



September 2016

PA Department of Environmental Protection
c/o Mr. Patrick McDonnell, Acting Secretary of Environmental Protection
P.O Box 2063
Harrisburg, PA 17105-2063

Dear Mr. McDonnell,

On behalf of our fellow co-petitioners, French & Pickering Creeks Conservation Trust is pleased to submit to the Department of Environmental Protection a stream redesignation petition for the Marsh Creek, a stunning tributary of the Brandywine Creek in East Nantmeal, West Nantmeal, West Vincent, Upper Uwchlan, Uwchlan, and Wallace Townships that feeds into the Christina River and the Delaware River. This stream is located in an ecologically significant area and we believe it is deserving of special protection and Exceptional Value status due to the quality of its macroinvertebrate population and other important qualifiers.

Co-petitioners for the Marsh Creek redesignation include the Guardians of the Brandywine and Green Valleys Watershed Association. In addition to our partners, we have included letters of support from over a dozen organizations, municipalities, and other stakeholders in the community who support this redesignation.

We look forward to working with the Department of Environmental Protection to make this redesignation petition a reality and we thank you for your hard work protecting the streams and important ecosystems in the Commonwealth.

We appreciate your time and consideration.

Sincerely,

A handwritten signature in black ink, appearing to read "Patrick Gardner".

Patrick Gardner

SECRETARY'S OFFICE

Conservation Associate
French & Pickering Creeks Conservation Trust
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OCT - 6 2016

DEPARTMENT OF
ENVIRONMENTAL PROTECTION

A. Petition to Amend § 93.9g

B. Why?

Marsh Creek contains important natural resources and is located within the Schuylkill Highlands Region. Its headwaters begin in the Great Marsh which is an Exceptional Value wetland and an ecologically significant ecosystem in East Nantmeal Township. Based on over 12 years of biological data, including macroinvertebrate data collected by the United States Geological Survey, we believe that Marsh Creek is not properly designated and is worthy of special protection by an Exceptional Value designation. This redesignation is important for the preservation of this watershed as East Nantmeal, Upper Uwchlan, and Wallace Township have grown over time. Please see pages 10-15 for more information on the justification for this redesignation.

C. Describe types of persons, businesses, etc. affected

The residents and businesses of East Nantmeal, West Nantmeal, Uwchlan, Upper Uwchlan, West Vincent, and Wallace Townships are likely to be most impacted by this proposal. East Nantmeal, on its website, states, "More than anything else, our township takes great pride in its stewardship of the land and its unique sense of community." More than two-thirds of Upper Uwchlan Township drains to Marsh Creek and the Marsh Creek Reservoir, which is used as an important source of drinking water for the region. All 26 permits to discharge into the Marsh Creek watershed are contained solely in Upper Uwchlan Township. The Schuylkill Highlands region and the 1,727-acre Marsh Creek State Park are enjoyed by visitors which include hikers, birders, wildlife enthusiasts, and general outdoor recreationalists. In addition, local residents and members of the agricultural industry within the community also enjoy the benefits this watershed has to offer. The redesignation of Marsh Creek will help to protect this important ecosystem for flora, fauna, and visitors who enjoy its natural beauty.

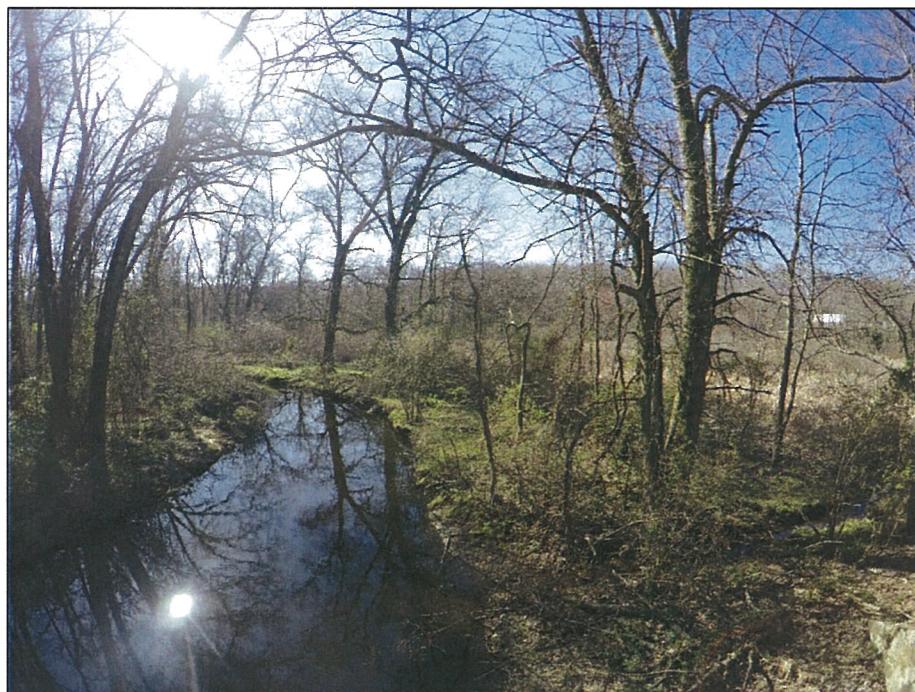
D. Affect current litigation?

NO

E. SEE BELOW



Petition to Upgrade the Marsh Creek Watershed
East Nantmeal, West Nantmeal, West Vincent, Upper Uwchlan, Uwchlan & Wallace
Townships, Chester County



September 2016

Submitted by French & Pickering Creeks Conservation Trust
in partnership with Guardians of the Brandywine and Green Valleys Watershed Association



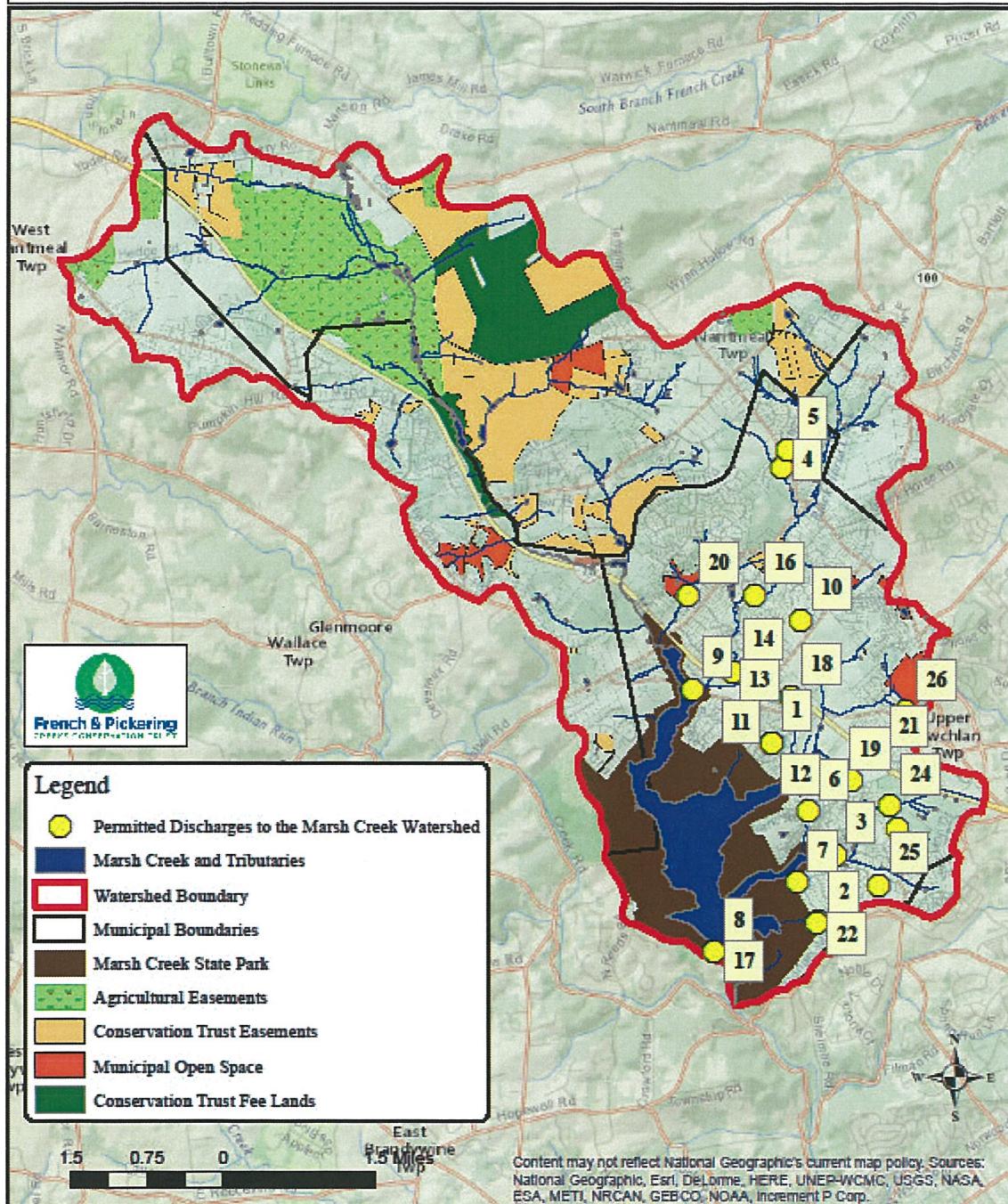
Petition to PA DEP for a Stream Redesignation of Marsh Creek, Chester County
Submitted August 2016

1. Delineation of the Watershed

The Marsh Creek¹ watershed is contained primarily in East Nantmeal Township and Upper Uwchlan Township (8.31 square miles), with portions of first order tributaries and a stretch of the main stem being located in Wallace Township and first order tributaries beginning in West Nantmeal Township and West Vincent Township. The Marsh Creek watershed is 20.31 square miles and its land use is primarily forested (37%), agriculture (35%), and wetland (8.6%). Marsh Creek flows downstream into the Marsh Creek Reservoir as a tributary of the East Branch Brandywine Creek in the Christina River Basin, which flows into the Delaware River. The headwaters are located in the Great Marsh in East Nantmeal Township.

¹ HUC 020402050101

Marsh Creek Watershed



- 2. Current Designated Use of the Watershed**
HQ-TSF, MF
- 3. Requested Designated Use of the Watershed**
EV
- 4. Available Technical Data of Instream Conditions**

The Stream Conditions of Chester County Biological Monitoring Network (Network) was established by the U.S. Geological Survey and the Chester County Water Resources Authority in 1969. Their 2012 report, 'A Benthic-Macroinvertebrate Index of Biotic Integrity and Assessment of Conditions in Selected Streams in Chester County, Pennsylvania, 1998-2009', reports data from sites which were sampled annually in the fall (October–November) during base-flow conditions for water chemistry, instream habitat, and benthic macroinvertebrates. "Benthic-macroinvertebrate data from samples collected during 1998–2009 were used to establish the Chester County Index of Biotic Integrity (CC-IBI). The CC-IBI was based on the methods and metrics outlined in the Pennsylvania Department of Environmental Protection's "A Benthic Index of Biotic Integrity for Wadeable Freestone Streams in Pennsylvania." Benthic-macroinvertebrate data from the Network were evaluated using the Brillouin's diversity index (1970–1980; Moore, 1987) and a multi-metric evaluation (1981–1997; Reif, 2002). Data from 1998 to 2009 were used to establish the Chester County Index of Biotic Integrity (CC-IBI). An index of biotic integrity (IBI) rates community-level biological attributes (structure, composition, pollution tolerance, diversity) in comparison to a reference or minimally disturbed condition. The CC-IBI was established by adapting the methods and metrics outlined in the Pa-IBI to the collection methods used in the Network and was calibrated using data collected during 1998–2009 from the Network. The resulting CC-IBI has site-specific scores that were based on benthic-macroinvertebrate samples collected from the Network during 1998–2009 and related to reference conditions found in Chester County. CC-IBI scores for the 84 flexible-location sites sampled from 1998 to 2009 ranged from 23.48 at Trout Run (site 82, 01478137) to **99.96 at Marsh Creek**. The habitat scores at the 84 flexible-location sites sampled from 1998 to 2009 ranged from 91 at Beaver Creek (site 78, 01480745) to **176 at Marsh Creek**.

