Darner	<i>Anax junius</i>	None
Springtime Darner	<i>Basiaeschna janata</i>	None
Fawn Darner	<i>Boyeria vinosa</i>	None
Swamp Darner	<i>Epiaeschna heros</i>	None
CLUBTAILS	GOMPHIDAE	N/A
Black-shouldered Spinyleg	<i>Dromogomphus spinosus</i>	None
Septima's Clubtail	<i>Gomphus (Gomphurus) septima</i>	SC
Cobra Clubtail	<i>Gomphus (Gomphurus) vastus</i>	None
Lancet Clubtail	<i>Gomphus (Gomphus) exilis</i>	None
Ashy Clubtail	<i>Gomphus (Gomphus) lividus</i>	None
Spine-crowned Clubtail	<i>Gomphus (Hylogomphus) abbreviatus</i>	None
Eastern Least Clubtail	<i>Stylogomphus albistylus</i>	None
Russet-tipped Clubtail	<i>Stylurus plagiatus</i>	None
Arrow Clubtail	<i>Stylurus spiniceps</i>	None
CRUISERS	MACROMIIDAE	N/A
Stream Cruiser	<i>Didymops transversa</i>	None
"Georgia" Swift River Cruiser	<i>Macromia illinoensis georgina</i>	None

**Appendix I. Dragonflies & Damselflies of Mercer County
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space**

Source: www.njodes.com

Note: Each species has a link to its own webpage.

Common Name	Scientific Name	Status
EMERALDS	FAMILY CORDULIIDAE	N/A
Prince Baskettail	<i>Epitheca (Epicordulia) princeps</i>	None
Common Baskettail	<i>Epitheca (Tetragoneuria) cynosura</i>	None
SKIMMERS	LIBELLULIDAE	N/A
Calico Pennant	<i>Celithemis elisa</i>	None
Halloween Pennant	<i>Celithemis eponina</i>	None
Eastern Pondhawk	<i>Erythemis simplicicollis</i>	None
Bar-winged Skimmer	<i>Libellula axilena</i>	None
Slaty Skimmer	<i>Libellula incesta</i>	None
Widow Skimmer	<i>Libellula luctuosa</i>	None
Twelve-spotted Skimmer	<i>Libellula pulchella</i>	None
Painted Skimmer	<i>Libellula semifasciata</i>	None
Great Blue Skimmer	<i>Libellula vibrans</i>	None
Blue Dasher	<i>Pachydiplax longipennis</i>	None
Wandering Glider	<i>Pantala flavescens</i>	None
Eastern Amberwing	<i>Perithemis tenera</i>	None
Common Whitetail	<i>Plathemis lydia</i>	None
"Western" Cherry-faced Meadowhawk	<i>Sympetrum internum</i>	None
"Eastern" Cherry-faced Meadowhawk	<i>Sympetrum internum(janae?)</i>	None
Band-winged Meadowhawk	<i>Sympetrum semicinctum</i>	None
Autumn Meadowhawk	<i>Sympetrum vicinum</i>	None
Black Saddlebags	<i>Tamea lacerata</i>	None

***WAP priority species are highlighted**

Species Status:

E - Endangered
T - Threatened
D - Decreasing
SC - Special Concern

S - Stable
U - Undertermined
I - Introduced
GS - Game Species

**Appendix J. Butterflies of Mercer County
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space**

Source: National Biological Information Infrastructure and Montana State University
www.butterfliesandmoths.org

Note: Each species has a link to its own webpage.

Common Name (Scientific Name) and Family and Sub-Family Name	Status
Brush-footed Butterflies (<i>Nymphalidae</i>)	N/A
Admirals and Relatives (<i>Limenitidinae</i>)	N/A
'Astyanax' Red-spotted Purple (<i>Limenitis arthemis astyanax</i>)	None
Red-spotted Purple or White Admiral (<i>Limenitis arthemis</i>)	None
Viceroy (<i>Limenitis archippus</i>)	None
Emperors (<i>Apaturinae</i>)	N/A
Hackberry Emperor (<i>Asterocampa celtis</i>)	None
Tawny Emperor (<i>Asterocampa clyton</i>)	None
Longwings (<i>Heliconiinae</i>)	N/A
Aphrodite Fritillary (<i>Speyeria aphrodite</i>)	None
Great Spangled Fritillary (<i>Speyeria cybele</i>)	None
Meadow Fritillary (<i>Boloria bellona</i>)	None
Regal Fritillary (<i>Speyeria idalia</i>)	None
Silver-bordered Fritillary (<i>Boloria selene</i>)	T
Variegated Fritillary (<i>Euptoieta claudia</i>)	None
Milkweed Butterflies (<i>Danainae</i>)	N/A
Monarch (<i>Danaus plexippus</i>)	None
Satyrs and Wood-Nymphs (<i>Satyrinae</i>)	N/A
Appalachian Brown (<i>Satyroides appalachia</i>)	None
Common Wood Nymph (<i>Cercyonis pegala</i>)	None
Eyed Brown (<i>Satyroides eurydice</i>)	None
Little Wood Satyr (<i>Megisto cymela</i>)	None
Snouts (<i>Libytheinae</i>)	N/A
American Snout (<i>Libytheana carinenta</i>)	None
True Brushfoots (<i>Nymphalinae</i>)	N/A
Baltimore (<i>Euphydryas phaeton</i>)	None
Common Buckeye (<i>Junonia coenia</i>)	None
Eastern Comma (<i>Polygonia comma</i>)	None
Gray Comma (<i>Polygonia progne</i>)	None
Green Comma (<i>Polygonia faunus</i>)	None
Milbert's Tortoiseshell (<i>Aglais milberti</i>)	None
Pearl Crescent (<i>Phyciodes tharos</i>)	None
Question Mark (<i>Polygonia interrogationis</i>)	None
Red Admiral (<i>Vanessa atalanta</i>)	None
Silvery Checkerspot (<i>Chlosyne nycteis</i>)	None
Gossamer-wing Butterflies (<i>Lycaenidae</i>)	N/A
Blues (<i>Polyommatainae</i>)	None
Appalachian Azure (<i>Celastrina neglecta-major</i>)	None
Eastern Tailed-Blue (<i>Cupido comyntas</i>)	None
Spring Azure (<i>Celastrina "ladon"</i>)	None
Coppers (<i>Lycaeninae</i>)	N/A
American Copper (<i>Lycaena phlaeas</i>)	None
Hairstreaks (<i>Theclinae</i>)	N/A
Banded Hairstreak (<i>Satyrium calanus</i>)	None
Brown Elfin (<i>Callophrys augustinus</i>)	None
Coral Hairstreak (<i>Satyrium titus</i>)	None

**Appendix J. Butterflies of Mercer County
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space**

Source: National Biological Information Infrastructure and Montana State University
www.butterfliesandmoths.org

Note: Each species has a link to its own webpage.

Common Name (Scientific Name) and Family and Sub-Family Name	Status
Eastern Pine Elfin (<i>Callophrys niphon</i>)	None
Edwards' Hairstreak (<i>Satyrium edwardsii</i>)	None
Frosted Elfin (<i>Callophrys irus</i>)	T
Gray Hairstreak (<i>Strymon melinus</i>)	None
Henry's Elfin (<i>Callophrys henrici</i>)	None
Hickory Hairstreak (<i>Satyrium caryaevorum</i>)	None
Juniper Hairstreak (<i>Callophrys gryneus</i>)	None
Red-banded Hairstreak (<i>Calycopis cecrops</i>)	None
Striped Hairstreak (<i>Satyrium liparops</i>)	None
White M Hairstreak (<i>Parrhasius m-album</i>)	None
Harvesters (<i>Miletinae</i>)	N/A
Harvester (<i>Feniseca tarquinius</i>)	None
Parnassians and Swallowtails (<i>Papilionidae</i>)	N/A
Swallowtails (<i>Papilioninae</i>)	N/A
Eastern Tiger Swallowtail (<i>Papilio glaucus</i>)	None
Giant Swallowtail (<i>Papilio cresphontes</i>)	None
Pipevine Swallowtail (<i>Battus philenor</i>)	None
Spicebush Swallowtail (<i>Papilio troilus</i>)	None
Skippers (<i>Hesperiidae</i>)	N/A
Grass Skippers (<i>Hesperiinae</i>)	N/A
Black Dash (<i>Euphyes conspicua</i>)	None
Broad-winged Skipper (<i>Poanes viator</i>)	None
Cobweb Skipper (<i>Hesperia metea</i>)	None
Common Roadside-Skipper (<i>Amblyscirtes vialis</i>)	None
Crossline Skipper (<i>Polites origenes</i>)	None
Delaware Skipper (<i>Anatrytone logan</i>)	None
Dusted Skipper (<i>Atrytonopsis hianna</i>)	None
European Skipper (<i>Thymelicus lineola</i>)	None
Fiery Skipper (<i>Hylephila phyleus</i>)	None
Indian Skipper (<i>Hesperia sassacus</i>)	None
Least Skipper (<i>Ancyloxypha numitor</i>)	None
Leonard's Skipper (<i>Hesperia leonardus</i>)	None
Little Glassywing (<i>Pompeius verna</i>)	None
Long Dash (<i>Polites mystic</i>)	None
Mulberry Wing (<i>Poanes massasoit</i>)	None
Swarthy Skipper (<i>Nastra lherminier</i>)	None
Tawny-edged Skipper (<i>Polites themistocles</i>)	None
Two-spotted Skipper (<i>Euphyes bimacula</i>)	None
Zabulon Skipper (<i>Poanes zabulon</i>)	None
Spread-wing Skippers (<i>Pyrginae</i>)	N/A
Columbine Duskywing (<i>Erynnis lucilius</i>)	None
Common Checkered-Skipper (<i>Pyrgus communis</i>)	None
Dreamy Duskywing (<i>Erynnis icelus</i>)	None
Hoary Edge (<i>Achalarus lyciades</i>)	None
Horace's Duskywing (<i>Erynnis horatius</i>)	None

**Appendix J. Butterflies of Mercer County
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space**

Source: National Biological Information Infrastructure and Montana State University
www.butterfliesandmoths.org

Note: Each species has a link to its own webpage.

Common Name (Scientific Name) and Family and Sub-Family Name	Status
Juvenal's Duskywing (<i>Erynnis juvenalis</i>)	None
Long-tailed Skipper (<i>Urbanus proteus</i>)	None
Mottled Duskywing (<i>Erynnis martialis</i>)	None
Northern Cloudywing (<i>Thorybes pylades</i>)	None
Silver-spotted Skipper (<i>Epargyreus clarus</i>)	None
Sleepy Duskywing (<i>Erynnis brizo</i>)	None
Southern Cloudywing (<i>Thorybes bathyllus</i>)	None
Wild Indigo Duskywing (<i>Erynnis baptisiae</i>)	None
Sphinx Moths, Hawkmoths (<i>Sphingidae</i>)	N/A
Macroglossinae (<i>Macroglossinae</i>)	N/A
Pandorus sphinx (<i>Eumorpha pandorus</i>)	None
Tiger Moths and Lichen Moths (<i>Arctiidae</i>)	N/A
Tiger Moths (<i>Arctiinae</i>)	N/A
Bella Moth (<i>Utetheisa ornatrix</i>)	None
Confused Haploa (<i>Haploa confusa</i>)	None
Isabella Tiger Moth or Banded Woollybear (<i>Pyrrharctia isabella</i>)	None
Whites and Sulphurs (<i>Pieridae</i>)	N/A
Sulphurs (<i>Coliadinae</i>)	N/A
Clouded Sulphur (<i>Colias philodice</i>)	None
Cloudless Sulphur (<i>Phoebis sennae</i>)	None
Little Yellow (<i>Pyrisitia lisa</i>)	None
Orange Sulphur (<i>Colias eurytheme</i>)	None
Whites (<i>Pierinae</i>)	N/A
Cabbage White (<i>Pieris rapae</i>)	None
Falcate Orangetip (<i>Anthocharis midea</i>)	None
Wild Silk Moths (<i>Saturniidae</i>)	N/A
Giant Silkworm Moths (<i>Saturniinae</i>)	N/A
Ailanthus silkworm (<i>Samia cynthia</i>)	None
Royal Moths (<i>Citheroniinae</i>)	N/A
Imperial moth (<i>Eacles imperialis</i>)	None
Pink-striped oakworm moth (<i>Anisota virginensis</i>)	None

*WAP priority species are highlighted

Species Status:

E - Endangered, S - Stable
T - Threatened, U - Undetermined
D - Decreasing, I - Introduced
SC - Special Concern, GS - Game Species

**Appendix K. Freshwater Mussels of Mercer County
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space**

Source: Center for Biodiversity and Conservation at the
American Museum of Natural History
<http://cbc.amnh.org/mussel/index.html>

Scientific Name	Common Name	AMNH Abundance	State Status	Nativity
<i>Alasmidonta varicosa</i>	brook floater	rare	None	Native
<i>Alasmidonta undulata</i>	triangle floater	rare	T	Native
<i>Elliptio complanata</i>	Eastern elliptio	abundant	None	Native
<i>Lampsilis cariosa</i>	yellow lampmuseel	rare	T	Native
<i>Lampsilis radiata</i>	Eastern lampmussel	rare	None	Native
<i>Lasmigona subviridis</i>	green floater	rare - Mercer County only	None	Native
<i>Leptodea ochracea</i>	tidewater mucket	rare	T	Native
<i>Ligumia nasuta</i>	Eastern pondmussel	rare	None	Native
<i>Pyganodon cataracta</i>	Eastern floater	abundant	None	Native
<i>Strophitus undulatus</i>	creeper	common to abundant	SC	Native

*WAP priority species are highlighted

Species Status:

E - Endangered	S - Stable
T - Threatened	U - Undertermined
D - Decreasing	I - Introduced
SC - Special Concern	GS - Game Species

Appendix M. Natural History of Rare and Priority Animal Species
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Taxa	Common Name	Scientific Name	ENSP Fact Sheet Available	Broad Habitats*				Habitat Description	Breeding / Nesting Notes	Diet	Winter Range
				Forest	Shrubland	Meadow	Water				
Amphibian	Fowler's Toad	<i>Bufo woodhousii fowleri</i>	No	X		X	X	forest, meadows, near water	Breeds in vernal pools, ditches and shallow edges of ponds, from late spring to mid-August	insects, spiders, earthworms	Winter resident
Bird	Acadian Flycatcher	<i>Empidonax vireescens</i>	No	X				heavily wooded deciduous forest, riparian thickets	Nest in shrub or conifer, 8-20' high	insects, berries, some seeds	Central and South America
Bird	American Kestrel	<i>Falco sparverius</i>	No			X		Open fields with scattered trees	Nest 12-80' high in a cavity or nest box	insects, small vertebrates and mammals	Winter resident
Bird	American Woodcock	<i>Philohela minor</i>	No		X	X		Edges of open fields, thickets	Nest on ground, under brush, tall weeds	earthworms, insects	Winter resident
Bird	Bald Eagle	<i>Haliaeetus leucocephalus</i>	Yes	X			X	Coast, rivers, large lakes	Nest 30-60' high or on a cliff	fish, birds, small mammals	Winter resident, near open water
Bird	Baltimore Oriole	<i>Icterus galbula</i>	No	X				Open woodlands, deciduous forest edge, near human habitation	Nest in deciduous tree, 15-30' high, a woven pouch hanging from a branch	insects, fruit, nectar	Mexico to Northern South America
Bird	Barred Owl	<i>Strix varia</i>	Yes	X				dense coniferous or mixed deciduous-coniferous forest, wooded swamps	Nest in cavity, also uses old hawk, squirrel nest	rodents, birds, small vertebrates	Winter resident
Bird	Black-and-white Warbler	<i>Miniotilta varia</i>	No	X				deciduous or deciduous-coniferous forest, especially on hillsides	Nest on ground, hidden under dead leaves or branches	insects	Southern US to Central and northern South America
Bird	Black-throated Blue Warbler	<i>Dendroica caerulescens</i>	No	X				deciduous or deciduous-coniferous forest, with dense rhododendron understory	Nest to 3' high, in shrub, small tree or vine tangle	insects	Central America
Bird	Blue-winged Warbler	<i>Vermivora pinus</i>	No	X	X			second growth forests, brushy hillsides	Nest close to or on the ground, in grass or vines	insects, spiders	Central America
Bird	Bobolink	<i>Dolichonyx oryziborus</i>	Yes			X		tall grassland, meadows, grain fields	Nest on ground, under dense cover of grass	insects, seeds, spiders	South America

Appendix M. Natural History of Rare and Priority Animal Species
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Taxa	Common Name	Scientific Name	ENSP Fact Sheet Available	Broad Habitats*				Habitat Description	Breeding / Nesting Notes	Diet	Winter Range
				Forest	Shrubland	Meadow	Water				
Bird	Broad-winged hawk	<i>Buteo platypterus</i>	No	X				Dense deciduous or mixed forest, often near water	Nest 30-50' high in deciduous tree	small mammals, birds, reptiles, insects	Central and South America
Bird	Brown Thrasher	<i>Toxostoma rufum</i>	No	X	X			Brush and shrubland, deciduous forest edge	Nest on ground or 2-5' high in shrub	insects, invertebrates, berries, fruit	Southern US
Bird	Canada Warbler	<i>Wilsonia canadensis</i>	No	X				Deciduous woodland, wet thickets	Nest on ground, usually on sphagnum hummock, among roots of upturned stumps	insects	South America
Bird	Cerulean Warbler	<i>Dendroica cerulea</i>	No	X				Mature deciduous forest	Nest 30-60' high in deciduous tree	insects	Central America to northern South America
Bird	Chimney Swift	<i>Chaetura pelagica</i>	No		X			Woodland, open areas, especially near humans	Nest attached to chimney wall or other suitable human structure, colonial	insects	South America
Bird	Cliff Swallow	<i>Hirundo pyrrhonota</i>	No				X	Open county, especially near water	Nest on underside of bridge, culvert, cliff	insects	South America
Bird	Cooper's Hawk	<i>Accipiter cooperii</i>	Yes	X	X	X		deciduous and coniferous forest, near water	Nest 35-45' high, coniferous and deciduous trees	Birds, small mammals, few reptiles	Southern US to Central America
Bird	Eastern Kingbird	<i>Tyrannus Tyrannus</i>	No		X			farmland, open woodland, forest edge	Nest deciduous shrub 8-25' high	insects, some fruit	Central and South America
Bird	Eastern Meadowlark	<i>Sturnella magna</i>	No			X		Grasslands, open fields	Nest on ground with domed cavity of grass	insects, seeds	Southern US to Central America
Bird	Eastern Screech Owl	<i>Otus asio</i>	No	X				Open woodland, deciduous forest	Nest in cavity, will use nest boxes	insects, small vertebrates and mammals	Winter resident
Bird	Eastern Towhee	<i>Pipilo erythrophthalmus</i>	No	X	X			forest edge, thickets, open woods	Nest on ground, or 0-5' high in shrub	insects, seeds, fruits	Southern US to Central America
Bird	Eastern Wood Pewee	<i>Contopus virens</i>	No	X				Deciduous and deciduous-coniferous forest, forest edge	Nest 15-35' high in deciduous tree	insects, few berries	Northern South America
Bird	Field Sparrow	<i>Spizella pusilla</i>	No		X	X		Old fields, brush, deciduous forest edge	Nest 0-2.5' high, in shrub or sapling	insects, seeds, spiders	Winter resident

Appendix M. Natural History of Rare and Priority Animal Species
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Taxa	Common Name	Scientific Name	ENSP Fact Sheet Available	Broad Habitats*				Habitat Description	Breeding / Nesting Notes	Diet	Winter Range
				Forest	Shrubland	Meadow	Water				
Bird	Grasshopper Sparrow	<i>Ammodramus savannarum</i>	Yes			X		Grasslands, cultivated fields, old fields, airports	Nest on ground, well concealed by overhanging grasses	insects, seeds	Southern US to Northern South America
Bird	Gray Catbird	<i>Dumetella carolinensis</i>	No		X	X		forest edge, dense thickets, Shrubland	Nest 2-10' high, in dense thicket	insects, spiders, berries	Sothern US to Central America
Bird	Great Blue Heron	<i>Ardea herodias</i>	No	X		X	X	marsh, bogs, swamps	Nest 50-80' high in a tree over water, colonial	Fish, amphibians, aquatic invertebrates	Winter resident
Bird	Great Crested Flycatcher	<i>Myiarchus crinitus</i>	No	X				Deciduous forest edge, woodland, parks	Nest in cavity	Insects, fruit	Mexico to South America
Bird	Green Heron	<i>Butorides striatus</i>	No	X			X	Woodlands near water, swamps	Nest in shrub, 10-20' high	Fish, insects, aquatic and terrestrial invertebrates	Antilles to Northern South America
Bird	Hooded Warbler	<i>Wilsonia citrine</i>	No	X				Dense understory of moist or wet deciduous woodlands	Nest in shrub, 2-3' high	entirely insects	Central America
Bird	Indigo Bunting	<i>Passerina cyanea</i>	No	X	X			Deciduous forest edge, open woodland, weedy fields, Shrubland	Nest in shrub, 1-10' high	insects, spiders, seeds, berries	Florida to Central America
Bird	Kentucky Warbler	<i>Oporornis formosus</i>	No	X				Woodlands with dense, damp, undergrowth	Nest at base of a shrub, on or close to the ground	insects and a few berries	Mexico to Northern South America
Bird	Long-eared Owl	<i>Asio otus</i>	Yes	X		X		coniferous and mixed coniferous and deciduous forest	Nest usually old hawk, squirrel, or crow nest	mostly rodents	South US to Mexico
Bird	Louisiana Waterthrush	<i>Seiurus motacilla</i>	No	X			X	wooded streams, swamp	Nest on ground, usually hidden among roots of tree, often only a few feet from the water	aquatic and terrestrial invertebrates, mollusks, crustaceans	Central America and northern South America
Bird	Northern Bobwhite	<i>Colinus virginianus</i>	No		X	X		Tall grassland, brushy fields, open woodland	Nest is shallow depression on the ground, concealed by vegetation	leaves, fruits, buds, tubers, spiders	Winter resident
Bird	Northern Flicker	<i>Colaptes auratus</i>	No	X				variety of wooded habitats	Nest in cavity, preferably in snag	ants, occasionally seeds, acorns, nuts	Winter resident
Bird	Osprey	<i>Pandion haliaetus</i>	Yes				X	Rivers, lakes, along coast	Nest 10-60' in deciduous tree or on platform near water	mostly fish, also rodents, birds	Texas and Florida, south to South America

Appendix M. Natural History of Rare and Priority Animal Species
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Taxa	Common Name	Scientific Name	ENSP Fact Sheet Available	Broad Habitats*				Habitat Description	Breeding / Nesting Notes	Diet	Winter Range
				Forest	Shrubland	Meadow	Water				
Bird	Pine Warbler	<i>Dendroica pinus</i>	No	X				Pine forest or mixed woodlands	Nest in a conifer, 25-40' high,	insects, spiders, some seeds and berries	North East Mexico, Caribbean
Bird	Prairie Warbler	<i>Dendroica discolor</i>	No		X			Dry, brushy clearings, forest edges	Nest in a shrub, 1-10' high	mostly insects	Florida to Caribbean
Bird	Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	Yes	X				Open deciduous woods	Nest in cavity, in barkless dead tree or dead stub on live tree	insects, bird eggs, nestlings, corn, berries, fruit, caches acorns and beechnuts	Southern US
Bird	Red-shouldered Hawk	<i>Buteo lineatus</i>	Yes	X			X	Wooded swamps,	Nest in deciduous tree, 20-60' high	rodents, snakes, lizards, insects	Winter resident
Bird	Ruffed Grouse	<i>Bonasa umbellus</i>	No	X				Deciduous and coniferous forest with dense understory, often on wet woods	Nest hidden at base of tree, under branches of fallen tree	mostly buds, leaves, flowers, seeds, fruit, then insects, spiders	Winter resident
Bird	Scarlet Tanager	<i>Piranga olivacea</i>	No	X				deciduous forest and woodland	Nest in conifer, 20'-30' high	terrestrial invertebrates, gleans from bark	Central America
Bird	Sharp-shinned Hawk	<i>Accipiter striatus</i>	No	X				woodland, coniferous, deciduous forest	Nest in deciduous tree, 10'-60' high, in woodland, coniferous-deciduous forest	mostly smaller birds, rarely smaller mammals, frogs	Central America
Bird	Veery	<i>Catharus fuscescens</i>	No	X				Shaded moist woodland, with understory	Nest in shrub, 0'-6' high, cup shaped, in shaded, moist woodland with understory, especially poplar, aspen	spiders, insects, some fruit	South America
Bird	Wood Duck	<i>Aix sponsa</i>	No	X			X	Wooded swamp, pond, marsh	Nest in cavity or nest box	seeds, acorns, berries, aquatic and terrestrial insects	Cuba and Bahamas
Bird	Wood Thrush	<i>Hylocichla mustelina</i>	No	X				deciduous or deciduous-coniferous forest	Nest in conifer, 6'-50' high, especially near water	spiders, insects, some fruit	Mexico to Panama
Bird	Worm-eating Warbler	<i>Helmitheros vermivorus</i>	No	X				ravines and hillsides in thick deciduous woods	Nest on ground, on hillside, usually tucked under a low shrub, in thick deciduous woods	insects	Bahamas, Greater Antilles, Mexico

Appendix M. Natural History of Rare and Priority Animal Species
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Taxa	Common Name	Scientific Name	ENSP Fact Sheet Available	Broad Habitats*				Habitat Description	Breeding / Nesting Notes	Diet	Winter Range
				Forest	Shrubland	Meadow	Water				
Bird	Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	No	X	X			open woodland with dense undergrowth	Nest in shrub, 4'-8' high, open woodland with dense undergrowth	hairy caterpillars, bird eggs, frogs, berries, fruit	South America
Bird	Yellow-breasted Chat	<i>Icteria virens</i>	No		X		X	dense brush or scrub, especially along streams	Nest in shrub, 1'-5' high, in dense brush or scrub, especially along streams and swamp margins	insects and berries	South to Panama
Bird	Yellow-throated Vireo	<i>Vireo flavifrons</i>	No	X				open deciduous woodland and forest edge	Nest in deciduous tree, 20'-60' high, open deciduous woodland and forest edge, deep cup, suspended by rim from prongs of forked twig	almost entirely insects	Mexico to Columbia
Fish	Bridle Shiner	<i>Notropis bifrenatus</i>	No				X	quiet streams, likes abundant submersed aquatic vegetation	TBD	zooplankton and aquatic insect larvae	Winter resident
Fish	Margined Madtom	<i>Noturus insignis</i>	No				X	inhabits rocky riffles and runs of clear, fast creeks	TBD	Aquatic invertebrates, insect larvae, fish, terrestrial insects	Winter resident
Fish	Shortnose Sturgeon	<i>Acipenser brevirostrum</i>	Yes				X	large river or estuary	TBD	bottom feeders eating primarily insects and small crustaceans	Winter resident
Mammal	Bobcat	<i>Lynx rufus</i>	Yes	X	X			woodland	TBD	rabbits, squirrels, other small mammals	Winter resident
Mussel	Brook Floater	<i>Alamidonta varicosa</i>	Yes				X	high relief stream, favors gravelly riffles	TBD	larvae are parasitic on gills of fish, adults are filter feeders	Winter resident
Mussel	Creeper	<i>Strophitus undulatus</i>	No				X	small to large rivers, with sand and gravel substrate	TBD	larvae are parasitic on gills of fish, adults are filter feeders	Winter resident
Mussel	Tidewater Mucket	<i>Leptodea ochracea</i>	Yes				X	coastal rivers	TBD	larvae are parasitic on gills of fish, adults are filter feeders	Winter resident
Mussel	Triangle Floater	<i>Alasmidonta undulata</i>	Yes				X	small to large rivers, with sand and gravel substrate	TBD	larvae are parasitic on gills of fish, adults are filter feeders	Winter resident

Appendix M. Natural History of Rare and Priority Animal Species
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Taxa	Common Name	Scientific Name	ENSP Fact Sheet Available	Broad Habitats*				Habitat Description	Breeding / Nesting Notes	Diet	Winter Range
				Forest	Shrubland	Meadow	Water				
Mussel	Yellow Lampmussel	<i>Lampsilis cariosa</i>	Yes				X	small to large rivers, with silt, sand and gravel bottoms	TBD	larvae are parasitic on gills of fish, adults are filter feeders	Winter resident
Reptile	Eastern Box Turtle	<i>Terrapene carolina carolina</i>	No	X	X	X		woods and meadows	Nesting occurs from May-July in sandy or loamy soil	omnivores, insects earthworms, vegetation, fruit	Winter resident
Reptile	Spotted Turtle	<i>Clemmys guttata</i>	No			X	X	marsh, bogs, swamps and wet woods	Nesting is in an open site, meadow, field or edge of road	plant material, insect larvae, worms, slugs	Winter resident
Reptile	Wood Turtle	<i>Clemmys insculpta</i>	Yes	X		X	X	clean streams running through meadows, woods and farms	Nesting areas receive ample sunlight, contain soft soil, free from flooding, devoid of rocks	omnivore, beetles, slugs, fungi, carrion	Winter resident

*Broad Habitats: Primary and secondary broad habitat utilization

Bald Eagle, *Haliaeetus leucocephalus*

Status: *State:* Endangered

Federal: Threatened (proposed for de-listing)

Identification

Adult bald eagles are distinguished by their large size (7- to 8-foot wingspan), full white heads and tails and dark brown, almost black body. They reach their adult size by the time they can fly. Their adult plumage, however, develops in their fifth year. Prior to that, their juvenile appearance varies from year to year. In their first year, their wings are slightly broader and entirely dark brown. The next year they begin to molt their flight feathers and the trailing edge of their wings appears symmetrically serrated as shorter adult feathers replace the longer juvenile ones. Their plumage is usually mottled, brown and white, and is widely variable with a considerable amount of white on the breast and belly. Bald eagles are even more mottled in their third year and begin to show signs of change from dark brown to light yellow in their eye and bill color, and may have some lighter plumage appearing on their heads and tails.



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During their fourth year, bald eagles begin to appear unmistakable as our national symbol. This is when they are transitioning from juvenile to adult and appear for the first time with a white head and tail. At this age, they retain some brown in the white plumage, giving them a dirty appearance. They also retain some white flecking in the brown of their bodies. In their next molt, they attain the clean white head and tail and solid brown body plumage of a full adult bald eagle.

Habitat

Bald eagle habitat consists of areas of forest that are associated with bodies of water. With fish as their primary diet, bald eagles in New Jersey have historically been associated with the forests near the Delaware River and Bay as well as all the rivers that empty into the Atlantic Ocean and Delaware Bay (Niles 1995). In northern and central New Jersey, bald eagles are resident on inland reservoirs and on the Delaware River. Throughout the state, these large birds require a nesting location that is safe from the threat of human disturbance and usually choose their nest tree accordingly. Typically, the tree they choose for building their large nests is a “super-canopy” tree that is taller than the trees immediately surrounding it. By nesting in such a tree, eagles can place their nest within the shelter of the crown and still be above the surrounding trees, enabling them to arrive and depart from the nest with ease.

In the northern part of the state, where the topography is hilly or mountainous, eagles can nest in trees that are on a slope and therefore have one side that is higher than its neighboring trees on the slope below it. Occasionally,

bald eagles will choose a lone tree in an open field.

In addition to nesting habitat, eagles also have habitat requirements for foraging and wintering, which might overlap their nesting habitat, but not necessarily. Foraging habitat for bald eagles consists of large perch trees near a body of water. Both of these elements are critical due to the “sit and watch” foraging behavior of eagles. Wintering habitat consists of the same, with the added condition of open, ice-free water. Parts of the Delaware River, such as the Delaware Water Gap, where the current is swift and the river remains open, or deep reservoirs with enough current or a dam to keep part of the water ice-free, serve as good wintering habitat for eagles. The tidal areas of southern New Jersey marshes are also ideal locations for winter foraging.

Status and Conservation

Long before the introduction of the pesticide DDT after World War II, habitat destruction, shootings and poisonings had greatly reduced the population of bald eagles in the lower 48 contiguous states. But the widespread use of DDT, which caused eagles to lay thin-shelled eggs that were often crushed during incubation, pushed the bird to the brink of extinction. New Jersey, where DDT was heavily used, in part for mosquito control, was no exception. By 1970, only one eagle nest remained in the state. Consequently, the bald eagle was listed as endangered under New Jersey’s new Endangered Species Act in 1974 and listed as federally endangered throughout the lower 48 states in 1978.

Management of the state’s only nest began in 1982, when biologists began climbing the nest tree to retrieve the thin-shelled eggs. They were then incubated in the lab underneath chickens before being returned to the nest as 10-day-old chicks, which were quickly cared for by the nest’s adults. Shortly thereafter, the state launched a “hacking” program through which 60 eaglets, primarily from Canada, were released into the heart of New Jersey’s bald eagle habitat between 1983 and 1989. Those efforts, combined with the 1972 federal ban on DDT, paid off rather quickly, with the appearance of the state’s second eagle nest in 1988. Since

then, biologists also have been successful in encouraging eagles to nest in certain areas by building “starter nests,” which eagles add to once they adopt them for nesting (Clark and Niles 1998). Building nests for eagles works best when a pair has already claimed a territory, and the birds may be drawn to a sturdy nest in a super-canopy tree.

Since the second nest appeared, the number of eagle nests has increased steadily ever since. In 2001, a record 27 bald eagle nests were active statewide, mostly in southern New Jersey. A record 34 young fledged that year (Smith et al. 2001).

Barred Owl, *Strix varia*

Status:

State: Threatened

Federal: Not listed

Identification

On still spring evenings, the hooting and eerie caterwauling of barred owls resonate throughout the remote, swampy woodlands of New Jersey. The resounding song of the barred owl, often represented as “who cooks for you, who cooks for you alllll,” is often accompanied by loud “hoo-ah” calls and yowling reminiscent of monkeys. Barred owls may vocalize throughout the year, but are most expressive during courtship, from late February to early April. These owls often call at night but may also vocalize during the day.



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The barred owl is a large fluffy-looking owl with brown barring on the upper breast and brown streaking on the lower breast and belly. The upperparts are brown with buffy-white barring. The tail is patterned with alternating bands of brown and buff-gray. The throat is white and the round head lacks ear tufts. The facial disk is grayish-white with a brown outline. The large facial disk funnels sounds towards the owl's proportionally gigantic ears, providing it with extraordinary hearing for detecting minute noises, such as the rustling of mice in the dark. Unlike all other eastern owls excluding the barn owl, the eyes of the barred owl are dark brown. The hooked bill is buff yellow. The feet and toes are feathered and the talons are dark brownish-black. Sexes are similar in plumage and, although there is much overlap, females may be larger than males. Juveniles resemble adults.

Barred owls fly with slow, moth-like wing beats that are interspersed with glides. In flight, the head appears large and the wings are broad and rounded. Soft feathers and serrated edges on the outer wing feathers minimize noise, enabling these and all other owls to fly silently--an advantage that enables them to surprise their prey.