Marsh Creek (site 86, 01480675) had the highest CC-IBI score (99.96) of all 320 samples collected (appendix 2). Marsh Creek had land use and chemical conditions similar to those at the Indian Run site, but the **Marsh Creek subbasin also had 8.6 percent wetlands land use (table 16).** This large amount of wetlands, along with 37 percent wooded land use and less than 1 percent urban land use, created stable chemical and physical habitat conditions that supported the most diverse benthic-macroinvertebrate community in Chester County (Table 1)."²

² Reif, A.G., 2012, A benthic-macroinvertebrate index of biotic integrity and assessment of conditions in selected streams in Chester County, Pennsylvania, 1998–2009: U.S. Geological Survey Scientific Investigations Report 2012–5116, 41 p.12, 27

Table 1. USGS Macroinvertebrate Data for Marsh Creek (Site 86)

Table 16. Summary of land use in the subbasin of selected flexible-location sites in the Stream Conditions of Chester County Biological Monitoring Network, Chester County, Pennsylvania, 1998–2009.

[USGS, U.S. Geological Survey; mi², square miles; Land use determined from Delaware Valley Regional Planning Commission, 2005]

| USGS station number | USGS site identifier | Stream | Drainage area (mi ²) | Land use (percent) | | | | | | |
|---------------------|----------------------|---|----------------------------------|--------------------|-------|-------------|-----------|--------|-------|---------|
| | | | | Residential | Urban | Agriculture | Rangeland | Wooded | Water | Wetland |
| 01473210 | 101 | Trout Creek near Port Kennedy, Pa. | 8.46 | 144.3 | 140.2 | 10.5 | 16.1 | 15.2 | 10.1 | 10.0 |
| 01478137 | 82 | Trout Run at Avondale, Pa. | 1.34 | 20.7 | 16.7 | 30.5 | 11.2 | 18.6 | 1.6 | 0.6 |
| 01480376 | 92 | South Branch Birch Run near Martins Corner, Pa. | 0.64 | 10.8 | 3.6 | 61.5 | 0.1 | 18.5 | 0.5 | 1.7 |
| 01480389 | 93 | North Branch Birch Run near Martins Corner, Pa. | 1.79 | 18.1 | 4.3 | 10.9 | 5.0 | 59.6 | 0.2 | 0.6 |
| 01480390 | 88 | Birch Run at Martins Corner, Pa. | 2.49 | 16.9 | 4.1 | 25.6 | 3.7 | 46.7 | 0.3 | 0.9 |
| 01480621 | 109 | Buck Run near Parkesburg, Pa. | 2.57 | 7.1 | 5.3 | 51.5 | 7.1 | 28.5 | 0.4 | 0.0 |
| 014806215 | 110 | Buck Run at Sadsburyville near Parkesburg, Pa. | 4.50 | 12.4 | 4.0 | 44.1 | 7.0 | 31.2 | 0.3 | 0.9 |
| 01480623 | 111 | Buck Run at Pomeroy, Pa. | 6.37 | 14.9 | 4.5 | 42.4 | 10.1 | 26.0 | 0.4 | 0.9 |
| 014806273 | 112 | Buck Run at Glenrose near Coatesville, Pa. | 12.60 | 16.3 | 4.8 | 43.8 | 8.1 | 24.7 | 0.4 | 1.1 |
| 01480658 | 85 | Indian Run at Glenmoore, Pa. | 4.27 | 21.7 | 5.2 | 21.7 | 12.7 | 37.4 | 0.7 | 0.6 |
| 01480675 | 86 | Marsh Creek near Glenmoore, Pa. | 8.57 | 13.3 | 0.8 | 34.8 | 4.0 | 37.3 | 1.1 | 8.6 |

¹ Land use for the Montgomery County part (3.3 square miles) of Trout Creek subbasin was estimated from aerial photographs.

Table 2. USGS Water Chemistry Date for Marsh Creek (Site 86)

Table 17. Physical characteristics, constituent concentrations, and selected index scores for selected flexible-location sites in the Stream Conditions of Chester County Biological Monitoring Network, Chester County, Pennsylvania, 1998–2009.

[USGS, U.S. Geological Survey; N, nitrogen; P, phosphorus; ft³/s, cubic feet per second; mg/L, milligrams per liter; °C, degrees Celsius; μ S/cm, microsiemens per centimeter; CC-IBI, Chester County Index of Biotic Integrity]

| USGS station number | USGS site identifier | Stream | Date | Discharge, instantaneous (ft ³ /s) | Dissolved oxygen (mg/L) | pH, field (standard units) | Specific conductance, field (μ S/cm at 25°C) | Temperature, water (°C) |
|---------------------|----------------------|---|----------|---|--|--|---|--------------------------|
| 01473210 | 101 | Trout Creek near Port Kennedy, Pa. | 10/24/06 | 2.5 | 10.0 | 7.6 | 778 | 10.3 |
| 01478137 | 82 | Trout Run at Avondale, Pa. | 12/02/02 | 1.1 | 11.4 | 7.3 | 858 | 4.1 |
| 01480376 | 92 | South Branch Birch Run near Martins Corner, Pa. | 10/22/04 | 0.8 | 10.0 | 6.8 | 257 | 11.1 |
| 01480389 | 93 | North Branch Birch Run near Martins Corner, Pa. | 10/22/04 | 2.0 | 10.7 | 6.8 | 83 | 10.2 |
| 01480390 | 88 | Birch Run near Martins Corner, Pa. | 10/22/04 | 2.8 | 10.6 | 6.9 | 135 | 10.5 |
| 01480658 | 85 | Indian Run at Glenmoore, Pa. | 11/17/03 | 8.9 | 12.1 | 7.52 | 178 | 8.6 |
| 01480675 | 86 | Marsh Creek near Glenmoore, Pa. | 11/18/03 | 13 | 11.7 | 7.31 | 186 | 7.7 |
| USGS station number | USGS site identifier | Stream | Date | Chloride, dissolved (mg/L) | Nitrate + Nitrite, dissolved (mg/L as N) | Orthophosphate (PO_4^{3-}), dissolved (mg/L as P) | CC-IBI score | Habitat assessment score |
| 01473210 | 101 | Trout Creek near Port Kennedy, Pa. | 10/24/06 | 112.0 | 2.02 | 0.202 | 33.28 | 140 |
| 01478137 | 82 | Trout Run at Avondale, Pa. | 12/02/02 | 56.8 | 7.77 | 0.170 | 23.48 | 109 |
| 01480376 | 92 | South Branch Birch Run near Martins Corner, Pa. | 10/22/04 | 14.2 | 5.92 | 0.045 | 70.37 | 149 |
| 01480389 | 93 | North Branch Birch Run near Martins Corner, Pa. | 10/22/04 | 7.2 | 1.29 | 0.032 | 95.75 | 160 |
| 01480390 | 88 | Birch Run near Martins Corner, Pa. | 10/22/04 | 9.0 | 2.72 | 0.036 | 81.78 | 150 |
| 01480658 | 85 | Indian Run at Glenmoore, Pa. | 11/17/03 | 12.6 | 2.25 | 0.018 | 94.01 | 169 |
| 01480675 | 86 | Marsh Creek near Glenmoore, Pa. | 11/18/03 | 22.2 | 1.28 | 0.013 | 99.96 | 176 |

Map 2. USGS Sampling Site (Marsh Creek – Site # 86)

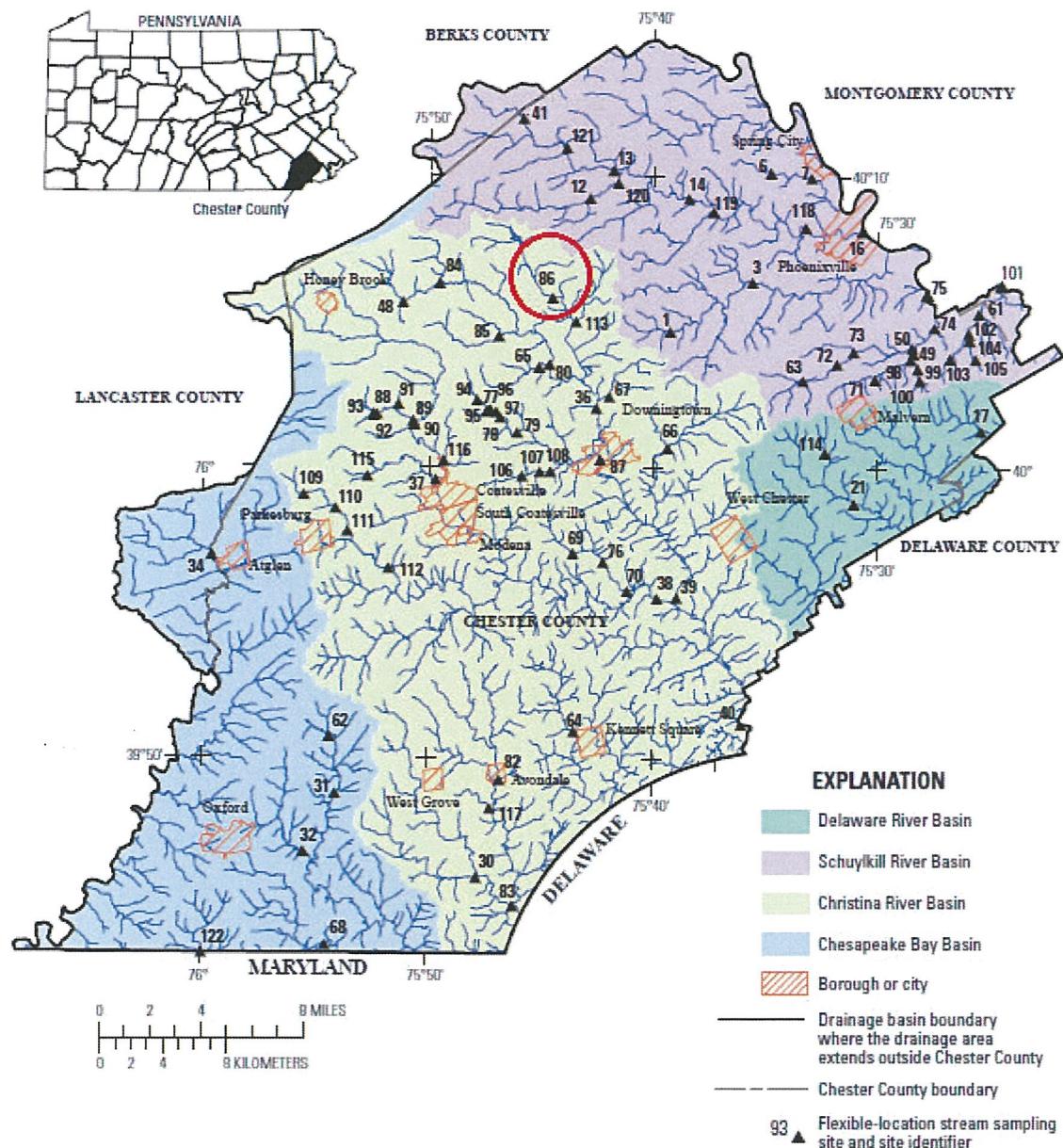


Figure 2. Locations of 84 flexible-location sampling sites and major drainage basin divides in Chester County, Pennsylvania. (Parts of Berks, Delaware, Lancaster, and Montgomery Counties are included in the study area where they contributed to the drainage area at a sampling site.)

5. Existing and Proposed Point Source and Non-Point Source Dischargers

Please see the map of Marsh Creek watershed above for location of sites.

| Site ID | Facility Name | Primary Use | Facility Type | Status |
|---------|--|-----------------------|-----------------|----------|
| 1 | MILFORD WELL STA WATER FILTRATRATION PLANT | INDUSTRIAL WASTE | DISCHARGE POINT | ACTIVE |
| 2 | UPPER UWCHLAN TWP MS4 | STORMWATER-MUNICIPAL | DISCHARGE POINT | ACTIVE |
| 3 | UPPER UWCHLAN TWP MS4 | STORMWATER-MUNICIPAL | DISCHARGE POINT | ACTIVE |
| 4 | UPPER UWCHLAN TWP MS4 | STORMWATER-MUNICIPAL | DISCHARGE POINT | ACTIVE |
| 5 | UPPER UWCHLAN TWP MS4 | STORMWATER-MUNICIPAL | DISCHARGE POINT | ACTIVE |
| 6 | UPPER UWCHLAN TWP MS4 | STORMWATER-MUNICIPAL | DISCHARGE POINT | ACTIVE |
| 7 | UPPER UWCHLAN TWP MS4 | STORMWATER-MUNICIPAL | DISCHARGE POINT | ACTIVE |
| 8 | DORLANS PAPER MILL | STORMWATER-INDUSTRIAL | DISCHARGE POINT | INACTIVE |
| 9 | UPPER UWCHLAN TWP MS4 | STORMWATER-MUNICIPAL | DISCHARGE POINT | ACTIVE |
| 10 | TEXAS EASTERN PAG-10 STATEWIDE PIPELINE | INDUSTRIAL WASTE | DISCHARGE POINT | INACTIVE |
| 11 | MILFORD WELL STA WATER FILTRATRATION PLANT | INDUSTRIAL WASTE | TREATMENT PLANT | ACTIVE |
| 12 | MILFORD WELL STA WATER FILTRATRATION PLANT | INDUSTRIAL WASTE | DISCHARGE POINT | ACTIVE |
| 13 | UPPER UWCHLAN SITE | INDUSTRIAL WASTE | DISCHARGE POINT | INACTIVE |
| 14 | UPPER UWCHLAN TWP MS4 | STORMWATER-MUNICIPAL | DISCHARGE POINT | ACTIVE |
| 15 | FEDEX FREIGHT INC. CHESTER SPRINGS FAC | STORMWATER-INDUSTRIAL | DISCHARGE POINT | ACTIVE |
| 16 | UPPER UWCHLAN TWP MS4 | STORMWATER-MUNICIPAL | DISCHARGE POINT | ACTIVE |
| 17 | DORLANS PAPER MILL | STORMWATER-INDUSTRIAL | TREATMENT PLANT | INACTIVE |
| 18 | UPPER UWCHLAN SITE | INDUSTRIAL WASTE | TREATMENT PLANT | INACTIVE |
| 19 | UPPER UWCHLAN TWP MS4 | STORMWATER-MUNICIPAL | DISCHARGE POINT | ACTIVE |
| 20 | UPPER UWCHLAN TWP MS4 | STORMWATER-MUNICIPAL | DISCHARGE POINT | ACTIVE |
| 21 | UPPER UWCHLAN TWP MS4 | STORMWATER-MUNICIPAL | DISCHARGE POINT | ACTIVE |
| 22 | UPPER UWCHLAN TWP MS4 | STORMWATER-MUNICIPAL | DISCHARGE POINT | ACTIVE |
| 23 | EAST SIDE EXPANSION PROJECT | INDUSTRIAL WASTE | DISCHARGE POINT | INACTIVE |
| 24 | EAST SIDE EXPANSION PROJECT | INDUSTRIAL WASTE | DISCHARGE POINT | INACTIVE |
| 25 | EAST SIDE EXPANSION PROJECT | INDUSTRIAL WASTE | DISCHARGE POINT | INACTIVE |
| 26 | EAST SIDE EXPANSION PROJECT | INDUSTRIAL WASTE | DISCHARGE POINT | INACTIVE |

Non-point source discharges to the Marsh Creek is made up primarily of the following sources:

- Roads and parking lots (i.e. heavy metals, sediments, road salt, etc.)
- Lawns (fertilizers, pesticides, animal waste)
- Cultivated fields (soil erosion/sedimentation)
- Construction sites (soil erosion/sedimentation)
- Livestock pastures (manure, soil erosion/sedimentation)
- Municipal stormwater management
- On-lot septic systems

6. Information regarding any of the qualifiers for designation as high quality or exceptional value waters used as a basis for the requested designation.

The petitioners believe that the following criteria are fulfilled for the Marsh Creek watershed to warrant redesignation from a HQ-TSF to an EV watershed.

§ 93.4b (b)(1)(v) - The water achieves a score of at least 92% (or its equivalent) using the methods and procedures described in subsection (a)(2)(i)(A) or (B).

The USGS stream data above illustrates the diversity and overall health of the Marsh Creek watershed. As one of the highest scoring sites in the county, Marsh Creek contains a large and diverse pollution-tolerant macroinvertebrate population.

§ 93.4b (b)(1)(iii) - The water is an outstanding National, State, regional or local resource water, and

§ 93.4b (b)(2) – The water is a surface water of exceptional ecological significance.

National Protection – Marsh Creek is located within the Schuylkill Highlands. This region was designated by an Act of Congress, The Highlands Conservation Act, which declares the area to be nationally significant and provides funding for its permanent protection. This diverse and extraordinary landscape of national significance in southeastern Pennsylvania, with its splendid vistas, quiet woodlands, pristine headwaters, rolling farmlands, and deep cultural and historic past includes the largest unbroken forest between Washington D.C. and New York City, 660 miles of Exceptional Value and High Quality Streams, a source of drinking water for over 1.75 million people, 9 Important Bird Areas, and Federally Threatened species and critical habitat areas for wildlife. One of the four major goals of the highlands is to preserve 50% of the

region's most critical habitat and watershed waters and provide stewardship of the key natural resources.

In 2016 French & Pickering Creeks Conservation Trust received funding to conduct biological assessments on water-sensitive plant and animal communities in the headwaters of the Marsh Creek.

Regional Protection - Both local and regional governments have adopted water quality protective measures to protect the Marsh Creek. The Chester County Board of Commissioners adopted the County's 'Watersheds' Plan as a functional element of the Chester County Comprehensive Plan in 2002. In 'Watersheds', the County identified Marsh Creek as one of the Highest Priority Subbasins Located Within Chester County for both Protecting Stream Resources and for Ground Water Protection (See Table 4 below). Furthermore, Marsh Creek Reservoir, the entire Marsh Creek watershed, its subbasins, and first order stream corridors, and the Great Marsh itself are identified as 'Resources to be Protected' (See Table 5 below).

Protective Local Ordinances – The townships which lie in the Marsh Creek watershed have adopted ordinances designed to protect Marsh Creek and other natural resources. East Nantmeal Township has adopted a variety of measures within their Zoning Ordinance (adopted 2011) and Stormwater Management, Grading & Erosion Control Ordinance (adopted 2014) to protect water quality in the township. The Zoning Ordinance prohibits disturbance and any activities within 100 feet of riparian buffers and wetlands, and requires one-hundred foot vegetated buffers to be installed along waterways for subdivisions and new land development. West Vincent, West Nantmeal, East Nantmeal, and Upper Uwchlan's Stormwater Ordinances all require BMPs be installed on construction sites so that such activity does not degrade physical, chemical, or biological characteristics of the township's waterways and require stream channel protection during disturbances near waterways.

Chester County Natural Heritage Inventory and Ecological Significance of the Marsh Creek watershed – Marsh Creek watershed contains the 2,500-acre Great Marsh ecosystem. The Great Marsh has been identified by Chester County as a Unique Natural Area and it is classified as a Focus Area under the Atlantic Joint Venture of Northern American Waterfowl Management Plan. It is also a designated Important Bird Area by the State Chapter of Pennsylvania Audubon Society.

The 2015 Chester County Natural Heritage Inventory listed the Marsh Creek as Natural Heritage Area and has identified two state rare natural communities in the Great Marsh, the headwaters of the Marsh Creek. The two communities include bluejoint-reed canary

grass marsh and circumneutral shrub swamp. Additionally, they identified 7 species of concern, including the imperiled marsh wren which nests in early successional wetlands. Loss of this habitat type is a significant threat to this species. Additionally, two state rare butterflies – black dash and mulberry wing, and state imperiled upland plant, Nuttalls' tick-trefoil. The 2015 Inventory identifies specific threats and stresses, which include changes to the current hydrology, degradation of water quality and quantity due to runoff from land development, agricultural use, and roads, and herbicides and pesticides sprayed along roads, fields, and right-of-ways. The recommendations for protecting the Great Marsh in the 2015 Inventory include maintaining the existing hydrology, protecting the riparian zone, avoiding fragment the surrounding forest and wetlands.

Preserved and Protected Lands – French & Pickering Creeks Conservation Trust owns approximately 675 acres within Marsh Creek watershed, including over 70 acres which contain the main stem of the Marsh Creek. French & Pickering Creeks Conservation Trust owns and manages this property with the ultimate goal of protecting the natural resources of Marsh Creek, specifically water quality for plant and animal habitat (See Appendix). Upstream from French & Pickering's fee-owned land, the Brandywine Conservancy has permanently protected over 560 acres of the Great Marsh and surrounding open space. Their easement is written to protect the Marsh Creek and other natural resources of the property. They also state, "various scientific studies of the geology, flora, and fauna of the Easement Areas by the Pennsylvania Academy of Natural Sciences, The Nature Conservancy, the Pennsylvania Audubon Society, and individual experts have revealed that the Easement Areas host of a vast diversity of animal and plant species, including several that are designated as rare, threatened, or endangered in state, federal, and global rankings of species of special concern including American bittern (*Botaurus lentiginosus*), Henslow's sparrow (*Ammodramus henslowii*), Marsh wren (*Cistothorus palustris*), Sedge wren (*Cistothorus palensis*), Bog turtle (*Clemmys muhlenbergii*), Black dash (*Euphyes canspicua*), Mulberry-winged skipper (*Poanes massasoit*), and Larger Canadian St. John's-wort (*Hypericum majus*)."

Table 4. Highest Priority Subbasins Located Within Chester County as Identified by Chester County's Watersheds Plan

| Highest Priority Subbasins Located Within Chester County | | | | |
|--|---|--|------------------------------------|---|
| Restoring Stream Water Quality (conditions and sensitive resources) | Restoring Stream Water Quality (conditions only) | Reducing Stormwater Runoff and Flooding | Protecting Stream Resources | Ground Water Protection |
| West Valley Creek (B15) | Lower East Branch Octoraro Creek (Oc1) | Middle French Creek (F2) | West Valley Creek (B15) | West Valley Creek (B15) |
| West Branch Brandywine Creek/ Rock Run/Sucker Run (B14) | West Valley Creek (B15) | West Valley Creek (B15) | Brandywine Creek/ Pocopson (B4) | Brandywine Creek/ Pocopson (B4) |
| Upper East Branch Octoraro Creek (Oc4) | West Branch White Clay Creek (WC10) | Trout Creek (Tr) | Upper Pickering Creek (Pc2) | Brandywine Creek above Chadds Ford (B1) |
| East Valley Creek (Va) | Lower White Clay Creek (WC2) | Lower White Clay Creek (WC2) | Lower Octoraro Creek (Oc2) | Brandywine Creek above Chadds Ford (B1) |
| Lower Octoraro Creek (Oc2) | Middle Branch White Clay Creek (WC3) | East Valley Creek (Va) | Marsh Creek (B10) | Upper Pickering Creek (Pc2) |

Source: Chester County Pennsylvania Water Resources Compendium (CCWA, 2001)

Table 5. Resources to be Protected as Identified by Chester County Watersheds Plan

| Resources to be Protected |
|--|
| <ul style="list-style-type: none"> • Subbasins B1, B2, B3, B9, B10, B11, and B14—first order stream corridors >35% wooded and/or wetlands • Designated trout fishery—Beaver Creek • EV watersheds (subbasin B13) • HQ streams (subbasins B7, B10, B11, B12, B14, and B15) • Designated cold-water streams • Chambers Lake and Marsh Creek water supply reservoirs and fisheries • Rock Run water supply reservoir • Struble Lake Recreational Lake and Fishery • Surface water intakes for public water supplies East Branch—Downington, Ingram's Mill, Wilmington; West Branch—Embreveille, Rock Run, Wagontown • Great Marsh • >25 PNDI sites • 11 historic bridges • Carbonate aquifer underlying extensive portions of watershed • Struble Trail and planned inter-connecting regional Chester Valley Trail • Designated Pennsylvania Scenic Corridor • Multiple recreational/eco-tourism uses • 56% of total stream miles are first order streams • 10 large instream wastewater discharges |

§ 93.4b (b)(2) – The water is a surface water of exceptional ecological significance.