The barred owl can be distinguished from most other New Jersey owls by its plumage, large size, distinctive vocalizations, and habitat selection. The great horned owl (*Bubo virginianus*), a common breeding species in the state, is also a large owl but has rich brown plumage and yellow eyes. The ear tufts of great horned owls may not be noticeable in flight, making them appear round-headed like a barred owl. The call of the great horned owl is a melancholy “hoo-hoo-hoo.” Great horned owls, which often reside in forested uplands or near human habitation, are less restrictive in their habitat choice than barred owls. The barn owl (*Tyto alba*), the only other New Jersey owl with dark eyes, is white below and golden brown above. In addition, the barn owl, which resides in

open fields and grasslands, has a narrow body, long unfeathered legs, and a heart-shaped facial disk.

Habitat

Traditionally known as the “swamp owl,” the barred owl is a denizen of remote, contiguous, old-growth wetland forests. These owls require mature wet woods that contain large trees with cavities suitable for nesting. Barred owl habitats typically have an open understory through which the owls can fly and hunt. The lack of large nesting cavities is often the primary limiting factor for barred owls. Consequently, these owls may nest immediately outside of a wetland or in sub-climax wetland forests if adequate nest sites are unavailable within a mature wetland forest. Barred owls are typically found in remote wilderness areas that may also contain other rare species such as the red-shouldered hawk (*Buteo lineatus*) or the Cooper’s hawk (*Accipiter cooperii*). Barred owls typically shun human activity by avoiding residential, agricultural, industrial, or commercial areas. In northern New Jersey, barred owls favored sites that were at least 500 meters (1640 ft.) from human habitation and had little or no forest clearings or trails (Bosakowski 1987).

In southern New Jersey, barred owls inhabit both deciduous wetland forests and Atlantic white cedar (*Chamaecyparis thyoides*) swamps associated with stream corridors. Often such lowland forests are buffered by surrounding pine or pine/oak uplands that may protect the owls from human disturbance and provide additional foraging habitat. Mixed hardwood swamps are often dominated by red maple (*Acer rubrum*) and black gum (*Nyssa sylvatica*) and may include highbush blueberry (*Vaccinium corymbosum*), swamp magnolia (*Magnolia virginiana*), or greenbrier (*Smilax spp.*) in the shrub layer. Although barred owls utilize white cedars for roosting, they infrequently provide cavities that are large enough for nesting owls.

In northern New Jersey, barred owls inhabit hemlock ravines and mixed deciduous wetland or riparian forests. Oak hardwood forests containing white oak (*Quercus alba*), red maple, black birch (*Betula lenta*), black willow (*Salix nigra*), hickory (*Carya spp.*), white ash (*Fraxinus americana*), basswood (*Tilia americana*), tulip poplar (*Liriodendron tulipifera*), black cherry (*Prunus serotina*), and black gum may be occupied. Barred owls may also inhabit northern hardwood forests that contain sugar maple (*A. saccharum*), birch (*Betula spp.*), and beech (*Fagus grandifolia*). Dense stands of hemlock (*Tsuga canadensis*), white pine (*Pinus strobus*), Norway spruce (*Picea abies*), or other conifers provide cover for roosting owls and protection from harsh weather. Barred owls prefer flat, lowland terrain and avoid rocky slopes and hillsides.

As a resident species, barred owls establish territories with fairly stable boundaries that are continuously maintained throughout the year. In eastern North America, home range sizes of 86 to 370 hectares (213 to 914 acres) have been documented for barred owls (Johnsgard 1988).

Status and Conservation

The barred owl was traditionally a common resident within the deep wooded swamps of New Jersey. Historically, these owls were shot as trophies or because of alleged poultry predation. Collectors also looted young owls and eggs. Despite human

persecution, the barred owl persisted virtually unscathed until the early 1940s when the cutting of old growth forests and the filling of wetlands greatly reduced habitat throughout the state. Rampant habitat loss and associated barred owl population declines continued for the next several decades. Consequently, these owls were lost from many historic breeding locales.

Due to population declines and habitat loss, the barred owl was listed as a threatened species in New Jersey in 1979. The New Jersey Natural Heritage Program considers the barred owl to be “demonstrably secure globally,” yet “rare in New Jersey” (Office of Natural Lands Management 1992). Currently, barred owl populations appear to be declining due to development and fragmentation of large tracts of private forested lands. The barred owl population has been estimated at 37 pairs in South Jersey and 75 pairs in North Jersey (Sutton and Sutton 1985, Bosakowski 1988). But recent surveys in South Jersey indicate as much as a 30 percent decline there.

Bobcat, *Felis rufus*

Status:

State: Endangered

Federal: Not listed

Identification

Taxonomically, bobcats belong to the order Carnivora, or carnivores, meaning that they are primarily flesh-eaters. They are members of the Felidae family and are commonly known as felines. All members of this family look somewhat similar in appearance. Bobcats have retractable claws and five digits on each foot. Their pelt color varies throughout different parts of their range within the continental United States. In this part of the country, bobcats generally have a tawny to grayish-brown fur with spots and streaks and a whitish-colored underside that is also spotted and streaked. The fur around their lips, chin and underside of the neck are also light-colored. Bobcats have ruffs of fur on both sides of their face and small tufts on the ears. The top of their short tails is tipped black.



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Like all other felines, bobcats have vertically shaped pupils that widen to maximize light reception for nocturnal activity. In addition, they have relatively long legs in relation to their bodies, with the hind legs being longer than the front. This posture accentuates the bobbed tail, which ranges in length from 5-7 in. A mature bobcat is approximately 35 in. in length and 20 in. high at the shoulders. Their weight ranges from about 15-25 lbs. for adult females and 20-35 lbs. for adult males. However, large males can weigh up to 40 lbs.

Habitat

Bobcats are extremely adaptable animals that can survive in a variety of habitats. In our western states they are found in deserts and mountains. In the South they inhabit swamps, river bottoms and forests. In the Northeast they can be found in forests, areas of mixed forest and agriculture and even rural areas near cities and small towns. In general, bobcats use rough, broken habitat that has a mix of early and late successional stages. They do not prosper in highly suburbanized areas or in areas that have been severely altered by intense agriculture. This explains their absence from many Midwest states. However, bobcats can survive in agricultural areas that are interspersed with natural cover if they support adequate prey populations (Godin 1977 and McCord 1977).

Bobcats prefer habitats that provide dense cover in the form of understory vines, briars, shrubs, and saplings (Leopold et al 1995). These cover types provide areas for resting, and protection from both weather and predators (Leopold et al 1995 and Godin

1977). In northern New Jersey, typical bobcat habitat consists of large areas of contiguous forest and fragmented forests interspersed with agricultural areas or early succession vegetation. Bobcats often use areas with rock outcrops, caves, and ledges that provide shelter and cover for hunting, resting and rearing young. Where rocky areas are not available, swamps, bogs, conifer stands and rhododendron and mountain laurel thickets provide good cover and excellent hunting grounds (New Jersey Division of Fish, Game and Wildlife 1995). In southern New Jersey, dense thickets of briars and conifers serve as resting and escape cover (New Jersey Division of Fish, Game and Wildlife 1995). Clearly, bobcats are extremely versatile creatures that have the ability to adapt to a wide variety of habitat types and prey species.

Status and Conservation

The bobcat has been extirpated from much of the Midwest due to habitat changes resulting from modern agricultural practices. It is considered endangered in Iowa, Indiana and Ohio. However, Illinois removed the bobcat from its threatened list in 1999 and Pennsylvania, which had permitted no legal hunting between 1970 and 1999, reinstated a limited hunting and trapping season beginning in 2000.

In New Jersey, the bobcat population experienced severe declines near the turn of the 19th century as most forests were cleared for lumber, fuel, charcoal and agricultural use. As the remaining habitat became highly fragmented, bobcat numbers plummeted. During the 1950s and 1960s, reports of bobcat sightings and killings persisted, but by the early 1970s it was thought that the feline had been extirpated from the Garden State. The bobcat gained full legal protection under New Jersey regulations in 1972 when it was classified as a game species with a closed season (Lund 1979).

In 1977, the New Jersey Division of Fish, Game and Wildlife initiated a project to restore the species to suitable habitat within the state. Between 1978 and 1982, 24 bobcats were captured in Maine and released in northern New Jersey (James Sciascia, pers. comm. 1997). In the years that followed, reports of bobcat sightings increased, suggesting that the project had been a success. In 1991 the status of the bobcat was changed again to endangered under New Jersey's Endangered and Nongame Species Conservation Act.

The New Jersey Division of Fish and Wildlife's Endangered and Nongame Species Program (ENSP) conducted a scent post survey in 1995 and confirmed bobcat presence in Sussex, Warren, Morris, and Passaic counties. In addition, reliable bobcat sightings have been reported from Mercer, Somerset, Bergen, Burlington, Ocean, Atlantic, Cape May, Cumberland, and Salem counties (Sciascia, pers. comm. 1997).

In 1996, the ENSP began a pilot project using radio telemetry to monitor the movements of bobcats in northern New Jersey. The objective was to determine the bobcats' home range and habitat preferences in that part of the state. The work is continuing, although technological advances now allow biologists to fit bobcats with satellite transmitters. Bobcat locations can now be monitored on a continual basis using satellites.

Bobolink, *Dolichonyx oryzivorus*

Status:

State: Threatened

Federal: Not listed

Identification

Amid a sea of agriculture, the bubbly “bobo-o-link!” song of the bobolink echoes from within an overgrown weedy field. On a fall day at Cape May, a chorus of “plink” notes is heard overhead as a flock of bobolinks passes above a fallow grassland. These are the song and call of the bobolink, a sparrow-sized member of the blackbird family.



Photo by S. Maslowski, courtesy US FWS

Bobolinks exhibit sexual dimorphism (gender differences) in plumage during the breeding season. The nuptial male is black overall with a creamy nape and hindneck, a white rump, and white scapulars (feathers at the base of the wing). The plumage of the female, which camouflages her during nesting, is relatively drab. The female is buffy with dark brown streaking on the back, sides, and rump and has dark stripes on the head. In non-breeding plumage, adult males resemble females. Immature bobolinks also resemble adult females but are more yellow and lack streaking on the sides of the body. All ages and sexes have a short, finch-like bill and pointed tail feathers.

Habitat

Bobolinks inhabit low-intensity agricultural habitats, such as hayfields and pastures, during the breeding season. In addition, lush fallow fields and meadows of grasses, forbs, and wildflowers are occupied. Bobolink nests are often placed in areas of greatest vegetative height and density. Although small numbers of bobolinks may nest in grasslands of 2 to 4 hectares (5-10 acres), larger sized fields support higher densities of nesting pairs (Jones and Vickery 1997a).

Similar habitats are occupied by bobolinks throughout their annual cycle. During migration, bobolinks inhabit fallow and agricultural fields, as well as coastal and freshwater marshes. On their South American wintering grounds, they occur in grasslands, marshes, rice fields, and farm fields.

Status and Conservation

Historic clearing of forests in the eastern United States during the 1700s and 1800s enabled numerous grassland species to expand their ranges, inhabiting the growing agricultural landscape. As a result, the bobolink became a common breeding species in the hayfields and pastures of New Jersey. However, by the early 1900s, bobolink

population declines were noted in the Northeast. The slaughter of migrant bobolinks in rice fields of the southern United States, market hunting, and modernized farming techniques likely caused this decline. During the 1960s and 1970s, changing agricultural practices, the conversion of fallow fields to forests, and the development of agricultural lands further shrunk bobolink populations in New Jersey.

Modern farming techniques, including frequent rotation of hayfields, early mowing of hay, decreased vegetative diversity, and the change from warm-season to cool-season grasses, have rendered agricultural fields less favorable for nesting bobolinks. In addition, alfalfa (*Medicago sativa*) fields, which offer poor nesting habitat for bobolinks, have replaced many timothy (*Phleum* spp.) and clover (Fabaceae) fields. The area of land cultivated as hay fields in the northeastern United States declined from 12.6 to 7.1 million hectares (31.1 to 17.5 million acres) from 1940 to 1986 (Martin and Gavin 1995). During the same period, the percentage of sites where alfalfa replaced hay increased from 20% to 60% (Bollinger and Gavin 1992). Habitat loss is largely responsible for the decline of bobolink populations in the United States and New Jersey detected by the Breeding Bird Survey from 1966 to 1999 (Sauer et al. 2000).

Due to population declines and habitat loss, the bobolink was listed as a threatened species in New Jersey in 1979. The New Jersey Natural Heritage Program considers the bobolink to be “demonstrably secure globally,” yet “imperiled in New Jersey because of rarity” (Office of Natural Lands Management 1992).

Cooper's hawk, *Accipiter cooperii*

Status:

State: Endangered

Federal: Not listed

Identification

On a cool fall day at Cape May Point, observers scan the skies as streams of accipiters zip past at tree-level. Darting through the cedars in pursuit of a yellow-rumped warbler is a Cooper's hawk, one of the three species of North American accipiters-hawks that prey chiefly on birds. The Cooper's hawk, as well as its cousins, the sharp-shinned hawk (*Accipiter striatus*) and the northern goshawk (*A. gentilis*), are forest-nesting raptors that are able to quickly maneuver through dense cover while chasing prey.



hawk, one of North American accipiters-hawks that prey chiefly on birds. The Cooper's hawk, as well as its cousins, the sharp-shinned hawk (*Accipiter striatus*) and the northern goshawk (*A. gentilis*), are forest-nesting raptors that are able to quickly maneuver through dense cover while chasing prey.

About the size of a crow, the Cooper's hawk has short, rounded wings and a long, narrow tail. When soaring, the head extends beyond the wrist, making it appear large-headed. In flight, the silhouette of a Cooper's hawk appears cross-shaped, whereas the similarly plumaged sharp-shinned hawk looks small-headed and T-shaped. Sharp-shinned hawks usually exhibit a shorter, more squared-off tail. In addition, the wing beats of the Cooper's hawk are stiffer and more powerful than the fluttery wing beats of the sharp-shinned hawk.

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The adult Cooper's hawk has a dark cap, blue-gray back, and rusty, barred underparts. The juvenile's back is brown with rufous (reddish brown) feather edges and sparse white spotting, and the underparts are light colored with brown vertical streaking on the breast. In all ages, the tail is usually rounded and has a white edge along the tip. Juveniles molt into adult plumage during their second year. Eye color changes from yellow-green in immature birds to dark orange or red in adults. Females are significantly larger than males. The call of the Cooper's hawk, which is often given during the breeding season, is a loud and nasal "cak-cak-cak."

Habitat

During the breeding season, Cooper's hawks inhabit deciduous, coniferous, and mixed riparian or wetland forests. In southern New Jersey, breeding habitats include large, remote red maple (*Acer rubrum*) or black gum (*Nyssa sylvatica*) swamps and, on occasion, Atlantic white cedar (*Chamaecyparis thyoides*) swamps. Within these sites, high-bush blueberry (*Vaccinium corymbosum*) and greenbrier (*Smilax rotundifolia*) typically dominate the shrub layer. Adjacent upland pine or mixed pine/oak forests

provide an additional habitat buffer for nesting Cooper's hawks. In northern New Jersey, Cooper's hawks inhabit mixed riparian woodlands, eastern hemlock (*Tsuga canadensis*) / white pine (*Pinus strobus*) forests, and conifer plantations. Dominant tree species within such habitats may include red maple, sugar maple (*Acer saccharum*), eastern hemlock, white pine, black birch (*Betula lenta*), white oak (*Quercus alba*), scotch pine (*Pinus sylvestris*), and Norway spruce (*Picea abies*).

Cooper's hawk nest sites are often located within sub-climax forests that provide a closed canopy, moderate to heavy shrub cover, and trees more than 30 years old. Territories often contain forest edges and small openings along streams or roads, which may be used for hunting. In northern New Jersey, Cooper's hawk territories contained over 70% forested habitat within 0.3 km (0.2 miles) of nest sites and were, on average, 0.5 km (0.3 miles) away from the nearest house (Bosakowski et al. 1993). Home ranges of breeding Cooper's hawks in the United States may comprise 105 to 1,800 hectares (260 to 4,450 acres) (Johnsgard 1990, Rosenfield and Bielefeldt 1993).

During the 1970s, when the Cooper's hawk was first listed as an endangered species in New Jersey (1974), breeding was documented only within large, contiguous forests. As the Cooper's hawk population increased, pairs have nested in smaller woodlots containing mature trees and fragmented woods within agricultural, suburban, or urban landscapes. This may be attributed to both a larger breeding population and increased fragmentation of forested habitats. Cooper's hawks may exhibit limited tolerance for human disturbance and habitat fragmentation.

Cooper's hawks, which occur year-round in New Jersey, use many of the same habitats in winter as during the breeding season. However, because of limited prey availability during the winter months, habitat use during this season is less restrictive than during the breeding season. Consequently, Cooper's hawks forage within a variety of forest types as well as woodland edges. Wintering hawks may also frequent residential areas where they hunt songbirds and doves at bird feeders. Cedar forests, conifer groves, and other dense woods that provide protection from harsh weather are favored for roosting.

Status and Conservation

Until the mid-1930s, many raptor species, including the Cooper's hawk, were shot in large numbers during migration and on their breeding grounds because of suspected poultry and game bird predation. Regardless, the Cooper's hawk remained a fairly common breeding species in New Jersey's forests until the 1950s when habitat loss caused population declines. In addition, the pesticide DDT impaired reproduction and contributed to population declines observed from the 1950s to 1970s. Due to the reduction in the state's breeding population and the loss of habitat, the Cooper's hawk was listed as an endangered species in New Jersey in 1974. The New Jersey Natural Heritage Program considers the Cooper's hawk to be "apparently secure globally," yet "rare in the State (breeding)" (Office of Natural Lands Management 1998). Concern for this species is evident in nearby states, such as New Hampshire, Rhode Island, and Connecticut, where it is listed as threatened, and Massachusetts and New York, where it is considered a species of Special Concern. The National Audubon Society also included the Cooper's hawk on its Blue List of Imperiled Species from 1971 to 1982 and in 1986, the final year of the list.

Following the nationwide ban of DDT in 1972 and the reforestation of fallow lands throughout the state, Cooper's hawk populations began to recover. Cooper's hawks experienced increases in New Jersey Christmas Bird Counts from 1959 to 1988 and Breeding Bird Surveys from 1980 to 1999 (Sauer et al. 1996, Sauer et al. 2001). Other recent surveys have also shown a substantial increase in the breeding population of Cooper's hawks in New Jersey. As a result, the status of the Cooper's hawk was reclassified from endangered to threatened in New Jersey in 1999. The loss of large, contiguous forests remains a threat to this species and warrants the continued protection of Cooper's hawk nesting habitats.

Grasshopper Sparrow, *Ammodramus savannarum*

Status:

State: Threatened

Federal: Not listed

Identification

A small, secretive songbird, the grasshopper sparrow is more often heard than seen as its insect-like melody emits from dense grasses. Its song consists of one to two chips followed by a buzzy trill reminiscent of a grasshopper. This sparrow also sings a series of buzzy notes.



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The grasshopper sparrow has a stocky body that is brown above with buff streaking. On adults, the breast and sides are solid buff and the belly is white. The buff breast and sides of juveniles are marked with dark brown vertical streaking. Grasshopper sparrows have flat heads with relatively large bills. The crown is dark brown with light central stripes atop the head and behind the eye. The lores (between the eyes and the bill) are orange or golden. The tail is short and brown.

Habitat

Grasshopper sparrows breed in grassland, upland meadow, pasture, hayfield, and old field habitats. Nesting grasshopper sparrows may occur on agricultural lands and airports where such habitats occur. Although grasshopper sparrows may use small grasslands, open areas of over 40 hectares (100 acres) are favored. Optimal habitat for these sparrows contains short- to medium-height bunch grasses interspersed with patches of bare ground, a shallow litter layer, scattered forbs, and few shrubs. Clumped grasses, such as poverty grass (*Danthonia spicata*) and broom-sedge (*Andropogon virginicus*), provide cover and foraging areas and are consequently favored over sod or matting grasses. In addition, orchardgrass (*Dactylis glomerata*), alfalfa (*Medicago sativa*), red clover (*Trifolium pratense*), lespedeza (*Lespedeza spp.*), and dewberry (*Rubus spp.*) provide sparrow habitat. Shrubs, fence posts, and tall forbs are used as song perches. However, habitats may become unsuitable for nesting grasshopper sparrows if shrub cover becomes too dense. Consequently, the presence and density of grasshopper sparrows at breeding sites varies annually due to habitat changes. Habitat use during the nonbreeding season is similar, although less restrictive, to that of the breeding season, as these sparrows may inhabit thickets, weedy lawns, vegetated landfills, fence rows, open fields, or grasslands.

Status and Conservation

In the eastern United States, the historic distribution of grasshopper sparrows was restricted to natural grasslands created by fires or flooding. However, the boom in agriculture during the late 1800s and early 1900s enabled this species to spread its range and increase in numbers, making it a fairly common breeder in New Jersey. By the 1950s and 1960s, expanding development of open areas, coupled with dwindling acreage of land devoted to farming or pasture, led to decreases in grasshopper sparrow populations. Continued declines in the northeast were noted in the 1970s and 1980s, when the species was considered locally distributed and uncommon. The number of grasshopper sparrows detected on Breeding Bird Survey routes in New Jersey, the eastern United States, and throughout the country declined from 1966 to 1999 (Sauer et al. 2000).

As the result of population declines and severe habitat loss, the grasshopper sparrow was listed as a threatened species in New Jersey in 1979. The New Jersey Natural Heritage Program considers this species to be “apparently secure globally,” yet “imperiled in New Jersey because of rarity” (Office of Natural Lands Management 1992). Currently, grasshopper sparrows occur in small, localized, and unstable populations in the Northeast. Consequently, other nearby states have listed this species as endangered (Maine, Connecticut), threatened (Massachusetts, Rhode Island), or of special concern (New York). In New Jersey, the survival of grasshopper sparrows is critically linked with management practices for grassland birds on airports, agricultural lands, and pastures.

Long-eared Owl, *Asio otus*

Status: *State:* Threatened *Federal:* Not listed

Identification

The long-eared owl is a slender, crow-sized owl with long “ear” tufts atop the head that are often visible when the owl perches. The ear tufts are not actual ears, but rather clusters of feathers that aid in camouflaging the bird. The true ears are located on either side of the head next to the round rusty-orange facial disk.

The breast of the long-eared owl is brown with irregular white spotting. The belly is buffy and crosshatched with dark brown markings. The upperparts are heavily marked with black and brown and have gray, buff, and white tones. The wings are long and rounded with a buff-orange patch at the base of the outer primaries on the upperwing. The flight feathers are grayish with dusky spots. The underwing shows a dark brown patch at the wrist. There is a small white patch on the throat below the black bill. The tail is buff colored with brown bands. The legs and feet are feathered to the talons, which are black.

The iris is yellow to golden-yellow. Sexes are alike in plumage, although males are often slightly paler than females.

The long-eared owl relies on its cryptic coloration to camouflage itself within its surroundings. When disturbed, the owl may elongate its body and raise its ear tufts to resemble a broken branch or part of a tree trunk. Long-eared owls also snap their bills if threatened. Vocal activity of the long-eared owl is primarily restricted to the breeding season when males emit a series of deep “hoo” notes during the nighttime hours. The call of the female is slightly higher pitched than that of the male. Both adults give a repeated barking “oo-ack” alarm call. Long-eared owls are skilled fliers that can maneuver among trees and migrate long distances.

The long-eared owl can be confused with other owl species. The great-horned owl (*Bubo virginianus*), which is similarly patterned and also has prominent ear tufts, can be distinguished from the long-eared owl by its larger size and stockier body. The eastern screech owl (*Otus asio*) is much smaller than the long-eared owl and differs in coloration, occurring in a rusty red or gray phase.



Habitat

Long-eared owls require a mosaic of wooded and open habitats. Both roosting and nesting sites may be located within dense stands of either natural or ornamental evergreens, such as Scotch pine (*Pinus sylvestris*), Austrian pine (*P. nigra*), Virginia pine (*P. virginiana*), eastern red cedar (*Juniperus virginiana*), Norway spruce (*Picea abies*), arborvitae (*Thuja orientalis*), eastern hemlock (*Tsuga canadensis*), red pine (*Pinus resinosa*), and white pine (*P. strobus*) (Bosakowski et al. 1989). Deciduous trees and impenetrable tangles of vines also provide cover for these owls. High foliage density is required at nesting and roosting sites to provide camouflage and protection from wind, cold temperatures, and precipitation. Roosting and nesting woodlots are located adjacent to upland or wetland open terrain. Open areas, such as fallow fields, farm fields, and marshes, are used for hunting and are integral components of long-eared owl habitat. Marshes may contain reed grass (*Phragmites australis*), cattail (*Typha spp.*), or sedges.

Status and Conservation

Prior to the 20th century, the clearing of eastern forests for agriculture resulted in a mosaic of farm fields and woodlands and may have enabled long-eared owl numbers to exceed pre-settlement populations. In the late 1800s and early 1900s, long-eared owls bred at scattered locations in New Jersey from Sussex County to Salem County. However, by the mid-1900s, vegetative succession, development of open and forested areas, and modern agricultural practices greatly reduced habitat for these owls in the state. The number of active long-eared owl winter roosts, as well as the number of birds per roost, has declined since the 1950s. Despite extensive surveys in the late 1980s, the number of known breeding pairs remained extremely low. Long-eared owls are currently absent from many nesting sites that were occupied prior to the 1960s. Expanding development has been responsible for the loss of traditional roosting and nesting sites. Due to population declines of breeding pairs and winter residents, habitat loss, and limited breeding distribution in the state, the long-eared owl was listed as a threatened species in New Jersey in 1991. The New Jersey Natural Heritage Program considers the long-eared owl to be “demonstrably secure globally,” yet “rare in New Jersey” (Office of Natural Lands Management 1992).

■ Sherry Liguori

MUSSELS

FRESHWATER MUSSELS:

Dwarf wedgemussel, *Alasmidonta heterodon*

Status: *State:* Endangered *Federal:* Endangered

Brook floater, *Alasmidonta varicosa*

Status: *State:* Endangered (pending) *Federal:* Species of Special Concern

Green floater, *Lasmigona subviridis*

Status: *State:* Endangered (pending) *Federal:* Species of Special Concern

Yellow lampmussel, *Lampsilis cariosa*

Status: *State:* Threatened (pending) *Federal:* Species of Special Concern

Eastern lampmussel, *Lampsilis radiata*

Status: *State:* Threatened (pending) *Federal:* Not listed

Eastern pondmussel, *Ligumia nasuta*

Status: *State:* Threatened (pending) *Federal:* Not listed

Tidewater mucket, *Leptodea ochracea*

Status: *State:* Threatened (pending) *Federal:* Not listed

Triangle floater, *Alasmidonta undulata*

Status: *State:* Threatened (pending) *Federal:* Not listed

Identification

All freshwater mussels have a calcium carbonate bivalve shell that is divided into a left and right half. The shell consists of three layers; the outer periostracum, the middle calcium carbonate, and the inner nacre. The periostracum (or epidermis) protects underlying calcium carbonate from the corrosive action of low pH water and damage from moving sand and gravel. A thin prismatic layer of crystalline calcium carbonate lies beneath the periostracum. The nacre or mother-of-pearl is the innermost and often thickest layer of the shell. It is comprised of thin, stacked calcium carbonate plates that lie parallel to the shell's surface. In many species, the color and texture of the nacre are important for identification.

Lateral and pseudocardinal teeth, separated by an interdentum, are located dorsally inside the shell. Lateral teeth are elongated and raised interlocking structures along the hinge line of a valve, whereas pseudocardinal teeth are triangular-shaped hinge teeth near the shell's anterior-dorsal margin. The interdentum is a flattened area of the hinge plate between the lateral and pseudocardinal teeth. The three points of apposition, which are taxonomically important in most species, serve to hold the two valves together. Some groups entirely lack lateral and pseudocardinal teeth. The umbo or beak is the dorsally raised, inflated area of the bivalve shell. Representing the oldest part of the shell, umbones appear as external swellings and are often points of taxonomic significance.

The valves are held closed by internal muscles. Empty shells show scars of former mussel attachment areas. Freshwater mussels have a large, muscular foot that extends between the valves and functions in locomotion and anchorage. The anterior and posterior retractor muscles draw the foot into the shell, while the anterior protractor helps in foot extension. Large anterior and posterior abductors draw the shell together.

Habitat

New Jersey's Endangered and Threatened Freshwater Mussel Species:

The **dwarf wedgemussel** is a rare freshwater mussel with a trapezoid-to-ovate or "humpbacked" shell rarely exceeding 1.5 in. in length. It is characterized by having two lateral teeth on the right valve of the shell, but only one on the left (thus the species name *heterodon*). The ventral margin is mostly straight. The beaks are low and rounded, projecting only slightly above the hinge line. The periostracum, or outer shell, is dark brown or yellowish brown and often exhibits greenish rays in young mussels. The nacre, or inner shell, is bluish or silvery white.

The dwarf wedgemussel once existed in 70 localities within 15 major Atlantic slope drainage basins from New Brunswick, Canada to North Carolina (U.S. Fish and Wildlife Service 1993). Today however, this species is thought to be extirpated from all but approximately 30 small sites in New Hampshire, Vermont, Maryland, North Carolina, New York, Connecticut, Virginia, and New Jersey.

In New Jersey, the dwarf wedgemussel historically inhabited areas of the Delaware, Hackensack, and Passaic rivers. These populations, however, are thought to

be extirpated because of water quality degradation and other factors. There are only three known active state occurrences of this elusive species; the Paulins Kill, Pequest River, and a portion of the upper Delaware River.

Preferred habitat of the dwarf wedgemussel ranges from muddy sand to sand and gravel/pebble bottoms in rivers and creeks with slow to moderate current. Favoring clean and relatively shallow water with little silt deposition, this species is known to co-occur with other freshwater mussels such as the eastern elliptio (*Elliptio complanata*), triangle floater (*Alasmidonta undulata*), creeper (*Strophitus undulatus*), eastern floater (*Pyganodon cataracta*) and eastern lampmussel (*Lampsilis radiata*).

Fish species identified as suitable hosts for the dwarf wedgemussel include the tessellated darter (*Etheostoma olmstedi*), mottled sculpin (*Cottus bairdi*) and Johnny darter (*Etheostoma nigrum*, not found in N.J.) (Michaelson and Neves 1995).

The **brook floater** has a small, kidney-shaped shell that is slightly thicker towards the anterior. There is a conspicuous posterior slope with wavy ridges perpendicular to the growth lines. The ventral margin is straight and slightly concave centrally. The outer shell color ranges from yellowish brown to dark brown and the nacre is a glossy bluish-white to orange in the umbo region. The pseudocardinal teeth exist as weak knobs and lateral teeth are absent. The species has a bright orange to pinkish foot.

The brook floater ranges from the Savannah River Basin in South Carolina north to the St. Lawrence River Basin in Canada and west to the Ohio River Basin of West Virginia. In New Jersey, there are reported occurrences in the Stony Brook, Musconetcong, Raritan, Lamington and upper Delaware rivers.

Habitat of the brook floater includes rapids or riffles on rock and gravel substrates. The species prefers small streams and is commonly associated with the eastern elliptio (*Elliptio complanata*) (Clarke 1981). Reported host fishes for the species that occur in New Jersey include the slimy sculpin (*Cottus cognatus*), longnose dace (*Rhinichthys cataractae*), golden shiner (*Notemigonus crysoleucas*) and pumpkinseed (*Lepomis gibbosus*).

The **green floater** is a small, rare mussel with an ovate trapezoid shell that is fragile and thin. The posterior ridge is rounded. The outer shell is light yellow or brown with many green rays, especially in juveniles. The pseudocardinal and lateral teeth are small and delicate. The beak cavity is shallow. The nacre can be white to blue and is iridescent towards the posterior end.

The green floater can be found from the Cape Fear River Basin in North Carolina north to the Hudson River Basin and westward to St. Lawrence River Basin in New York. In New Jersey, the species once occurred in the Passaic, Raritan, Delaware, and Pequest rivers, but is now represented by a single known individual in the Stony Brook in Mercer County.

This species can be found in smaller streams, most often in pools and eddies with gravelly and sandy bottoms (Ortmann 1919). It is averse to strong currents (Clarke



Photo courtesy North Carolina
Wildlife Resources Commission

1985). The host fish is not known. There is some evidence that the green floater may not require a host fish in order to complete its life cycle (Barfield and Watters 1998, Lellis and King 1998).

The **yellow lampmussel** has a medium-sized shell, with males elliptical and somewhat elongate and females more ovate. Shells are moderately inflated and thick. The anterior margin is rounded and the ventral margin is slightly curved. The umbos are swollen and raised above the hinge line. The pseudocardinal teeth are compressed and the beak cavity is somewhat deep. The periostracum is smooth, shiny and usually yellow with brown patches.

The nacre is white to bluish white. There may be green or black rays on the posterior slope.

The species ranges from Georgia to the Lower Ottawa River Canada and eastward to Nova Scotia. New Jersey occurrences of the yellow lampmussel are restricted to the Delaware River.

The yellow lampmussel prefers large rivers that drain more than 1,200 sq. Km (Strayer 1993), and is often found in sand/silt substrates. Although the host fish has not been identified, a migratory species such as the alewife is the suspected host.

Shells of the **eastern lampmussel** are elliptical and have a rounded posterior ridge. The posterior and anterior ends are rounded and swollen umbos extend above the hinge line. The periostracum is brown and extensively rayed. The nacre is white and may be tinged with pink or salmon. This species has long lateral teeth and two pseudocardinal teeth on the left and right valves.

The eastern lampmussel ranges from South Carolina north to the St. Lawrence River Basin. In New Jersey, the species is known from locations in the Ramapo, Pequannock, and Wallkill rivers.

The eastern lampmussel is found in a variety of habitats. It is reported to prefer medium to coarse sands. The host fish is unknown.

The **eastern pondmussel** can be distinguished by its bluntly pointed posterior and distinctive posterior ridge. The shells are elongate and twice as long as wide. The dorsal margin is straight and the ventral margin (the side that opens) is curved. The beaks are low and located in the anterior quarter of the shell. The lateral teeth are long and straight. The pseudocardinal teeth are compressed. The nacre is white, but can also vary



Photo courtesy North Carolina Wildlife Resources Commission



Photo courtesy North Carolina Wildlife Resources Commission



Photo courtesy North Carolina Wildlife Resources Commission

from an iridescent blue to salmon. The periostracum is greenish yellow to dark olive or brown.

The eastern pondmussel occurs from Cape Fear River Basin, North Carolina, to the St. Lawrence River Basin, Canada, and westward through northern parts of the continent's Interior Basin. In New Jersey, the species can be found in the Delaware River and several of its tributaries.

The eastern pondmussel is often associated with tidewaters. The host fish is unknown.

The **tidewater mucket** appears similar to the yellow lampmussel. The shell is small; males are elliptical and females are ovate, subinflated and thin. The anterior end is rounded; the posterior margin is evenly rounded, somewhat pointed in males and truncated in females. The beaks are moderately swollen, raised above the hinge line, and are located near the middle of the shell. The periostracum is yellow to brown or olive green and is often covered with fine green rays. The pseudocardinal teeth are compressed; the lateral teeth are short and curved. The beak cavity is shallow and the nacre is bluish-white and sometimes pink.

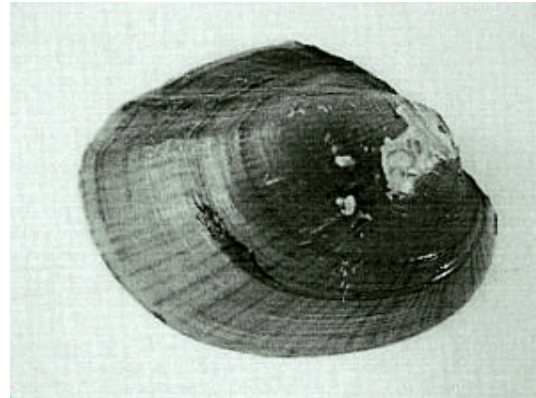


Photo courtesy North Carolina
Wildlife Resources Commission

The tidewater mucket ranges from the Savannah River Drainage Basin in Georgia north into Nova Scotia. In New Jersey, the species occurs in the Delaware River.

This species is associated with tidewaters and can be found in sand/silt substrates. The host fish is undetermined.

The **triangle floater** is a small, ovate to triangular shaped mussel. The lateral teeth are absent, but there is an interdental projection in the left valve. The pseudocardinal teeth are large and well-developed. The periostracum is yellowish-green to black and is extensively rayed. The nacre is pinkish-salmon posteriorly and whitish on the anterior portion.

The triangle floater is a generalist and can be found in a variety of stream and river habitats. The host fish is not determined.

Status and Conservation

The dwarf wedgemussel is afforded protection through federal and state Endangered Species acts, federal and state Clean Water acts, Flood Hazard Area Control Act rules (stream encroachment), and environmental reviews of proposed development projects. The other species listed above are scheduled to be listed as state endangered or threatened in late 2001/early 2002. Federal and state Clean Water acts, stream encroachment rules, environmental reviews of proposed development projects and the state Endangered Species Act will serve to help protect existing populations.

Osprey, *Pandion haliaetus*

Status:

State: Threatened

Federal: Not listed

Identification

The osprey is a large raptor with a wingspan of 4.5 ft. to 6 ft. When gliding, the osprey's long, narrow wings are pulled towards the body and its silhouette is analogous to an "M" shape, closely resembling a gull in flight. In a shallow glide or full soar, the wings are bowed downwards. Ospreys fly with stiff and shallow wing beats, pumping the head and body up and down while flapping.



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The adult osprey is dark brown above and light below. The underside is white with contrasting dark carpal ("wrist") patches and barred flight feathers. The head is white with a broad, black eye stripe that extends to the back of the neck. The tail and flight feathers are dark brown with faint white bands. Adult females and juveniles of both sexes exhibit a "necklace" of dark feathers contrasting with the white feathers of the upper breast. The intensity of this necklace varies among individuals, with some adult males also displaying this trait. Females are only slightly larger than males and, excluding the necklace, the plumage of both sexes is identical. Juvenile ospreys closely resemble adults. However, juveniles exhibit buffy tips to the upperwing coverts, a more heavily streaked crown, mottled carpal patches, and a tawny wash to the underwing that fades by the following spring.

On all ages, the osprey has a pale blue-gray cere (fleshy area behind the base of the bill) and legs. Their toes are equipped with tiny spines, or spicules, that enable them to grasp slippery fish. The bill is black and strongly hooked with a sharp tip for piercing the skin of fish. The osprey's eye color changes from blood red in nestlings to orange-yellow in juveniles to yellow in adults. The osprey's call is a high-pitched, down-slurred whistle that is often repeated in a short series.

Habitat

As a piscivorous species, the osprey is strictly associated with bodies of water that support adequate fish populations. Consequently, ospreys inhabit coastal rivers, marshes, bays, and inlets as well as inland rivers, lakes, and reservoirs. Ospreys nest on live or dead trees, man-made nesting platforms, light poles, channel markers, abandoned duck blinds, or other artificial structures that are in close proximity to fishing areas and offer an unobstructed view of the surrounding landscape. Infrequently, ospreys nest on the ground within coastal marshes. Territories typically contain poles, snags, or structures near the nest on which the ospreys perch.

Status and Conservation

In the 1800s, the osprey was an abundant breeding species along the New Jersey coast. In 1884, there were 100 nests at Seven Mile Beach, currently Avalon/Stone Harbor, alone. However, by 1890, the number of ospreys nesting at Seven Mile Beach shrank to only 25 pairs, and similar declines were evident throughout the state. These early population declines are attributed to habitat loss, eradication of nest trees, egg collecting, and shooting. Further declines in the osprey population continued through the turn of the century and into the 1930s and 1940s. As human settlement along the coast increased during this time, trees that were used by ospreys as nesting sites were destroyed.

The pesticide DDT was first used to control mosquitoes in Cape May County marshes in 1946 and was applied at increasing rates until 1964. When introduced into the environment, DDT enters the food chain and bioaccumulates at each trophic level, contaminating top level predators such as the osprey with high doses of this biologically harmful pesticide. DDT contamination inhibits calcium metabolism in birds, reducing the thickness of the eggshell. When an adult bird attempts to incubate an egg with a thinned shell, the egg will break under the weight of the bird. Because DDT contamination may remain within an adult osprey's body for years, pairs can continue to experience reproductive failure over a long period of time.

Following the use of DDT, osprey populations in New Jersey plummeted due to several decades of poor productivity. Prior to the 1950s, the osprey population in New Jersey was estimated at 500 pairs (Leck 1984). In 1950, there were 253 nesting pairs along the Atlantic Coast of New Jersey south of Barnegat Light. By 1975, only 53 pairs remained in this area and a total of only 68 pairs remained statewide.

Due to its disastrous environmental impacts, the use of DDT was banned in New Jersey in 1968 and in the United States in 1972. However, because of its persistence in biological systems, contamination from DDT and its metabolite, DDE, continued to impair osprey productivity. Ospreys in areas that experienced the most severe population declines and the lowest productivity in the state were also found to contain the highest DDT levels in their eggs. Osprey eggs collected in New Jersey during the early 1970s yielded much higher DDT and DDE concentrations than those from other states. In addition, analysis of eggs from New Jersey ospreys also revealed contamination from PCBs.

Pesticide contamination and habitat loss had reduced New Jersey's osprey population to a tiny fraction of its former level. Consequently, the osprey was one of the first species to be included on the New Jersey Endangered Species List when the New Jersey Endangered Species Conservation Act passed in 1974. With this legislation came the establishment of the New Jersey Endangered and Nongame Species Program (ENSP), a team of biologists dedicated to the conservation of New Jersey's imperiled wildlife. In 1979, the ENSP began an osprey reintroduction program in which biologists transplanted eggs from healthy nests in the Chesapeake Bay area into active, but unsuccessful, New Jersey nests. In addition, biologists erected nesting platforms to support a growing population and began annual surveys to monitor osprey productivity.

Slowly, the osprey population began to recover, as nesting success improved and the number of nesting pairs increased each year. The state population grew from a low of 68 pairs in 1975 to 87 pairs in 1981. Productivity had improved from 0.42 young per active nest in 1968-1972 to 0.97 in 1979 and to 1.18 in 1982-1984. Due to its improved reproductive success, its acceptance of man-made nesting structures, and the decline of persistent pesticides, the status of the osprey was changed from endangered to threatened in New Jersey in 1985. The osprey, brought back from the brink, was the first to be removed from the endangered species list in New Jersey. The New Jersey Natural Heritage Program considers the osprey to be “demonstrably secure globally” yet “rare in New Jersey” (Office of Natural Lands Management 1992).

After 1985, New Jersey’s osprey population grew beyond 200 pairs and productivity was stable at around 1.3 to 1.5 young per active nest. The ban of DDT, the reintroduction of healthy eggs, and the ospreys' acceptance of artificial nest sites are largely responsible for this species’ recovery.

However, despite increases in productivity along the Atlantic Coast, osprey production along the Delaware Bay Coast, particularly in Salem County, remained low throughout the 1980s. Productivity in Salem County, which averaged 0.63 young per active nest from 1974 to 1984, was well below productivity in other areas of the state, which often exceeded one young per active nest. In addition, the number of active nests in Salem County declined from 1984 to 1987. In 1987, ENSP biologists initiated an investigation into the poor productivity of this population. Contaminant analysis revealed that Delaware Bay ospreys experienced more severe eggshell thinning and higher levels of contaminants such as DDE, DDD, PCBs, and dieldrin heptachlor epoxide than Atlantic Coast ospreys. In addition, fish samples collected from Delaware Bay in 1990 contained higher contaminant levels than those from the Atlantic Coast. Osprey eggs and blood collected from Salem County nests from 1991 to 1994 were compared to samples taken from declining populations around the Great Lakes. The analysis revealed that ospreys nesting along Delaware Bay had higher organochlorine and PCB levels than Great Lakes osprey populations. However, by the late 1990s, organochlorine pesticide levels had declined in osprey eggs and fish collected along the Delaware Bay, allowing for improved nesting productivity in this area. Productivity among Delaware Bay nests averaged a very healthy 1.78 young per nest in 2001.

Ospreys nesting along the Atlantic Coast of New Jersey experienced a dramatic reduction in productivity in 1997 and 1998, possibly due to a scarcity of prey. But productivity, which averaged only 0.6 young per nest along the Atlantic Coast during these years, returned to a normal average of 1.3 young per nest in 1999 and 2000, and increased to nearly 1.6 in 2001. The biennial aerial osprey survey in 2001 tallied 340 pairs in the state, the majority of which were located along the Atlantic Coast.

Red-headed woodpecker, *Melanerpes erythrocephalus*

Status:

State: Threatened

Federal: Not listed

Identification

The red-headed woodpecker is a robin-sized bird, readily distinguished by its vibrant black, white, and red plumage. Brilliant red cloaks the head, neck, and throat and is separated from the white breast by a thin black border. The belly, undertail coverts, and rump are white, contrasting with the black tail, back, and upperwing coverts. White inner secondaries and tertials adjacent to black outer secondaries and primaries (flight feathers) form a white patch on the inner wing that is conspicuous in flight.

Though they lack the striking plumage of adults, juvenile red-headed woodpeckers are similarly patterned. The head and wings of juveniles are brown and the white belly has a variable amount of brown streaking. The back is brown with dark brown barring and the white wing patch is also marked with dark barring. During their first fall and winter, juveniles molt into adult plumage.

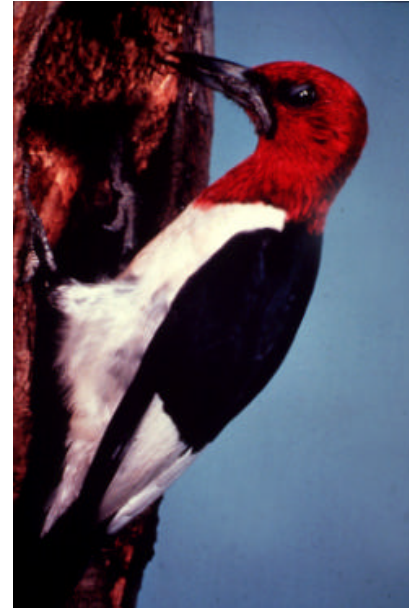


Photo courtesy NJ ENSP

Although the male is slightly larger, the sexes are indistinguishable by plumage. On all ages and sexes, the iris is brown and the legs are gray. The chisel-shaped bill is heavy and colored blue-gray. Like other woodpeckers, the red-headed has zygodactyl feet, in which two toes point forward and two point backward, enabling it to cling vertically to trees. In addition, the tail feathers are stiff and pointed, serving to prop the woodpecker up against a tree. Red-headed woodpeckers fly low over the ground in an undulating manner. The call of the red-headed woodpecker is a repeated “qweer”.

Habitat

Red-headed woodpeckers inhabit open woods, both upland and wetland, that contain dead or dying trees and sparse undergrowth. Such habitat is often created by disturbances such as fire, flooding, or insect outbreaks. A sparse understory is favored for foraging and dead or dying trees are required for nesting. Red-headed woodpeckers occupy similar habitats throughout the year, seeking wintering sites such as open riparian or pine forests and orchards that contain nut and mast producing trees.

In southern New Jersey, typical red-headed woodpecker nesting sites include upland oak or mixed oak/pine forests that contain both living and dead trees. Pitch pine (*Pinus rigida*), white oak (*Quercus alba*), and red oak (*Q. rubra*) are often found in the overstory and lowbush blueberry (*Vaccinium vacillans*) or huckleberry (*Gaylussacia spp.*) dominate the ground cover. In northern New Jersey, red-headed woodpeckers breed in open upland forests, beaver marshes, or wetland forests associated with floodplains or

swamps. Such wetland habitats, which often provide an abundance of dead trees, may contain oak (*Quercus spp.*), hickory (*Carya spp.*), elm (*Ulmus spp.*), and hackberry (*Celtis occidentalis*) in the overstory and sedge (*Carex spp.*) on the ground.

Status and Conservation

During the late 1700s and 1800s, the red-headed woodpecker was a common and widespread species in the Northeast. In the 1870s and 1880s, large concentrations of these birds, including flights of several hundred, were observed during fall migration at New York and Long Island, where it is now an uncommon migrant. Stone (1965) stated that the red-headed woodpecker was a rare fall migrant at Cape May, with only one to two records, on average, per year. Currently, an average of eight per season is observed each fall at Cape May (Sibley 1997). This apparent increase in the number of birds recorded at Cape May is likely due to increased coverage by birders rather than an actual increase in red-headed woodpecker populations. Stone (1908) also described the red-headed woodpecker as a rare breeder in south Jersey that was “never found in the Pine Barrens.” However, this again may reflect a lack of coverage during historic times.

By the turn of the 20th century, red-headed woodpeckers had suffered population declines due to road mortality, competition with European starlings for nesting cavities, and harvesting for the millinery trade in which populations of many avian species were greatly reduced to provide feathers for women’s hats. Farmers at this time also killed red-headed woodpeckers because they damaged fruit and berry crops. Further population declines resulting from habitat loss, limited availability of nesting sites, and road mortality were noted from the 1930s to the 1970s. Red-headed woodpeckers experienced declines survey-wide on Christmas Bird Counts from 1959 to 1988 (Sauer et al. 1996). The Breeding Bird Survey detected annual declines of red-headed woodpeckers in New Jersey and the northeast from 1966 to 1999 (Sauer et al. 2001). Currently, the species is considered to be rare in the Northeast.

Due to population declines, the red-headed woodpecker was listed as a threatened species in New Jersey in 1979. The New Jersey Natural Heritage Program considers the red-headed woodpecker to be “demonstrably secure globally,” yet “imperiled in New Jersey because of rarity” (Office of Natural Lands Management 1998). Loss of breeding habitat and regional population declines in areas such as New Jersey and New York led the National Audubon Society to include the red-headed woodpecker on its Blue List of Imperiled Species in 1972 and from 1976 to 1981 (Arbib 1975, Tate 1986). In addition, the National Audubon Society has recognized the red-headed woodpecker as a species of special concern since 1982 (Tate 1986).

Red-shouldered Hawk, *Buteo lineatus*

Status: *State:* Endangered (breeding population), Threatened (nonbreeding population)
Federal: Migratory Nongame Bird of Management Concern

Identification

The red-shouldered hawk is a crow-sized buteo, or soaring hawk. The adults are strikingly plumed, with rufous (brownish red) shoulder patches and a rufous barred breast. Rufous lesser and median upperwing coverts form the “red shoulders” evident on this species. The flight feathers of adults are barred black and white and show a white crescent-shaped window across the primaries,



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which is visible in flight. The underparts, which are rufous with white barring, often exhibit thin, dark streaks on the chest. The head and back are dark brown. The black tail is bisected by several narrow white bands. Although females average slightly larger than males, plumage is similar for both sexes. The call of the red-shouldered hawk is a series of nasal drawn-out “aahhh” cries.

Juvenile red-shouldered hawks can be distinguished from adults by their overall browner, less brilliant plumage. The shoulder patches of juveniles are paler rufous and the crescents across the primaries are tawny. The underparts are whitish with variable amounts of brown streaking. The tail is brown with several thin pale bands. Adult plumage appears in the second year.

The red-shouldered hawk is a long-tailed buteo with squared-off wings and a protruding head. Characterized by quick choppy wingbeats interspersed with short glides, the flight style of this hawk is similar to that of an accipiter. When soaring, most buteos hold their wings straight out, whereas the red-shouldered hawk bows its wings forward.

Habitat

Mature wet woods such as hardwood swamps and riparian forests typify red-shouldered hawk breeding habitat. Nesting territories, which occur in deciduous, coniferous, or mixed woodlands, are typically located within remote and extensive old growth forests containing standing water. Consequently, breeding barred owls (*Strix varia*) and Cooper’s hawks (*Accipiter cooperii*) are often found in habitats containing red-shouldered hawks.

Red-shouldered hawks select large deciduous and, to a lesser extent, coniferous trees for nesting. Nests have been documented in oak (*Quercus spp.*), pine (*Pinus spp.*), maple (*Acer spp.*), ash (*Fraxinus spp.*), beech (*Fagus grandifolia*), birch (*Betula spp.*),

basswood (*Tilia americana*), chestnut (*Castanea dentata*), hemlock (*Tsuga canadensis*), elm (*Ulmus spp.*), cherry (*Prunus spp.*), hickory (*Carya spp.*), and tulip poplar (*Liriodendron tulipifera*). Forest characteristics include a closed canopy of tall trees, an open subcanopy, and variable amounts of understory cover.

Red-shouldered hawks inhabit wetland forest types unique to the different physiographic regions throughout northern and southern New Jersey. In north Jersey, they occupy riparian forests, wooded wetlands, beaver meadows, and mesic (slightly moist) lowland forests. Within the Pequannock Watershed, red-shouldered hawks are found in stream bottomlands and coniferous or mixed forests containing eastern hemlock or white pine (*Pinus strobus*). Nests are predominately located in wilderness areas where there are abundant wetlands, small forest openings, and limited areas of large open water such as lakes. In the Pequannock Watershed, red-shouldered hawks avoid areas of human inhabitation, steep uplands, dry slopes, open water, areas with limited conifers, and areas with too many or too few forest openings. Although red-shouldered hawks require extensive tracts of forested habitat for nesting, territories may also contain edges where the birds forage.

The majority of red-shouldered hawk nests in southern New Jersey are contained within vast contiguous freshwater wetlands. Hardwood or mixed hardwood/cedar swamps containing red maple (*Acer rubrum*), black gum (*Nyssa sylvatica*), sassafras (*Sassafras albidum*), sweetbay magnolia (*Magnolia virginiana*), and Atlantic white cedar (*Chamaecyparis thyoides*) are occupied by red-shouldered hawks. Often, such large forested tracts are surrounded by oak/pine forests or agricultural fields. Although red-shouldered hawks nest in large contiguous tracts of wet old growth forests in Cumberland County, they occupy younger wet woods, often on private property safeguarded from high levels of human activity, in Cape May County.

An-area sensitive species, the red-shouldered hawk typically nests away from residences, roads, and development. In the Pequannock Watershed, red-shouldered hawk nests were located an average of 1,013 m and a standard deviation of plus or minus 614 m ($3,324 \pm 2,014$ ft.) from the nearest building; and an average of 812 m and a standard deviation of plus or minus 634 m ($2,664 \pm 2,080$ ft) from the nearest road (Bosakowski et al. 1991). Red-shouldered hawks avoid small fragmented woodlots and forests that do not contain trees large enough for nesting.

Red-shouldered hawks require large contiguous wooded tracts of 100 to 250 hectares (250 to 620 acres) (Johnsgard 1990). Eastern populations occupy breeding home ranges of 109 to 339 hectares (270 to 838 acres) (Crocoll 1994). In the Pequannock Watershed, red-shouldered hawk breeding densities were estimated at one nest per 450 hectares (1,112 acres) with an average distance of 1.2 to 1.6 km (0.75 to 1.0 mi.) between nests in areas containing the highest breeding concentrations (Bosakowski et al. 1991). Home range sizes of males exceed those of females, during both the breeding and nonbreeding seasons. Individuals of either sex may expand their home ranges while rearing young or throughout the winter months.

During the nonbreeding season, red-shouldered hawks are less restrictive in their habitat use. They inhabit the traditional wetland forests occupied during the breeding season as well as uplands, fragmented woods, smaller forests, open areas, and edges.

Status and Conservation

The red-shouldered hawk was once considered a common resident of wet lowland forests in New Jersey. Only a century ago, bounties were placed on birds of prey, which were accused of poultry and game predation. This unfortunate practice, coupled with egg collecting and the placement of wild red-shouldered hawks in captivity, may have caused initial population declines. The clearing of forests and filling of wetlands exacerbated red-shouldered hawk declines, which were noted as early as the mid-1920s. Reduced numbers of red-shouldered hawks wintering in New Jersey were documented from the early 1950s to the 1970s, as development increased and forest contiguity and patch size decreased. As a result, the red-shouldered hawk, with an estimated 100 breeding pairs in the state, was listed as a threatened species in New Jersey in 1979. In 1982, the U.S. Fish and Wildlife Service listed the red-shouldered hawk as a Migratory Nongame Bird of Management Concern due to population declines and restricted habitat requirements. In addition, the red-shouldered hawk was included on the National Audubon Society's Blue List of Imperiled Species from 1972 to 1986, the final year of the list.

During the 1980s, habitat loss continued to pose an increasing threat, causing red-shouldered hawk populations to decline ever further. By the late 1980s and early 1990s, the state's breeding population was estimated at only 36 pairs, nearly one-third the population size at the time of original listing. As a result, the breeding population of the red-shouldered hawk was reclassified as endangered in 1991. The nonbreeding population remained listed as threatened. The New Jersey Natural Heritage Program considers the red-shouldered hawk to be "demonstrably secure globally," yet "imperiled in New Jersey because of rarity" (Office of Natural Lands Management 1992). Habitat loss and declines of red-shouldered hawks in the Northeast have resulted in the listing of this species as threatened in New York and of special concern in Connecticut.

Shortnose Sturgeon, *Acipenser brevirostrum*

Status:

State: Endangered

Federal: Endangered

Identification

The shortnose sturgeon has a short and bluntly rounded snout, wide mouth, barbels, numerous dorsal, lateral and ventral scutes (bony or horny plates), and a heterocercal tail (the upper lobe of the tail fin is larger and contains the upturned end of the spinal column). Typically, the body is yellowish brown to nearly black on the head, back and sides level to lateral plates, and whitish to yellowish below. Length at initial



Joshua D. Ingram, courtesy John C. O'Herron, II

maturity for this species occurs between 45-55 cm fork length, from the snout to the middle of the tail (18-22 in.) for males and females (Dadswell *et al.* 1984). Maximum known fork lengths are nearly 49 in. for a female and nearly 39 in. for a male. In New Jersey, 28 tagged males ranged between 21 in. to nearly 35 in. fork length.

Habitat

River mouths, tidal rivers, estuaries, and bays serve as prime habitat for the shortnose sturgeon. In addition, individuals occasionally enter the open ocean. A significant portion of New Jersey's shortnose sturgeon occurs in the upper tidal Delaware River (Dadswell *et al.* 1984).

Status and Conservation

The shortnose sturgeon has been federally listed as endangered since the inception of the Endangered Species Act in 1973, when it was also considered endangered in New Jersey. The Office of Natural Land's Management ranks the species as "rare in N.J." and "either very rare and local throughout its range or found locally in a restricted range or because of other factors making it vulnerable to extinction throughout its range."

This species is afforded protection under both federal and state Endangered Species acts, Clean Water acts, fishing regulations, and environmental review of proposed development projects.

Wood Turtle, *Clemmys insculpta*

Status:

State: Threatened

Federal: Not listed

Identification

As the taxonomic name insculpta indicates, the wood turtle is distinguished by the sculpted or grooved appearance of its carapace, or upper shell. Each season a new annulus, or ridge, is formed, giving each scute (a scale-like horny layer) a distinctive pyramid-shaped appearance. As the turtle ages, natural wear smooths the surface of the shell. While the scutes of the carapace are brown, the plastron, or underneath shell, consists of



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yellow scutes with brown or black blotches on each outer edge. The legs and throat are reddish-orange. The male wood turtle has a concave plastron while that of the female is flat or convex. The male also has a thicker tail than the female. Adult wood turtles measure 14 to 20 cm (5.5 to 8.0 in.) in length (Conant and Collins 1991).

Habitat

Unlike other turtle species that favor either land or water, the wood turtle resides in both aquatic and terrestrial environments. Aquatic habitats are required for mating, feeding, and hibernation, while terrestrial habitats are used for egg laying and foraging. Freshwater streams, brooks, creeks, or rivers that are relatively remote provide the habitat needed by these turtles. Consequently, wood turtles are often found within streams containing native brook trout (Salvelinus fontinalis). These tributaries are characteristically clean, free of litter and pollutants, and occur within undisturbed uplands such as fields, meadows, or forests. Open fields and thickets of alder (Alnus spp.), greenbrier (Smilax spp.), or multiflora rose (Rosa multiflora) are favored basking habitats. Lowland, mid-successional forests dominated by oaks (Quercus spp.), black birch (Betula lenta), and red maple (Acer rubrum) may also be used. Wood turtles may also be found on abandoned railroad beds or agricultural fields and pastures. Nevertheless, wood turtle habitats typically contain few roads and are often over one-half of a mile away from developed or populated areas (Zappalorti et al. 1984). Individuals from relict or declining populations are also sighted in areas of formally good habitat that have been fragmented by roads and development.

Status and Conservation

Historically, the wood turtle was a fairly common species within suitable habitat in New Jersey. By the 1970s, however, declines were noted as wood turtles were absent from many historic sites due to habitat loss and stream degradation. Consequently, the wood turtle was listed as a threatened species in New Jersey in 1979. The New Jersey Natural Heritage Program considers the wood turtle to be “demonstrably secure globally,” yet “rare in New Jersey” (Office of Natural Lands Management 1992).

Since the late 1970s, biologists have monitored and surveyed wood turtle sites in New Jersey, providing valuable data regarding the life history, reproduction, and habitat use of these turtles in the state. There is, however, a continuing need to examine the productivity and juvenile survival of wood turtles, which may be threatened by disturbance or predation.

In 1995, the wood turtle was proposed for inclusion on the federal endangered species list. Despite declines in several northeastern states, populations were considered stable enough throughout the species’ entire range to deny listing. However, the wood turtle was considered by the U.S. Fish and Wildlife Service as a species that, “although not necessarily now threatened with extinction may become so unless trade in them is strictly controlled” (U.S. Fish and Wildlife Service 1995). As a result, international trade of these turtles is strictly monitored and regulated through the CITES Act (Convention on International Trade in Endangered Species of Wild Flora and Fauna Act). The New Jersey Endangered Species Act prohibits the collection or possession of wood turtles.

Appendix P. Photographs of Rare and Priority Species
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

The following pictures of Rare and Priority Species in the Hopewell Valley are listed alphabetical by common name within their respective taxa.

Amphibian

Fowler's Toad
Bufo woodhousii fowleri
John White, FWS



Birds

Acadian Flycatcher
Empidonax virescens



Appendix P. Photographs of Rare and Priority Species
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

American Kestrel

Falco sparverius



Appendix P. Photographs of Rare and Priority Species
Hopewell Valley Community Stewardship Plan
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American Woodcock

Philohela minor



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Hopewell Valley Community Stewardship Plan
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Bald Eagle

Haliaeetus leucocephalus



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Baltimore Oriole

Icterus galbula



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Hopewell Valley Community Stewardship Plan
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Barred Owl

Strix varia



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Black-and-white Warbler

Miniotilta varia



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Black-throated Blue Warbler

Dendroica caerulescens



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Blue-winged Warbler

Vermivora pinus



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Bobolink

Dolichonyx oryziborus



Appendix P. Photographs of Rare and Priority Species
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Broad-winged hawk

Buteo platypterus



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Brown Thrasher

Toxostoma rufum



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Canada Warbler

Wilsonia canadensis



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Cerulean Warbler

Dendroica cerulea



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Chimney Swift

Chaetura pelagica



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Cliff Swallow

Hirundo pyrrhonota



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Cooper's Hawk
Accipiter cooperii



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Eastern Kingbird

Tyrannus Tyrannus



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Eastern Meadowlark

Sturnella magna



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Eastern Screech Owl

Otus asio



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Eastern Towhee

Pipilo erythrophthalmus



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Hopewell Valley Community Stewardship Plan
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Eastern Wood Pewee

Contopus virens



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Hopewell Valley Community Stewardship Plan
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Field Sparrow

Spizella pusilla



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Hopewell Valley Community Stewardship Plan
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Grasshopper Sparrow

Ammodramus savannarum



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Gray Catbird

Dumetella carolinensis



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Great Blue Heron
Ardea herodias



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Great Crested Flycatcher

Myiarchus crinitus



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Hopewell Valley Community Stewardship Plan
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Green Heron
Butorides striatus



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Hopewell Valley Community Stewardship Plan
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Hooded Warbler

Wilsonia citrine



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Indigo Bunting

Passerina cyanea



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Kentucky Warbler

Oporornis formosus



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Hopewell Valley Community Stewardship Plan
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Long-eared Owl

Asio otus



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Hopewell Valley Community Stewardship Plan
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Louisiana Waterthrush

Seiurus motacilla



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Hopewell Valley Community Stewardship Plan
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Northern Bobwhite

Colinus virginianus



Appendix P. Photographs of Rare and Priority Species
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Northern Flicker

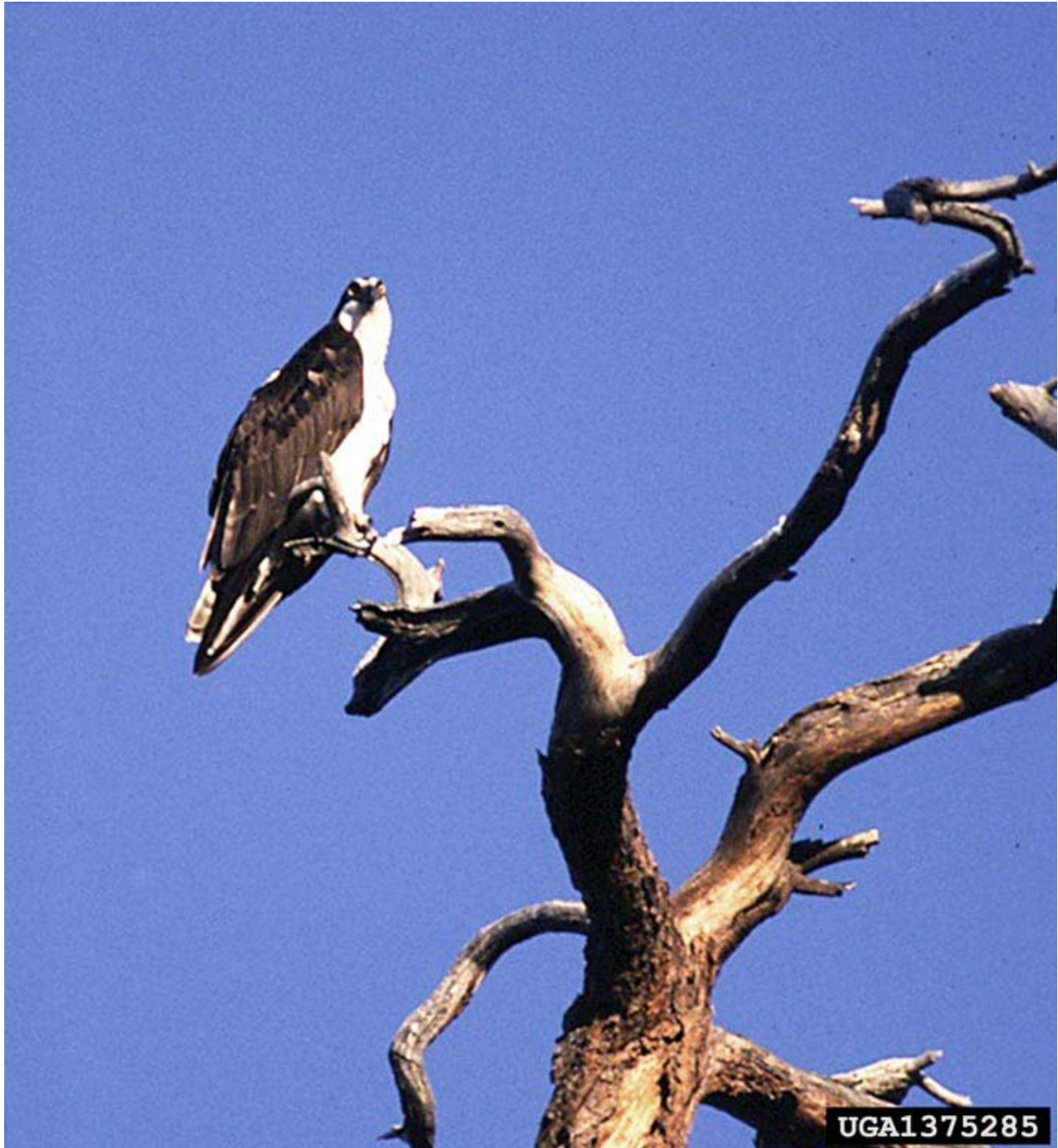
Colaptes auratus



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Osprey

Pandion haliaetus



Appendix P. Photographs of Rare and Priority Species
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Pine Warbler

Dendroica pinus



Appendix P. Photographs of Rare and Priority Species
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Prairie Warbler

Dendroica discolor



Appendix P. Photographs of Rare and Priority Species
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Red-headed Woodpecker

Melanerpes erythrocephalus



Appendix P. Photographs of Rare and Priority Species
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Red-shouldered Hawk

Buteo lineatus



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Ruffed Grouse

Bonasa umbellus



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Scarlet Tanager

Piranga olivacea



Appendix P. Photographs of Rare and Priority Species
Hopewell Valley Community Stewardship Plan
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Sharp-shinned Hawk

Accipiter striatus



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Hopewell Valley Community Stewardship Plan
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Veery

Catharus fuscescens



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Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Wood Duck

Aix sponsa



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Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Wood Thrush

Hylocichla mustelina



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Hopewell Valley Community Stewardship Plan
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Worm-eating Warbler

Helmitheros vermivorus



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Hopewell Valley Community Stewardship Plan
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Yellow-billed Cuckoo

Coccyzus americanus



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Yellow-breasted Chat

Icteria virens



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Hopewell Valley Community Stewardship Plan
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Yellow-throated Vireo

Vireo flavifrons



Fish

Bridle Shiner

Notropis bifrenatus



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Hopewell Valley Community Stewardship Plan
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Margined Madtom

Noturus insignis



Appendix P. Photographs of Rare and Priority Species
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Shortnose Sturgeon

Acipenser brevirostrum



Mammal

Bobcat

Lynx rufus



Mussels

Brook Floater

Alasmidonta varicosa

Allen Barlow Conserve Wildlife Foundation of NJ



Appendix P. Photographs of Rare and Priority Species
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Creeper

Strophitus undulatus

Karen Little, Illinois State Museum

Museum.state.il.us



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Tidewater Mucket

Leptodea ochracea

Allen Barlow



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Triangle Floater

Alasmidonta undulata

Allen Barlow, Conserve Wildlife Foundation of NJ



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Yellow Lampmussel

Lampsilis cariosa



Plants

American Ginseng

Panax quinquefolius



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Aunt Lucy

Ellisia nyctelea



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Buttonbush Dodder
Cuscuta cephalanthi



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Frank's Love Grass
Eragrostis frankii



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Frank's Sedge

Carex frankii



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Green violet

Hybanthus concolor



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Low Spearwort

Ranunculus pusillus var. *pusillus*



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Lowland Fragile Fern
Cystopteris protrusa



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Ohio Spiderwort

Tradescantia ohiensis



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Redbud

Cercis canadensis



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Slender Toothwort

Cardamine angustata



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Smooth Beardtongue

Penstemon laevigatus



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Spring Avens
Geum vernum

Robert H. Mohlenbrock. USDA SCS. 1989. *Midwest wetland flora: Field office illustrated guide to plant species*. Midwest National Technical Center, Lincoln.