The Great Marsh and Marsh Creek are clearly ecologically significant, however the Great Marsh is such a unique and sensitive habitat it is hard to characterize via traditional chemical, physical, and biological data. Furthermore, the Great Marsh is an Exceptional Value wetland, exhibiting two of the qualifiers under PA CODE § 105.17.

§ 105.17 (1)(i) – Wetlands which serve as habitat for fauna or flora listed as “threatened” or “endangered” under the Endangered Species Act of 1973 (7 U.S.C.A. § 136; 16 U.S.C.A. §§ 4601-9, 460k-1, 668dd, 715i, 715a, 1362, 1371, 1372, 1402 and 1531 – 1543), the Wild Resource Conservation Act (32 P. S. §§ 5301 – 5314), 30 Pa.C.S. (relating to the Fish and Boat Code) or 34 Pa.C.S. (relating to the Game and Wildlife Code).

and

§ 105.17 (1)(iv) - Wetlands located along an existing public or private drinking water supply, including both surface water and groundwater sources, that maintain the quality or quantity of the drinking water supply.

Marsh Creek/Great Marsh serves as habitat for the federally threatened Bog Turtle (State Rank: S2, Global Rank: G3) and Spotted Turtles (State Rank: S3, Global Rank: G5). **Both species have been identified and verified in the Great Marsh.**

Also, the Marsh Creek/Great Marsh wetlands are located along an existing public or private drinking water supply, draining to the Marsh Creek Reservoir. The Great Marsh is one of the largest periglacial freshwater marshes in the state, and the last remaining periglacial freshwater marsh in southeastern Pennsylvania. The unique geology which formed the headwaters of Marsh Creek has created a unique habitat which contains state and federally endangered species and species of concern, including American bittern (Botaurus lentiginosus), Henslow’s sparrow (Ammodramus henslowii), Marsh wren (Cistothorus palustris), Sedge wren (Cistothorus palensis), Black dash (Euphyes cæspicua), Mulberry-winged skipper (Poanes massasoit), and Larger Canadian St. John’s-wort (Hypericum majus).

7. Land use in the Marsh Creek watershed is primarily agricultural, wooded, residential, and wetland. In general, much of the watershed is open space, and certain townships such as West Vincent and East Nantmeal have dedicated open space funds to ensure the watershed remains in its natural state. East Nantmeal Township alone has preserved over 80% of its land as open space. In addition to the 675 acres owned by French &

Pickering, the 1,700-acre Marsh Creek State Park also lies within the watershed. There has been development in certain areas of the watershed, mostly within Upper Uwchlan. Below is a breakdown of land use within the Marsh Creek watershed.

Wooded – 37.3%
 Agricultural – 34.7%
 Residential – 13.3%
 Wetland – 8.6%
 Rangeland – 4.0%
 Water – 1.1%
 Urban – 0.8%
 Barren/Vacant – 0.2%

Table 6. Land Use in the Marsh Creek watershed

Table 16. Summary of land use in the subbasin of selected flexible-location sites in the Stream Conditions of Chester County Biological Monitoring Network, Chester County, Pennsylvania, 1998–2009.

[USGS, U.S. Geological Survey; mi², square miles; Land use determined from Delaware Valley Regional Planning Commission, 2005]

| USGS station number | USGS site identifier | Stream | Drainage area (mi ²) | Land use (percent) | | | | | | | |
|---------------------|----------------------|---|----------------------------------|--------------------|-------|-------------|-----------|--------|-------|---------|---------------|
| | | | | Residential | Urban | Agriculture | Rangeland | Wooded | Water | Wetland | Barren/vacant |
| 01473210 | 101 | Trout Creek near Port Kennedy, Pa. | 8.46 | 144.3 | 140.2 | 10.5 | 16.1 | 15.2 | 10.1 | 10.0 | 13.6 |
| 01478137 | 82 | Trout Run at Avondale, Pa. | 1.34 | 20.7 | 16.7 | 30.5 | 11.2 | 18.6 | 1.6 | 0.6 | 0.0 |
| 01480376 | 92 | South Branch Birch Run near Martins Corner, Pa. | 0.64 | 10.8 | 3.6 | 61.5 | 0.1 | 18.5 | 0.5 | 1.7 | 3.4 |
| 01480389 | 93 | North Branch Birch Run near Martins Corner, Pa. | 1.79 | 18.1 | 4.3 | 10.9 | 5.0 | 59.6 | 0.2 | 0.6 | 1.1 |
| 01480390 | 88 | Birch Run at Martins Corner, Pa. | 2.49 | 16.9 | 4.1 | 25.6 | 3.7 | 46.7 | 0.3 | 0.9 | 1.8 |
| 01480621 | 109 | Buck Run near Parkesburg, Pa. | 2.57 | 7.1 | 5.3 | 51.5 | 7.1 | 28.5 | 0.4 | 0.0 | 0.0 |
| 014806215 | 110 | Buck Run at Sadsburyville near Parkesburg, Pa. | 4.50 | 12.4 | 4.0 | 44.1 | 7.0 | 31.2 | 0.3 | 0.9 | 0.1 |
| 01480623 | 111 | Buck Run at Pomeroy, Pa. | 6.37 | 14.9 | 4.5 | 42.4 | 10.1 | 26.0 | 0.4 | 0.9 | 0.8 |
| 014806273 | 112 | Buck Run at Glenrose near Coatesville, Pa. | 12.60 | 16.3 | 4.8 | 43.8 | 8.1 | 24.7 | 0.4 | 1.1 | 0.7 |
| 01480658 | 85 | Indian Run at Glenmoore, Pa. | 4.27 | 21.7 | 5.2 | 21.7 | 12.7 | 37.4 | 0.7 | 0.6 | 0.0 |
| 01480675 | 86 | Marsh Creek near Glenmoore, Pa. | 8.57 | 13.3 | 0.8 | 34.8 | 4.0 | 37.3 | 1.1 | 8.6 | 0.2 |

¹Land use for the Montgomery County part (3.3 square miles) of Trout Creek subbasin was estimated from aerial photographs.

8. The Names of All Municipalities Through Which the Watershed or Segment Flows, Including Official Names and Contacts.

East Nantmeal Township

Township Secretary: Kathy Brumfield
 338 Conestoga Road
 Glenmoore, PA 19343
 Ph: (610) 458-1970

Upper Uwchlan Township

Township Manager: Cary B. Vargo
 140 Pottstown Pike
 Chester Springs, PA 19425
 Ph: (610) 458-9400

Uwchlan Township

Township Manager: Douglass D. Hanley
715 North Ship Road
Exton, PA 19341
Ph: (610) 363-9450

Wallace Township

Board Supervisor: William T. Moore
1250 Creek Road
P.O. Box 670
Glenmoore, PA 19343
Ph: (610) 942-2880

West Vincent Township

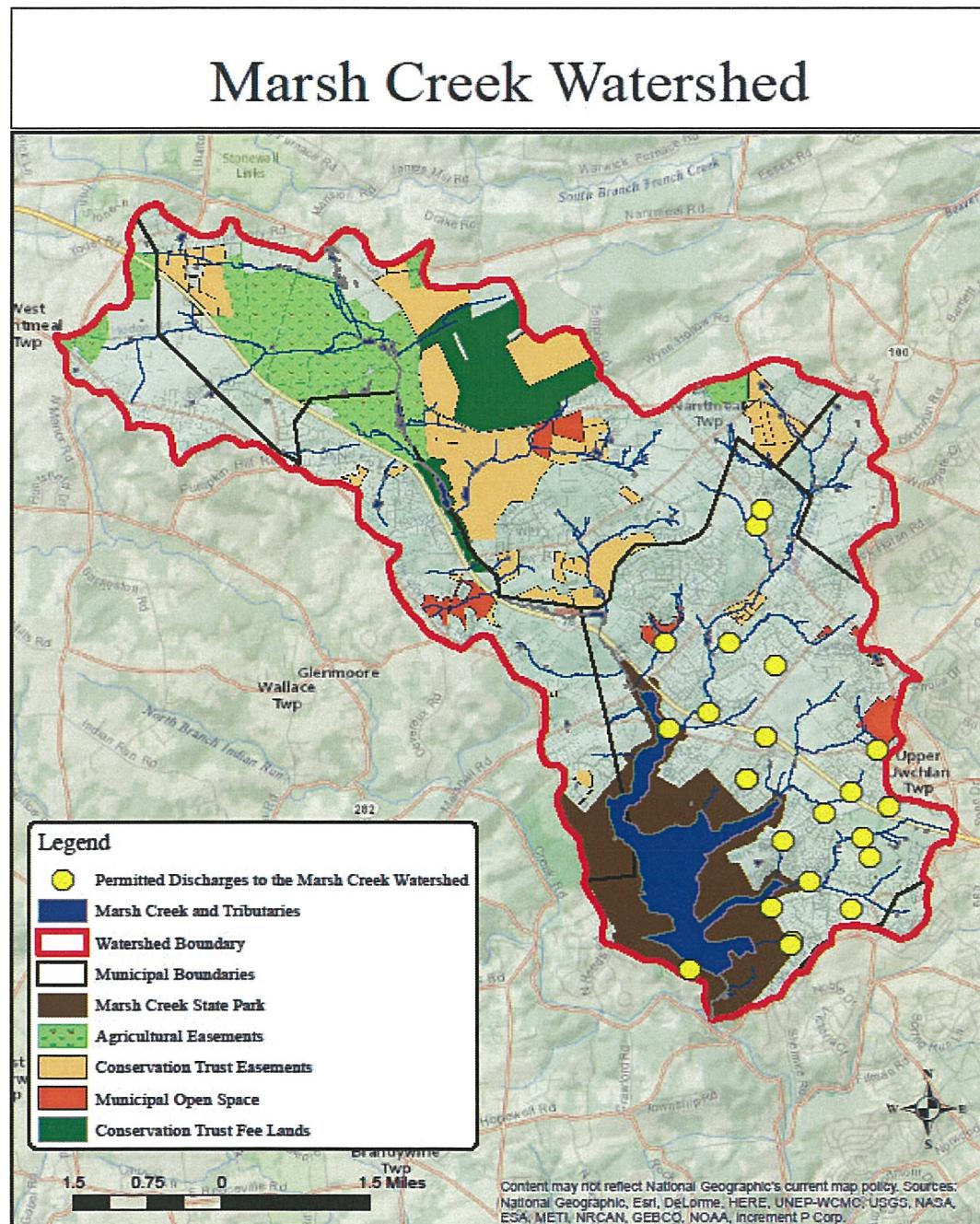
Township Secretary: Tammy Swavely
729 St. Matthews Road
Chester Springs, PA 19425
Ph: (610) 458-3205

West Nantmeal Township

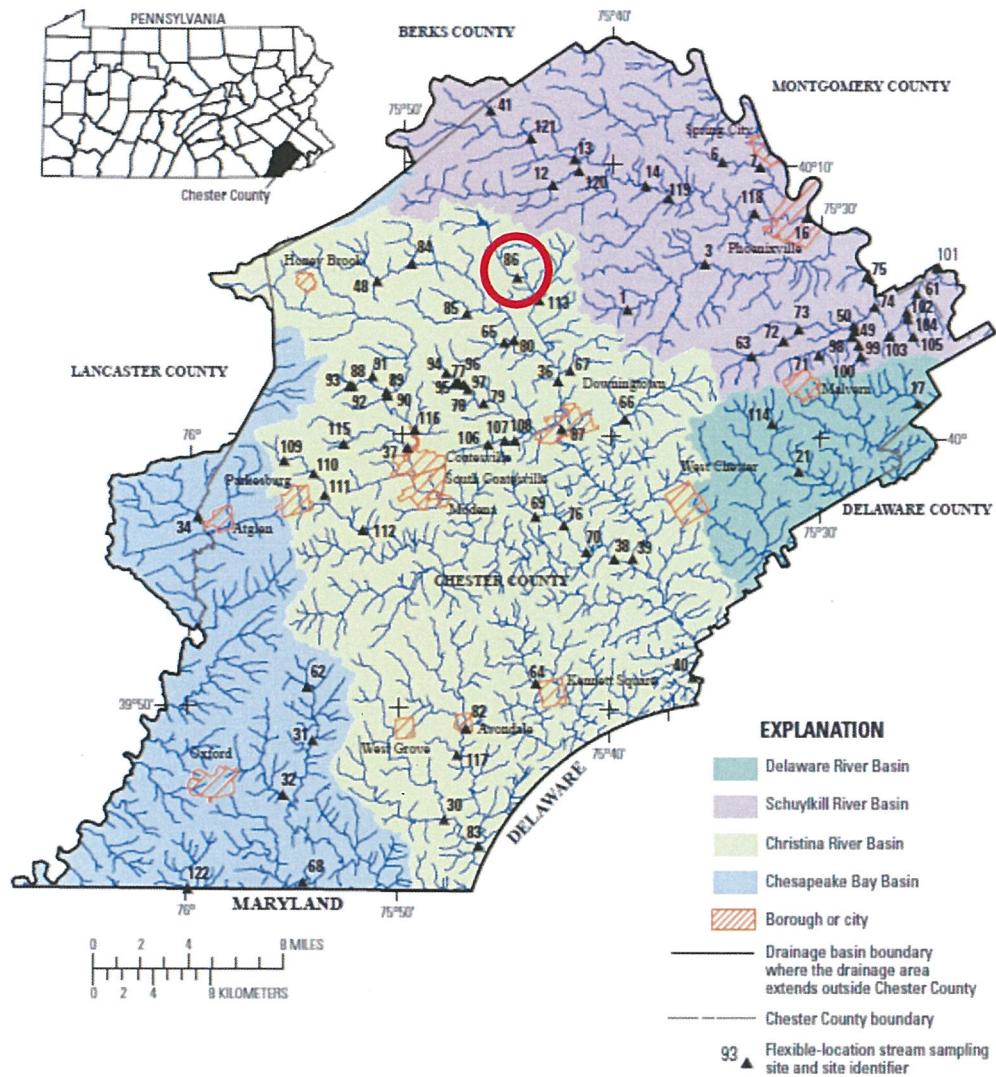
Township Secretary: Susan L. Ward
455 N. Manor Road
P.O. Box 234
Elverson, PA 19520
Ph: (610) 286-9722

9. Location Information Relevant to Items 4-8 Displayed on a Map or Maps, if Possible.

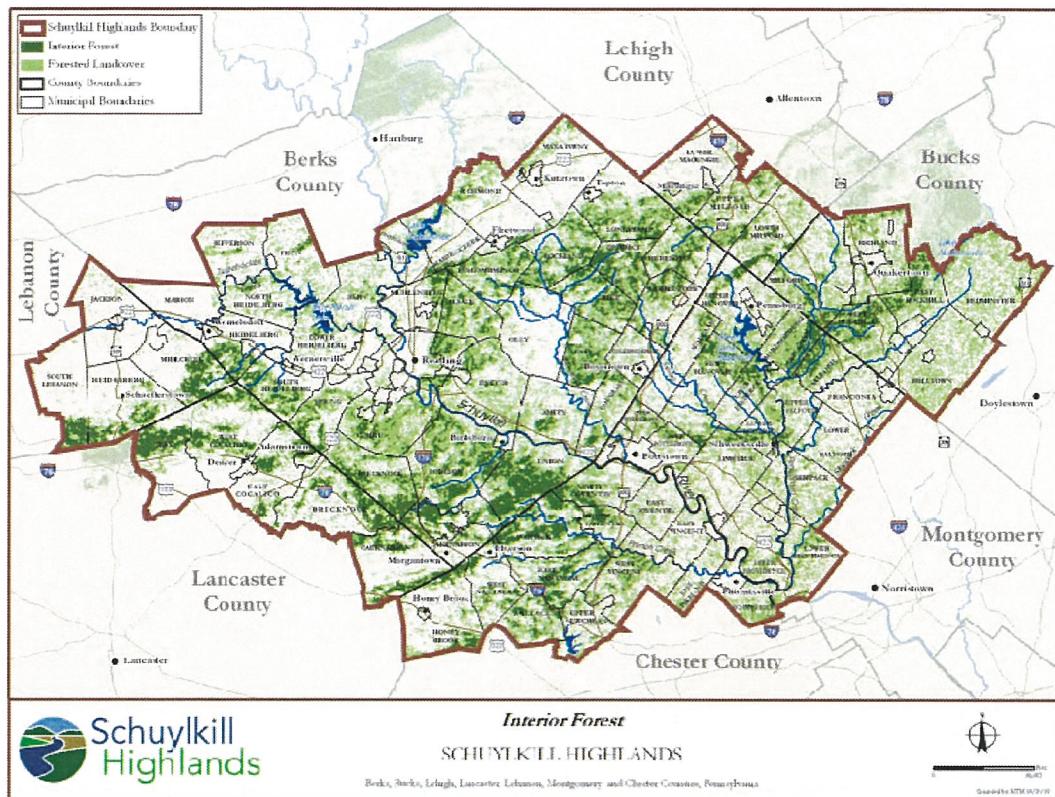
1. Map of Marsh Creek Watershed with Protected Lands and Discharge Points



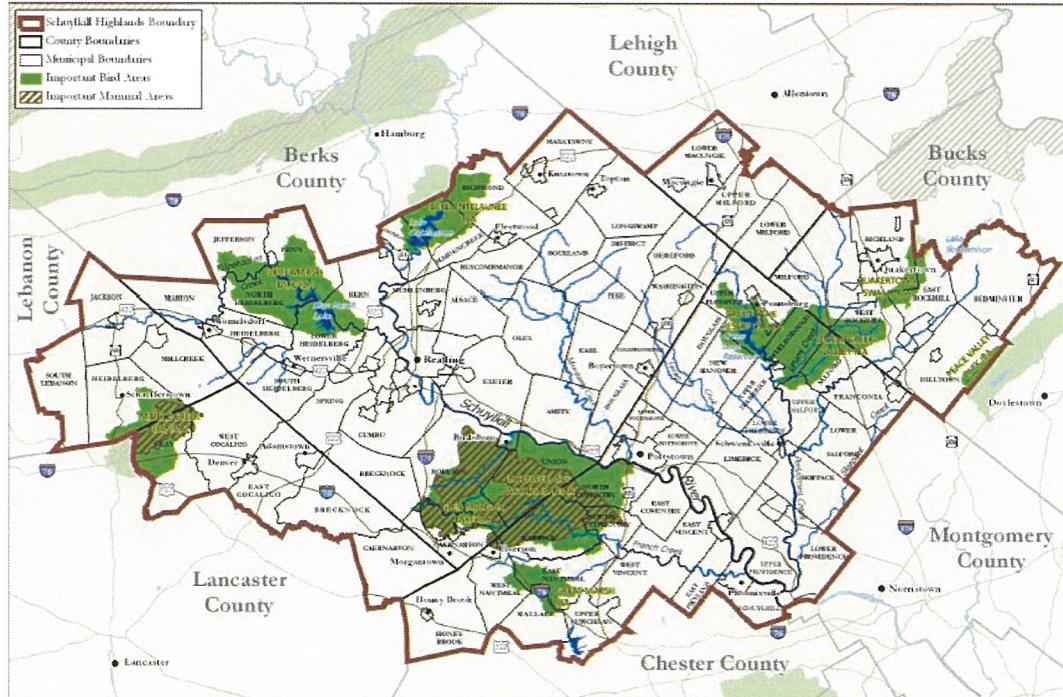
2. USGS Sampling Site in Marsh Creek Watershed



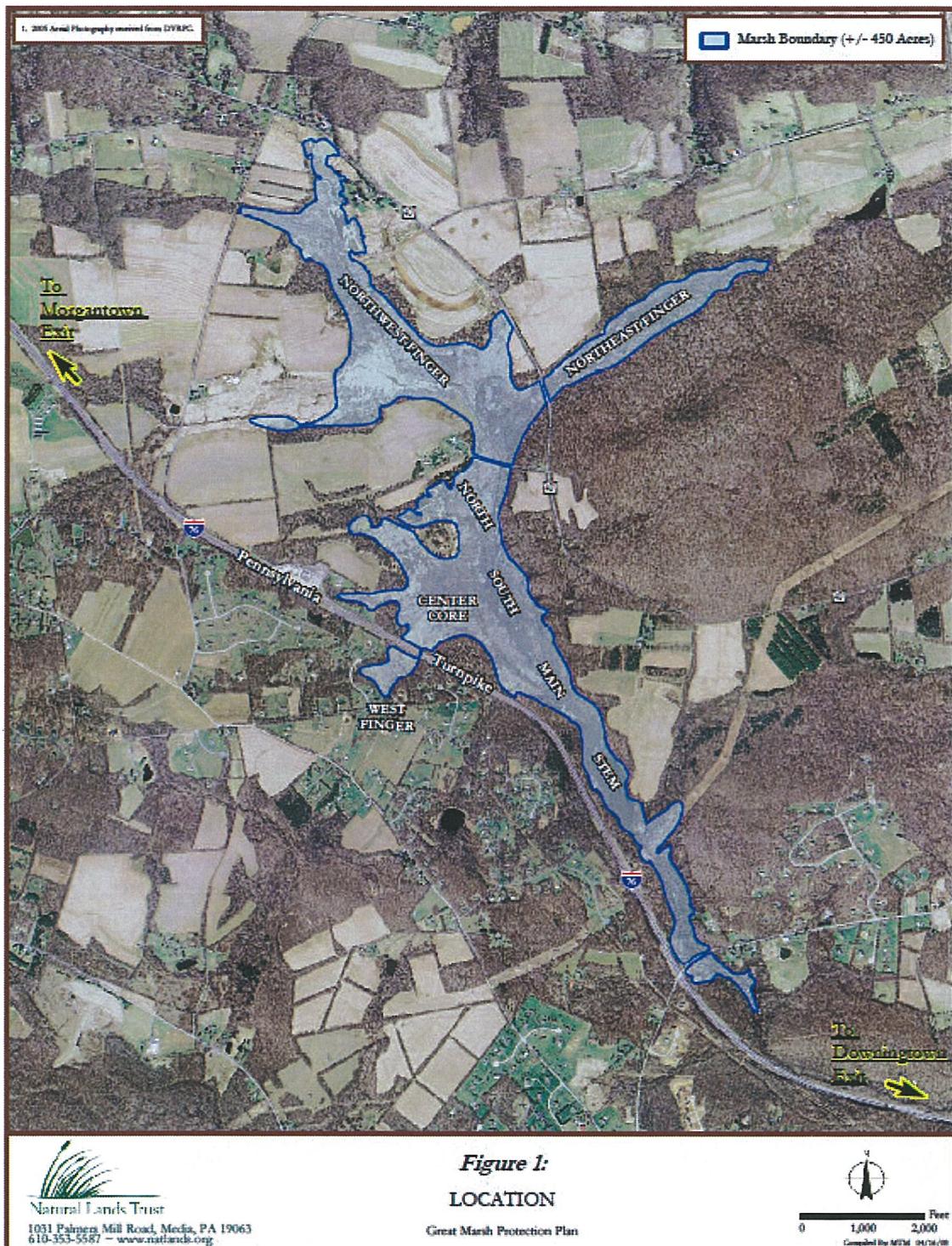
3. Interior Forests of the Schuylkill Highlands