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Squirrel-corn

Dicentra canadensis



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Twinleaf

Jeffersonia diphylla



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Wild Comfrey
Cynoglossum virginianum var. *virginianum*



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Willdenow's Sedge
Carex willdenowii var. *willdenowii*



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Winged Monkey-flower

Mimulus alatus



Reptiles

Eastern Box Turtle

Terrapene carolina carolina



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Hopewell Valley Community Stewardship Plan
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Spotted Turtle

Clemmys guttata



Appendix P. Photographs of Rare and Priority Species
Hopewell Valley Community Stewardship Plan
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Wood Turtle

Clemmys insculpta



Appendix Q. Overview of Invasive Species Control
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

This appendix provided a brief overview of invasive species control. Species-level control recommendations for all species detected during surveys on FoHVOS preserves are provided in Appendix R. Additional references for invasive species control can be found at the New Jersey Invasive Species Strike Team website (www.njisst.org).

The underlying philosophical context for invasive species management is the obligation to counteract negative human impacts on natural systems, which is often referred to as “stewardship”. The guiding principal of stewardship is fostering health of native plant communities that support our flora and fauna, which is indirectly accomplished through the management of invasive species. Management of invasive species is generally achieved through targeted control measures that minimizes, but does not eradicate, particular invasive species. Eradication within pre-defined boundaries should only be considered a valid goal when populations are relatively small and the threat of continued spread is significant (i.e., emerging invasive species, nascent populations of widespread invasive species). Eradication may also be considered at ‘showcase’ lands such as portions of the Ted Stiles Preserve at Baldpate Mountain. In all cases, invasive species management should aim to stimulate native plant communities to resist infestation and minimize the use of herbicides and any other intervention. However, human impacts on natural systems are diverse and perpetual, which will necessitate continuing stewardship of natural lands within the context of a human-dominated environment in order to support healthy native plant and animal communities.

There are two general approaches related to invasive species management. These involve a species-led approach or a habitat-led approach. A species-led approach should be employed when an invasive or potentially invasive species can either be eradicated or contained to reduce impacts across the entire Preserve or to minimize spread onto surrounding properties. This approach is warranted for invasive species that are emerging locally or regionally and for widespread invasive species with limited distribution at the Preserve.

A habitat-led approach should be employed when priority conservation areas are threatened by invasive species that are widespread throughout the region. This approach involves holistic strategies to promote native plant species assemblages that reduce overall invasive species cover through direct competition for light and soil nutrients. The ultimate goal is to foster native plant communities that resist future infestations.

Control Methods - The management of invasive species can be classified into five broad methods referred to as mechanical, chemical, biological, cultural and ecological control (Table 1). Each control method utilizes multiple techniques and control methods may be used alone or in combination depending upon the resource to be protected and practical constraints (see Table 2).

Mechanical control involves physical removal or cutting of invasive species. In the past, many groups performing invasive species control relied entirely on mechanical methods. Although mechanical methods can be the most appropriate choice in limited situations, many groups have abandoned this option because progress is exceedingly slow and methods are often ineffective.

Chemical control is the most commonly used method. It can be used in concert with mechanical control (e.g., cutting plants and applying herbicide to the stump) or alone (e.g., basal bark applications). However, herbicide use to control invasive species should be judicious to avoid impacts to non-target plants and animals. In all cases, herbicide use should involve the most benign formulations and application methods that effectively control the invasive species being treated (See www.njisst.org for summaries of herbicide characteristics including target species classes, persistence in the environment, toxicity to humans and wildlife and estimated material cost.

Appendix Q. Overview of Invasive Species Control
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

The application of pesticides is regulated by the NJ Department of Environmental Protection - Pesticide Control Program (PCP). Lead staff members involved with the application of herbicides must become 'commercial pesticide applicators', which requires attendance in a one day course on pesticide safety, passing PCP's core exam and at least one PCP category exam and completing 40 hours of on-the-job training for each category of pesticide application. There are two pesticide application categories that cover any potential applications in natural areas and stewards would be required to pass both category exams along with the core exam. These categories include Category 2: Forest Pest Control and Category 5: Aquatic Pest Control (required for wetland applications).

Staff may opt to become 'certified pesticide operators', which requires attendance in a one day training course on pesticide safety and receipt of 40 hours of on-the-job training for each category of pesticide application. Operators are not required to pass any examinations and must be directly supervised by a certified pesticide applicator. According to current regulations, direct supervision beyond the 40 hour on-the-job training consists of operators being within "very timely voice contact" and within "three travel hours by land". Staff members that are not certified applicators or operators may still apply herbicides if a certified applicator is always physically present and in the line-of-sight of the non-certified staff member.

The PCP also requires a permit for any wetland applications of pesticides. Currently, this involves a simple reporting form and an associated \$75 fee. In some cases, the PCP may require an additional permit from the NJ Department of Environmental Protection - Division of Land Use when control work is deemed to significantly alter the vegetative structure of a wetland (e.g., removal of significant invasive shrub cover to promote emergent wetland).

**Appendix Q. Overview of Invasive Species Control
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space**

Table 1. Description of Invasive Plant Control Methods

Control Method	Description	Pros	Cons	Notes
Biological	Introduction of a biocontrol agent (e.g., insect, pathogen) from the invasive species' native range	Dramatic reduction in abundance with minimal costs; minimal accessibility issues	Limited number of invasive species have agents	Requires extensive resources to provide effective host-specific agents; Numerous federal regulations provide significantly reduced risk of impacts to non-targets species
Mechanical	Physical removal of all or portions of an invasive species	No requirement for specialized training; can be performed by volunteers	Very labor intensive; may require specialized equipment; site accessibility issues, impractical for large infestations; re-sprouting or further invasive species dissemination may occur	Common techniques include mowing, cutting, pulling and girdling
Chemical	Application of herbicide to all or portions of a plant	Most effective and efficient method in most cases; trained staff can be assisted by volunteers	Labor intensive; site accessibility issues; requires specialized training/license and equipment; may require repeated applications for more difficult species	Common applications include foliar, cut stump, basal bark and injection; Mechanical and chemical controls may be combined for cut stump and hack-and-squirt methods
Cultural	Removal of invasive species through broad land use activities	Very cost effective	Does not apply well to forest habitats	Primarily applies to agricultural or horticultural systems, but may apply to the maintenance of early successional natural systems including grasslands; Techniques include prescribed fire and prescribed grazing
Ecological	Allowing natural ecological processes (e.g., competition for light and soil resources, predator-prey relationships, etc.) to reduce invasive species over time	Very cost effective; utilizes natural processes	May not occur in many systems due to persistent or continuing human impacts (e.g., overabundant deer, continual physical disturbance, habitat fragmentation, etc.)	Primarily applies to forest systems; As an example, very strong anecdotal evidence suggests that overabundant deer facilitate infestations by Japanese stiltgrass and other invasive species in forests by removing the native shrub layer

**Appendix Q. Overview of Invasive Species Control
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space**

Table 2. Specific Control Techniques by Invasive Plant Class

Invasive Species Class	Suggested Treatment Techniques	Notes
Large tree	Basal Bark, Girdling or Harvesting	May be combined with herbicide application to girdled area
Large shrub / small tree	Basal bark, Hack-and-Squirt, Cut Stump, Girdling	Mowing may be used as a pre-treatment to reduce plant size prior to chemical treatments
Small shrub / tree sapling	Basal Bark, Foliar Spray, Cut Stump, Pulling	Mowing may be used as a pre-treatment to reduce plant size prior to chemical treatments; Prescribed Fire or Prescribed Grazing may be used in grassland habitat
Large vines	Basal Bark, Cut Stump, Hack-and-Squirt	Many vine species have extensive root systems that require herbicide treatment
Forest herbs, woody seedlings and small vines	Foliar Spray, Pulling	Mulching may be utilized in garden beds or other human-modified areas

Biological control involves the purposeful introduction of an insect or pathogen (biocontrol agent) that attacks an invasive species. The biocontrol agent is usually native to the same point of origin as the invasive species. Biological control is the most effective treatment technology for the limited number of invasive species where biocontrol agents have been developed. Biological control has had notable success stories and notorious failures. For example, the non-native Indian mongoose was released to control non-native rats (European and Asian) in sugarcane plantations in the West Indies. The mongoose was only partially effective (only controlled the Asiatic rat), but proceeded to consume native birds, amphibians and reptiles and ten species were driven to extinction. They also preyed upon domesticated poultry. Finally, the mongoose became a vector of infectious diseases such as rabies. The total economic cost of the biocontrol agent approaches \$50 million dollars per year (Pimentel et al. 2005). Notable success stories include the control of alligator weed (New Zealand, Australia, US), mist flower (Hawaii), nodding thistle (New Zealand), prickly pear (Australia), ragwort (New Zealand) and St. John’s wort (New Zealand, Canada). Modern biological control involves thorough testing for ‘host specificity’ (making sure that the newly released biocontrol agent doesn’t harm anything but the invasive species being targeted). This does not guarantee unintended consequences, but provides a reasonable reduction of risk that is assumed to be lower than the risk of damage known to occur through the unchecked spread of the targeted invasive species.

In the Hopewell Valley, biological control agents have been released for Purple Loosestrife and Mile-a-Minute – both are showing promise in reducing the abundance of these invasive species. Researchers are developing a biocontrol agent for garlic mustard, which is one of New Jersey’s worst invasive species (Van Driesche et al. 2002). Research to determine natural enemies of garlic mustard began in 1998. Five weevil species and one flea beetle species were selected as potential biocontrol agents based upon field observations of host specificity and extent of damage created on garlic mustard in its native range. Researchers are currently in the process of performing laboratory tests of host specificity that includes related native species and agricultural crops in the mustard family (Brassicaceae). In addition, studies will be conducted to determine which biocontrol agents or combination of agents may lead to the greatest impacts on garlic mustard. Some of this research will be conducted during field trials in garlic mustard’s native range, while others will occur under laboratory conditions. All testing will be done using widely standardized techniques and following guidelines established in the literature and by the U.S. Department of Agriculture.

Appendix Q. Overview of Invasive Species Control
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Cultural control is similar to the concept of agricultural best management practices but can be applied to early successional natural systems (e.g., grasslands, meadows). There are numerous practices that could have the effect of reducing invasive species as well as native woody species. These practices could involve planting native warm season grasses, prescribed fire, prescribed grazing and elimination of hedgerows to promote grassland or meadow plant communities that sustain themselves with minimal use of mowing and herbicide application. Prescribed fire can be an effective technique to maintain grasslands and the use of fire for ecological purposes has received attention across the world (Myers 2006 and references therein). The primary benefit of prescribed fire is its combination of cost efficiency and efficacy, especially where native warm season grasses have been established.

Prescribed grazing is defined as the application of a specific kind of livestock at a determined season, duration and intensity to accomplish defined vegetation or landscape goals (Launchbaugh 2006). The benefits of using livestock to control invasive species have been demonstrated for New Jersey's bog turtles (Tesauro 2001). This work primarily involved the use of cows to consume and destroy root mats of invasive species such as Phragmites and purple loosestrife. Another potential application may be the use of goats or other livestock to consume dense thickets of Multiflora Rose or Autumn Olive. There are a number of practical considerations to consider (e.g., cost associated with fencing materials), but targeted grazing may be the best option for land stewards under certain conditions.

Ecological control of invasive species refers to the reduction of invasive species through competitive interactions with native species. Strong anecdotal evidence of other sites in New Jersey (e.g., portions of Cushtunk Mountain, Stephens State Park, Wawayanda State Park and Ted Stiles Preserve at Baldpate Mountain) indicate that a healthy native forest can resist or reverse infestations even when invasive species are located nearby or within the forest (invasive species may be restricted to highly disturbed trail edges without proliferating in the forest interior).

Although the removal of invasive species by any method has the implicit goal of fostering native species that will resist future infestations, there are a variety of factors that limit native species ability to exert ecological control. The single largest factor that can be remedied is overabundance of white-tailed deer.

Appendix R. Species-level Invasive Plant Control Recommendations
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

flowering period
period of flowering and fruiting
fruiting period

Scientific Name	Common Name	Month												Treatment Recommendation Notes ^{1,2,3,4,5}	
		1	2	3	4	5	6	7	8	9	10	11	12		
<i>Acer palmatum</i>	Japanese Maple														Options: BB,FS,GI, HS,CS,PU; Glyphosate recommended for all methods except BB, where triclopyr is recommended
<i>Acer platanoides</i>	Norway Maple														Options: BB,FS,GI, HS,CS,PU; Glyphosate recommended for all methods except BB, where triclopyr is recommended
<i>Ailanthus altissima</i>	Tree-of-Heaven														Options: BB,FS,HS; Species has great potential to re-sprout; Glyphosate recommended for foliar applications; Triclopyr recommended for non-foliar applications
<i>Alliaria petiolata</i>	Garlic Mustard														Options: FS,MU,PU; FS applications in late-winter/early spring avoid harming most native herbs; Long-lived seed bank requires 3-5 years of treatments; Glyphosate recommended
<i>Artemisia vulgaris</i>	Common Mugwort														Options: FS; Difficult to control (i.e., more than one spraying may be required) - FS with triclopyr recommended
<i>Arthraxon hispidus</i>	Small Cargrass														Options: FS; Long-lived seed bank requires 3-5 years of treatments; Species has extremely dense growth of individuals - pulling is impractical; Glyphosate recommended
<i>Berberis thunbergii</i>	Japanese Barberry														Options: BB, FS,CS,MO,PU; Glyphosate recommended for all methods except BB, where triclopyr is recommended
<i>Cardamine impatiens</i>	Narrow-leaved Bittercress														Options: FS, PU; Species is biennial--treatment recommended early in season before seed set. Glyphosate recommended.
<i>Catalpa bignonioides</i>	Northern Catalpa														Options: BB,FS,HS; Species has great potential to re-sprout; Glyphosate recommended for foliar applications; Triclopyr recommended for non-foliar applications
<i>Celastrus orbiculatus</i>	Asiatic Bittersweet														Options: BB,FS,CS; Species has an extensive root system and pulling is ineffective; Glyphosate recommended for foliar applications; Triclopyr recommended for non-foliar applications
<i>Centuarea sp.</i>	Knapweed sp.														Options: FS, PU; Long-lived seed bank requires multiple years of treatments
<i>Cirsium arvense</i>	Canada Thistle														Options: FS, PU; Long-lived seed bank requires multiple years of treatments
<i>Dipsacus sylvestris</i>	Teasel														Options: FS,PU; Long-lived seed bank requires multiple years of treatments; Glyphosate recommended
<i>Eleagnus umbellata</i>	Autumn Olive														Options: BB, FS,CS,MO,PU; Glyphosate recommended for foliar applications; Triclopyr recommended for non-foliar applications
<i>Euonymus alata</i>	Winged Burning Bush														Options: BB,FS,CS,MO,PU; Glyphosate recommended for all methods except BB, where triclopyr is recommended
<i>Iris pseudoacris</i>	Yellow Iris														Options: FS,PU; PU is only effective for young individuals that have not yet become deeply rooted; Glyphosate recommended; in wetlands, seek aquatic application permit and use wetlands appropriate herbicides
<i>Lespedeza cuneata</i>	Chinese Bushclover														Options: FS,MO; Species has an extensive root system and pulling is ineffective; Triclopyr recommended for foliar applications.
<i>Ligustrum obtusifolium</i>	Border Privet														Options: BB, FS,CS,MO,PU; Glyphosate recommended for all methods except BB, where triclopyr is recommended
<i>Lonicera japonica</i>	Japanese Honeysuckle														Options: FS,MO,PU; Foliar application is the only practical solution - hand-pulling very difficult as species roots at multiple leaf nodes; Mowing may be performed in July and September to weaken plants prior to spraying; Spraying may occur in non-growing season because species is semi-evergreen; Glyphosate recommended
<i>Lonicera maackii</i>	Amur Honeysuckle														Options: BB, FS,CS,MO,PU; Glyphosate recommended for all methods except BB, where triclopyr is recommended
<i>Lonicera morrowii</i>	Morrow's Honeysuckle														Options: BB, FS,CS,MO,PU; Glyphosate recommended for all methods except BB, where triclopyr is recommended
<i>Lysimachia nummularia</i>	Moneywort														Options FS; Glyphosate recommended
<i>Lythrum salicaria</i>	Purple Loosestrife														Options: FS,PU; PU is only effective for young individuals that have not yet become deeply rooted; Glyphosate recommended. Biological control agent is very effective - check for beetle before considering treatments
<i>Malus toringo</i>	Toringo Crabapple														Options: BB,FS,HS; Glyphosate recommended for foliar applications; Triclopyr recommended for non-foliar applications

Appendix R. Species-level Invasive Plant Control Recommendations
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

flowering period
period of flowering and fruiting
fruiting period

Scientific Name	Common Name	Month												Treatment Recommendation Notes ^{1,2,3,4,5}	
		1	2	3	4	5	6	7	8	9	10	11	12		
<i>Microstegium vimineum</i>	Japanese Stiltgrass														Options: FS; Long-lived seed bank requires 3-5 years of treatments; Species has extremely dense growth of individuals - pulling is impractical; Glyphosate recommended
N/A	Non-native, cool season grass														Options: FS; Glyphosate recommended
<i>Phalaris arundinacea</i>	Reed Canary Grass														Options: FS,PF,PG,MO; Very difficult to control - may require multiple cutting and herbicide treatments; Glyphosate recommended
<i>Phragmites australis</i>	Common Reed														Options: FS,PF,PG,MO; Very difficult to control - may require multiple cutting and herbicide treatments; PF,PG and MO are helpful to remove old stems or reduce height of living stems prior to FS; Glyphosate recommended
<i>Polygonum cuspidatum</i>	Japanese Knotweed														Options: FS,MO; Very difficult to control - may require multiple cutting and herbicide treatments; Glyphosate recommended
<i>Polygonum perfoliatum</i>	Mile-a-Minute														Options: FS, PU; Long-lived seed bank requires 3-5 years of treatments; Pulling is recommended for very small infestations only; Glyphosate recommended for foliar applications
<i>Pyrus calleryana</i>	Callery Pear														Options: BB,FS,HS; Glyphosate recommended for foliar applications; Triclopyr recommended for non-foliar applications
<i>Ranunculus ficaria</i>	Lesser Celandine														Options: FS,MU; Species has extremely dense growth of individuals and underground reproductive tissues - pulling is impractical; Glyphosate recommended
<i>Robinia pseudoacacia</i>	Black Locust														Options: BB,FS,HS; Species has great potential to re-sprout; Glyphosate recommended for foliar applications; Triclopyr recommended for non-foliar applications
<i>Rosa multiflora</i>	Multiflora Rose														Options: BB, FS,PF,PG,CS,MO,PU; Glyphosate recommended for all methods except BB, where triclopyr is recommended. Re-sprouting stems are highly susceptible to RRD and may not require treatment.
<i>Rubus phoenicolasius</i>	Wineberry														Options: BB,FS,MO,PU; CS is impractical due to thinness of stems; Glyphosate recommended for all methods except BB, where triclopyr is recommended
<i>Securigera varia</i>	Crown vetch														Options: FS, PU; Long-lived seed bank requires multiple years of treatments
<i>Viburnum dilatatum</i>	Linden Viburnum														Options: BB,FS,HS; Species has great potential to re-sprout; Glyphosate recommended for foliar applications; Triclopyr recommended for non-foliar applications
<i>Viburnum sieboldii</i>	Siebold's Viburnum														Options: BB,FS,HS; Species has great potential to re-sprout; Glyphosate recommended for foliar applications; Triclopyr recommended for non-foliar applications
<i>Wisteria floribunda</i>	Japanese Wisteria														Options: BB,FS,HS; Species has great potential to re-sprout; Glyphosate recommended for foliar applications; Triclopyr recommended for non-foliar applications

¹Phenology information collected from Hough (1983), MOBOT (2007),PFAF (2007) or Brand (2007) and is intended to guide timing of control efforts.

²Treatment recommendations from Zerbe et al. (2003), multiple websites, personal experiences of author and fellow colleagues.

³Optimal treatment methods vary by size of individual plants and extent of infestation in selected treatment areas.

⁴For bark applications, triclopyr should be used in its ester form (e.g., Garlon 4).

⁵See below for a sample of invasive species control and species information websites:

- Plants for a Future <http://www.pfaf.org/index.html>
- Flora of North America http://www.efloras.org/flora_page.aspx?flora_id=1
- USDA PLANTS <http://plants.usda.gov/index.html>
- Invasive Plant Atlas of New England <http://www.lib.uconn.edu/webapps/ipane/search.cfm>
- Plant Conservation Alliance - Alien Plant Working Group <http://www.nps.gov/plants/alien/fact.htm>
- Plant Invaders of Mid-Atlantic Natural Areas <http://www.invasive.org/weeds.cfm>
- The Nature Conservancy's Global Invasive Species Initiative <http://tncweeds.ucdavis.edu/control.html>
- National Invasive Species Information Center <http://www.invasivespeciesinfo.gov/plants/control.shtml>

Appendix S1. Forest Health Monitoring Protocols
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Method Name: Sentinel Seedlings

Concept: An experimental approach to measure the effectiveness of deer management programs and investigate potential for natural regeneration of trees and shrubs. The method involves planting red oak seedlings within upland forest habitat and measuring the percentage of browsed individuals after six months. [Note: Red oak is ubiquitous in upland forests of Northern New Jersey. Other habitats (e.g. forested wetlands, Pine Barrens region) would require an alternate species selection.]

Rationale: Experimental planting is a simple technique to determine current deer browse intensity that reduces 'ecological noise' involved with measuring browse impacts on existing woody plants. Factors that are controlled and/or accounted for within the methodology include: 1) difficulty in locating a statistically valid quantity of naturally occurring woody seedlings (e.g. little or no existing natural woody vegetation below the browse line), 2) lack of natural regeneration following initiation of deer management programs caused by other factors (e.g. recovery lag time caused by various factors such as temporally low seed production, drought conditions that kill seedlings, or continuing impacts of low deer densities when little browse is available), 3) previous browse damage that complicates interpretation of browse levels in the time period of interest (e.g. ambiguity in separating new browse from old browse), and 4) clumped or sparse distribution of natural seedlings (e.g. adequate sampling of an entire area of interest is not possible).

Methods:

Materials –

1. Red Oak seedlings (minimum of 12" tall) - 10 per plot x ____ plots = ____ seedlings. [Note: Bare root seedlings are available Croshaw Nursery in Columbus, New Jersey. They have 18"+ seedlings for \$0.98/seedling (25-199 seedlings), \$0.94/seedling (300-499 seedlings), and \$0.69/seedling (>500 seedlings).] Pin Oak seedlings should be used in wetland forests.
2. Flagging Tape (enough to mark mature trees surrounding each plot and to mark each seedling)
3. Pin Flags (enough to mark the four corners of each plot)
4. Seedling planting spade / tree bar (or other planting aide)
5. Compass (to determine north-south orientation of each plot)
6. GPS Unit (to determine the location of each plot)
7. Data sheets (see attached)

Procedures –

Timing - Seedlings should be planted while dormant in December. The recording of browse should be performed six months after planting (June). [Note: The timing reduces the possibility of seedling death (and therefore lack of palatability) due to growing season events such as drought, insect herbivory, pathogen attack, etc.

Sample Size - The total number of plots required by dividing the entire area of interest by 25 (i.e. 1 plot for each 25 acres). This number can be reduced if sampling of large areas is required. Conversely, if the area of interest is small, than plot density can be increased. [Note: sample sizes of less than 10 plots begin to lose statistical validity].

Plot Placement Rules - To remove edge effects when testing forest areas, plots should be at least 25m from non-forest habitat (structures/disturbances including homes, roads, open fields, etc.). Unless specifically part of the experimental design, plots should not be located in large canopy gaps (i.e. canopy

Appendix S1. Forest Health Monitoring Protocols
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

coverage less than 30% over an area greater than ¼ acre). Other areas that should be avoided include rock outcrops/areas too rocky to plant seedlings, early successional forest types (e.g. stem exclusion/pole phase, successional/dense red cedar woodlands), and other areas where seedlings are usually not found. If a pre-selected plot location (see below) does not meet the above criteria, then a new point should be randomly selected.

Plot Location Selection - Each plot location should be chosen *randomly* on the established statewide 100m x 100m grid. Random selection is achieved by systematic assignment of identification numbers to each grid point within the area of interest. Generally, one would ‘clip’ the statewide grid to the shape of the area of interest before assigning grid identification numbers (this is a simple operation within ArcMap). Plot selection is achieved by using a random numbers table or similar resources (see www.random.org) to select the number of plots desired from the full number of possible plots within the area of interest. [Note: If desired, sample plots can be ‘stratified’ by sub-areas within the entire area of interest. This would be beneficial wherever there is a special interest in assuring measurements at various locations (e.g. two distinct habitat types, areas near and distant to parking access, etc.).] [Note: The spacing of plot locations on the grid maintains independence of plots (i.e. two plots cannot be simultaneously considered during a single browse event). The 100m spacing also aides sample placement across the landscape and avoids potential placement bias (e.g. plot locations in known areas of high or low deer activity).]

Seedling Plot Design - Plant 10 seedlings in two parallel rows of 5 with 1m between adjacent seedlings. The long edge of plots should face North-South. Flagging tape should be placed in several trees surrounding the plot and pin flags should be placed in the four plot corners to assist with relocation. Flagging tape should be tied to the base of each seedling to assist with their relocation.

Browse Data Collection - Immediately upon planting seedlings within a plot, the number of intact end bud clusters should be counted on each seedling (end buds in oak species generally consist of a cluster of three or more buds at the terminus of a stem). [Note: Branches will break in the process of transporting and planting seedlings. An initial end bud cluster count allows clear interpretation of browse at the end of the experiment. Seedlings without end bud clusters should not be used in the experiment.] Final end bud cluster counts are performed after seven months of exposure to deer browse. [Note: Although browse in forest habitat is usually associated with deer, a variety of other animals may browse woody seedlings. However, removal by deer is associated with a noticeably jagged/torn stem. Removal by rabbits and rodents are associated with a clean, angled stem cut (approximately 45°).]

Data Analysis - The proportion of seedlings receiving browse can be analyzed using Goodness-of-Fit statistics. Results can be compared against a pre-determined benchmark or pre- and post-implementation of a deer management program. If this methodology is used in multiple locations, then results can be compared with each other to statistically determine differences in deer browse between locations based upon a variety of potential factors (e.g. habitat types, deer management strategies, etc.). In addition, a simple review of the spatial pattern of browse should be performed. This can be accomplished by visual assessment of an aerial map depicting plot locations that are labeled with their respective percentages of seedlings browsed.

Appendix S1. Forest Health Monitoring Protocols
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Method Name: Forest Secchi

Concept: A measurement of existing shrub and sapling cover in forest habitat. The method involves measuring the amount of a white board that is obstructed at 10m from a pre-determined point.

Rationale: This method is a very rapid assessment of existing forest conditions and acts as an index of forest health. It is meant to complement the Sentinel Seedling study above that provides ‘instantaneous measurements’. Interpretation of this method is unambiguous and can be used to determine the success of a mature deer management program (but baseline data should be taken prior to initiation of a deer management program). Although this method is slower to show the benefits of a deer management program (see Sentinel Seedling rationale above), it directly measures a natural response of the forest to reduced deer densities.

Methods:

Materials –

1. One meter square white foam board (should be able to be folded in half to facilitate movements through forest habitat)
2. Black tape (placed every 0.25m to create an evenly-spaced 16-cell grid on the white board)
3. Densiometer
4. ‘Guide Post’ – 1.4m tall (see text below)
5. Plot locations are the same as used above (materials included flagging tape, compass, GPS unit, measuring tape)
6. Data Sheets (see attached)

Procedures –

Forest Secchi measurements should be conducted at the same locations used for the Sentinel Seedling experiment. Measurements should be repeated every 2-4 years after collecting baseline data.

Timing – Sampling of existing woody vegetation can occur at any time during the growing season. To minimize data collection time when using the Sentinel Seedling experiment, measurements should be performed in mid-May through mid-June. [Note: In past experience, the most time consuming part of both techniques is travel time between plots. Data collection time for both techniques is minimal.]

Sample Size – See Sentinel Seedling above.

Plot Placement Rules – See Sentinel Seedling above.

Plot Location Selection – See Sentinel Seedling above. The same plots used in the Sentinel Seedling study should be used for the Forest Secchi measurements.

Data Collection – A 1-m² white foam board should be evenly divided into a 16-cell grid using black tape. The number of obstructed cells (partially or completely) should be recorded at a distance of 10m from the center point of the plot. Cover of native and non-native species should be recorded separately. For each point, four readings should be taken at the following compass bearings: NE, SE, SW, NW (readings should not be taken directly N-S so that any impacts on vegetation coincident with seedling planting does not alter measurements). The white board should be held 40cm (1.31 feet) above the ground (top of board

Appendix S1. Forest Health Monitoring Protocols
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

will then be 1.4m or 4.59 feet above ground). [Note: In past experience, deer begin to ‘notice’ woody vegetation greater than six inches tall. Therefore, sites with a history of high deer densities tend to have very low cover of woody plants taller than the lowest height of the board (i.e. 40cm). The maximum typical height of deer browse damage does not exceed 1.4m.] [Note: The construction of a 1.4m post with a small projection at 0.4m (enough to hold the board at the desired height) would increase the speed and accuracy of measurements. Further, a homemade or modified tripod could allow an individual to take unassisted measurements.] Ideally, a densiometer should be used to measure forest canopy coverage at each sampling point because shrub and tree sapling density can be impacted by shade (i.e. growth rates are lower under dense canopy coverage). If resources are limiting, canopy coverage should be recorded using a visual estimate and placed into broad categories for rapid data collection (i.e. 0-25, 25-50, 50-75, 75-100). [Note: Additional data collection, if resources permit, could include a list of woody species within plots, canopy species composition, herbaceous cover and species list, etc. Though not essential to data interpretation, this additional data could provide valuable information toward understanding the complexities of forest recovery upon implementation of an effective deer management program.]

Data Analysis – See Sentinel Seedling above. Additional analyses could include comparisons of native and non-native cover related to current browse measured via the Sentinel Seedlings. Unfortunately, I have not used this exact method in the past and do not have guidance toward setting thresholds. Existing literature should be reviewed, but I would estimate that a threshold of approximately 70% mean woody cover.