4. Important Bird and Mammal Areas of the Schuylkill Highlands



5. Great Marsh Map



APPENDIX

Letters of Support

Brandywine Red Clay Alliance
Brandywine Conservancy
Chester County Conservation District
Chester County Water Resources Authority
Franklin & Marshall College
Guardians of the Brandywine
Green Valleys Watershed Association
Villanova University
Victory Brewing
University of Delaware
The Nature Conservancy
Natural Lands Trust
West Vincent Township
French & Pickering Creeks Conservation Trust Resolution for EV Upgrade

Supporting Environmental Data

2015 Great Marsh Herpetological Report
Bog Turtle Finding Report
Brandywine Conservancy – East Nantmeal Township Testimony
Nature Conservancy – East Nantmeal Township Testimony



1760 Unionville-Wawaset Road, West Chester, PA 19382 | 610.793.1090
contact@brandywineredclay.org | brandywineredclay.org

June 9, 2016

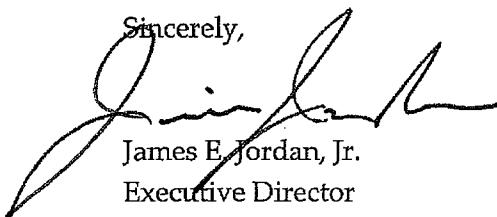
Mr. Patrick Gardner
French & Pickering Creeks Conservation Trust
511 Kimberton Road
Phoenixville, PA 19460

Dear Patrick,

We are pleased to support your Petition to upgrade the designation of the Marsh Creek from High Quality to Exceptional Value. We believe that these waters should be given the highest level of protection the Commonwealth of Pennsylvania offers. Protecting this valuable resource, which has one of the highest benthic macroinvertebrate scores in Chester County (USGS), along with providing drinking water to the surrounding communities (Marsh Creek State Park Reservoir, which the Marsh Creek is the main stream suppling the reservoir). Chester County has identified the Great Marsh, headwaters to the Marsh Creek, as a Unique Natural Area, part of a 2,500-acre Exceptional Value wetland. The Great Marsh ecosystem is designated an Important Bird Area as well as a Natural Heritage area with numerous rare, threatened or endangered species on state, federal, and global rankings of species of special concern.

We hope that you will convey our support to the decision-making bodies.

Sincerely,



James E. Jordan, Jr.
Executive Director

CC Robert Struble



**BRANDYWINE
CONSERVANCY**

*Preserving Our
Land & Water*

June 13, 2016

Patrick Gardner
French & Pickering Creeks Conservation Trust
511 Kimberton Road
Phoenixville, PA 19460

Re: Petition for EV Upgrade of Marsh Creek

Dear Patrick:

The Brandywine Conservancy strongly supports the French & Pickering Creeks Conservation Trust's Petition to change the designation of Marsh Creek from High Quality to Exceptional Value. We agree that these waters should be given the highest level of protection.

We need to protect Marsh Creek because it is an extremely valuable resource, which has the most diverse benthic macroinvertebrate communities in Chester County, provides drinking water to the surrounding communities, and is part of the larger 2,500-acre Exceptional-Value Wetland. The Great Marsh ecosystem is designated as a Unique Natural Area by Chester County and an Important Bird Area by the State Chapter of Pennsylvania Audubon Society. Lastly, the Great Marsh hosts a vast diversity of animal and plant species, including several that are designated as rare, threatened, or endangered in state, federal, and global rankings of species of special concern.

We hope that you will convey the Conservancy's support to the decision making bodies.

Sincerely,

Seung Ah Byun, PhD, PE
Senior Planner for Water Resources, Brandywine Conservancy



June 9, 2016

Patrick Gardner
French & Pickering Creeks Conservation Trust
511 Kimberton Road
Phoenixville, PA 19460

Subject: Marsh Creek Upgrade

Dear Patrick,

The Chester County Conservation District strongly supports the efforts and petition of the French and Pickering Creeks Conservation Trust to upgrade the water quality designation of Marsh Creek from High Quality (at present) to Exceptional Value (EV). We agree that these waters should be given the highest level of protection.

This new designation will protect this valuable resource which has and continues to experience a high level of development with the potential for increased non-point source pollution. This designation upgrade will strengthen the conservation/natural resource rules and regulations to which all must comply in order to protect the watershed during construction and/or agricultural cultivation.

We hope that you will convey our support to the decision making bodies. If you have questions or require additional information, please contact Christian E. Strohmaier, Manager, at 610-925-4920 EXT. 0 or cstrohmaier@chesco.org

We wish you well in this effort and hope for great success with an EV designation for Marsh Creek. .

Sincerely,

Charlotte D. Sprenkle
Watershed Coordinator

THE COUNTY OF CHESTER

CHESTER COUNTY

WATER RESOURCES AUTHORITY
Government Services Center
601 Westtown Road, Suite 260
P.O. Box 2747
West Chester, PA 19380-0990



CHESTER COUNTY BOARD

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Michelle Kichline

Robert G. Struble, Jr., Chairman
Janet L. Bowers, P.G., Executive Director

Telephone: (610) 344-5400
Fax: (610) 344-5401

August 3, 2016

Patrick Gardner
French & Pickering Creeks Conservation Trust
511 Kimberton Road
Phoenixville, PA 19460

RE: Letter of Support – Petition to Upgrade Marsh Creek, East Branch Brandywine Creek, Chester County to Exceptional Value

Dear Patrick:

The Chester County Water Resources Authority supports the French & Pickering Creeks Conservation Trust's petition requesting that the Pennsylvania Department of Environmental Protection consider Marsh Creek, including its tributaries and Marsh Creek Reservoir, for redesignation from High Quality to Exceptional Value (EV). If redesignated to EV, the upgrade would enable the creek, its headwaters in the Great Marsh, tributaries and the lake in Marsh Creek State Park to maintain its water quality, despite the significant current and future development pressure in this area. This proposed effort is also essential to protect water quantity. Marsh Creek, the Reservoir, and the East Branch Brandywine Creek watershed serve as an important drinking water source for the greater Downingtown Region, West Chester Region, City of Wilmington and northern New Castle County in the state of Delaware. This redesignation effort also dovetails with other watershed protection and restoration efforts in the Christina River Basin watershed.

The Great Marsh and the Marsh Creek subwatershed, including Marsh Creek Lake, are designated as Natural Heritage Areas in Chester County by the Pennsylvania Natural Heritage Program and these areas are ranked as state significant. The Great Marsh supports two state rare natural communities and seven species of concern and Marsh Creek Lake supports several species of concern.

Landscapes2 and Watersheds – An Integrated Water Resources Management Plan for Chester County, PA and its Watersheds promote the protection of state-designated sensitive aquatic habitat and supports upgrades in state stream designations where justified by stream conditions and uses. The subbasin containing Marsh Creek is ranked as one of the highest priorities in Chester County for the protection of stream resources and groundwater protection because of its critical role in water supply and the maintenance of stream base flows for Brandywine Creek. Marsh Creek Reservoir serves as an essential part of regional water supply and is considered an important component of future water supply needs as the region grows. All municipalities in the Marsh Creek subwatershed have adopted standards consistent with the *County-wide Act 167 Stormwater Management Plan for Chester County, PA* to address stormwater quality and quantity management.

The upgrade to EV would afford the highest level of protection for a critical water resource. This proposed redesignation will work in tandem with other local and regional efforts to protect local surface water quality, groundwater quality, regional water supplies, and state significant habitats. CCWRA supports this redesignation and encourages favorable consideration of the petition.

Sincerely,

A handwritten signature in blue ink that reads "Janet L. Bowers".

Janet L. Bowers, P.G.
Executive Director

FRANKLIN & MARSHALL

Dorothy J. Merritts, Ph.D. & Robert C. Walter, Ph.D.,

Department of Earth and Environment Franklin & Marshall College P.O. Box 3003 Lancaster, Pennsylvania 17604-3003
Office: 717.291.4398 Home: 717.290.7374 Fax: 717.291.4186 dorothy.merritts@fandm.edu robert.walter@fandm.edu

June 9, 2016

French & Pickering Creeks Conservation Trust
511 Kimberton Road
Phoenixville, PA 19460

Dear Patrick,

We are pleased to support your Petition to upgrade the designation of the Marsh Creek from High Quality to Exceptional Value. We believe that these waters should be given the highest level of protection the Commonwealth of Pennsylvania offers. Protecting this valuable resource, which has one of the highest benthic macroinvertebrate scores in Chester County (USGS), along with providing drinking water to the surrounding communities (Marsh Creek State Park Reservoir, which the Marsh creek is the main stream suppling the reservoir). Chester County has identified the Great Marsh, headwaters to the Marsh Creek, as a Unique Natural Area, part of a 2,500 acre Exceptional Value wetland. The Great Marsh ecosystem is designated an Important Bird Area as well as a Natural Heritage area with numerous rare, threatened or endangered species on state, federal, and global rankings of species of special concern.

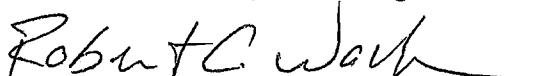
We hope that you will convey our support to the decision making bodies.

Sincerely,



Dorothy J. Merritts, Ph.D

The Harry W. & Mary B. Huffnagle Professor of Geoscience



Robert C. Walter, Ph.D.

Director, Big Spring Run Restoration Project

<http://www.bsr-project.org/>



June 12, 2016

French & Pickering Creeks Conservation Trust
511 Kimberton Road
Phoenixville, PA 19460

Dear Patrick,

We are pleased to support your Petition to upgrade the designation of the Marsh Creek from High Quality to Exceptional Value. We believe that these waters should be given the highest level of protection the Commonwealth of Pennsylvania offers.

Marsh Creek, which has one of the highest benthic macro-invertebrate scores in Chester County (USGS), is the main stream suppling water to the Marsh Creek State Park Reservoir which provides drinking water to the surrounding community. By protecting this valuable resource, we protect the drinking water for thousands of residents and businesses in Chester County.

Chester County has identified the Great Marsh, headwaters to the Marsh Creek, as a Unique Natural Area, part of a 2,500 acre Exceptional Value wetland. The Great Marsh ecosystem is designated an Important Bird Area as well as a Natural Heritage area with numerous rare, threatened or endangered species on state, federal, and global rankings of species of special concern.

We hope that you will convey our support to the decision making bodies.

Sincerely,
Tish Molloy
Tish Molloy, President
Guardians of the Brandywine



June 8, 2016

French & Pickering Creeks Conservation Trust
Patrick Gardner
511 Kimberton Road
Phoenixville, PA 19460

Dear Patrick,

We are pleased to support your Petition to upgrade the designation of the Marsh Creek from High Quality to Exceptional Value. We believe that these waters should be given the highest level of protection the Commonwealth of Pennsylvania offers. Protecting this valuable resource, which has one of the highest benthic macroinvertebrate scores in Chester County (USGS), along with providing drinking water to the surrounding communities (Marsh Creek State Park Reservoir, which the Marsh creek is the main stream suppling the reservoir). Chester County has identified the Great Marsh, headwaters to the Marsh Creek, as a Unique Natural Area, part of a 2,500 acre Exceptional Value wetland. The Great Marsh ecosystem is designated an Important Bird Area as well as a Natural Heritage area with numerous rare, threatened or endangered species on state, federal, and global rankings of species of special concern

We hope that you will convey our support to the decision making bodies.

Sincerely,

Edward F. Bacon

Edward F. Bacon
President

Victoria Laubach

Victoria Laubach
Executive Director

June 9, 2016

French & Pickering Creeks Conservation Trust
511 Kimberton Road
Phoenixville, PA 19460

Dear Patrick,

We are pleased to support your Petition to upgrade the designation of the Marsh Creek from High Quality to Exceptional Value. We believe that these waters should be given the highest level of protection the Commonwealth of Pennsylvania offers. Protecting this valuable resource, which has one of the highest benthic macroinvertebrate scores in Chester County (USGS), along with providing drinking water to the surrounding communities (Marsh Creek State Park Reservoir, which the Marsh creek is the main stream suppling the reservoir). Chester County has identified the Great Marsh, headwaters to the Marsh Creek, as a Unique Natural Area, part of a 2,500 acre Exceptional Value wetland. The Great Marsh ecosystem is designated an Important Bird Area as well as a Natural Heritage area with numerous rare, threatened or endangered species on state, federal, and global rankings of species of special concern.

We hope that you will convey our support to the decision making bodies.

Sincerely,



Dr. Steven T. Goldsmith
Assistant Professor of Environmental Science
Department of Geography and the Environment
Villanova University

Mr. Patrick Gardner
French & Pickering Creeks Conservation Trust
511 Kimberton Road
Phoenixville, PA 19460

June 16, 2016

Dear Patrick,

We at Victory Brewing Company believe that the Marsh Creek waters should be given the highest level of protection the Commonwealth of Pennsylvania can offer and, therefore, fully support your Petition to upgrade the designation of the Marsh Creek from High Quality to Exceptional Value.

It is our understanding that Marsh Creek boasts one of the highest benthic macro-invertebrate scores in Chester County according to the US Geological Survey which, we believe, justifies Exceptional Value status. Additionally, as the main stream supplying water to the Marsh Creek State Park Reservoir, a reservoir which provides drinking water to the surrounding community, Exceptional Value designation of Marsh Creek is justified. As a business employing over 420 dedicated individuals, we at Victory believe that the valuable resource of Marsh Creek should be protected for the enjoyment of thousands of residents and businesses in Chester County within its watershed.

It is our understanding that the Great Marsh, headwaters to the Marsh Creek, has been identified as a Unique Natural Area and is part of a 2,500 acre Exceptional Value wetland. Additionally the Great Marsh ecosystem is designated an Important Bird Area as well as a Natural Heritage area with numerous rare, threatened or endangered species on state, federal, and global rankings of species of special concern. These facts further demonstrate that Marsh Creek is a vital part of a thriving ecosystem that is worthy of utmost care.

Please convey our support to those agencies and individuals engaged in the decision to elevate the Marsh Creek from High Quality to Exceptional Value.

Sincerely,

A handwritten signature in blue ink that reads "William J. Covaleski".

William J. Covaleski
Founder & Brewmaster
Victory Brewing Company



School of Public Policy
& Administration
INSTITUTE FOR PUBLIC ADMINISTRATION

180 Graham Hall
Newark, DE 19716-7380
Phone: 302-831-8971
Fax: 302-831-3488
Email: ipa@udel.edu

June 9, 2016

French & Pickering Creeks Conservation Trust
511 Kimberton Road
Phoenixville, PA 19460

Dear Patrick:

We are pleased to support your Petition to upgrade the designation of the Marsh Creek from High Quality (HQ) to Exceptional Value (EV). Marsh Creek Reservoir and the Brandywine Creek watershed are part of the largest source of drinking water for Downingtown and West Chester, Pennsylvania and Wilmington, Delaware's largest city.

We believe that these waters should be given the highest level of protection by the Commonwealth of Pennsylvania. Protecting this valuable resource, which has one of the highest benthic macroinvertebrate scores in Chester County (USGS), along with providing drinking water to the surrounding communities (Marsh Creek State Park Reservoir, which the Marsh creek is the main stream suppling the reservoir). Chester County has identified the Great Marsh, headwaters to the Marsh Creek, as a Unique Natural Area and part of a 2,500-acre Exceptional Value wetland. The Great Marsh ecosystem is designated an Important Bird Area as well as a Natural Heritage area with numerous rare, threatened or endangered species on state, federal, and global rankings of species of special concern.

Thank you for the opportunity to comment and please convey our support to the decision making bodies.

Sincerely,

Gerald J. Kauffman, Ph. D., Director
University of Delaware
Water Resources Center
Newark, Del. 19716



Protecting nature. Preserving life.

2101 North Front Street
Building #1, Suite 200
Harrisburg, PA 17110

nature.org/pennsylvania

Tel (717) 232-6001
Fax (717) 230-1909

August 17, 2016

French & Pickering Creeks Conservation Trust
511 Kimberton Road
Phoenixville, PA 19460

Dear Patrick,

We are pleased to support your Petition to upgrade the designation of the Marsh Creek from High Quality to Exceptional Value. We believe that these waters should be given the highest level of protection the Commonwealth of Pennsylvania offers. Protecting this valuable resource, which has one of the highest benthic macroinvertebrate scores in Chester County (USGS), along with providing drinking water to the surrounding communities (Marsh Creek State Park Reservoir, which the Marsh Creek is the main stream suppling the reservoir), has been a high priority for both our organizations for decades. Chester County has identified the Great Marsh, headwaters to the Marsh Creek, as a Unique Natural Area, part of a 2,500 acre Exceptional Value wetland. The Great Marsh ecosystem is designated an Important Bird Area as well as a Natural Heritage area with numerous rare, threatened or endangered species on state, federal, and global rankings of species of special concern.

We hope that you will convey our support to the decision making bodies.

Sincerely,

A handwritten signature in black ink, appearing to read "Elizabeth Johnson".
Elizabeth Johnson
Director of Ecological Management



Natural Lands Trust

Hildacy Farm Preserve
1031 Palmers Mill Road
Media, PA 19063
tel: 610-353-5587
fax: 610-353-0517
info@natlands.org
natlands.org

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June 9, 2016

Patrick Gardner, Conservation Associate
French & Pickering Creeks Conservation Trust
511 Kimberton Road
Phoenixville, PA 19460

Re: Designation of Marsh Creek as Exceptional Value

Dear Patrick,

I am pleased to support the French and Pickering Creeks Conservation Trust's Petition to upgrade the designation of the Marsh Creek from High Quality to Exceptional Value. I believe that these waters should be given the highest level of protection the Commonwealth of Pennsylvania offers. Protecting this valuable resource, which has one of the highest benthic macroinvertebrate scores in Chester County (USGS), along with providing drinking water to the surrounding communities (Marsh Creek State Park Reservoir, which the Marsh Creek is the main stream supplying the reservoir). Is critical in sustaining its water quality and benefit to the overall watershed.

Chester County has also identified the Great Marsh, headwaters to the Marsh Creek, as a Unique Natural Area, part of a 2,500 acre Exceptional Value wetland. The Great Marsh ecosystem is also designated an Important Bird Area as well as a Natural Heritage area with numerous rare, threatened and endangered species on state, federal, and global rankings of species of special concern.

I highly recommend and support the process of re-designating Marsh Creek as an exceptional value stream.

If you need any further support, please do not hesitate to contact me.

Kindest regards,

Carol De Wolf

Director, Schuylkill Highlands Conservation Landscape
Natural Lands Trust



PA: The official registration and financial information of Natural Lands Trust, Inc. may be obtained from the Pennsylvania Department of State by calling toll free, within Pennsylvania, 1-800-732-0999. Registration does not imply endorsement. NJ: Information filed with the Attorney General concerning this charitable solicitation and the percentage of contributions received by the charity during the last reporting period that were dedicated to the charitable purpose may be obtained from the Attorney General of the State of New Jersey by calling 973-504-6215 and is available on the internet at www.NJConsumerAffairs.gov. Registration with the Attorney General does not imply endorsement.

JOHN JACOBS, Chairman
DAVID BROWN, Vice Chairman
MICHAEL SCHNEIDER, Member

BOARD OF SUPERVISORS

West Vincent Township
729 St. Matthews Road
Chester Springs, PA 19425-3301
610-458-1601 610-458-1603
www.westvincenttwp.org.

ERICA BATDORF
Township Manager

August 10, 2016

French & Pickering Creeks Conservation Trust
511 Kimberton Road
Phoenixville, PA 19460

Dear Patrick,

We are pleased to support your Petition to upgrade the designation of the Marsh Creek from High Quality to Exceptional Value. We believe that these waters should be given the highest level of protection the Commonwealth of Pennsylvania offers. Protecting this valuable resource, which has one of the highest benthic macroinvertebrate scores in Chester County (USGS), along with providing drinking water to the surrounding communities (Marsh Creek State Park Reservoir, which the Marsh creek is the main stream supplying the reservoir). Chester County has identified the Great Marsh, headwaters to the Marsh Creek, as a Unique Natural Area, part of a 2,500 acre Exceptional Value wetland. The Great Marsh ecosystem is designated an Important Bird Area as well as a Natural Heritage area with numerous rare, threatened or endangered species on state, federal, and global rankings of species of special concern.

We hope that you will convey our support to the decision making bodies.

Sincerely,



John Jacobs, Chairman
West Vincent Township Board of Supervisors



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DIRECTOR OF ADMINISTRATION

PATRICK GARDNER
CONSERVATION ASSOCIATE

KERSTEN APPLER
LAND PRESERVATION ASSOCIATE

DONNA DELANY
STEWARDSHIP ADVISOR

NANCY LONG
STEWARDSHIP COORDINATOR

RESOLUTION 4-2016

TO SUPPORT A PETITION TO UPGRADE MARSH CREEK TO EV STATUS

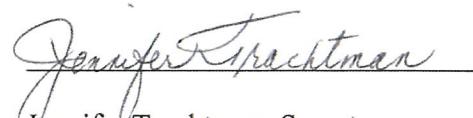
WHEREAS, the Board of French and Pickering Creeks Conservation Trust has made the protection of water quality a priority and;

WHEREAS, The Nature Conservancy conveyed 675 acres of land to the Trust in November 2015, the majority of which are located in the Marsh Creek Watershed and;

WHEREAS, a collaboration has been formed among local conservation organizations, including Green Valleys Watershed Association and The Guardians of the Brandywine, to submit a petition to DEP to upgrade the status of the Marsh Creek to Exceptional Value and;

WHEREAS, the Trust has been asked to support the petition by agreeing to manage its fee-owned lands within the Marsh Creek watershed for long-term water quality protection;

NOW, THEREFORE, BE IT RESOLVED this 25th day of May, 2016, that the Board of Directors of French and Pickering Creeks Conservation Trust, Inc., by a vote in favor by a majority of its members, approves this Resolution.



Jennifer Trachtman, Secretary

r

2015 Marshlands Herping Report

By Bernard Brown and Scott McWilliams

Introduction

The past season marks our eighth consecutive year of exploring the Marshlands and surveying its reptile and amphibian residents. Despite a late start to the season due to persistent winter weather, we were able to visit Marshlands more in 2015 than in any recent years. We logged more spotted turtle captures than in any other year since 2009, and for the first time since 2008 we documented a new snake species -the Eastern Ribbon Snake. More importantly, we were able to explore several heretofore undersampled areas of excellent habitat, and made some new discoveries about the movements and habits of the Marshlands' herptile inhabitants. Also for the first time this year we explored an area of wetland habitat immediately adjacent to the Moore property and have thus begun to deepen our appreciation of the larger mosaic of habitats within which the Marshlands sits.