Appendix S3. Ecological Community Monitoring Methods
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Response Factor Number	Habitat Type	Response Factor Name	Measurement Technique	Method Notes	Potential Value Ranges (Measured)	Potential Value Ranges (Converted)	Excel Conversion Formulas
1	Grassland	Native Grass Species	Presence / Absence	At 10 meters in each cardinal compass direction from the selected grid point, the presence or absence of the response factor is recorded within a 0.5-m ² plot (PVC-constructed plots are most convenient).	0 or 1	0-100% (% of all plots with response factor present)	=(sum(cell ranges)/total plot number)*100
2	Grassland	Non-Native Grass Species	Presence / Absence	Same as above	Same as above	Same as above	Same as above
3	Grassland	Native Herb Species	Presence / Absence	Same as above	Same as above	Same as above	Same as above
4	Grassland	Non-Native Herb Species	Presence / Absence	Same as above	Same as above	Same as above	Same as above
5	Grassland	Native Woody Seedlings Species	Presence / Absence	Same as above	Same as above	Same as above	Same as above
6	Grassland	Non-Native Woody Seedlings Species	Presence / Absence	Same as above	Same as above	Same as above	Same as above
7	Forest	Total Woody Cover Within Browse Zone	Assisted Visual Estimate	Record number of <i>covered grid cells</i> on forest secchi board. Record separate values for total, native and non-native woody cover. Plot location is identical to those used for presence/absence measurements. Observer stands at selected grid point and assistant holds forest secchi board 10 meters away. Data should be collected at each of the four cardinal compass directions (i.e., North, South, East and West).	0 to 16	0-100% (% of grids)	=(sum(cell ranges)/16)/number of plots*100
8	Forest	Native Woody Cover within Browse Zone	Assisted Visual Estimate	Same as above	Same as above	Same as above	Same as above

Appendix S3. Ecological Community Monitoring Methods
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Response Factor Number	Habitat Type	Response Factor Name	Measurement Technique	Method Notes	Potential Value Ranges (Measured)	Potential Value Ranges (Converted)	Excel Conversion Formulas
9	Forest	Non-Native Woody Cover Within Browse Zone	Assisted Visual Estimate	Same as above	Same as above	Same as above	Same as above
10	Forest	Total Canopy Cover	Assisted Visual Estimate	Measures total canopy coverage using a densiometer (four measurements taken while standing at the selected grid point - face North, South, East, West). Exact method varies by instrument, but generally involves counting the number of etched squares <i>where canopy is absent</i> in a concave/convex mirror and converting to a percentage of canopy cover. Specific instructions are provided with each densiometer.	0 to 96 "dots"		=100-((sum(cell ranges)*1.04)/number of plots): Formula is specific to concave spherical densiometer owned by Van Clef.
11	Forest	Native Tree Individuals	Census	Measures number of individual native trees (with DBH > 4.5 inches -- measure DBH at 4.5 feet above the ground) within a 10 square meter area (corners of defined area defined by locations of presence/absence plots - see below). Only count trees with their main trunks rooted in the sample area.	whole number	total number counted	=(sum(cell ranges)/total plot number)
12	Forest	Non-Native Tree Individuals	Census	Same as above	Same as above	Same as above	Same as above
13	Forest	Native Grass Species	Presence / Absence	At 10 meters in each cardinal compass direction from the selected grid point, the presence or absence of the response factor is recorded within a 0.5-m ² plot (PVC-constructed plots are most convenient). Plots should be placed immediately <u>behind</u> the forest secchi board.	0 or 1	0-100% (% of all plots with response factor present)	=(sum(cell ranges)/total plot number)*100

Appendix S3. Ecological Community Monitoring Methods
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Response Factor Number	Habitat Type	Response Factor Name	Measurement Technique	Method Notes	Potential Value Ranges (Measured)	Potential Value Ranges (Converted)	Excel Conversion Formulas
14	Forest	Non-Native Grass Species	Presence / Absence	Same as above	Same as above	Same as above	Same as above
15	Forest	Native Herb Species	Presence / Absence	Same as above	Same as above	Same as above	Same as above
16	Forest	Non-Native Herb Species	Presence / Absence	Same as above	Same as above	Same as above	Same as above
17	Forest	Native Woody Seedlings Species	Presence / Absence	Same as above	Same as above	Same as above	Same as above
18	Forest	Non-Native Woody Seedlings Species	Presence / Absence	Same as above	Same as above	Same as above	Same as above
19	Meadow - Wetland	Native Grass Species	Presence / Absence	At 10 meters in each cardinal compass direction from the selected grid point, the presence or absence of the response factor is recorded within a 0.5-m ² plot (PVC-constructed plots are most convenient).	0 or 1	0-100% (% of all plots with response factor present)	=(sum(cell ranges)/total plot number)*100
20	Meadow - Wetland	Non-Native Grass Species	Presence / Absence	Same as above	Same as above	Same as above	Same as above
21	Meadow - Wetland	Native Herb Species	Presence / Absence	Same as above	Same as above	Same as above	Same as above
22	Meadow - Wetland	Non-Native Herb Species	Presence / Absence	Same as above	Same as above	Same as above	Same as above
23	Meadow - Wetland	Native Woody Seedlings Species	Presence / Absence	Same as above	Same as above	Same as above	Same as above
24	Meadow - Wetland	Non-Native Woody Seedlings Species	Presence / Absence	Same as above	Same as above	Same as above	Same as above

Appendix S3. Ecological Community Monitoring Methods
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Response Factor Number	Habitat Type	Response Factor Name	Measurement Technique	Method Notes	Potential Value Ranges (Measured)	Potential Value Ranges (Converted)	Excel Conversion Formulas
25	Meadow - Upland	Native Grass Species	Presence / Absence	At 10 meters in each cardinal compass direction from the selected grid point, the presence or absence of the response factor is recorded within a 0.5-m ² plot (PVC-constructed plots are most convenient).	0 or 1	0-100% (% of all plots with response factor present)	=(sum(cell ranges)/total plot number)*100
26	Meadow - Upland	Non-Native Grass Species	Presence / Absence	Same as above	Same as above	Same as above	Same as above
27	Meadow - Upland	Native Herb Species	Presence / Absence	Same as above	Same as above	Same as above	Same as above
28	Meadow - Upland	Non-Native Herb Species	Presence / Absence	Same as above	Same as above	Same as above	Same as above
29	Meadow - Upland	Native Woody Seedlings Species	Presence / Absence	Same as above	Same as above	Same as above	Same as above
30	Meadow - Upland	Non-Native Woody Seedlings Species	Presence / Absence	Same as above	Same as above	Same as above	Same as above

Appendix S3. Ecological Community Monitoring - Sample Data Sheet
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Response Factor Number	Response Factor Name	Data Collection Date	Sample Grid ID	Recorded Values
7a	Total Woody Cover Within Browse Zone (Forest Secchi) - North Reading			
7b	Total Woody Cover Within Browse Zone (Forest Secchi) - East Reading			
7c	Total Woody Cover Within Browse Zone (Forest Secchi) - South Reading			
7d	Total Woody Cover Within Browse Zone (Forest Secchi) - West Reading			
8a	Native Woody Cover Within Browse Zone (Forest Secchi) - North Reading			
8b	Native Woody Cover Within Browse Zone (Forest Secchi) - East Reading			
8c	Native Woody Cover Within Browse Zone (Forest Secchi) - South Reading			
8d	Native Woody Cover Within Browse Zone (Forest Secchi) - West Reading			
9a	Non-Native Woody Cover Within Browse Zone (Forest Secchi) - North Reading			
9b	Non-Native Woody Cover Within Browse Zone (Forest Secchi) - East Reading			
9c	Non-Native Woody Cover Within Browse Zone (Forest Secchi) - South Reading			
9d	Non-Native Woody Cover Within Browse Zone (Forest Secchi) - West Reading			
10a	Total Canopy Cover (Densiometer) - North Reading			
10b	Total Canopy Cover (Densiometer) - East Reading			
10c	Total Canopy Cover (Densiometer) - South Reading			
10d	Total Canopy Cover (Densiometer) - West Reading			
11	Number of Native Tree Individuals within 10 meter radius			
12	Number of Non-Native Tree Individuals within 10 meter radius			
13a	Native Grass Species (present / absent) - North Reading			
13b	Native Grass Species (present / absent) - East Reading			
13c	Native Grass Species (present / absent) - South Reading			
13d	Native Grass Species (present / absent) - West Reading			
14a	Non-Native Grass Species (present / absent) - North Reading			
14b	Non-Native Grass Species (present / absent) - East Reading			
14c	Non-Native Grass Species (present / absent) - South Reading			
14d	Non-Native Grass Species (present / absent) - West Reading			
15a	Native Herb Species (present / absent) - North Reading			
15b	Native Herb Species (present / absent) - East Reading			
15c	Native Herb Species (present / absent) - South Reading			
15d	Native Herb Species (present / absent) - West Reading			
16a	Non-Native Herb Species (present / absent) - North Reading			
16b	Non-Native Herb Species (present / absent) - East Reading			
16c	Non-Native Herb Species (present / absent) - South Reading			
16d	Non-Native Herb Species (present / absent) - West Reading			
17a	Native Woody Seedlings (present / absent) - North Reading			
17b	Native Woody Seedlings (present / absent) - East Reading			
17c	Native Woody Seedlings (present / absent) - South Reading			
17d	Native Woody Seedlings (present / absent) - West Reading			
18a	Non-Native Woody Seedlings (present / absent) - North Reading			
18b	Non-Native Woody Seedlings (present / absent) - East Reading			
18c	Non-Native Woody Seedlings (present / absent) - South Reading			
18d	Non-Native Woody Seedlings (present / absent) - West Reading			

Appendix T. FoHVOS Preserves - Habitat Goals for Early Successional Lands
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Sequential Field ID	Preserve	Perimeter (feet)	Acres	Current Programs	Agricultural Uses	Other Programmatic Uses	Current Habitat Type	Habitat Goal	Native Species Composition	Invasive Species Management Concerns	Stewardship Recommendation	Stewardship Priority	Landscape-scale Feature Overlap	Notes
1	Arena	2131	6.4	None	None	None	Meadow	Meadow	Herbs: 76-100%; Woodies: 1-10%; Species: Rushes & Sedges, Goldenrod, Dogbane, Common Milkweed, Allegheny Blackberry	Herbs: 76-100%; Woodies: 1-10%; Species: Hay Grasses, Japanese Stiltgrass, Reed Canary Grass, Small Carpgrass, Canada Thistle, Autumn Olive, Multifloral Rose, Siebold's Crabapple, Callery Pear	Regular mowing/burning	Moderate	RPWHP Crossroads Forest Focal Area	Edge of offshoot of Crossroads Forest Focal Area; Unclear trajectory, but no replanting/restoration required. Diverse seed source present on site.
2	Arena	2150	4.8	None	None	None	Shrubland	Meadow	Herbs: 11-25%; Woodies: 11-25%; Species: Rushes & Sedges, Goldenrod, New York Ironweed, Swamp Milkweed, Dogbane, Common Milkweed, Swamp Rose Mallow, Allegheny Blackberry, Red Maple	Herbs: 11-25%; Woodies: 76-100%; Species: Multifloral Rose, Autumn Olive, Siebold's Crabapple, Callery Pear, Asiatic Bittersweet, Japanese Honeysuckle, Hay Grasses, Japanese Stiltgrass, Reed Canary Grass, Small Carpgrass, Poison Hemlock, Mugwort, <i>Bidens</i> sp. (adventive)	Significant woody treatment required; regular mowing/burning to foster already present good native herbs	High	RPWHP Crossroads Forest Focal Area	Edge of offshoot of Crossroads Forest Focal Area; Lots of invasive woodies preclude mowing; native quality still high, therefore action required immediately
3	Arena	2119	3.6	None	None	None	Meadow	Meadow	Herbs: 76-100%; Woodies: 1-10%; Species: Rushes & Sedges, Goldenrod, Dogbane, Broom Grass, Allegheny Blackberry	Herbs: 76-100%; Woodies: 1-10%; Species: Hay Grasses, Reed Canary Grass, Japanese Stiltgrass, Siebold's Crabapple, Callery Pear, Autumn Olive, Multifloral Rose, Japanese Barberry	Regular mowing/burning	Moderate	RPWHP Crossroads Forest Focal Area	Edge of offshoot of Crossroads Forest Focal Area; Unclear trajectory, but no replanting/restoration required. Diverse seed source present on site. Allow portion to be used as food plot.
4	Baldpate	4948	7.2	None	None	Powerline ROW	Shrubland	Meadow	Western 2/3rds: Herbs: 76-100%; Woodies: 11-25%; Species: Indian Grass, Field Aster, Goldenrods, Yarrow, Deer Tongue Grass, Pussytoes, Broom Grass, Little Bluestem, Allegheny Blackberry. Eastern 1/3rd: Herbs: 26-50%; Woodies: 1-10%; Species same as above	Western 2/3 rds: Herbs: 1-10%; Woodies: 76-100%; Species: Hay Grasses, Autumn Olive, Mile-a-Minute, Japanese Honeysuckle, Multifloral Rose, Chinese Bushclover. Eastern 1/3rd: Herbs: 76-100%; Woodies: 11-25%; Species same as above	Regular mowing	Low	RPWHP Baldpate Forest Focal Area	Large parking lot present. Powerline ROW - provide mowing recommendation.
5	Baldpate	7280	12.0	None	None	Powerline ROW	Shrubland	Meadow	Western 2/3rds: Herbs: 1-10%; Woodies: 1-10%; Species: Indian Grass, Field Aster, Goldenrods, Deer Tongue Grass, Pussytoes, Broom Grass, Little Bluestem, White Snakeroot, Allegheny Blackberry. Eastern 1/3rd: Herbs: 26-50%; Woodies: 11-25%; Species same as above	Western 2/3 rds: Herbs: 1-10%; Woodies: 76-100%; Species: Hay Grasses, Autumn Olive, Mile-a-Minute, Japanese Honeysuckle, Multifloral Rose, Chinese Bushclover, Japanese Stiltgrass, Phragmites, Asiatic Bittersweet. Eastern 1/3rd: Herbs: 1-10%; Woodies: 11-25%; Species same as above	Regular mowing	Low	RPWHP Baldpate Forest Focal Area	Powerline ROW - provide mowing recommendation.
6	Baldpate	2773	8.6	None	None	Viewshed	Shrubland	Meadow	Herbs: 1-10%; Woodies: 50-75%; Species: Dewberry, Allegheny Blackberry, Poison Ivy, Grease Grass	Herbs: 76-100%; Woodies: 1-10%; Species: Hay Grasses, Autumn Olive, Multifloral Rose	Meadow Restoration; Regular mowing/burning	High	RPWHP Baldpate Forest Focal Area	Meadow-like, but technically a shrubland due to large amounts of native <i>Rubus</i>

Appendix T. FoHVOS Preserves - Habitat Goals for Early Successional Lands
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Sequential Field ID	Preserve	Perimeter (feet)	Acres	Current Programs	Agricultural Uses	Other Programmatic Uses	Current Habitat Type	Habitat Goal	Native Species Composition	Invasive Species Management Concerns	Stewardship Recommendation	Stewardship Priority	Landscape-scale Feature Overlap	Notes
7	Baldpate	680	0.6	None	None	None	Shrubland	Forest	Herbs: 1-10%; Woodies: 1-10%; Species: Not Recorded	Herbs: 1-10%; Woodies: 76-100%; Species: Morrow's Honeysuckle, Multiflora Rose, Autumn Olive, Catalpa, Japanese Honeysuckle	Forest Restoration	High	RPWHP Baldpate Forest Focal Area	
8	Baldpate	1377	1.9	USFWS-PFW through 2020	None	None	Meadow	Forest	Herbs: 1-10%; Woodies: 11-25%; Species: Allegheny Blackberry, Dewberry, Grease Grass, Dogbane	Herbs: 76-100%; Woodies: 76-100%; Species: Hay Grasses, Japanese Honeysuckle, Autumn Olive, Multiflora Rose, Catalpa, Morrow's Honeysuckle, Asiatic Bittersweet, Wineberry	Forest Restoration planting and fencing performed in 2010; Japanese Honeysuckle control via winter foliar spray; Catalpa control via basal bark, Autumn Olive and Multiflora Rose control via basal bark or cut stump	High	RPWHP Baldpate Forest Focal Area	Natural ash recruitment occurring in autumn 2011
9	Baldpate	1523	2.1	None	None	None	Shrubland	Forest	Not Recorded	Herbs: 1-10%; Woodies: 50-75%; Species: Hay Grasses, Wineberry, Autumn Olive, Asiatic Bittersweet, Multiflora Rose, Morrow's Honeysuckle	Forest Restoration	High	RPWHP Baldpate Forest Focal Area	Former orchard
10	Baldpate	2115	5.3	None	None	Viewshed	Shrubland	Shrubland	Herbs: 1-10%; Woodies: 26-50%; Species: Allegheny Blackberry, Ash, Dewberry, Grease Grass	Herbs: 76-100%; Woodies: 11-25%; Species: Hay Grasses, Chinese Bushclover, Autumn Olive, Multiflora Rose, Common Mugwort, Japanese Wisteria	Shrubland Restoration; Selective removal of invasive woodies; 5-10-year heavy mowing cycle.	High	RPWHP Baldpate Forest Focal Area	Meadow-like, but technically a shrubland due to large amounts of native Rubus
11	Baldpate	1010	1.1	None	None	Historic Preservation	Meadow	Meadow	Herbs: 11-25%; Woodies: 1-10%; Species: Grease Grass, Indian Grass, Allegheny Blackberry, Ash	Herbs: 76-100%; Woodies: T; Species: Hay Grasses, Chinese Bushclover, Autumn Olive, Multiflora Rose, Japanese Stiltgrass, Wineberry	Meadow Restoration; Regular mowing/burning; Garlon 3A foliar for Chinese Bushclover	High	RPWHP Baldpate Forest Focal Area	
12	Baldpate	2808	6.3	USFWS-PFW through 2020	None	None	Meadow	Forest	Herbs: 10-25%; Woodies: 10-25%; Species: Dewberry, Allegheny Blackberry, Ash, Grease Grass, Field Aster, Common Milkweed	Herbs: 76-100%; Woodies: 1-10%; Species: Hay Grasses, Autumn Olive, Wineberry, Multiflora Rose, Japanese Stiltgrass	Forest Restoration planting and fencing performed in 2010; Vigilance on Multiflora Rose and Autumn Olive	High	RPWHP Baldpate Forest Focal Area	
13	Baldpate	2132	4.5	None	None	Historic Preservation	Meadow	Meadow	Herbs: 76-100%; Woodies: 26-50%; Species: Goldenrods, Grease Grass, Indian Grass, Allegheny Blackberry, Tulip Poplar, Ash	Herbs: 51-75%; Woodies: 1-10%; Species: Hay Grasses, Japanese Stiltgrass, Canada Thistle, Chinese Bushclover	Meadow Restoration; Regular mowing/burning; Garlon 3A foliar for Chinese Bushclover	Moderate	RPWHP Baldpate Forest Focal Area	
14	Baldpate	1436	2.7	None	None	None	Meadow	Forest	Herbs: 26-50%; Woodies: 1-10%; Species: Red Cedar, Allegheny Blackberry, Indian Grass, Field Aster, Goldenrods, Beard Tongue	Herbs: 76-100%; Woodies: 11-25%; Species: Hay Grasses, Chinese Bushclover, Japanese Stiltgrass, Siebold's Crabapple, Autumn Olive, Multiflora Rose	Forest Restoration	High	RPWHP Baldpate Forest Focal Area	

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Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

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15	Baldpate	1169	1.8	None	None	Event parking?	Lawn / Meadow	Forest	Herbs: 11-25%; Woodyies: 0%; Species: Yarrow, Common Milkweed, Fleabane, Grease Grass, Broom Grass	Herbs: 76-100%; Woodyies: 1-10%; Species: Hay Grasses, Multiflora Rose, Autumn Olive, Common Mugwort, Phragmites, Purple Loosestrife	Forest Restoration	High	RPWHP Baldpate Forest Focal Area	Heavily degraded meadow
16	Baldpate	864	1.1	None	None	Event parking?	Lawn / Meadow	Forest	Herbs: 1-10%; Woodyies: 0%; Species: Grease Grass, Broom Grass	Herbs: 76-100%; Woodyies: 1-10%; Species: Hay Grasses, Multiflora Rose, Autumn Olive, Common Mugwort	Forest Restoration	High	RPWHP Baldpate Forest Focal Area	Heavily degraded meadow
17	Baldpate	1438	2.3	None	None	Historic Preservation	Lawn / Meadow	Lawn / Meadow	N/A	N/A	None	None	RPWHP Baldpate Forest Focal Area	Historic buildings, surrounding lawn and pond
18	Baldpate	1088	1.6	None	None	None	Shrubland	Meadow	Herbs: 1-10%; Woodyies: 1-10%; Species: Flowering Dogwood, Allegheny Blackberry, goldenrods	Herbs: 11-25%; Woodyies: 76-100%; Species: Multiflora Rose, Autumn Olive, Siebold's Crabapple, Japanese Honeysuckle, Japanese Stiltgrass, Japanese Wisteria, Chinese Bushclover	Meadow Restoration	High	RPWHP Baldpate Forest Focal Area	Old Homestead area; Access road exists
19	Baldpate	745	0.8	None	None	None	Shrubland	Forest	Herbs: 1-10%; Woodyies: 1-10%; Species: Allegheny Blackberry, goldenrods	Herbs: 11-25%; Woodyies: 76-100%; Species: Multiflora Rose, Japanese Honeysuckle, Japanese Stiltgrass	Succession	Low	RPWHP Baldpate Forest Focal Area	Old Homestead area; No clear access for large equipment
20	Baldpate	3278	8.8	None	None	None	Shrubland	Forest	Herbs: 26-50%; Woodyies: 26-50%; Species: Goldenrods, Cattail, Rushes & Sedges, Mountain Mint, Monkey Flower, Allegheny Blackberry, Blackhaw, Red Maple	Herbs: 26-50%; Woodyies: 26-50%; Species: Canada Thistle, Teasel, Japanese Stiltgrass, Japanese Honeysuckle, Multiflora Rose, Autumn Olive, Privet, Reed Canary Grass	Succession	None	RPWHP Baldpate Forest Focal Area	Adjacent to Fiddler's Creek Road parking lot
21	Eames	1671	3.9	None	None	None	Meadow	Forest	Herbs: 26-50%; Woodyies: 26-50%; Species: Goldenrods, Indian Grass, Little Bluestem, Rushes & Sedges, Allegheny Blackberry, Blackhaw, Red Maple, Pin Oak, Poison Ivy	Herbs: 1-10%; Woodyies: 76-100%; Species: Hay Grasses, Japanese Stiltgrass, Autumn Olive, Multiflora Rose	Succession	None	Pennington Mountain Forest Area	Too thick with woodyies; Difficult vehicle/equipment access; Surrounding forest part of Pennington Mountain Forest Patch
22	Eames	1673	3.7	None	None	None	Meadow	Meadow	Herbs: 76-100%; Woodyies: 0; Mountain Mint, Beardtongue, Indian Grass, Little Blue Stem, Goldenrods, Field Aster	Herbs: 76-100%; Woodyies: 1-10%; Species: Hay Grasses, Japanese Stiltgrass, Small Carpgrass, Autumn Olive, Multiflora Rose, Japanese Honeysuckle	Regular mowing/burning	Moderate	Pennington Mountain Forest Area	Annually mowed by hunters; Food Plot?; Surrounding forest part of Pennington Mountain Forest Patch
23	Eames	1575	2.6	None	None	None	Meadow	Meadow	Not Recorded	Herbs: 76-100%; Woodyies: 1-10%; Hay Grasses, Canada Thistle, Japanese Stiltgrass, Small Carpgrass, Japanese Honeysuckle, Multiflora Rose, Autumn Olive	Regular mowing/burning	Moderate	Pennington Mountain Forest Area	Annually mowed by hunters; Food Plot?; Surrounding forest part of Pennington Mountain Forest Patch

Appendix T. FoHVOS Preserves - Habitat Goals for Early Successional Lands
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Sequential Field ID	Preserve	Perimeter (feet)	Acres	Current Programs	Agricultural Uses	Other Programmatic Uses	Current Habitat Type	Habitat Goal	Native Species Composition	Invasive Species Management Concerns	Stewardship Recommendation	Stewardship Priority	Landscape-scale Feature Overlap	Notes
24	Eames	966	0.9	None	None	None	Meadow / Shurbland	Forest	Not Recorded	Herbs: 51-75%; Woodies: 25-50%; Hay Grasses, Japanese Stiltgrass, Multiflora Rose	Succession; Food Plot?	None	Pennington Mountain Forest Area	Annually mowed by hunters; Large island of mature red maple and ash in center of meadow; Surrounding forest part of Pennington Mountain Forest Patch
25	Eames	790	0.6	None	None	None	Meadow	Forest	Herbs: 26-50%; Woodies: 0; Seedbox, Deertongue Grass, Goldenrods, Field Aster, Arrowleaf Tearthumb, Indian Grass	Herbs: 76-100%; Woodies 26-50%; Hay Grasses, Japanese Stiltgrass, Small Carpgrass, Multiflora Rose	Succession; Food Plot?	None	Pennington Mountain Forest Area	Annually mowed by hunters; Surrounding forest part of Pennington Mountain Forest Patch
26	Eames	1268	0.8	None	None	None	Meadow	Forest	Herbs: 1-10%; Blue-eyed Grass	Herbs: 51-75%; Woodies: 25-50%; Hay Grasses, Japanese Stiltgrass, Autumn Olive, Multiflora Rose, Wineberry	Succession	None	Pennington Mountain Forest Area	Former home site; Surrounding forest part of Pennington Mountain Forest Patch
27	Gomez	707	0.5	None	None	None	Lawn / Meadow	Meadow	Herbs: 50-75%; Woodies: 0; Species: Indian Grass, Goldenrods, Beardtongue, Grease Grass	Herbs: 50-75%; Woodies: 0; Species: Hay Grasses, Queen Anne Lace, Plantain	Regular mowing/burning	Moderate		Former air strip mowed annually by T. Petro
28	Gomez	3606	4.0	None	None	None	Lawn / Meadow	Meadow	Herbs: 76-100%; Woodies: 0; Species: Indian Grass, Field Aster, Little Bluestem	Herbs: 26-50%; Woodies: 0; Species: Hay Grasses, Small Carpgrass, Queen Anne Lace, Plantain	Regular mowing/burning	Moderate		Former air strip mowed annually by T. Petro
29	Gomez	920	1.0	None	None	None	Lawn / Meadow	Meadow	Herbs: 50-75%; Woodies: 0; Species: Indian Grass, Goldenrods, Beardtongue, Grease Grass	Herbs: 26-50%; Woodies: 0; Species: Hay Grasses, Queen Anne Lace, Plantain	Regular mowing/burning	Moderate		Mowed annually by T. Petro
30	Gomez	730	0.5	None	None	None	Meadow	Meadow	Herbs: 76-100%; Woodies: 0; Species: Indian Grass, Field Aster, Goldenrods	Herbs: 11-25%; Woodies: T; Species: Hay Grasses, Japanese Stiltgrass, Multiflora Rose, Autumn Olive	Regular mowing/burning	Moderate		Mowed annually by T. Petro
31	Gomez	2175	7.0	None	None	None	Meadow	Meadow	Herbs: 76-100%; Woodies: 0; Species: Indian Grass, Field Aster, Goldenrods	Herbs: 11-25%; Woodies: 1-10%; Species: Hay Grasses, Japanese Stiltgrass, Multiflora Rose, Autumn Olive	Regular mowing/burning	Moderate		Mowed annually by T. Petro
32	Gomez	1787	4.6	None	None	None	Meadow	Meadow	Herbs: 26-50%; Woodies: 0; Species: Indian Grass, Field Aster, Goldenrods, Beardtongue, Grease Grass, Broom Grass, Wool Grass, Big Bluestem	Herbs: 76-100%; Woodies: T; Species: Hay Grasses, Queen Anne Lace, Plantain, Common Mugwort, Small Carpgrass, Japanese Stiltgrass, Multiflora Rose, Autumn Olive	Regular mowing/burning; Treatment of Chinese Silver Grass and Chinese Lespedeza	Moderate		Farmer periodically mows
33	Heritage	1963	4.6	None	None	None	Meadow	Meadow	Herbs: 11-25%; Woodies: 26-50%; Species: Sedes & Rushes, Goldenrods, Sensitive Fern, Mountain Mint, Allegheny Monkeyflower, Ticktrefoil sp., Allegheny Blackberry	Herbs: 26-50%; Woodies: 51-75%; Species: Hay Grasses, Canada Thistle, Mugwort, Small Carpgrass, Japanese Stiltgrass, Reed Canary Grass, Purple Loosestrife, Autumn Olive, Multiflora Rose, Japanese Wisteria	Regular mowing/burning; Treatment of Wisteria	Moderate		Eastern portion of field woodies requiring larger machinery to clear

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Sequential Field ID	Preserve	Perimeter (feet)	Acres	Current Programs	Agricultural Uses	Other Programmatic Uses	Current Habitat Type	Habitat Goal	Native Species Composition	Invasive Species Management Concerns	Stewardship Recommendation	Stewardship Priority	Landscape-scale Feature Overlap	Notes
34	Heritage	1449	2.6	None	None	None	Lawn / Meadow	Meadow	Herbs: 11-25%; Woodies: T; Species: Rushes & Sedges, Dogbane, Common Cinquefoil, Yarrow, Pin Oak	Herbs: 50-75%; Woodies: 26-50%; Species: Hay Grasses, Mugwort, Canada Thistle, Autumn Olive, Multiflora Rose, (Queen Anne's Lace)	Regular mowing/burning	Low		Recently mowed annually by neighbor; used by killdeer; Used as truck parking lot in recent past - probably heavily compacted
35	Hollystone	3761	17.8	None	None	None	Meadow	Forest	Herbs: 11-25%; Woodies: 0; Species: Broom Grass, Purple Cudweed	Herbs: 76-100%; Woodies: 1-10%; Species: Hay Grasses, Knapweed, Canada Thistle, Sericea Bushclover, Reed Canary Grass, Multiflora Rose, Autumn Olive	Restoration	High	RPWHP Baldpate Forest Focal Area	Farmland abandoned in 2010; LECU concentrated on edges, but found throughout fields 1-3; Composition equal, combine into one field?
36	Hollystone	2637	9.4	None	None	None	Meadow	Forest	Herbs: 11-25%; Woodies: 0; Species: Broom Grass, Purple Cudweed	Herbs: 76-100%; Woodies: 1-10%; Species: Hay Grasses, Knapweed, Canada Thistle, Sericea Bushclover, Reed Canary Grass, Multiflora Rose, Autumn Olive	Restoration	High	RPWHP Baldpate Forest Focal Area	Farmland abandoned in 2010; LECU concentrated on edges, but found throughout fields 1-3; Composition equal, combine into one field?
37	Hollystone	1936	4.9	None	None	None	Meadow	Forest	Herbs: 11-25%; Woodies: 0; Species: Broom Grass, Purple Cudweed	Herbs: 76-100%; Woodies: 1-10%; Species: Hay Grasses, Knapweed, Canada Thistle, Sericea Bushclover, Reed Canary Grass, Multiflora Rose, Autumn Olive	Restoration	High	RPWHP Baldpate Forest Focal Area	Farmland abandoned in 2010; LECU concentrated on edges, but found throughout fields 1-3; Composition equal, combine into one field?
38	Hollystone	3437	7.8	None	None	None	Shrubland	Forest	Herbs: 1-10 %; Woodies: 26-50%; Species: Goldenrods, Pokeberry, Allegheny Blackberry, Red Cedar, Honey Locust, Ash, Boxelder, Sycamore	Herbs: 11-25%; Woodies: 76-100%; Species: Canada Thistle, Reed Canary Grass, Sericea Bushclover, Hay Grasses, Butter and Eggs, Japanese Honeysuckle, Privet, Autumn Olive, Privet, Wineberry, Multiflora Rose	Restoration	High	RPWHP Baldpate Forest Focal Area	False/Climbing Buckwheat sp.
39	Hollystone	2508	4.5	None	None	None	Shrubland	Forest	Not Recorded	Herbs: 76-100%; Woodies: 76-100%; Species: Garlic Mustard, Mugwort, Knapweed sp., Autumn Olive, Dame's Rocket, Japanese Stiltgrass, Mile-a-minute Vine, Japanese Honeysuckle, Wineberry, Tree of Heaven, Multiflora Rose, Wineberry, Black Locust	Succession	None	RPWHP Baldpate Forest Focal Area	No access

Appendix T. FoHVOS Preserves - Habitat Goals for Early Successional Lands
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Sequential Field ID	Preserve	Perimeter (feet)	Acres	Current Programs	Agricultural Uses	Other Programmatic Uses	Current Habitat Type	Habitat Goal	Native Species Composition	Invasive Species Management Concerns	Stewardship Recommendation	Stewardship Priority	Landscape-scale Feature Overlap	Notes
40	Hollystone	1642	1.1	None	None	None	Shrubland	Forest	Not Recorded	Northern half: Herbs: 11-25%; Woodies: 51-75%; Species: Mugwort, Autumn Olive, Privet, Japanese Honeysuckle, Morrow's Honeysuckle, Japanese Stiltgrass, Multiflora Rose; Southern half: Herbs: 76-100%; Woodies: 1-10%; Species: Hay Grasses, Mugwort, Japanese Stiltgrass, Japanese Honeysuckle, Mile-a-Minute, Wineberry	Succession	None	RPWHP Baldpate Forest Focal Area	No access
41	Krech	1022	1.6	None	None	None	Meadow	Shrubland	Herbs: 76-100%; Woodies: 1-10%; Species: Goldenrods, Field Aster, New England Aster, Common Milkweed, Dogbane, Ironweed, Arrow-leaved Tearthumb, Wool Grass, Cattail, Sensitive Fern, Rushes & Sedges, Bayberry, Allegheny Blackberry	Herbs: 11-25%; Woodies: 11-25%; Species: Small Carpgrass, Japanese Stiltgrass, Purple Loosestrife, Autumn Olive, Multiflora Rose	Treatment of Autumn Olive and Multiflora Rose	Moderate		Approximately 2/3 moist and 1/3 wet (along forest edge)
42	Kulak - Lawrence	2472	7.9	None	None	None	Meadow	Forest	Herbs: 76-100%; Woodies: 1-10%; Species: Field Aster, Goldenrod, Fleabane, Beardtongue, Sundrops, Blue-eyed Grass, Sedges & Rushes	Herbs: 76-100%; Woodies: 0; Species: Hay Grasses	Restoration performed in 2011. Treatment of woody invasives as necessary.	High	RPWHP Sourland Mountain Forest Focal Area; Wood Turtle habitat	Farmland abandoned in 2009
43	Kulak - Lawrence	1767	4.0	None	None	None	Meadow	Forest	Herbs: 76-100%; Woodies: 11-25%; Species: Goldenrod, Rushes & Sedges, Yarrow, Mountain Mint, Sundrops, Swamp Milkweed, Common Milkweed, Beardtongue, Bugleweed, Allegheny Blackberry, Dogwood, Virginia Creeper, Grape, Red Cedar, Ash	Herbs: 11-25%; Woodies: 11-25%; Species: Hay Grasses, Japanese Stiltgrass, Small Carpgrass, <i>Bidens</i> sp. (adventive), Multiflora Rose, Autumn Olive, Japanese Honeysuckle	Restoration	Moderate	RPWHP Sourland Mountain Forest Focal Area; Wood Turtle habitat	
44	Kulak - Lawrence	2738	8.9	None	None	None	Meadow	Forest	Herbs: 51-75%; Woodies: 11-25%; Species: Goldenrod, Rushes & Sedges, Mountain Mint, Sensitive Fern, Small Sundrops, Agrimony, Showy Skullcap, Fleabane, Indian Grass, Deertongue Grass, Blue Vervain, Swamp Dewberry, Grape	Herbs: 11-25%; Woodies: 1-10%; Species: Hay Grasses, Japanese Stiltgrass, Small Carpgrass, Reed Canary Grass, Candad Thistle, Bull Thistle, Multiflora Rose, Autumn Olive, Japanese Honeysuckle	Restoration	Moderate	RPWHP Sourland Mountain Forest Focal Area; Wood Turtle habitat	

Appendix T. FoHVOS Preserves - Habitat Goals for Early Successional Lands
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Sequential Field ID	Preserve	Perimeter (feet)	Acres	Current Programs	Agricultural Uses	Other Programmatic Uses	Current Habitat Type	Habitat Goal	Native Species Composition	Invasive Species Management Concerns	Stewardship Recommendation	Stewardship Priority	Landscape-scale Feature Overlap	Notes
45	Kulak - Lawrence	921	0.6	None	None	None	Meadow / Canopy Gap	Forest	Herbs: 50-75%; Woody: 1-10%; Species: Sedges & Rushes, Sensitive Fern, Mountain Mint, Jumpseed, Arrow-leaved Tearthumb, Golden Ragwort, Bugleweed, St. Johnswort sp., Sundrops, Red Maple, Allegheny Blackberry, Pin Oak, Ash	Herbs: 51-75%; Woody: 11-25%; Species: Purple Loosestrife, Chinese Bushclover, Japanese Stiltgrass, Small Carpgrass, Multiflora Rose, Black Locust, Autumn Olive	Succession	None	RPWHP Sourland Mountain Forest Focal Area; Wood Turtle habitat	
46	Mount	273	0.1	None	None	None	Lawn / Meadow	Forest	Herbs: 1-10%; Woody: 0%; Species: Common Milkweed, Carolina Horsenettle	Herbs: 51-75%; Woody: 25-50%; Hay Grasses, Canada Thistle, (Chicory,) Autumn Olive, Multiflora Rose	Succession	None		Formerly mowed annually by neighbor
47	Nayfield	2237	4.1	None	None	None	Meadow	Meadow	Herbs: 76-100%; Woody: 1-10%; Species: Goldenrods, Mountain Mint, Beardtongue, Pokeweed, Field Aster, New England Aster, Common Milkweed, Dogbane, Ironweed, Blue Vervain, Indian Grass, Allegheny Blackberry, Common Elderberry	Herbs: 11-25%; Woody: Trace; Species: Small Carpgrass, Japanese Stiltgrass, Purple Loosestrife, Autumn Olive, Multiflora Rose	Regular mowing/burning; Spot treatment of woody species	High		Woody concentrated in western edge of field, but mowing is controlling/reducing
48	Nexus	1429	2.7	None	None	Detention basin	Lawn / Meadow	Meadow	None	Herbs: 76-100%; Woody: None; Species: Lawn	Restoration; Regular mowing/burning	Moderate	Pennington Mountain Forest Area	Edge of Pennington Mountain Forest Area
49	Nexus	1705	3.5	None	None	Detention basin	Lawn / Meadow	Meadow	None	Herbs: 76-100%; Woody: None; Species: Lawn	Restoration; Regular mowing/burning	Moderate		
50	Skyview-Garfi	2330	8.1	None	None	None	Meadow	Meadow	Herbs: 51-75%; Woody: 11-25%; Species: Rushes & Sedges, Common Milkweed, Broom Grass, Dogbane, Mountain Mint, Fleabane, Beardtongue, Blue-eyed Grass, Golden Ragwort, Agrimony, Jewelweed, Horsetail, Sensitive Fern, Boneset, Goldenrods, Common Cinquefoil, Allegheny Blackberry, Red Cedar, Ash	Herbs: 51-75%; Woody: 26-50%; Species: Hay Grasses, Multiflora Rose, Autumn Olive, Small Carpgrass, Japanese Stiltgrass, Canada Thistle, Reed Canary Grass	Regular mowing/burning; Spot treatment of woody species	High	Pennington Mountain Forest Area; RPWHP Stony Brook Focal Riparian Area	Strip on northern field edge part of RPWHP Stony Brook; Surrounding forest part of Pennington Mountain Forest Patch; Winterberry and Bayberry along western field edge
51	Skyview-Garfi	3158	15.2	None	None	None	Meadow	Meadow	Herbs: 51-75%; Woody: 11-25%; Species: Rushes & Sedges, Beardtongue, Sensitive Fern, Mountain Mint, Golden Ragwort, Common Milkweed, Agrimony, Horsetail, Poison Ivy, Allegheny Blackberry, Boxelder	Herbs: 26-50%; Woody: 26-50%; Species: Hay Grasses, Autumn Olive, Multiflora Rose	Regular mowing/burning; Spot treatment of woody species	High	Pennington Mountain Forest Area; RPWHP Stony Brook Focal Riparian Area	Dragonfly foraging ground; eastern portion part of RPWHP Stony Brook; Surrounding forest part of Pennington Mountain Forest Patch

Appendix T. FoHVOS Preserves - Habitat Goals for Early Successional Lands
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Sequential Field ID	Preserve	Perimeter (feet)	Acres	Current Programs	Agricultural Uses	Other Programmatic Uses	Current Habitat Type	Habitat Goal	Native Species Composition	Invasive Species Management Concerns	Stewardship Recommendation	Stewardship Priority	Landscape-scale Feature Overlap	Notes
52	Skyview-Garfi	2703	6.9	None	None	None	Meadow	Forest	Herbs: 26-50%; Woodies: 11-25%; Species: Goldenrod, Dogbane, Common Milkweed, Rushes & Sedges, Fleabane, Golden Ragwort, Sensitive Fern, Allegheny Blackberry, Ash, Pin Oak, Red Cedar	Herbs:26-50%; Woodies:26-50% ; Species: Hay Grasses, Small Carpgrass, Mugwort, Canada Thistle, Japanese Honeysuckle, Autumn Olive, Multiflora Rose	Succession	None	Pennington Mountain Forest Area; RPWHP Stony Brook Focal Riparian Area	Entire field part of RPWHP Stony Brook; Surrounding forest part of Pennington Mountain Forest Patch
53	Skyview-Garfi	3185	9.2	None	None	None	Meadow	Meadow	Herbs: 11-25%; Woodies: 11-25%; Species: Rushes & Sedges, Beardtongue, Goldenrods, Mountain Mint, Dogbane, Ragged Fringed Orchid, Blue-eyed Grass, Indian Grass, Wild Strawberry, Allegheny Blackberry, Red Cedar	Herbs: 26-50%; Woodies: 76-100%; Species: Hay Grasses, Mugwort, Small Carpgrass, Canada Thistle, Japanese Stiltgrass, Autumn Olive, Multiflora Rose	Regular mowing/burning; Treatment of Autumn Olive	Moderate	Pennington Mountain Forest Area	Large Autumn Olive grove on eastern side of meadow
54	Skyview-Garfi	1629	1.8	None	None	None	Lawn / Meadow	Meadow	None	Herbs: 76-100%; Woodies: None; Species: Lawn	Regular mowing/burning	Low	Pennington Mountain Forest Area	Mowed regularly by neighbor
55	Thompson	2066	4.9	None	Farmland - Organic; lease through 2027	None	Farmland	Farmland	None	Herbs: 1-10%; Woodies: None; Canada Thistle	None	None	RPWHP Stony Brook Focal Riparian Area	Eastern half of field within RPWHP Stony Brook
56	Thompson	1910	4.9	None	Farmland - Organic; lease through 2027	None	Farmland	Farmland	None	None	None	None	RPWHP Stony Brook Focal Riparian Area	Eastern half of field within RPWHP Stony Brook
57	Thompson	2179	7.0	None	Farmland - Organic; lease through 2027	None	Farmland	Farmland	None	None	None	None	RPWHP Stony Brook Focal Riparian Area	Eastern half of field within RPWHP Stony Brook
58	Thompson	2263	3.8	NRCS-WHIP, USFWS-PFW through 2025	None	None	Meadow	Meadow	Herbs: 76-100%; Woodies: None; Species: Bee Balm, Indian Grass, Fleabane, Brown-eyed Susan, New York Ironweed	Herbs: 1-10%; Woodies: 1-10%; Species: Canada Thistle, Garlic Mustard, Reed Canary Grass, Teasel, Japanese Honeysuckle, Multiflora Rose, Wineberry, Autumn Olive, Seibold's Crabapple	Restored in 2010; Regular mowing/burning; Spot treat woody species as necessary	High	RPWHP Stony Brook Focal Riparian Area; Wood Turtle habitat	Entire field part of RPWHP Stony Brook
59	Thompson	1609	3.2	NRCS-WHIP, USFWS-PFW through 2025	None	None	Meadow	Meadow	Herbs: 76-100%; Woodies: 1-10%; Species: Bee Balm, Indian Grass, Fleabane, Brown-eyed Susan, Shrub Dogwood, Arrowwood Viburnum	Herbs: 1-10%; Woodies: 11-25%; Species: Mugwort, Knapweed sp., Japanese Honeysuckle, Autumn Olive, Multiflora Rose, Seibold's Crabapple	Restored in 2010; Regular mowing/burning; Spot treat woody species as necessary	High	RPWHP Stony Brook Focal Riparian Area; Wood Turtle habitat	Entire field part of RPWHP Stony Brook
60	Vales	469	0.3	None	None	None	Meadow	Forest	Herbs: 76-100%; Woodies: 1-10%; Species: Mountain Mint, Sedges, Beardtongue, Fleabane, Yarrow, Poison Ivy	Herbs: 76-100%; Woodies: 26-50%; Species: Reed Canary Grass, Chinese Bushclover, Autumn Olive, Multiflora Rose, Japanese Honeysuckle (Peppermint)	None	None	Pennington Mountain Forest Area; Wood Turtle habitat	Site of former house
61	Vogler	2201	6.2	None	Farmland - Hay	None	Farmland	Meadow	Herbs: 75-100%; Woodies: 0; Species: Grape, Poison Ivy, Yarrow, Common Cinquefoil, White Avens, Common Milkweed	Herbs: 76-100%; Woodies: 1-10%; Species: Canada Thistle, Mugwort, <i>Vicia</i> sp., Multiflora Rose (Deptford Pink)	Restoration; Regular mowing/burning	Low	Wood Turtle habitat	Keep available as farmland? Annually mowed by unknown farmer; Appeared to have been mowed in early June
Totals		120532	271											

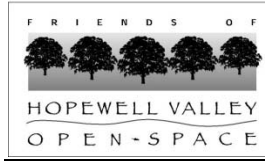
Appendix U. FoHVOS Preserves - Mowing Requirements
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Sequential Field ID	Preserve	Acres	Field Mowing Cost Estimate	Trail Mowing Requirements (Hours)					Current Mowing Status
				Trail Distance (miles)	Middle May	End June	Mid August	End September	
1	Arena	6.4	\$481	0	N/A	N/A	N/A	N/A	Performed by Neighbor (potential)
2	Arena	4.8	\$362	0	N/A	N/A	N/A	N/A	Performed by Neighbor (potential)
3	Arena	3.6	\$273	0	N/A	N/A	N/A	N/A	Performed by Neighbor (potential)
4	Baldpate	7.2	\$543	0	N/A	N/A	N/A	N/A	Performed by JCP&L
5	Baldpate	12.0	\$899	0	N/A	N/A	N/A	N/A	Performed by JCP&L
6	Baldpate	8.6	\$646	0	N/A	N/A	N/A	N/A	Performed by Mercer County
7	Baldpate	0.6	N/A	0	N/A	N/A	N/A	N/A	Performed by Mercer County
8	Baldpate	1.9	N/A	0	N/A	N/A	N/A	N/A	None
9	Baldpate	2.1	N/A	0	N/A	N/A	N/A	N/A	None
10	Baldpate	5.3	\$398	0	N/A	N/A	N/A	N/A	Performed by Mercer County
11	Baldpate	1.1	N/A	0	N/A	N/A	N/A	N/A	Performed by Mercer County
12	Baldpate	6.3	N/A	0	N/A	N/A	N/A	N/A	None
13	Baldpate	4.5	\$338	0	N/A	N/A	N/A	N/A	Performed by Mercer County
14	Baldpate	2.7	N/A	0	N/A	N/A	N/A	N/A	Performed by Mercer County
15	Baldpate	1.8	N/A	0	N/A	N/A	N/A	N/A	Performed by Mercer County
16	Baldpate	1.1	N/A	0	N/A	N/A	N/A	N/A	Performed by Mercer County
17	Baldpate	2.3	\$173	0	N/A	N/A	N/A	N/A	Performed by Mercer County
18	Baldpate	1.6	\$120	0	N/A	N/A	N/A	N/A	Performed by Mercer County (potential)
19	Baldpate	0.8	\$60	0	N/A	N/A	N/A	N/A	None
20	Baldpate	8.8	N/A	0	N/A	N/A	N/A	N/A	None
21	Eames	3.9	N/A	0.15	2.25	2.25	2.25	2.25	Field Only: None; Trail Only: Performed by Joe Novack
22	Eames	3.7	\$275	0	N/A	N/A	N/A	N/A	Performed by Gary Brown
23	Eames	2.6	\$196	0	N/A	N/A	N/A	N/A	Performed by Gary Brown
24	Eames	0.9	N/A	0	N/A	N/A	N/A	N/A	Performed by Gary Brown
25	Eames	0.6	N/A	0	N/A	N/A	N/A	N/A	Performed by Gary Brown
26	Eames	0.8	N/A	0	N/A	N/A	N/A	N/A	None
27	Gomez	0.5	\$41	0	N/A	N/A	N/A	N/A	Performed by Thomas Petro
28	Gomez	4.0	\$300	0	N/A	N/A	N/A	N/A	Performed by Thomas Petro
29	Gomez	1.0	\$78	0	N/A	N/A	N/A	N/A	Performed by Thomas Petro
30	Gomez	0.5	\$35	0	N/A	N/A	N/A	N/A	Performed by Thomas Petro
31	Gomez	7.0	\$528	0	N/A	N/A	N/A	N/A	Performed by Thomas Petro
32	Gomez	4.6	\$346	0	N/A	N/A	N/A	N/A	Performed by an unknown farmer
33	Heritage	4.6	\$346	0.14	1.25	1.25	1.25	1.25	Field Only: None; Trail Only: Performed Jim Seliga
34	Heritage	2.6	\$195	0	N/A	N/A	N/A	N/A	None
35	Hollystone	17.8	N/A	0	N/A	N/A	N/A	N/A	None
36	Hollystone	9.4	\$707	0	N/A	N/A	N/A	N/A	None
37	Hollystone	4.9	N/A	0	N/A	N/A	N/A	N/A	None
38	Hollystone	7.8	N/A	0	N/A	N/A	N/A	N/A	None
39	Hollystone	4.5	N/A	0	N/A	N/A	N/A	N/A	None
40	Hollystone	1.1	N/A	0	N/A	N/A	N/A	N/A	None
41	Krech	1.6	N/A	0	N/A	N/A	N/A	N/A	None
42	Kulak - Lawrence	7.9	N/A	0	N/A	N/A	N/A	N/A	None
43	Kulak - Lawrence	4.0	N/A	0	N/A	N/A	N/A	N/A	Performed by D&R Greenway
44	Kulak - Lawrence	8.9	N/A	0	N/A	N/A	N/A	N/A	Performed by D&R Greenway
45	Kulak - Lawrence	0.6	N/A	0	N/A	N/A	N/A	N/A	None

Appendix U. FoHVOS Preserves - Mowing Requirements
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Sequential Field ID	Preserve	Acres	Field Mowing Cost Estimate	Trail Mowing Requirements (Hours)					Current Mowing Status
				Trail Distance (miles)	Middle May	End June	Mid August	End September	
46	Mount	0.1	N/A	0	N/A	N/A	N/A	N/A	None
47	Nayfield	4.1	\$306	0.3	2.25	2.25	2.25	2.25	Performed by Robert Womack
48	Nexus	2.7	\$200	0	N/A	N/A	N/A	N/A	Performed by homeowner's association
49	Nexus	3.5	\$265	0	N/A	N/A	N/A	N/A	Performed by homeowner's association
50	Skyview-Garfi	8.1	\$609	0	N/A	N/A	N/A	N/A	None
51	Skyview-Garfi	15.2	\$1,141	0.5	2	2	2	2	Field Only: None; Trail Only: Performed by Frank Modafarre
52	Skyview-Garfi	6.9	N/A	0.2	1	1	1	1	Field Only: None; Trail Only: Performed by Frank Modafarre
53	Skyview-Garfi	9.2	\$689	0	N/A	N/A	N/A	N/A	None
54	Skyview-Garfi	1.8	\$137	0	N/A	N/A	N/A	N/A	None
55	Thompson	4.9	N/A	0.22	1	1	1	1	Trail Only: Performed by Wayne Topley
56	Thompson	4.9	N/A	0.09	0.5	0.5	0.5	0.5	Trail Only: Performed by Wayne Topley
57	Thompson	7.0	N/A	0.06	0.5	0.5	0.5	0.5	Trail Only: Performed by Wayne Topley
58	Thompson	3.8	\$287	0.13	0.5	0.5	0.5	0.5	Field Only: Performed by Jess Niederer; Trail Only: Performed by Wayne Topley
59	Thompson	3.2	\$241	0	N/A	N/A	N/A	N/A	Field Only: Performed by Jess Niederer; Trail Only: Performed by Wayne Topley
60	Vales	0.3	N/A	0	N/A	N/A	N/A	N/A	None
61	Vogler	6.2	\$462	0	N/A	N/A	N/A	N/A	Performed by an unknown farmer
Totals		271	\$11,677	1.8	11.3	11.3	11.3	11.3	

Appendix V. Preserve Monitoring Report Form
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space



Annual Monitoring Report – PRESERVE NAME

Are signs and boundary markers intact? ___ Yes ___ No

If no, explain what is needed: Did not know where to post the Friends' sign

If applicable, please describe parking condition and availability:

Trail condition: ___ Excellent ___ Good ___ Fair ___ Poor ___ N/A

Problems needing attention: _____

Did you observe any hazards or potential liability factors? ___ Yes ___ No

If yes, please explain:

Do any of the following problems exist?

___ Vandalism

___ Off-road vehicles

___ Litter

___ Erosion

___ Trespassing

___ Hunting

___ Fire

___ Pollution

___ Over-Use

___ Disease/Pest Infestation

___ Drainage issues

___ Dumping

Other (please explain): _____

Action/s Taken: _____

Future Management Concerns: _____

Additional projects that should be considered:

Unique species identified: _____

Submitted By: _____

Date: _____

Relationship to FoHVOS: Staff

Report Reviewed By: _____

Date: _____

Recommended Actions: _____

Appendix W. FoHVOS Preserves - Preserve Information
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Preserve	Blocks & Lots	Address	Total Acres	DMP	DMP Manager	Co-Owners	Seller Name(s)	Closing Date	County of Record	Book Number	Page Numbers	Recorded Date	Green Acres Funding	Notes
Albahary	Block 13, Lot 1; Block 8, Lot 47, 48	Midland Ave., Hopewell	7.04	Yes	FoHVOS	NONE	Albert S. and Mary Louise Albahary	15-Jan-03	Mercer	4472	022-035	3-Jul-03	Yes	
Arena	Block 26, Lot 4.01	Harbourton- Rocktown Rd., Lambertville	28.23	Yes	FoHVOS	NONE	Susan Arena	30-Jun-05	Mercer	5095	268-275, 276-282, 283-290, 291-TBD	14-Jul-05	Yes	Acquisition involved subdivision, Original B26, L4 broken into 4.01 (preserve), 4.02 (sold to Schwartz), and 4.03 (sold to Hopewell Township for low income housing)
Arno	Block 14, Lot 9.022	Hopewell-Amwell Rd., Hopewell	5.71	Yes	FoHVOS	NONE	Erik H. Von Marcke and Lewis Arno	2-Mar-1	Mercer	4016	277 & 285	2-Mar-01	No	Acquisition involved subdivision
Baldpate: Ted Stiles Preserve at Baldpate Mountain	Block 59, Lot 2; Block 60, Lot 1, 5, 6, 7, 7.01, 17, 18, 21, 27, 31, 32, 37, 38, 43, 47, 50	Fiddler's Creek Rd., Titusville	1222	Yes	Mercer	NJDEP, Mercer County, Hopewell Township, FoHVOS. Percentages TBD	Trap Rock Industries	22-Apr-98	Mercer	3365	222-TBD	9-Apr-98	Yes	
Eames	Block 30, Lot 4	43 Harbourton- Woodsville Rd., Pennington	75.89	Yes	FoHVOS	NJDEP (72.6%), FoHVOS (27.4%)	Grace K. Eames	11-Jun-04	Mercer	4814	017-027	19-Aug-04	Yes	
Elks	Block 20, Lot 10	Crusher Rd., Hopewell	44.6	Yes	FoHVOS	NONE	Trenton Lodge No. 105, B.P.O.E.	30-Oct-00	Mercer	3962	209-212	3-Nov-00	Yes	Settlements B00295P0290-0291
Franz	Block 92, Lot 12.02	Pennington- Titusville Rd., Pennington	18.5	Yes	FoHVOS	NONE	Andreas Franz	29-Aug-00	Mercer	3898	171-178	30-Aug-00	No	Acquisition involved subdivision
Garfi	Block 23, Lot 27	Marshall's Corner- Woodsville Rd., Hopewell	4.21	Yes	FoHVOS	NONE	Daniel and Lise Garfi	22-Jun-07	Mercer	5690	240-248	7-Aug-07	Yes	
Genovesi	Block 20, Lot 18.01	Crusher Rd., Hopewell	3.0	Yes	FoHVOS	NONE	John V. and Lina Genovesi	6-Jul-00	Mercer	3928	045-050	18-Oct-00	No	
Gomez	Block 28, Lot 3.01, 11	Harbourton- Rocktown Rd., Lambertville	58.6	Yes	Hopewell	Hopewell Township (20%), FoHVOS (80%)	Hopewell Township	16-Dec-08	Mercer	4499	132-143	17-Dec-08	Yes	
Grossman	Block 8, Lot 108	Midland Ave., Hopewell	0.93	Yes	FoHVOS	NONE	Ronald D. Grossman	22-Dec-01	Mercer	4328	076	25-Jun-02	No	
Guastella	Block 7, Lot 16	Van Dyke Rd., Hopewell	0.53	No	N/A	NONE	John Guastella	19-Jun-07	Mercer	5659	0066-75	21-Jun-07	No	

Appendix W. FoHVOS Preserves - Preserve Information
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Preserve	Blocks & Lots	Address	Total Acres	DMP	DMP Manager	Co-Owners	Seller Name(s)	Closing Date	County of Record	Book Number	Page Numbers	Recorded Date	Green Acres Funding	Notes
Heritage	Ewing: Block 225.03, Lot 13; Hopewell: Block 88, Lots 25, 26, 27, 29, 30, 40; Block 78.06, Lot 44	Reed Road, Ewing	65.7	Yes	FoHVOS	NONE	Heritage Conservancy, Inc	20-Oct-08	Mercer	5952	76-87	5- Nov-08	Yes	
Hollystone	Block 113, Lot 14 Block 113, Lot 13 (in part)	Harbourton-Woodsville Rd., Pennington	107.7	Yes	Mercer	NJDEP, Mercer County, Hopewell Township, FoHVOS. Percentages TBD	Joseph Saladino	TBD	Mercer	6054	670-706	25-May-2010	Yes	133, 13 in part retained by Saladino
Huber	Block 31, Lot 75	Harbourton-Mt. Airy Rd., Lambertville	0.99	No	N/A	NONE	Leslie Moock Huber, Peter R. Moock, Edward John Harvey, W. Todd Russell Harvey, John Blake	10-Oct-03	Mercer	677	0210-213	29-Nov-03	Yes	
Krech	Block 28, Lot 1.02	25 Featherbed Lane, Hopewell	4.58	Yes	FoHVOS	NONE	Robert W. and Karen A. Krech	8-Jan-04	Mercer	697	56-59	9-Feb-04	Yes	
Kulak	Block 4, Lots 16, 18, 41	Featherbed Lane, Hopewell, NJ 08525	56.38	Yes	D&R	D&R Greenway, FoHVOS. Percentages TBD	Chester and Eileen Kulak	2008	Mercer	TBD	TBD	TBD	Yes	
Lawrence	Block 4, Lot 1.01	Crusher Rd., Hopewell	13.84	Yes	FoHVOS	NONE	F. Vinton Lawrence III	15-Jan-03	Mercer	4472	018-021	7-Mar-03	Yes	Settlement deed B00560P0069-0070
Lipp / Lewellen	Block 18, Lot 20	Marshall's Corner-Woodsville Rd., Hopewell	3.856	No	N/A	NONE	William S. Lewellen, Marjorie Lewellen, Steven Lipp, Faye Lipp	18-Feb-98	Mercer	3333, 3548	292-295, 108	3-Mar-98	Yes	
Mount	Block 31, Lot 41	Lambertville-Hopewell Rd., Lambertville	0.12	No	N/A	NONE	Thelma Mount	21-Feb-02	Mercer	4328	070	25-Jul-02	No	
Nayfield	Block 25, Lot 3.01	Baker Way, Pennington	56.86	Yes	FoHVOS	NJDEP (27%), FoHVOS (73%)	Judith Nayfield Kelly	8-Jun-06	Mercer	5391	037-049	14-Jun-06	Yes	Acquisition involved subdivision, settlement deed B00987P0209-0210; subdivision deed B5391P006-017; easement deed B5391P018-036

Appendix W. FoHVOS Preserves - Preserve Information
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Preserve	Blocks & Lots	Address	Total Acres	DMP	DMP Manager	Co-Owners	Seller Name(s)	Closing Date	County of Record	Book Number	Page Numbers	Recorded Date	Green Acres Funding	Notes
Nexus	Block 62, Lot 12.04, 12.07, 12.08, Block 62.01, Lot 80.15	Carter Rd., Princeton	24.52	Yes	FoHVOS	NONE	High Pointe at Hopewell, LLC	25-Oct-01	Mercer	4340	190-193	16-Aug-02	No	Acquisition involved subdivision
Perkins	Block 39, Lot 56, 21	Hopewell-Amwell Rd., Hopewell	5.09	No	N/A	NONE	Sandra D. and Timothy R. Perkins	22-Dec-03	Mercer	4695	1-5	23-Feb-04	Yes	
Pogorzelski	Block 14, Lot 6, 7	Fiddler's Creek Rd., Titusville	8	Yes	FoHVOS	NONE	Paul E. Pogorzelski	9-Nov-04	Mercer	4891	74-80	10-NOV-04	Yes	
Skyview Partners	Block 23, Lot 11	Skyview Drive, Hopewell	72.2	Yes	FoHVOS	NJDEP (72%), FoHVOS (28%)	Skyview Partners	18-Nov-01	Mercer	4189	038-042	17-Dec-01	Yes	
Stephens	Block 2, Lot 8.01	197 Hopewell-Wertsville Rd., Hopewell	5.07	Yes	FoHVOS	NONE	Kathryn N. Guinness, John D. Guinness, Viola D. Stephens	12-Sep-05	Mercer	5213	274-284, 285-292, 293-299	10-Nov-05	Yes	Acquisition involved subdivision
Thompson	Block 34, Lot 5	Princeton-Hopewell Rd., Hopewell	57	Yes	FoHVOS	NONE	James L. Thompson and Rachel A. Thompson	22-Jan-02	Mercer	4218	077-082	31-Jan-02	Yes	
Vales	Block 31, Lot 3, 64	Route 31 North, Pennington	6.13	Yes	Hopewell	Hopewell Township (80%), FoHVOS (20%)	Hopewell Township	12-Apr-11	Mercer	6013	35-46	18-Apr-11	Yes	
Vogler	Block 32, Lot 6.09	Marshall's Corner-Woodsville Rd., Pennington	11.03	Yes	Hopewell	Hopewell Township (20%), FoHVOS (80%)	Hopewell Township	16-Nov-01	Mercer	4214	64-69	28-Jan-02	Yes	
Weidel	Block 65, Lot 87, 96, 97	Route 31 South, Pennington	1.6	No	N/A	NONE	Kathryn Weidel Reuter and Elizabeth Weidel Kessler	20Dec-01	Mercer	4218	083-088	31-Jan-02	Yes	
Totals			1,970											

Appendix X. Land Cover Data (2007)
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Preserve / Area	Hopewell Valley		All Preserves		1-mile radius - Acres	1-mile radius - Percent	Albany-Grossman	1-mile radius - Acres	1-mile radius - Percent	Arena	1-mile radius - Acres	1-mile radius - Percent	Arno/Pogorzelski	1-mile radius - Acres	1-mile radius - Percent	Baldpate Mountain	2-mile radius - Acres	2-mile radius - Percent				
	Acres	Percent	Acres	Percent															Acres	Percent	Acres	Percent
Description	Acres	Percent	Acres	Percent	1-mile radius - Acres	1-mile radius - Percent	Acres	Percent	1-mile radius - Acres	1-mile radius - Percent	Acres	Percent	1-mile radius - Acres	1-mile radius - Percent	Acres	Percent	2-mile radius - Acres	2-mile radius - Percent				
Coniferous Forest (> 50% canopy) - Upland	772	2.0	67	3.8	N/A	N/A	6.4	79.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	42.5	3.8	N/A	N/A
Deciduous Forest (> 50% canopy) - Upland	8427	21.8	1053	59.9	N/A	N/A	0.4	4.9	N/A	N/A	9.4	33.5	N/A	N/A	13.9	97.2	N/A	N/A	850.9	75.2	N/A	N/A
Coniferous Woodland (10-50% canopy) - Upland	324	0.8	46	2.6	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	32.0	2.8	N/A	N/A
Deciduous Woodland (10-50% canopy) - Upland	1402	3.6	57	3.2	N/A	N/A	1.3	16.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	38.6	3.4	N/A	N/A
Shrubland (< 10% canopy, > 25% shrub cover) - Upland	2727	7.1	130	7.4	N/A	N/A	0.0	0.0	N/A	N/A	0.4	1.4	N/A	N/A	0.0	0.0	N/A	N/A	85.3	7.5	N/A	N/A
Meadows (< 25% shrub cover) - Upland	397	1.0	12	0.7	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	1.1	0.1	N/A	N/A
Upland Habitat Totals	14049	36.4	1364	77.6	N/A	N/A	8.1	100.0	N/A	N/A	9.8	34.9	N/A	N/A	13.9	97.2	N/A	N/A	1050.4	92.8	N/A	N/A
Coniferous Forest (> 50% canopy) - Wetland	18	0.0	0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Deciduous Forest (> 50% canopy) - Wetland	2319	6.0	138	7.9	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.3	2.1	N/A	N/A	2.3	0.2	N/A	N/A
Coniferous Woodland (10-50% canopy) - Wetland	0	0.0	0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Deciduous Woodland (10-50% canopy) - Wetland	0	0.0	0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Shrubland (< 10% canopy, > 25% shrub cover) - Wetland	296	0.8	5	0.3	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Meadows (< 25% shrub cover) - Wetland	149	0.4	1	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.7	0.1	N/A	N/A
Wetland Habitat Totals	2782	7.2	143	8.2	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.3	2.1	N/A	N/A	3.0	0.3	N/A	N/A
Open Water	704	1.8	5	0.3	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	1.2	0.1	N/A	N/A
Total Natural Cover (including open water)	17535	45.4	1513	86.1	22529	47.9	8.1	100.0	735	36.6	9.8	34.9	679	49.9	14.2	99.3	657	39.3	1054.6	93.2	3073	67.1
Agricultural Lands	10101	26.2	188	10.7	12376	26.3	0.0	0.0	629	31.3	17.3	61.6	447	32.9	0.0	0.0	637	38.1	39.9	3.5	823	18.0
Barren Lands	357	0.9	0	0.0	596	1.3	0.0	0.0	0	0.0	0.0	0.0	1	0.1	0.0	0.0	0	0.0	0.4	0.0	94	2.1
Urban Lands	10617	27.5	57	3.2	11549	24.5	0.0	0.0	645	32.1	1.0	3.6	234	17.2	0.1	0.7	378	22.6	37.0	3.3	592	12.9
Total Land Area	38610	72.9	1757	100	47050	100	8.1	100	2010	100	28.1	100	1361	100	14.3	100	1672	100	1131.9	100	4582	100

Appendix X. Land Cover Data (2007)
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Preserve / Area	Eames				Elks				Franz				Genovesi				Gomez				Guastella			
	Acres	Percent	1-mile radius - Acres	1-mile radius - Percent	Acres	Percent	1-mile radius - Acres	1-mile radius - Percent	Acres	Percent	1-mile radius - Acres	1-mile radius - Percent	Acres	Percent	1-mile radius - Acres	1-mile radius - Percent	Acres	Percent	1-mile radius - Acres	1-mile radius - Percent	Acres	Percent	1-mile radius - Acres	1-mile radius - Percent
Description																								
Coniferous Forest (> 50% canopy) - Upland	2.1	2.8	N/A	N/A	0.0	0.0	N/A	N/A	6.3	32.1	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Deciduous Forest (> 50% canopy) - Upland	49.3	65.2	N/A	N/A	12.5	29.8	N/A	N/A	7.7	39.2	N/A	N/A	3.1	100.0	N/A	N/A	14.6	25.1	N/A	N/A	0.0	0.0	N/A	N/A
Coniferous Woodland (10-50% canopy) - Upland	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	3.0	5.2	N/A	N/A	0.0	0.0	N/A	N/A
Deciduous Woodland (10-50% canopy) - Upland	3.9	5.2	N/A	N/A	0.0	0.0	N/A	N/A	1.2	6.1	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Shrubland (< 10% canopy, > 25% shrub cover) - Upland	5.6	7.4	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.1	N/A	N/A	0.0	0.0	N/A	N/A	19.5	33.5	N/A	N/A	0.4	76.5	N/A	N/A
Meadows (< 25% shrub cover) - Upland	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Upland Habitat Totals	60.9	80.6	N/A	N/A	12.5	29.8	N/A	N/A	15.2	77.5	N/A	N/A	3.1	100.0	N/A	N/A	37.1	63.7	N/A	N/A	0.4	76.5	N/A	N/A
Coniferous Forest (> 50% canopy) - Wetland	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Deciduous Forest (> 50% canopy) - Wetland	1.2	1.6	N/A	N/A	29.5	70.2	N/A	N/A	2.6	13.3	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Coniferous Woodland (10-50% canopy) - Wetland	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Deciduous Woodland (10-50% canopy) - Wetland	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Shrubland (< 10% canopy, > 25% shrub cover) - Wetland	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Meadows (< 25% shrub cover) - Wetland	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Wetland Habitat Totals	1.2	1.6	N/A	N/A	29.5	70.2	N/A	N/A	2.6	13.3	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Open Water	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.9	4.8	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Total Natural Cover (including open water)	62.1	82.1	956	49.1	42.0	100.0	958	47.7	18.8	95.6	706	35.1	3.1	100.0	1173	58.3	37.1	63.7	884	52.1	0.4	76.5	858	42.7
Agricultural Lands	11.5	15.2	569	29.3	0.0	0.0	439	21.8	0.1	0.6	625	31.1	0.0	0.0	430	21.4	16.9	29.0	525	31.0	0.0	0.0	544	27.1
Barren Lands	0.0	0.0	6	0.3	0.0	0.0	1	0.0	0.0	0.0	3	0.1	0.0	0.0	2	0.1	0.0	0.0	5	0.3	0.0	0.0	0	0.0
Urban Lands	2.0	2.6	414	21.3	0.0	0.0	612	30.4	0.8	3.9	676	33.6	0.0	0.0	406	20.2	4.2	7.2	282	16.6	0.1	23.5	608	30.2
Total Land Area	75.6	100	1945	100	42.0	100	2010	100	19.6	100	2010	100	3.1	100	2010	100	58.2	100	1695	100	0.5	100	2010	100

Appendix X. Land Cover Data (2007)
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Preserve / Area	Heritage				Huber				Krech				Kulak/Lawrence				Lipp / Lewellen				Mount				
	Acres	Percent	1-mile radius - Acres	1-mile radius - Percent	Acres	Percent	1-mile radius - Acres	1-mile radius - Percent	Acres	Percent	1-mile radius - Acres	1-mile radius - Percent	Acres	Percent	1-mile radius - Acres	1-mile radius - Percent	Acres	Percent	1-mile radius - Acres	1-mile radius - Percent	Acres	Percent	1-mile radius - Acres	1-mile radius - Percent	
Description																									
Coniferous Forest (> 50% canopy) - Upland	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	
Deciduous Forest (> 50% canopy) - Upland	0.3	0.6	N/A	N/A	0.6	58.2	N/A	N/A	0.0	0.4	N/A	N/A	16.8	23.9	N/A	N/A	4.5	100.0	N/A	N/A	0.0	0.0	N/A	N/A	
Coniferous Woodland (10-50% canopy) - Upland	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	
Deciduous Woodland (10-50% canopy) - Upland	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	
Shrubland (< 10% canopy, > 25% shrub cover) - Upland	4.5	8.2	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	1.1	1.6	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	
Meadows (< 25% shrub cover) - Upland	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	1.5	32.7	N/A	N/A	0.7	1.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	
Upland Habitat Totals	4.8	8.8	N/A	N/A	0.6	58.2	N/A	N/A	1.5	33.1	N/A	N/A	18.6	26.5	N/A	N/A	4.5	100.0	N/A	N/A	0.0	0.0	N/A	N/A	
Coniferous Forest (> 50% canopy) - Wetland	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	
Deciduous Forest (> 50% canopy) - Wetland	40.0	73.2	N/A	N/A	0.0	0.0	N/A	N/A	3.0	65.4	N/A	N/A	28.0	39.9	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	
Coniferous Woodland (10-50% canopy) - Wetland	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	
Deciduous Woodland (10-50% canopy) - Wetland	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	
Shrubland (< 10% canopy, > 25% shrub cover) - Wetland	4.6	8.4	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	
Meadows (< 25% shrub cover) - Wetland	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	
Wetland Habitat Totals	44.6	81.6	N/A	N/A	0.0	0.0	N/A	N/A	3.0	65.4	N/A	N/A	28.0	39.9	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	
Open Water	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.3	0.5	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	
Total Natural Cover (including open water)	49.4	90.5	461	37.6	0.6	58.2	988	49.2	4.5	98.5	509	45.2	47.0	66.9	1349	74.6	4.5	100.0	1044	51.9	0.0	0.0	908	45.2	
Agricultural Lands	4.8	8.8	192	15.6	0.2	15.3	581	28.9	0.0	0.0	411	36.5	23.0	32.7	192	10.6	0.0	0.0	456	22.7	0.1	100.0	596	29.7	
Barren Lands	0.0	0.0	3	0.3	0.0	0.0	26	1.3	0.0	0.0	5	0.4	0.0	0.0	1	0.1	0.0	0.0	0	0.0	0.0	0.0	131	6.5	
Urban Lands	0.4	0.8	571	46.5	0.3	26.5	415	20.7	0.1	1.5	203	18.0	0.3	0.4	267	14.7	0.0	0.0	510	25.4	0.0	0.0	375	18.7	
Total Land Area	54.6	100	1227	100	1.0	100	2010	100	4.6	100	1127	100	70.2	100	1809	100	4.5	100	2010	100	0.1	100	2010	100	

Appendix X. Land Cover Data (2007)
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Preserve / Area	Nayfield				Nexus				Perkins				Skyview Partners/Garfi				Stephens				Thompson			
	Acres	Percent	1-mile radius - Acres	1-mile radius - Percent	Acres	Percent	1-mile radius - Acres	1-mile radius - Percent	Acres	Percent	1-mile radius - Acres	1-mile radius - Percent	Acres	Percent	1-mile radius - Acres	1-mile radius - Percent	Acres	Percent	1-mile radius - Acres	1-mile radius - Percent	Acres	Percent	1-mile radius - Acres	1-mile radius - Percent
Description																								
Coniferous Forest (> 50% canopy) - Upland	6.0	10.6	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	3.7	4.9	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Deciduous Forest (> 50% canopy) - Upland	24.2	42.8	N/A	N/A	8.6	35.4	N/A	N/A	5.0	100.0	N/A	N/A	14.0	18.5	N/A	N/A	4.7	99.4	N/A	N/A	11.0	19.4	N/A	N/A
Coniferous Woodland (10-50% canopy) - Upland	6.7	11.9	N/A	N/A	2.8	11.5	N/A	N/A	0.0	0.0	N/A	N/A	1.1	1.5	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Deciduous Woodland (10-50% canopy) - Upland	2.8	5.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.1	N/A	N/A	0.0	0.0	N/A	N/A	8.0	14.1	N/A	N/A
Shrubland (< 10% canopy, > 25% shrub cover) - Upland	2.3	4.1	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.9	1.1	N/A	N/A	0.0	0.0	N/A	N/A	3.7	6.5	N/A	N/A
Meadows (< 25% shrub cover) - Upland	0.0	0.0	N/A	N/A	0.1	0.3	N/A	N/A	0.0	0.0	N/A	N/A	8.5	11.2	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Upland Habitat Totals	42.0	74.3	N/A	N/A	11.5	47.2	N/A	N/A	5.0	100.0	N/A	N/A	28.2	37.2	N/A	N/A	4.7	99.4	N/A	N/A	22.7	40.0	N/A	N/A
Coniferous Forest (> 50% canopy) - Wetland	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Deciduous Forest (> 50% canopy) - Wetland	9.7	17.2	N/A	N/A	3.8	15.6	N/A	N/A	0.0	0.0	N/A	N/A	10.0	13.2	N/A	N/A	0.0	0.0	N/A	N/A	5.3	9.4	N/A	N/A
Coniferous Woodland (10-50% canopy) - Wetland	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Deciduous Woodland (10-50% canopy) - Wetland	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Shrubland (< 10% canopy, > 25% shrub cover) - Wetland	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Meadows (< 25% shrub cover) - Wetland	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Wetland Habitat Totals	9.7	17.2	N/A	N/A	3.8	15.6	N/A	N/A	0.0	0.0	N/A	N/A	10.0	13.2	N/A	N/A	0.0	0.0	N/A	N/A	5.3	9.4	N/A	N/A
Open Water	0.0	0.0	N/A	N/A	1.0	4.1	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	1.4	2.5	N/A	N/A
Total Natural Cover (including open water)	51.7	91.4	676	51.8	16.3	67.0	648	32.2	5.0	100.0	859	56.8	38.2	50.5	603	44.3	4.7	99.4	981	74.1	29.4	51.9	810	40.3
Agricultural Lands	4.7	8.3	374	28.7	0.1	0.5	943	46.9	0.0	0.0	202	13.4	36.0	47.5	419	30.8	0.0	0.0	176	13.3	27.0	47.6	610	30.3
Barren Lands	0.0	0.0	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0	0.0	0.0	0.0	6	0.4	0.0	0.0	0	0.0	0.0	0.0	16	0.8
Urban Lands	0.1	0.2	254	19.5	7.9	32.5	419	20.8	0.0	0.0	450	29.8	1.5	2.0	334	24.5	0.0	0.6	166	12.5	0.3	0.5	575	28.6
Total Land Area	56.5	100	1304	100	24.3	100	2010	100	5.0	100	1511	100	75.7	100	1362	100	4.7	100	1323	100	56.7	100.0	2011	100

Appendix X. Land Cover Data (2007)
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Preserve / Area	Vales				Vogler				Weidel			
	Acres	Percent	1-mile radius - Acres	1-mile radius - Percent	Acres	Percent	1-mile radius - Acres	1-mile radius - Percent	Acres	Percent	1-mile radius - Acres	1-mile radius - Percent
Description												
Coniferous Forest (> 50% canopy) - Upland	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Deciduous Forest (> 50% canopy) - Upland	0.0	0.0	N/A	N/A	0.7	7.2	N/A	N/A	0.4	27.3	N/A	N/A
Coniferous Woodland (10-50% canopy) - Upland	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Deciduous Woodland (10-50% canopy) - Upland	0.0	0.0	N/A	N/A	0.1	0.5	N/A	N/A	1.0	60.9	N/A	N/A
Shrubland (< 10% canopy, > 25% shrub cover) - Upland	3.4	56.9	N/A	N/A	3.2	31.5	N/A	N/A	0.0	0.0	N/A	N/A
Meadows (< 25% shrub cover) - Upland	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Upland Habitat Totals	3.4	56.9	N/A	N/A	4.0	39.2	N/A	N/A	1.4	88.2	N/A	N/A
Coniferous Forest (> 50% canopy) - Wetland	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Deciduous Forest (> 50% canopy) - Wetland	2.0	33.4	N/A	N/A	0.1	1.4	N/A	N/A	0.2	11.8	N/A	N/A
Coniferous Woodland (10-50% canopy) - Wetland	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Deciduous Woodland (10-50% canopy) - Wetland	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Shrubland (< 10% canopy, > 25% shrub cover) - Wetland	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Meadows (< 25% shrub cover) - Wetland	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Wetland Habitat Totals	2.0	33.4	N/A	N/A	0.1	1.4	N/A	N/A	0.2	11.8	N/A	N/A
Open Water	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A	0.0	0.0	N/A	N/A
Total Natural Cover (including open water)	5.4	90.3	803	39.9	4.1	40.6	758	37.7	1.6	100.0	453	22.6
Agricultural Lands	0.0	0.0	622	30.9	6.0	59.1	602	29.9	0.0	0.0	331	16.5
Barren Lands	0.0	0.0	152	7.6	0.0	0.0	120	6.0	0.0	0.0	25	1.2
Urban Lands	0.6	9.7	434	21.6	0.0	0.4	531	26.4	0.0	0.0	1199	59.7
Total Land Area	6	100.0	2011	100	10	100.0	2011	100	1.6	100.0	2008	100

Appendix Y1. FoHVOS Preserves - Soil Type Data
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

MUSYM	Soil Mapping Unit	Hopewell Valley		All Preserves		Albahary-Grossman		Arena		Arena - Field ID#1		Arena - Field ID#2		Arena - Field ID#3		Arno/Pogorzelski		Baldpate Mountain		Baldpate - Field ID#4		Baldpate - Field ID#5	
		Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
NehEe	Neshaminy silt loam, 12 to 30 percent slopes, very rubbly	58.19	0.15	0.62	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehEb	Neshaminy silt loam, 18 to 35 percent slopes, very stony	308.07	0.80	94.84	5.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	94.84	8.37	0.00	0.00	0.00
NehB	Neshaminy silt loam, 2 to 6 percent slopes	451.32	1.17	20.91	1.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.59	1.82	0.00	0.00	0.00
NehC	Neshaminy silt loam, 6 to 12 percent slopes	66.72	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehC2	Neshaminy silt loam, 6 to 12 percent slopes, eroded	50.22	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehCb	Neshaminy silt loam, 6 to 12 percent slopes, very stony	705.73	1.83	211.89	11.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	203.69	17.99	0.00	0.00	4.09
NemCb	Neshaminy-Mount Lucas silt loams, 6 to 12 percent slopes, very stony	70.24	0.18	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OthA	Othello silt loam, 0 to 2 percent slopes	7.14	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PeoD	Penn channery silt loam, 12 to 18 percent slopes	342.13	0.89	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PeoB	Penn channery silt loam, 2 to 6 percent slopes	2513.43	6.52	31.10	1.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.03	1.59	1.84	25.55	0.00
PeoC	Penn channery silt loam, 6 to 12 percent slopes	1422.79	3.69	42.11	2.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.72	2.09	0.00	0.00	0.00
PHG	Pits, sand and gravel	66.33	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PomAs	Pope fine sandy loam, high bottom, 0 to 2 percent slopes, occasional	128.71	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QumD2	Quakertown channery silt loam, 12 to 18 percent slopes, eroded	122.67	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QumB	Quakertown channery silt loam, 2 to 6 percent slopes	251.13	0.65	51.42	2.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QumC	Quakertown channery silt loam, 6 to 12 percent slopes	137.77	0.36	5.35	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QumC2	Quakertown channery silt loam, 6 to 12 percent slopes, eroded	185.53	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukD	Quakertown silt loam, 12 to 18 percent slopes	28.28	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukD2	Quakertown silt loam, 12 to 18 percent slopes, eroded	0.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukB	Quakertown silt loam, 2 to 6 percent slopes	1612.72	4.18	76.09	4.05	1.50	18.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukB2	Quakertown silt loam, 2 to 6 percent slopes, eroded	176.36	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukC	Quakertown silt loam, 6 to 12 percent slopes	279.70	0.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukC2	Quakertown silt loam, 6 to 12 percent slopes, eroded	361.53	0.94	2.40	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFA	Readington and Abbottstown silt loams, 0 to 2 percent slopes	452.45	1.17	6.61	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFB	Readington and Abbottstown silt loams, 2 to 6 percent slopes	1423.81	3.69	13.39	0.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFB2	Readington and Abbottstown silt loams, 2 to 6 percent slopes, eroded	196.25	0.51	0.59	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFC2	Readington and Abbottstown silt loams, 6 to 12 percent slopes, eroded	86.34	0.22	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RedC2	Readington silt loam, 6 to 12 percent slopes, eroded	5.93	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RepwA	Reaville poorly drained variant silt loam, 0 to 2 percent slopes	5.99	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RehA	Reaville silt loam, 0 to 2 percent slopes	438.92	1.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RehB	Reaville silt loam, 2 to 6 percent slopes	1520.47	3.95	6.88	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RehB2	Reaville silt loam, 2 to 6 percent slopes, eroded	375.64	0.97	4.59	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RehC2	Reaville silt loam, 6 to 12 percent slopes, eroded	268.94	0.70	7.11	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.11	0.63	1.75	24.24	0.00
RksC	Riverhead gravelly sandy loam, 8 to 15 percent slopes	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ROPF	Rough broken land, shale	11.45	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RorAt	Rowland silt loam, 0 to 2 percent slopes, frequently flooded	887.07	2.30	20.40	1.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.04	0.00	0.00	0.00
ThoAs	Tioga fine sandy loam, 0 to 2 percent slopes, occasionally flooded	163.82	0.43	10.91	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.91	0.96	0.00	0.00	0.00
UdbB	Udorthents, bedrock substratum, 0 to 8 percent slopes	239.49	0.62	0.22	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UdgB	Udorthents, gravelly substratum, 0 to 8 percent slopes	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WasA	Watchung silt loam, 0 to 2 percent slopes	35.57	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WasAe	Watchung silt loam, 0 to 3 percent slopes, very rubbly	35.83	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WATER	Water	542.67	1.41	0.38	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38	0.03	0.00	0.00	0.00
Totals		38536	100	1753	93	8	100	28	100	6	100	5	101	4	100	6	46	1132	100	7	101	12	100

Appendix Y1. FoHVOS Preserves - Soil Type Data
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

MUSYM	Soil Mapping Unit	Baldpate - Field ID#6		Baldpate - Field ID#7		Baldpate - Field ID#8		Baldpate - Field ID#9		Baldpate - Field ID#10		Baldpate - Field ID#11		Baldpate - Field ID#12		Baldpate - Field ID#13		Baldpate - Field ID#14		Baldpate - Field ID#15		Baldpate - Field ID#16	
		Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
NehEe	Neshaminy silt loam, 12 to 30 percent slopes, very rubbly	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehEb	Neshaminy silt loam, 18 to 35 percent slopes, very stony	4.65	54.11	0.00	0.00	1.25	65.90	2.09	99.45	5.34	100.82	1.12	101.61	5.98	94.98	2.30	51.10	0.00	0.00	0.00	0.00	0.00	0.00
NehB	Neshaminy silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.19	48.64	0.00	0.00	0.00	0.00	0.00	0.00
NehC	Neshaminy silt loam, 6 to 12 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehC2	Neshaminy silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehCb	Neshaminy silt loam, 6 to 12 percent slopes, very stony	3.96	46.03	0.64	106.96	0.70	36.71	0.00	0.00	0.00	0.00	0.00	0.00	0.19	2.98	0.00	0.00	0.18	6.85	0.00	0.00	0.00	0.00
NemCb	Neshaminy-Mount Lucas silt loams, 6 to 12 percent slopes, very stony	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OthA	Othello silt loam, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PeoD	Penn channery silt loam, 12 to 18 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PeoB	Penn channery silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PeoC	Penn channery silt loam, 6 to 12 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	14.70	0.00	0.00	0.00	0.00	0.00
PHG	Pits, sand and gravel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PomAs	Pope fine sandy loam, high bottom, 0 to 2 percent slopes, occasionall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QumD2	Quakertown channery silt loam, 12 to 18 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QumB	Quakertown channery silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QumC	Quakertown channery silt loam, 6 to 12 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QumC2	Quakertown channery silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukD	Quakertown silt loam, 12 to 18 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukD2	Quakertown silt loam, 12 to 18 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukB	Quakertown silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukB2	Quakertown silt loam, 2 to 6 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukC	Quakertown silt loam, 6 to 12 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukC2	Quakertown silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFA	Readington and Abbottstown silt loams, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFB	Readington and Abbottstown silt loams, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFB2	Readington and Abbottstown silt loams, 2 to 6 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFC2	Readington and Abbottstown silt loams, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RedC2	Readington silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RepwA	Reaville poorly drained variant silt loam, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RehA	Reaville silt loam, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RehB	Reaville silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RehB2	Reaville silt loam, 2 to 6 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RehC2	Reaville silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RksC	Riverhead gravelly sandy loam, 8 to 15 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ROPF	Rough broken land, shale	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RorAt	Rowland silt loam, 0 to 2 percent slopes, frequently flooded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ThoAs	Tioga fine sandy loam, 0 to 2 percent slopes, occasionally flooded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.75	97.28	1.07	97.40	0.00
UdbB	Udorthents, bedrock substratum, 0 to 8 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UdgB	Udorthents, gravelly substratum, 0 to 8 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WasA	Watchung silt loam, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WasAe	Watchung silt loam, 0 to 3 percent slopes, very rubbly	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WATER	Water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Totals		9	100	1	107	2	103	2	99	5	101	1	102	6	100	4	100	3	101	2	97	1	97

Appendix Y1. FoHVOS Preserves - Soil Type Data
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Preserve / Area	Soil Mapping Unit	Baldpate - Field ID#17		Baldpate - Field ID#18		Baldpate - Field ID#19		Baldpate - Field ID#20		Eames		Eames - Field ID#21		Eames - Field ID#22		Eames - Field ID#23		Eames - Field ID#24		Eames - Field ID#25		Eames - Field ID#26	
		Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
MUSYM	AbrB Abbottstown silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BhmB Birdsboro loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BhmB2 Birdsboro loam, 2 to 6 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BhmC2 Birdsboro loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.10	1.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BHRSB Birdsboro sandy subsoil variant soils, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BhnA Birdsboro silt loam, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BhnB Birdsboro silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BoyAt Bowmansville silt loam, 0 to 2 percent slopes, frequently flooded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.77	1.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BucA Bucks silt loam, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BucB Bucks silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BucB2 Bucks silt loam, 2 to 6 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BucC Bucks silt loam, 6 to 12 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	BucC2 Bucks silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	ChcA Chalfont silt loam, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	ChcBb Chalfont silt loam, 0 to 6 percent slopes, very stony	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	ChcB Chalfont silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.61	4.75	0.00	0.00	0.00	0.10	0.13	5.10	0.05	5.46	0.00	0.00	0.00	0.00	0.00
	ChcB2 Chalfont silt loam, 2 to 6 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	ChcC Chalfont silt loam, 6 to 12 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	ChcC2 Chalfont silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	DOZC Doylestown and Reaville variant silt loams, 6 to 12 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	DOZA Doylestown and Reaville variant silt loams, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	DOZB Doylestown and Reaville variant silt loams, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.29	17.48	3.91	100.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	DOZB2 Doylestown and Reaville variant silt loams, 2 to 6 percent slopes, er	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	DOZC2 Doylestown and Reaville variant silt loams, 6 to 12 percent slopes, e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	HdyD Hazleton channery loam, 12 to 18 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	KkoD Klinesville channery loam, 12 to 18 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	KkoE Klinesville channery loam, 18 to 35 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	KkoC Klinesville channery loam, 6 to 12 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	LbnD2 Lansdale channery loam, 12 to 18 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	LbnC2 Lansdale channery loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	LbmCb Lansdale loam, 0 to 12 percent slopes, very stony	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	LbmEb Lansdale loam, 12 to 30 percent slopes, very stony	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	LbmB Lansdale loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	LbhB Lansdale sandy loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	LDXA Lawrenceville and Mount Lucas silt loams, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	LDXB Lawrenceville and Mount Lucas silt loams, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	LDXB2 Lawrenceville and Mount Lucas silt loams, 2 to 6 percent slopes, erod	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	LDXC2 Lawrenceville and Mount Lucas silt loams, 6 to 12 percent slopes, ero	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	LdmB Lawrenceville silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	LegD Legore gravelly loam, 12 to 18 percent slopes	0.00	0.00	1.50	93.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	LegE Legore gravelly loam, 18 to 30 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	LegC Legore gravelly loam, 6 to 12 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	LemD2 Lehigh silt loam, 12 to 18 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	LemB Lehigh silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	3.90	44.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	LemB2 Lehigh silt loam, 2 to 6 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	LemC2 Lehigh silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.06	3.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MORCE Mount Lucas and Neshaminy soils, 0 to 12 percent																						

Appendix Y1. FoHVOS Preserves - Soil Type Data
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Preserve / Area	Baldpate - Field ID#17		Baldpate - Field ID#18		Baldpate - Field ID#19		Baldpate - Field ID#20		Eames		Eames - Field ID#21		Eames - Field ID#22		Eames - Field ID#23		Eames - Field ID#24		Eames - Field ID#25		Eames - Field ID#26	
	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
MUSYM	Soil Mapping Unit																					
NehEe	Neshaminy silt loam, 12 to 30 percent slopes, very rubbly																					
NehEb	Neshaminy silt loam, 18 to 35 percent slopes, very stony																					
NehB	Neshaminy silt loam, 2 to 6 percent slopes																					
NehC	Neshaminy silt loam, 6 to 12 percent slopes																					
NehC2	Neshaminy silt loam, 6 to 12 percent slopes, eroded																					
NehCb	Neshaminy silt loam, 6 to 12 percent slopes, very stony																					
NemCb	Neshaminy-Mount Lucas silt loams, 6 to 12 percent slopes, very stony																					
OthA	Othello silt loam, 0 to 2 percent slopes																					
PeoD	Penn channery silt loam, 12 to 18 percent slopes																					
PeoB	Penn channery silt loam, 2 to 6 percent slopes																					
PeoC	Penn channery silt loam, 6 to 12 percent slopes																					
PHG	Pits, sand and gravel																					
PomAs	Pope fine sandy loam, high bottom, 0 to 2 percent slopes, occasionall																					
QumD2	Quakertown channery silt loam, 12 to 18 percent slopes, eroded																					
QumB	Quakertown channery silt loam, 2 to 6 percent slopes																					
QumC	Quakertown channery silt loam, 6 to 12 percent slopes																					
QumC2	Quakertown channery silt loam, 6 to 12 percent slopes, eroded																					
QukD	Quakertown silt loam, 12 to 18 percent slopes																					
QukD2	Quakertown silt loam, 12 to 18 percent slopes, eroded																					
QukB	Quakertown silt loam, 2 to 6 percent slopes																					
QukB2	Quakertown silt loam, 2 to 6 percent slopes, eroded																					
QukC	Quakertown silt loam, 6 to 12 percent slopes																					
QukC2	Quakertown silt loam, 6 to 12 percent slopes, eroded																					
REFA	Readington and Abbottstown silt loams, 0 to 2 percent slopes																					
REFB	Readington and Abbottstown silt loams, 2 to 6 percent slopes																					
REFB2	Readington and Abbottstown silt loams, 2 to 6 percent slopes, eroded																					
REFC2	Readington and Abbottstown silt loams, 6 to 12 percent slopes, eroded																					
RedC2	Readington silt loam, 6 to 12 percent slopes, eroded																					
RepwA	Reaville poorly drained variant silt loam, 0 to 2 percent slopes																					
RehA	Reaville silt loam, 0 to 2 percent slopes																					
RehB	Reaville silt loam, 2 to 6 percent slopes																					
RehB2	Reaville silt loam, 2 to 6 percent slopes, eroded																					
RehC2	Reaville silt loam, 6 to 12 percent slopes, eroded																					
RksC	Riverhead gravelly sandy loam, 8 to 15 percent slopes																					
ROPF	Rough broken land, shale																					
RorAt	Rowland silt loam, 0 to 2 percent slopes, frequently flooded																					
ThoAs	Tioga fine sandy loam, 0 to 2 percent slopes, occasionally flooded																					
UdbB	Udorthents, bedrock substratum, 0 to 8 percent slopes																					
UdgB	Udorthents, gravelly substratum, 0 to 8 percent slopes																					
WasA	Watchung silt loam, 0 to 2 percent slopes																					
WasAe	Watchung silt loam, 0 to 3 percent slopes, very rubbly																					
WATER	Water																					
Totals	2	100	2	97	1	99	9	100	76	100	4	100	4	99	3	100	1	105	1	95	1	105

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Friends of Hopewell Valley Open Space

MUSYM	Soil Mapping Unit	Elks		Franz		Genovesi		Gomez		Gomez - Field ID#27		Gomez - Field ID#28		Gomez - Field ID#29		Gomez - Field ID#30		Gomez - Field ID#31		Gomez - Field ID#32		Guastella	
		Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
NehEe	Neshaminy silt loam, 12 to 30 percent slopes, very rubbly	0.00	0.00	0.00	0.00	0.62	19.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehEb	Neshaminy silt loam, 18 to 35 percent slopes, very stony	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehB	Neshaminy silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.33	10.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehC	Neshaminy silt loam, 6 to 12 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehC2	Neshaminy silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehCb	Neshaminy silt loam, 6 to 12 percent slopes, very stony	0.00	0.00	0.00	0.00	2.22	69.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NemCb	Neshaminy-Mount Lucas silt loams, 6 to 12 percent slopes, very stony	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OthA	Othello silt loam, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PeoD	Penn channery silt loam, 12 to 18 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PeoB	Penn channery silt loam, 2 to 6 percent slopes	0.00	0.00	1.55	7.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PeoC	Penn channery silt loam, 6 to 12 percent slopes	0.00	0.00	0.76	3.81	0.00	0.00	7.00	11.97	0.00	0.57	14.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PHG	Pits, sand and gravel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PomAs	Pope fine sandy loam, high bottom, 0 to 2 percent slopes, occasionall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QumD2	Quakertown channery silt loam, 12 to 18 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QumB	Quakertown channery silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	12.28	21.00	0.00	0.00	0.00	0.93	93.25	0.00	0.00	3.47	49.54	0.00	0.00	0.00	0.00	0.00
QumC	Quakertown channery silt loam, 6 to 12 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QumC2	Quakertown channery silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukD	Quakertown silt loam, 12 to 18 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukD2	Quakertown silt loam, 12 to 18 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukB	Quakertown silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	15.09	25.79	0.00	0.00	0.00	0.11	11.32	0.47	93.22	1.23	17.56	3.83	83.22	0.00	0.00	0.00
QukB2	Quakertown silt loam, 2 to 6 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukC	Quakertown silt loam, 6 to 12 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukC2	Quakertown silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFA	Readington and Abbottstown silt loams, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFB	Readington and Abbottstown silt loams, 2 to 6 percent slopes	2.86	6.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFB2	Readington and Abbottstown silt loams, 2 to 6 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFC2	Readington and Abbottstown silt loams, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RedC2	Readington silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RepwA	Reaville poorly drained variant silt loam, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RehA	Reaville silt loam, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RehB	Reaville silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	1.89	3.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41	8.98	0.00	0.00
RehB2	Reaville silt loam, 2 to 6 percent slopes, eroded	0.00	0.00	4.59	23.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RehC2	Reaville silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RksC	Riverhead gravelly sandy loam, 8 to 15 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ROPF	Rough broken land, shale	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RorAt	Rowland silt loam, 0 to 2 percent slopes, frequently flooded	0.00	0.00	4.22	21.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ThoAs	Tioga fine sandy loam, 0 to 2 percent slopes, occasionally flooded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UdbB	Udorthents, bedrock substratum, 0 to 8 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UdgB	Udorthents, gravelly substratum, 0 to 8 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WasA	Watchung silt loam, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WasAe	Watchung silt loam, 0 to 3 percent slopes, very rubbly	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WATER	Water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Totals		42	100	20	100	3	99	58	100	1	108	4	100	1	105	0	94	7	101	5	100	1	105

Appendix Y1. FoHVOS Preserves - Soil Type Data
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

MUSYM	Soil Mapping Unit	Heritage		Heritage - Field ID#33		Heritage - Field ID#34		Hollystone		Hollystone - Field ID#35		Hollystone - Field ID#36		Hollystone - Field ID#37		Hollystone - Field ID#38		Hollystone - Field ID#39		Hollystone - Field ID#40		Huber	
		Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
NehEe	Neshaminy silt loam, 12 to 30 percent slopes, very rubbly	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehEb	Neshaminy silt loam, 18 to 35 percent slopes, very stony	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehB	Neshaminy silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehC	Neshaminy silt loam, 6 to 12 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehC2	Neshaminy silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehCb	Neshaminy silt loam, 6 to 12 percent slopes, very stony	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NemCb	Neshaminy-Mount Lucas silt loams, 6 to 12 percent slopes, very stony	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OthA	Othello silt loam, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PeoD	Penn channery silt loam, 12 to 18 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PeoB	Penn channery silt loam, 2 to 6 percent slopes	0.72	1.13	0.00	0.00	0.00	0.00	31.23	29.00	17.82	100.12	4.84	51.54	1.98	40.39	0.23	2.94	0.00	0.00	0.00	0.00	0.00	0.00
PeoC	Penn channery silt loam, 6 to 12 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	11.90	11.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
PHG	Pits, sand and gravel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PomAs	Pope fine sandy loam, high bottom, 0 to 2 percent slopes, occasionall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QumD2	Quakertown channery silt loam, 12 to 18 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QumB	Quakertown channery silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QumC	Quakertown channery silt loam, 6 to 12 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QumC2	Quakertown channery silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukD	Quakertown silt loam, 12 to 18 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukD2	Quakertown silt loam, 12 to 18 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukB	Quakertown silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.99	99.26
QukB2	Quakertown silt loam, 2 to 6 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukC	Quakertown silt loam, 6 to 12 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukC2	Quakertown silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFA	Readington and Abbottstown silt loams, 0 to 2 percent slopes	5.92	9.25	1.09	23.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFB	Readington and Abbottstown silt loams, 2 to 6 percent slopes	6.85	10.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFB2	Readington and Abbottstown silt loams, 2 to 6 percent slopes, eroded	0.59	0.93	0.00	0.00	1.38	52.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFC2	Readington and Abbottstown silt loams, 6 to 12 percent slopes, eroded	0.06	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RedC2	Readington silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RepwA	Reaville poorly drained variant silt loam, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RehA	Reaville silt loam, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RehB	Reaville silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RehB2	Reaville silt loam, 2 to 6 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RehC2	Reaville silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RksC	Riverhead gravelly sandy loam, 8 to 15 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ROPF	Rough broken land, shale	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RorAt	Rowland silt loam, 0 to 2 percent slopes, frequently flooded	3.20	4.99	0.06	1.25	0.13	5.09	11.45	10.63	0.00	0.00	0.00	0.00	0.00	0.00	0.05	1.66	36.83	0.75	68.32	0.00	0.00	0.00
ThoAs	Tioga fine sandy loam, 0 to 2 percent slopes, occasionally flooded	0.00	0.00	0.00	0.00	0.00	0.00	2.39	2.22	0.00	0.00	0.00	0.00	0.00	0.00	0.28	6.18	0.00	0.00	0.00	0.00	0.00	0.00
UdbB	Udorthents, bedrock substratum, 0 to 8 percent slopes	0.22	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UdgB	Udorthents, gravelly substratum, 0 to 8 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WasA	Watchung silt loam, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WasAe	Watchung silt loam, 0 to 3 percent slopes, very rubbly	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WATER	Water	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Totals		55	85	4	87	3	100	108	100	18	100	9	100	5	100	8	99	5	101	1	99	1	99

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Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

MUSYM	Soil Mapping Unit	Krech		Krech - Field ID#41		Kulak/Lawrence		Kulak/Lawrence - Field ID#42		Kulak/Lawrence - Field ID#43		Kulak/Lawrence - Field ID#44		Kulak/Lawrence - Field ID#45		Lipp / Lewellen		Mount		Mount - Field ID#46		Nayfield	
		Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
NehEe	Neshaminy silt loam, 12 to 30 percent slopes, very rubbly	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehEb	Neshaminy silt loam, 18 to 35 percent slopes, very stony	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehB	Neshaminy silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehC	Neshaminy silt loam, 6 to 12 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehC2	Neshaminy silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehCb	Neshaminy silt loam, 6 to 12 percent slopes, very stony	0.00	0.00	0.00	0.00	1.50	2.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.48	99.61	0.00	0.00	0.00	0.00	0.00
NemCb	Neshaminy-Mount Lucas silt loams, 6 to 12 percent slopes, very stony	0.00	0.00	0.00	0.00	0.09	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.09	14.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OthA	Othello silt loam, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PeoD	Penn channery silt loam, 12 to 18 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PeoB	Penn channery silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PeoC	Penn channery silt loam, 6 to 12 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PHG	Pits, sand and gravel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PomAs	Pope fine sandy loam, high bottom, 0 to 2 percent slopes, occasional	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QumD2	Quakertown channery silt loam, 12 to 18 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QumB	Quakertown channery silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.19	9.12
QumC	Quakertown channery silt loam, 6 to 12 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QumC2	Quakertown channery silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukD	Quakertown silt loam, 12 to 18 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukD2	Quakertown silt loam, 12 to 18 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukB	Quakertown silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.94	20.99
QukB2	Quakertown silt loam, 2 to 6 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukC	Quakertown silt loam, 6 to 12 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukC2	Quakertown silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFA	Readington and Abbottstown silt loams, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFB	Readington and Abbottstown silt loams, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFB2	Readington and Abbottstown silt loams, 2 to 6 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFC2	Readington and Abbottstown silt loams, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RedC2	Readington silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RepwA	Reaville poorly drained variant silt loam, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RehA	Reaville silt loam, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RehB	Reaville silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RehB2	Reaville silt loam, 2 to 6 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RehC2	Reaville silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RksC	Riverhead gravelly sandy loam, 8 to 15 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ROPF	Rough broken land, shale	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RorAt	Rowland silt loam, 0 to 2 percent slopes, frequently flooded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ThoAs	Tioga fine sandy loam, 0 to 2 percent slopes, occasionally flooded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UdbB	Udorthents, bedrock substratum, 0 to 8 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UdgB	Udorthents, gravelly substratum, 0 to 8 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WasA	Watchung silt loam, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WasAe	Watchung silt loam, 0 to 3 percent slopes, very rubbly	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WATER	Water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Totals		5	99	2	98	70	100	8	100	4	99	9	99	1	100	4	100	0	78	0	78	57	100

Appendix Y1. FoHVOS Preserves - Soil Type Data
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

MUSYM	Soil Mapping Unit	Mayfield - Field ID#47		Nexus		Nexus - Field ID#48		Nexus - Field ID#49		Perkins		Skyview/Garfi		Skyview/Garfi - Field ID #50		Skyview/Garfi - Field ID#51		Skyview/Garfi - Field ID #52		Skyview/Garfi - Field ID #53		Skyview/Garfi - Field ID #54	
		Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
NehEe	Neshaminy silt loam, 12 to 30 percent slopes, very rubbly	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehEb	Neshaminy silt loam, 18 to 35 percent slopes, very stony	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehB	Neshaminy silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehC	Neshaminy silt loam, 6 to 12 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehC2	Neshaminy silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehCb	Neshaminy silt loam, 6 to 12 percent slopes, very stony	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NemCb	Neshaminy-Mount Lucas silt loams, 6 to 12 percent slopes, very stony	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OthA	Othello silt loam, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PeoD	Penn channery silt loam, 12 to 18 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PeoB	Penn channery silt loam, 2 to 6 percent slopes	0.00	0.00	2.84	11.58	0.00	0.00	1.68	47.95	0.00	0.00	7.96	10.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	6.83
PeoC	Penn channery silt loam, 6 to 12 percent slopes	0.00	0.00	7.63	31.15	2.67	99.00	1.03	29.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PHG	Pits, sand and gravel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PomAs	Pope fine sandy loam, high bottom, 0 to 2 percent slopes, occasionall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QumD2	Quakertown channery silt loam, 12 to 18 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QumB	Quakertown channery silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QumC	Quakertown channery silt loam, 6 to 12 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QumC2	Quakertown channery silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukD	Quakertown silt loam, 12 to 18 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukD2	Quakertown silt loam, 12 to 18 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukB	Quakertown silt loam, 2 to 6 percent slopes	3.28	79.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.00	39.26	4.91	60.58	5.37	35.34	5.43	78.66	5.36	58.26	0.00	0.00
QukB2	Quakertown silt loam, 2 to 6 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukC	Quakertown silt loam, 6 to 12 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukC2	Quakertown silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFA	Readington and Abbottstown silt loams, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFB	Readington and Abbottstown silt loams, 2 to 6 percent slopes	0.00	0.00	0.94	3.85	0.00	0.00	0.42	12.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFB2	Readington and Abbottstown silt loams, 2 to 6 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFC2	Readington and Abbottstown silt loams, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RedC2	Readington silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RepwA	Reaville poorly drained variant silt loam, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RehA	Reaville silt loam, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RehB	Reaville silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.99	99.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RehB2	Reaville silt loam, 2 to 6 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RehC2	Reaville silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RksC	Riverhead gravelly sandy loam, 8 to 15 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ROPF	Rough broken land, shale	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RorAt	Rowland silt loam, 0 to 2 percent slopes, frequently flooded	0.00	0.00	6.14	25.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ThoAs	Tioga fine sandy loam, 0 to 2 percent slopes, occasionally flooded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UdbB	Udorthents, bedrock substratum, 0 to 8 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UdgB	Udorthents, gravelly substratum, 0 to 8 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WasA	Watchung silt loam, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WasAe	Watchung silt loam, 0 to 3 percent slopes, very rubbly	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WATER	Water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Totals		4	100	25	100	3	99	4	101	5	100	76	100	8	100	15	100	7	100	9	100	2	102

Appendix Y1. FoHVOS Preserves - Soil Type Data
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

MUSYM	Soil Mapping Unit	Stephens		Thompson		Thompson - Field ID#55		Thompson - Field ID#56		Thompson - Field ID#57		Thompson - Field ID#58		Thompson - Field ID#59		Vales		Vales - Field ID#60		Vogler		Vogler - Field ID#61		Weidel	
		Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
NehEe	Neshaminy silt loam, 12 to 30 percent slopes, very rubbly	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehEb	Neshaminy silt loam, 18 to 35 percent slopes, very stony	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehB	Neshaminy silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehC	Neshaminy silt loam, 6 to 12 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehC2	Neshaminy silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NehCb	Neshaminy silt loam, 6 to 12 percent slopes, very stony	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NemCb	Neshaminy-Mount Lucas silt loams, 6 to 12 percent slopes, very stony	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OthA	Othello silt loam, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PeoD	Penn channery silt loam, 12 to 18 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.10	0.00	0.00	0.00	0.00
PeoB	Penn channery silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PeoC	Penn channery silt loam, 6 to 12 percent slopes	0.00	0.00	1.67	2.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.33	82.83	0.00
PHG	Pits, sand and gravel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PomAs	Pope fine sandy loam, high bottom, 0 to 2 percent slopes, occasionall	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QumD2	Quakertown channery silt loam, 12 to 18 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QumB	Quakertown channery silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QumC	Quakertown channery silt loam, 6 to 12 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QumC2	Quakertown channery silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukD	Quakertown silt loam, 12 to 18 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukD2	Quakertown silt loam, 12 to 18 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukB	Quakertown silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukB2	Quakertown silt loam, 2 to 6 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukC	Quakertown silt loam, 6 to 12 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
QukC2	Quakertown silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFA	Readington and Abbottstown silt loams, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69	6.72	0.69	11.15	0.00	0.00
REFB	Readington and Abbottstown silt loams, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.74	26.57	0.17	2.79	0.00	0.00
REFB2	Readington and Abbottstown silt loams, 2 to 6 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REFC2	Readington and Abbottstown silt loams, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RedC2	Readington silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RepwA	Reaville poorly drained variant silt loam, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RehA	Reaville silt loam, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RehB	Reaville silt loam, 2 to 6 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RehB2	Reaville silt loam, 2 to 6 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RehC2	Reaville silt loam, 6 to 12 percent slopes, eroded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RksC	Riverhead gravelly sandy loam, 8 to 15 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ROPF	Rough broken land, shale	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RorAt	Rowland silt loam, 0 to 2 percent slopes, frequently flooded	0.00	0.00	6.39	11.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	2.35
ThoAs	Tioga fine sandy loam, 0 to 2 percent slopes, occasionally flooded	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UdbB	Udorthents, bedrock substratum, 0 to 8 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UdgB	Udorthents, gravelly substratum, 0 to 8 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WasA	Watchung silt loam, 0 to 2 percent slopes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WasAe	Watchung silt loam, 0 to 3 percent slopes, very rubbly	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WATER	Water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Totals		5	99	57	100	5	101	5	101	7	99	4													

Appendix Y2. FoHVOs Preserves - Soil Characteristics Data
 Hopewell Valley Community Stewardship Plan
 Friends of Hopewell Valley Open Space

Attribute	Code	Description	Hopewell Valley		All Preserves		Albahary-Grossman		Arena		Arena - Field ID#1		Arena - Field ID#2		Arena - Field ID#3		Arno/Pogorzelski		Baldpate Mountain		Baldpate - Field ID#4		Baldpate - Field ID#5	
			Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
Farmland Importance Class	0	No Designation	5446.0	14.1	927.4	49.4	4.0	47.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6	45.1	878.6	77.6	2.0	28.2	12.0	99.9
	1	Prime Farmland	16964.0	44.0	301.6	16.1	2.6	31.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	75.3	6.6	1.8	25.6	0.0	0.0
	2	Farmland of Statewide Importance	13795.0	35.8	412.5	22.0	1.7	19.9	28.1	100.0	6.4	100.2	4.8	100.6	3.6	99.7	0.0	0.4	178.2	15.7	3.4	46.9	0.0	0.0
	3	Farmland of Local Importance	1788.0	4.6	108.4	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	4	Farmland of Unique Importance	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
99	Water or NA or Not available	543.0	1.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	
Erodible Land Class	0	Not highly erodible land	3337.0	8.7	73.7	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.1	2.6	0.4	5.0	0.0	0.0
	1	Potentially erodible land	28071.0	72.8	887.8	47.3	8.2	98.9	28.1	100.0	6.4	100.2	4.8	100.6	3.6	99.7	5.7	45.5	358.0	31.6	1.8	25.6	6.3	52.3
	2	Highly erodible land	6584.0	17.1	786.6	41.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	744.9	65.8	5.0	70.1	1.7	14.4
	99	Water or NA or Not available	543.0	1.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0
	All	Totals	38535.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hydric Class	0	Non-hydric soil	34692.0	90.0	1548.9	82.5	8.2	98.9	28.1	100.0	6.4	100.2	4.8	100.6	3.6	99.7	5.7	45.5	1114.2	98.4	6.9	95.6	12.0	99.9
	1	Hydric soil	3301.0	8.6	142.5	7.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.8	1.6	0.4	5.0	0.0	0.0
	99	Water or NA or Not available	543.0	1.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0
Drainage Class	1	Poorly Drained	3224.0	8.4	142.1	7.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.8	1.6	0.4	5.0	0.0	0.0
	2	Somewhat Poorly Drained	7733.0	20.1	293.0	15.6	0.0	0.0	28.1	100.0	6.4	100.2	4.8	100.6	3.6	99.7	0.0	0.0	115.0	10.2	3.0	41.8	0.0	0.0
	3	Moderately Well Drained	4906.0	12.7	152.0	8.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	80.8	7.1	0.0	0.0	2.2	18.3
	4	Well Drained	20694.0	53.7	1187.4	63.2	8.2	98.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.7	45.5	905.0	79.9	1.8	25.7	9.8	81.6
	5	Somewhat Excessively Drained	1370.0	3.6	32.2	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.3	1.2	2.0	28.2	0.0	0.0
	99	Water or NA or Not available	609.0	1.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0
Bedrock Depth Class	1	< 1	11.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	1-2	1552.0	4.0	32.2	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.3	1.2	2.0	28.2	0.0	0.0
	3	2-3	10573.0	27.4	320.6	17.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	157.2	13.9	4.9	67.4	0.0	0.0
	4	3-4	11240.0	29.2	569.6	30.3	1.1	13.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	503.6	44.5	0.0	0.0	5.7	47.5
	5	>4	14550.0	37.8	820.0	43.7	7.1	85.4	28.1	100.0	6.4	100.2	4.8	100.6	3.6	99.7	5.7	45.5	457.9	40.4	0.4	5.1	6.3	52.3
	99	Water or NA or Not available	609.0	1.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0
Stone Cover Class	0	0	36099.0	93.7	1364.6	72.6	8.2	98.9	28.1	100.0	6.4	100.2	4.8	100.6	3.6	99.7	0.0	0.0	769.3	67.9	7.2	100.6	5.7	47.5
	1	< 2	1660.0	4.3	379.4	20.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6	45.1	363.1	32.1	0.0	0.0	6.3	52.3
	2	70	222.0	0.6	8.6	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3	100	11.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	99	Water or NA or Not available	543.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Groundwater Depth Class	1	< 1	7449.0	19.3	299.3	15.9	0.0	0.0	28.1	100.0	6.4	100.2	4.8	100.6	3.6	99.7	0.0	0.0	17.8	1.6	0.4	5.0	0.0	0.0
	2	1-2	4758.0	12.3	221.1	11.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	180.0	15.9	3.0	41.8	2.2	18.3
	3	2-3	3808.0	9.9	43.3	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.8	1.4	0.0	0.0	0.0	0.0
	4	3-4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	5	>4	164.0	0.4	10.9	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.9	1.0	0.0	0.0	0.0	0.0
	99	Water or NA or Not available	22357.0	58.0	1168.2	62.2	8.2	98.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.7	45.5	907.9	80.2	3.9	53.8	9.8	81.6
Slope Class	1	< 5	27988.0	72.6	673.3	35.8	2.6	31.3	28.1	100.0	6.4	100.2	4.8	100.6	3.6	99.7	0.0	0.0	132.9	11.7	2.2	30.5	2.2	18.2
	2	5-10	7393.0	19.2	450.7	24.0	5.6	67.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.7	45.5	388.9	34.3	3.0	41.9	4.1	34.1
	3	10-15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	4	15-20	839.0	2.2	137.1	7.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	137.1	12.1	0.0	0.0	1.7	14.4
	5	> 20	1695.0	4.4	488.8	26.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	473.2	41.8	2.0	28.2	4.0	33.2
	99	Water or NA or Not available	620.0	1.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0

Appendix Y2. FoHVOS Preserves - Soil Characteristics Data
 Hopewell Valley Community Stewardship Plan
 Friends of Hopewell Valley Open Space

Attribute	Code	Description	Baldpate - Field ID#18		Baldpate - Field ID#19		Baldpate - Field ID#20		Eames		Eames - Field ID#21		Eames - Field ID#22		Eames - Field ID#23		Eames - Field ID#24		Eames - Field ID#25		Eames - Field ID#26		Elks		Franz				
			Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	
Farmland Importance Class	0	No Designation	1.5	93.6	0.8	98.7	3.7	42.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.8	44.1
	1	Prime Farmland	0.0	0.0	0.0	0.0	1.0	11.8	50.5	66.5	0.0	0.0	3.7	99.2	2.5	95.4	0.9	99.7	0.6	94.5	0.8	105.2	10.4	24.6	1.6	7.8			
	2	Farmland of Statewide Importance	0.1	3.8	0.0	0.0	4.0	45.5	9.7	12.8	0.0	0.0	0.0	0.1	0.1	5.1	0.0	5.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.6	48.1
	3	Farmland of Local Importance	0.0	0.0	0.0	0.0	0.0	0.0	13.3	17.5	3.9	100.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.7	75.4	0.0	0.0
	4	Farmland of Unique Importance	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Erodible Land Class	0	Not highly erodible land	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2	21.2	
	1	Potentially erodible land	0.0	0.0	0.8	98.7	8.7	98.6	67.4	88.7	3.9	100.1	3.7	99.3	2.6	100.5	0.9	105.2	0.6	94.5	0.8	105.2	42.1	100.0	10.1	50.6			
	2	Highly erodible land	1.6	97.4	0.0	0.0	0.1	1.1	5.4	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6	28.1	
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	All	Totals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hydric Class	0	Non-hydric soil	1.6	97.4	0.8	98.7	8.8	99.7	59.5	78.3	0.0	0.0	3.7	99.3	2.6	100.5	0.9	105.2	0.6	94.5	0.8	105.2	10.4	24.6	19.9	100.0			
	1	Hydric soil	0.0	0.0	0.0	0.0	0.0	0.0	14.1	18.5	3.9	100.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.7	75.4	0.0	0.0
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			0.0	0.0	0.0	0.0	0.0	0.0	14.1	18.5	3.9	100.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Drainage Class	1	Poorly Drained	0.0	0.0	0.0	0.0	0.0	0.0	14.1	18.5	3.9	100.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.7	75.4	0.0	0.0
	2	Somewhat Poorly Drained	0.1	3.8	0.0	0.0	3.9	44.4	3.6	4.8	0.0	0.0	0.0	0.1	0.1	5.1	0.0	5.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.6	23.1	
	3	Moderately Well Drained	0.0	0.0	0.0	0.0	0.1	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.4	24.6	4.2	21.2	
	4	Well Drained	1.5	93.6	0.8	98.7	4.8	54.4	55.9	73.5	0.0	0.0	3.7	99.2	2.5	95.4	0.9	99.7	0.6	94.5	0.8	105.2	0.0	0.0	0.0	2.3	11.6		
	5	Somewhat Excessively Drained	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.8	44.1	
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bedrock Depth Class	1	< 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	2	1-2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.8	44.1	
	3	2-3	0.1	3.8	0.0	0.0	1.0	11.8	13.3	17.5	3.9	100.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	39.2	93.2	6.9	34.7	
	4	3-4	1.5	93.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.9	6.8	0.0	0.0	
	5	>4	0.0	0.0	0.8	98.7	7.7	87.9	60.3	79.3	0.0	0.0	3.7	99.3	2.6	100.5	0.9	105.2	0.6	94.5	0.8	105.2	0.0	0.0	0.0	4.2	21.2		
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stone Cover Class	0	0	1.6	97.4	0.0	0.0	5.0	57.3	76.0	99.9	3.9	100.1	3.7	99.3	2.6	100.5	0.9	105.2	0.6	94.5	0.8	105.2	42.1	100.0	19.9	100.0			
	1	< 2	0.0	0.0	0.8	98.7	3.7	42.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	2	70	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Groundwater Depth Class	1	< 1	0.0	0.0	0.0	0.0	0.0	0.0	17.7	23.3	3.9	100.1	0.0	0.1	0.1	5.1	0.0	5.5	0.0	0.0	0.0	0.0	0.0	0.0	31.7	75.4	0.0	0.0	
	2	1-2	0.1	3.8	0.0	0.0	4.0	45.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.8	44.3		
	3	2-3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.4	24.6	0.0	0.0	
	4	3-4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	5	>4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	99	Water or NA or Not available	1.5	93.6	0.8	98.7	4.8	54.4	55.9	73.5	0.0	0.0	3.7	99.2	2.5	95.4	0.9	99.7	0.6	94.5	0.8	105.2	0.0	0.0	0.0	11.1	55.7		
Slope Class	1	< 5	0.0	0.0	0.0	0.0	4.9	56.2	68.2	89.7	3.9	100.1	3.7	99.3	2.6	100.5	0.9	105.2	0.6	94.5	0.8	105.2	42.1	100.0	10.4	52.1			
	2	5-10	0.1	3.8	0.8	98.7	3.8	43.5	5.4	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.7	23.5		
	3	10-15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	4	15-20	1.5	93.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	5	> 20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.8	24.3	
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Appendix Y2. FoHVOs Preserves - Soil Characteristics Data
 Hopewell Valley Community Stewardship Plan
 Friends of Hopewell Valley Open Space

Preserve / Area			Genovesi		Gomez		Gomez - Field ID#27		Gomez - Field ID#28		Gomez - Field ID#29		Gomez - Field ID#30		Gomez - Field ID#31		Gomez - Field ID#32		Guastella		Heritage		Heritage - Field ID#33		Heritage - Field ID#34				
Attribute	Code	Description	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent			
Farmland Importance Class	0	No Designation	2.8	88.6	5.0	8.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	2.1	30.0	0.1	2.4	0.0	0.0	0.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	
	1	Prime Farmland	0.3	10.2	27.4	46.8	0.0	0.0	0.0	0.0	1.0	104.6	0.5	93.2	4.7	67.1	3.8	83.2	0.5	105.1	17.9	27.9	3.1	67.8	1.4	52.9			
	2	Farmland of Statewide Importance	0.0	0.0	26.1	44.6	0.5	108.2	4.0	100.1	0.0	0.0	0.0	0.0	0.2	3.5	0.7	14.6	0.0	0.0	3.5	5.5	2.0	44.2	0.1	5.1			
	3	Farmland of Local Importance	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.0	51.6	0.8	17.8	1.1	42.2			
	4	Farmland of Unique Importance	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Erodible Land Class	0	Not highly erodible land	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	5.7	0.1	1.2	0.1	5.1			
	1	Potentially erodible land	2.5	79.6	46.5	79.4	0.5	108.2	3.4	85.9	1.0	104.6	0.5	93.2	4.9	70.6	4.5	97.8	0.5	105.1	51.0	79.6	3.9	85.6	2.5	95.2			
	2	Highly erodible land	0.6	19.2	12.0	20.5	0.0	0.0	0.6	14.2	0.0	0.0	0.0	0.5	2.1	30.0	0.1	2.4	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	All	Totals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hydric Class	0	Non-hydric soil	3.2	98.8	0.0	0.0	0.5	108.2	4.0	100.1	1.0	104.6	0.5	93.7	7.0	100.6	4.6	100.2	0.5	105.1	21.3	33.3	3.2	69.0	1.5	58.0			
	1	Hydric soil	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	52.1	0.8	17.8	1.1	42.2			
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Drainage Class	1	Poorly Drained	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	52.1	0.8	17.8	1.1	42.2			
	2	Somewhat Poorly Drained	0.0	0.0	19.1	32.6	0.5	108.2	3.4	85.9	0.0	0.0	0.0	0.0	0.2	3.5	0.7	14.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3	Moderately Well Drained	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	105.1	16.8	26.3	1.1	24.8	1.5	58.0			
	4	Well Drained	3.2	98.8	34.4	58.8	0.0	0.0	0.6	14.2	1.0	104.6	0.5	93.2	4.7	67.1	3.8	83.2	0.0	0.0	4.5	7.0	2.0	44.2	0.0	0.0			
	5	Somewhat Excessively Drained	0.0	0.0	5.0	8.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	2.1	30.0	0.1	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bedrock Depth Class	1	< 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	2	1-2	0.0	0.0	5.0	8.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	2.1	30.0	0.1	2.4	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3	2-3	0.0	0.0	8.9	15.2	0.0	0.0	0.6	14.2	0.0	0.0	0.0	0.0	0.0	0.0	0.4	9.0	0.5	105.1	33.0	51.6	0.8	17.8	1.1	42.2			
	4	3-4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.7	16.8	3.1	67.8	1.4	52.9			
	5	> 4	3.2	98.8	44.6	76.2	0.5	108.2	3.4	85.9	1.0	104.6	0.5	93.2	4.9	70.6	4.1	88.8	0.0	0.0	3.4	5.4	0.1	1.2	0.1	5.1			
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stone Cover Class	0	0	0.3	10.2	58.5	100.0	0.5	108.2	4.0	100.1	1.0	104.6	0.5	93.7	7.0	100.6	4.6	100.2	0.5	105.1	54.7	85.4	4.0	86.8	2.6	100.2			
	1	< 2	2.2	69.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	70	0.6	19.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Groundwater Depth Class	1	< 1	0.0	0.0	17.2	29.4	0.5	108.2	3.4	85.9	0.0	0.0	0.0	0.0	0.2	3.5	0.3	5.6	0.0	0.0	33.3	52.1	0.8	17.8	1.1	42.2			
	2	1-2	0.0	0.0	1.9	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	9.0	0.0	0.0	3.2	5.0	0.1	1.2	0.1	5.1			
	3	2-3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	105.1	7.4	11.6	1.1	23.6	1.4	52.9			
	4	3-4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	5	> 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	99	Water or NA or Not available	3.2	98.8	39.4	67.3	0.0	0.0	0.6	14.2	1.0	104.6	0.5	93.7	7.0	100.6	3.9	85.6	0.0	0.0	3.3	5.1	2.0	44.2	0.0	0.0			
Slope Class	1	< 5	0.3	10.2	46.5	79.4	0.5	108.2	3.4	85.9	1.0	104.6	0.5	93.2	4.9	70.6	4.5	97.8	0.5	105.1	54.6	85.3	4.0	86.8	2.6	100.2			
	2	5-10	2.2	69.4	7.0	12.0	0.0	0.0	0.6	14.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	
	3	10-15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	4	15-20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	5	> 20	0.6	19.2	5.0	8.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	2.1	30.0	0.1	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Appendix Y2. FoHVOS Preserves - Soil Characteristics Data
 Hopewell Valley Community Stewardship Plan
 Friends of Hopewell Valley Open Space

Attribute	Code	Description	Preserve / Area		Kulak/Lawrence - Field ID#43		Kulak/Lawrence - Field ID#44		Kulak/Lawrence - Field ID#45		Lipp / Lewellen		Mount		Mount - Field ID#46		Nayfield		Nayfield - Field ID#47		Nexus		Nexus - Field #48		Nexus - Field ID#49		Perkins	
			Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
Farmland Importance Class	0	No Designation	0.0	0.0	0.0	0.0	0.2	34.1	4.5	99.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.1	20.7	0.0	0.0	0.0	0.0	0.0	0.0
	1	Prime Farmland	0.0	0.0	0.0	0.0	0.4	65.9	0.0	0.0	0.0	0.0	0.0	0.0	17.1	30.1	3.3	79.9	4.5	18.5	0.0	0.0	2.5	71.4	0.0	0.0		
	2	Farmland of Statewide Importance	4.0	99.3	8.9	99.5	0.0	0.0	0.0	0.0	0.1	77.7	0.1	77.7	22.6	39.7	0.0	0.0	14.9	61.0	2.7	99.0	1.0	29.5	5.0	99.9		
	3	Farmland of Local Importance	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.1	30.0	0.8	19.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
	4	Farmland of Unique Importance	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Erodible Land Class	0	Not highly erodible land	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.3	29.8	0.0	0.0	0.0	0.0	0.0	0.0		
	1	Potentially erodible land	4.0	99.3	8.9	99.5	0.6	99.9	4.5	99.6	0.1	77.7	0.1	77.7	56.8	99.8	4.1	99.5	4.5	18.5	0.0	0.0	2.5	71.4	5.0	99.9		
	2	Highly erodible land	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.7	51.9	2.7	99.0	1.0	29.5	0.0	0.0			
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
	All	Totals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Hydric Class	0	Non-hydric soil	4.0	99.3	8.9	99.5	0.5	84.6	4.5	99.6	0.1	77.7	0.1	77.7	39.7	69.8	3.3	79.9	23.4	95.4	2.7	99.0	3.5	100.9	5.0	99.9		
	1	Hydric soil	0.0	0.0	0.0	0.0	0.1	15.4	0.0	0.0	0.0	0.0	0.0	0.0	17.1	30.0	0.8	19.6	1.2	4.8	0.0	0.0	0.0	0.0	0.0			
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Drainage Class	1	Poorly Drained	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.1	30.0	0.8	19.6	1.2	4.8	0.0	0.0	0.0	0.0	0.0			
	2	Somewhat Poorly Drained	4.0	99.3	8.9	99.5	0.0	4.1	0.0	0.0	0.0	0.0	0.0	0.0	22.6	39.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	99.9		
	3	Moderately Well Drained	0.0	0.0	0.0	0.0	0.5	81.2	0.0	0.0	0.0	0.0	0.0	0.0	17.1	30.1	0.0	0.0	7.1	28.9	0.0	0.0	0.4	12.1	0.0	0.0		
	4	Well Drained	0.0	0.0	0.0	0.0	0.1	14.7	4.5	99.6	0.1	77.7	0.1	77.7	56.8	99.8	3.3	79.9	11.2	45.8	2.7	99.0	3.1	88.8	0.0	0.0		
	5	Somewhat Excessively Drained	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.1	20.7	0.0	0.0	0.0	0.0	0.0	0.0			
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Bedrock Depth Class	1	< 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
	2	1-2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.1	20.7	0.0	0.0	0.0	0.0	0.0				
	3	2-3	0.0	0.0	0.0	0.0	0.4	65.9	0.0	0.0	0.0	0.0	0.0	0.0	17.1	30.0	0.8	19.6	10.5	42.7	2.7	99.0	2.7	77.5	5.0	99.9		
	4	3-4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	6.9	0.0	0.0	0.8	23.4	0.0	0.0			
	5	>4	4.0	99.3	8.9	99.5	0.2	34.1	4.5	99.6	0.1	77.7	0.1	77.7	39.7	69.8	3.3	79.9	7.3	29.8	0.0	0.0	0.0	0.0	0.0			
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Stone Cover Class	0	0	4.0	99.3	8.9	99.5	0.4	65.9	0.0	0.0	0.1	77.7	0.1	77.7	56.8	99.8	4.1	99.5	24.5	100.2	2.7	99.0	3.5	100.9	5.0	99.9		
	1	< 2	0.0	0.0	0.0	0.0	0.2	30.0	4.5	99.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
	2	70	0.0	0.0	0.0	0.0	0.0	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
	3	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
Groundwater Depth Class	1	< 1	4.0	99.3	8.9	99.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	39.7	69.7	0.8	19.6	1.2	4.8	0.0	0.0	0.0	0.0				
	2	1-2	0.0	0.0	0.0	0.0	0.1	19.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.1	25.1	0.0	0.0	0.0	0.0					
	3	2-3	0.0	0.0	0.0	0.0	0.4	65.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	3.8	0.0	0.0	0.4	12.1	0.0	0.0			
	4	3-4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
	5	>4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.1	14.7	4.5	99.6	0.1	77.7	0.1	77.7	17.1	30.1	3.3	79.9	16.3	66.5	2.7	99.0	3.1	88.8	0.0	0.0		
Slope Class	1	< 5	4.0	99.3	8.9	99.5	0.5	81.2	0.0	0.0	0.0	0.0	0.0	0.0	56.8	99.8	4.1	99.5	11.8	48.3	0.0	0.0	2.5	71.4	5.0	99.9		
	2	5-10	0.0	0.0	0.0	0.0	0.1	18.7	4.5	99.6	0.1	77.7	0.1	77.7	0.0	0.0	0.0	7.6	31.2	2.7	99.0	1.0	29.5	0.0	0.0			
	3	10-15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
	4	15-20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
	5	> 20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.1	20.7	0.0	0.0	0.0	0.0					
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					

Appendix Y2. FoHVOS Preserves - Soil Characteristics Data
 Hopewell Valley Community Stewardship Plan
 Friends of Hopewell Valley Open Space

Attribute	Code	Description	Preserve / Area		Skyview/Garfi - Field ID #50		Skyview/Garfi - Field ID#51		Skyview/Garfi - Field ID #52		Skyview/Garfi - Field ID #53		Skyview/Garfi - Field ID #54		Stephens		Thompson		Thompson - Field ID#55		Thompson - Field ID#56		Thompson - Field ID#57		Thompson - Field ID#58		
			Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres
Farmland Importance Class	0	No Designation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1	Prime Farmland	39.9	52.3	4.9	60.6	5.4	35.3	5.4	78.7	5.4	58.3	1.8	101.8	0.0	0.0	40.0	70.2	4.9	100.6	4.9	100.6	7.0	99.3	3.8	100.8	
	2	Farmland of Statewide Importance	29.4	38.5	2.3	27.9	9.8	64.2	1.5	21.5	3.8	41.6	0.0	0.0	5.1	99.3	16.9	29.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3	Farmland of Local Importance	7.1	9.3	0.9	11.7	0.1	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	4	Farmland of Unique Importance	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Erodible Land Class	0	Not highly erodible land	6.0	7.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.6	39.7	0.2	4.4	2.9	59.4	4.1	58.7	0.0	0.0	
	1	Potentially erodible land	70.4	92.2	8.1	100.2	15.2	100.1	6.9	100.1	9.2	99.8	1.8	101.8	5.1	99.3	32.7	57.4	4.7	96.2	2.0	41.2	2.8	40.7	3.8	100.8	
	2	Highly erodible land	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	All	Totals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Hydric Class	0	Non-hydric soil	63.4	82.9	7.2	88.5	15.1	99.5	6.9	100.1	9.2	99.8	1.8	101.8	5.1	99.3	49.3	86.5	4.9	100.6	4.9	100.6	7.0	99.3	3.8	100.8	
	1	Hydric soil	13.1	17.1	0.9	11.7	0.1	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7	13.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Drainage Class	1	Poorly Drained	13.1	17.1	0.9	11.7	0.1	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7	13.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	2	Somewhat Poorly Drained	23.4	30.7	2.3	27.9	9.8	64.2	1.5	21.5	3.8	41.6	0.0	0.0	5.1	99.3	1.2	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3	Moderately Well Drained	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.4	11.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	4	Well Drained	39.9	52.3	4.9	60.6	5.4	35.3	5.4	78.7	5.4	58.3	1.8	101.8	0.0	0.0	41.7	73.2	4.9	100.6	4.9	100.6	7.0	99.3	3.8	100.8	
	5	Somewhat Excessively Drained	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Bedrock Depth Class	1	< 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	2	1-2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3	2-3	15.0	19.7	0.9	11.7	0.1	0.5	0.0	0.0	0.0	0.0	0.1	6.8	0.0	0.0	1.7	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	4	3-4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40.0	70.2	4.9	100.6	4.9	100.6	7.0	99.3	3.8	100.8	
	5	>4	61.4	80.3	7.2	88.5	15.1	99.5	6.9	100.1	9.2	99.8	1.7	94.9	5.1	99.3	15.3	26.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Stone Cover Class	0	0	76.4	100.0	8.1	100.2	15.2	100.1	6.9	100.1	9.2	99.8	1.8	101.8	5.1	99.3	57.0	100.0	4.9	100.6	4.9	100.6	7.0	99.3	3.8	100.8	
	1	< 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	2	70	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Groundwater Depth Class	1	< 1	36.5	47.8	3.2	39.6	9.8	64.7	1.5	21.5	3.8	41.6	0.0	0.0	5.1	99.3	7.7	13.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	2	1-2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.6	13.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3	2-3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	4	3-4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	5	>4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	99	Water or NA or Not available	39.9	52.3	4.9	60.6	5.4	35.3	5.4	78.7	5.4	58.3	1.8	101.8	0.0	0.0	41.7	73.2	4.9	100.6	4.9	100.6	7.0	99.3	3.8	100.8	
Slope Class	1	< 5	76.4	100.0	8.1	100.2	15.2	100.1	6.9	100.1	9.2	99.8	1.8	101.8	5.1	99.3	55.3	97.0	4.9	100.6	4.9	100.6	7.0	99.3	3.8	100.8	
	2	5-10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	3	10-15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	4	15-20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	5	> 20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Appendix Y2. FoHVOS Preserves - Soil Characteristics Data
Hopewell Valley Community Stewardship Plan
Friends of Hopewell Valley Open Space

Preserve / Area			Thompson - Field ID#59		Vales		Vales - Field ID#60		Vogler		Vogler - Field ID#61		Weidel	
Attribute	Code	Description	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
Farmland Importance Class	0	No Designation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
	1	Prime Farmland	3.2	100.3	0.0	0.0	0.0	0.0	9.3	90.1	5.9	95.2	0.3	17.1
	2	Farmland of Statewide Importance	0.0	0.0	4.9	82.0	0.3	89.7	0.0	0.0	0.0	0.0	1.4	85.2
	3	Farmland of Local Importance	0.0	0.0	1.1	18.8	0.0	0.0	1.0	10.0	0.0	0.0	0.0	0.0
	4	Farmland of Unique Importance	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Erodible Land Class	0	Not highly erodible land	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3
	1	Potentially erodible land	3.2	100.3	4.3	71.0	0.3	89.7	10.3	100.2	5.9	95.2	0.3	17.1
	2	Highly erodible land	0.0	0.0	1.8	29.7	0.0	0.0	0.1	0.0	0.0	0.0	1.3	82.8
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	All	Totals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hydric Class	0	Non-hydric soil	3.2	100.3	4.9	82.0	0.3	89.7	9.3	90.2	5.9	95.2	1.6	102.3
	1	Hydric soil	0.0	0.0	1.1	18.8	0.0	0.0	1.0	10.0	0.0	0.0	0.0	0.0
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Drainage Class	1	Poorly Drained	0.0	0.0	1.1	18.8	0.0	0.0	1.0	10.0	0.0	0.0	0.0	0.0
	2	Somewhat Poorly Drained	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3	Moderately Well Drained	0.0	0.0	1.8	29.7	0.0	0.0	3.4	33.3	0.9	13.9	0.0	2.3
	4	Well Drained	3.2	100.3	3.1	52.3	0.3	89.7	5.9	56.9	5.0	81.3	1.6	99.9
	5	Somewhat Excessively Drained	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bedrock Depth Class	1	< 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	1-2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3	2-3	0.0	0.0	2.9	48.5	0.0	0.0	1.0	10.1	0.0	0.0	1.3	82.8
	4	3-4	3.2	100.3	0.0	0.0	0.0	0.0	9.3	90.1	5.9	95.2	0.3	17.1
	5	>4	0.0	0.0	3.1	52.3	0.3	89.7	0.0	0.0	0.0	0.0	0.0	2.3
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stone Cover Class	0	0	3.2	100.3	6.0	100.8	0.3	89.7	10.3	100.3	5.9	95.2	1.6	102.3
	1	< 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	70	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Groundwater Depth Class	1	< 1	0.0	0.0	1.1	18.8	0.0	0.0	1.0	10.0	0.0	0.0	0.0	0.0
	2	1-2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3
	3	2-3	0.0	0.0	1.8	29.7	0.0	0.0	3.4	33.3	0.9	13.9	0.0	0.0
	4	3-4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	5	>4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	99	Water or NA or Not available	3.2	100.3	3.1	52.3	0.3	89.7	5.9	56.9	5.0	81.3	1.6	99.9
Slope Class	1	< 5	3.2	100.3	1.1	18.8	0.0	0.0	10.3	100.2	5.9	95.2	0.3	19.5
	2	5-10	0.0	0.0	4.9	82.0	0.3	89.7	0.0	0.0	0.0	0.0	1.3	82.8
	3	10-15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	4	15-20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
	5	> 20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	99	Water or NA or Not available	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0