As in previous seasons, we have focused much of our effort in the Marshlands on the spotted turtle (*Clemmys guttata*), a species of conservation concern in Pennsylvania and currently the subject of an ESA petition for federal protection. In this our eighth year of marking spotted turtles, a significant number of our sightings have been recaptures of individuals marked in previous seasons.

We continued this year to see spotted turtles concentrated very early in the season in the wet, grassy area downhill from the Bass Ponds, a spot where they apparently hibernate, later to move into the broader section of marsh south of Moore's Lane. Given the size of the Marshlands and the number of spotted turtles we have marked which are not known to use this one confirmed hibernaculum, we have long suspected that there may be other communal hibernacula scattered throughout the wetland. Identifying other locations where spotted turtles appear early in the season has been a goal for several seasons, as it may eventually point us to these additional overwintering sites. We are pleased to report that we may have succeeded in this effort in 2015; an area of shallow water, low grasses and sedge on the north side of Moore's Lane, located near deerstand # 18, yielded several new captures for us early in the spring. We are eager to see if we can document turtles near this site even earlier in the 2016 season, and hopeful that doing so will eventually allow us to pinpoint the location of a second hibernacula.

We remain intrigued by what look like older identifying notches on turtles with smoothly worn shells (a sign of advanced age in spotted turtles). Our suspicion is that someone marked them, and we hope to

someday uncover the story behind these marks.

Finally, in early April of 2015 we were approached by Bonnie Dershem, an Endangered Species Biologist with the US Fish and Wildlife Service about informally surveying an area of wetland closely adjoining the Marshlands and owned by the Monteiro family with an eye towards possibly confirming the presence of bog turtles there. Between late April and mid-May we made a series of trips to several areas that had previously been determined to hold potential bog turtle habitat, and although we were able to document the presence of a breeding population of spotted turtles in addition to several more common species, we failed to find any evidence of bog turtles. We will be submitting a brief summary of our findings to Bonnie Dershem and to Jon Kasitz with Resource Environmental Solutions. A copy of that report is included here for your records.

2015 Trips to the Marshlands

In 2015 we made a total of twelve trips to the Marshlands. Either Scott, Bernard, or both of us visited on every occasion. On one outing Scott's wife Caroline and two sons, Miles and Carson accompanied him.

3/29/2015

On a cool and calm day Billy observed calling spring peepers, basking painted turtles, and, in the spring house off the driveway, a red salamander.

4/5/2015

A sunny day with temperatures in the high 50s brought the McWilliams family out to the Marshlands to look for reptiles and amphibians and to blow off some winter steam. A total of six spotted turtles were found basking at their communal hibernaculum, just downhill from the Bass Ponds. Spring peepers were heard calling loudly at mid-day and a Northern watersnake and adult female painted turtle were also captured. We also enjoyed a chance to catch up with the Moore family.

4/12/2015

Scott and Billy managed a joint trip in sunny weather and found three spotted turtles basking at their hibernaculum in the late morning. In the afternoon we explored several infrequently visited areas of wetland and were pleased to find four previously unmarked spotted turtles tightly clustered together in an area of shallow water, low grasses and sedge along the northern boundary of the Marshlands. Two of these turtles were mating at the time of capture -these were detained only very briefly for marking and released together in the hopes that they might resume their dalliance. We also observed basking painted turtles, calling spring peepers, and saw eggs of both wood frogs and spotted salamanders. We found a red-

backed salamander under a coverboard, and found two species of snakes: garter snakes and a ribbon snake.

4/15/2015

Encouraged by recent success, Scott returned to the Marshlands on a sunny day reaching into the mid-60s and found two more previously unmarked spotted turtles in the same area of low grasses and shallow water on the northern edge of the marsh.

4/22/2015

Scott visited on a windy day with intermittent sun and was rewarded with four spotted turtle captures - again finding a pair engaged in courtship behavior. Calling spring peepers and green frogs kept him company for much of the morning despite the wind.

4/26/2015

Billy visited and found three spotted turtles in the area near deerstand #18, two of which were new to us. He also observed pickerel frogs, red-spotted newts, a snapping turtle, and several basking painted turtles.

4/27/2015

On an overcast, windy day with temperatures in the mid-50s, Scott returned to the Marshlands to check and retrieve the traps set the previous day by Billy. With only GPS coordinates and vague phrases like "near the dead tree, past the duck pond" to guide you, there can be a bit of a treasure-hunt feeling to retrieving traps set by someone else in an expansive wetland. In the past we have had difficulty finding suitable trap locations owing to surprising daily fluctuations in water levels within some sections of the Marsh. While we succeeded in locating workably stable locations for trapping on this occasion, we failed to trap any spotted turtles. In one trap we captured 4 young pike and an adult red-spotted newt -the only herp yielded by this particular exercise. Hope springs eternal, however.

4/28/2015

Scott visited the easement site on the Monteiro family property on a windy but sunny day with temperatures in the 70s and found three adult spotted turtles. These were photographed, but not marked as we had not previously obtained the landowner's permission to include turtles from their property in our larger mark-recapture sample.

Also noted almost immediately was a bald eagle nest, located atop a large oak tree on the edge of the easement site. On this and all subsequent visits to this location Scott was accompanied (and occasionally buzzed rather unnervingly from behind) by its occupants.

4/29/2015

Scott managed a third consecutive day of herping. Though he enjoyed arguably better conditions than on the preceding day, he was apparently alone in this assessment. He searched the easement site intensively for a little over 5 hours but saw no turtles. Bull frogs and green frogs were observed, and the egg masses of several american toads were observed, unhatched.

5/03/2015

Billy visited and found relatively little on a paddling trip down Marsh Creek: one musk turtle (stinkpot).

5/6/2015

Scott returned to the easement site on a sunny day with temperatures in the mid-60s following a morning rainstorm and captured three spotted turtles. Two were adults and were marked as part of our study; a third was a juvenile whose carapace (the upper part of the shell) was still too soft to notch without risking harm.

5/7/2015

Temperatures in the 70s brought Scott back to the easement site yet again and he captured one adult spotted turtle and one young-adult painted turtle. True to species form, the painted turtle was captured within a section of deeper, pond-like standing water while the spotted turtle was found basking nearby, among sedge and grasses interspersed with pockets of shallow water and mud.

5/11/2015

Scott made one final trip to the easement site on a cloudy but hot day with temperatures nearing 80 degrees and captured 2 spotted turtles.

5/17/2015

Billy visited and found very little: one spring peeper hiding in the reed canary grass just to the south of Moore Lane.

10/8/2015

Scott made a rare fall trip to the Marshlands on a beautiful day with temperatures in the mid-70s to see if any spotted turtles could be located near their suspected hibernation sites. None were observed at the known hibernaculum near the bass ponds, but one adult female was captured north of Moore's Lane, at the suspected overwintering site near deerstand #18. This same turtle was captured only a few meters

away at the start of the season. It is hard not to wonder where her wanderings took her during the intervening 6 months.

Species Found (since 2008):

Spring Peeper (*Pseudacris crucifer*)

Spring peepers are small (up to 1.25 inch long) frogs, beige with a darker X on the back (hence their specific name, "*crucifer*"). They are aptly named, calling with a series of high-pitched peeps in early spring. Spring peepers are generously distributed throughout the Marshlands, and this year, as in the past, we heard choruses in the early spring and smaller numbers of stubborn males calling at other cool period through the year.

Wood frog (*Rana sylvatica*)

Wood frogs are medium-sized frogs (up to 2.75 inch long), tan with a dark robber's mask pattern across their eyes. They call with a chuckling/quacking sound and are one of the first species up in the spring, overlapping with the peepers. Their eggs are an important food source for newts, spotted turtles, and numerous other marsh animals. This year we noted slightly fewer adults and egg masses than we have in previous seasons, but this was most likely a function of the timing of our trips, and since we have never made an attempt to measure wood frog breeding quantitatively, accurate comparisons from season to season are difficult to make.

Pickerel Frog (*Rana palustris*)

Pickerel frogs are medium-sized frogs (up to 3 inch long) marked with distinct, large, squarish spots down the backs and sides and with prominent, lighter-colored ridges running down each side of the back. They call with a short snoring call, which we heard this year. In addition we came across adults frequently as we wandered the Marshlands -especially around the margins of the Bass and Spring ponds.

American Toad (*Bufo americanus*)

American toads are medium sized (up to 3.5 inches) toads, generally quite common, and specifically quite common at the Marshlands. They are generally a tan or brown color with darker blotches surrounding their warts. Their call, a long, high pitched and somewhat eerie trill, is likely familiar to anyone who has visited the Marshlands in early spring.

Bull Frog (*Rana catesbeiana*)

These are large frogs (up to 6 inches) with muddy green background and sometimes darker spots. They

call with a deep rumbling call sometimes written out as “jug o’rum.” We saw several adults this year in and around the Bass Ponds, and we observed their tadpoles (which are notable for remaining in the tadpole stage for 2 seasons –often growing close to an inch and rather plump in that time) in the moat surrounding the Bass Ponds.

Green Frog (*Rana clamitans*)

These are medium to large frogs (up to 3.5 inches) that look somewhat similar to bull frogs. They call with what sounds like a loose banjo string being plucked. We heard them calling throughout the Marshlands from late April through May.

Spotted Salamander (*Ambystoma maculata*)

These are big for a salamander (up to 7.75 inches and thick) and boldly marked with two rows of large yellow dots on a purple-black background. They tend to live underground in wooded habitat for most of the year but emerge in early spring, often on the first warm, rainy evenings in February or March to breed in vernal pools. In past seasons we have identified egg masses which we believed to be of this species, but did not succeed in tracking down an adult in the Marshlands until this season -we are happy to finally be able to cross this common and impressive species off our “to-do” list.

Red-backed Salamander (*Plethodon cinereus*)

These small woodland salamanders might be the most abundant vertebrates in the Northeast and Midatlantic United States. They most commonly occur in two color phases: one with grey flanks sprinkled with white specks and a reddish-brown back, the other with the grey over the entire body - the ‘leadback.’ Unlike most other salamanders, members of the genus *Plethodon* lay their eggs on land. The babies are terrestrial, meaning that they can and do range far from water. We frequently find these salamanders under logs, rocks, and other cover objects in uplands around the Marsh.

Slimy Salamander (*Plethodon glutinosus*)

These are medium-sized (up to almost 6.75 inches), slender woodland salamanders, black with white speckles. These are often common under rocks and logs in the forest, and Bernard found one near the Rock Garden in 2008.

Two-Lined Salamander (*Eurycea bislineata*)

These small, greenish-yellow salamanders live in and next to streams, hiding under rocks and other objects during the day. Like the spotted salamanders they begin their lives with an aquatic larval stage after hatching, though they do not congregate to breed. They are extremely hardy salamanders, of our native streamside salamanders the most tolerant of pollution and other environmental stresses.

Red Salamander (*Pseudotriton ruber*)

These are attractive red or orange salamanders with black speckles and a slightly pudgy build. We tend to find them in or near shallow running water, and we somewhat reliably find the aquatic larvae or young adults where the springhouse flow exits the springhouse and before it passes under the driveway.

Northern Water Snake (*Nerodia sipedon*)

These are medium-sized snakes, generally growing to about four feet (usually shorter) and somewhat thick. They are marked in a pattern of gray and reddish brown broken bands and blotches, but the pattern can fade with age, and they're generally dirty, often making them look a uniform gray. These are common in the Marsh (as expected).

Common Garter Snake (*Thamnophis sirtalis*)

These familiar snakes are smaller than northern water snakes (generally no longer than three feet) and variable in color, ranging from a dark background striped with a distinct tan or yellow stripe down the back and two more at the edges of the belly, to stripeless but with a general small checkered pattern. This year we located quite a few garter snakes under the Moore products sign -since milk snakes frequently feed on young garter snakes, it is probably no coincidence that we located far fewer milk snakes in this location than we have in previous seasons.

Eastern Ribbon Snake (*Thamnophis sauritus*)

These medium length, slender bodied snakes are close relatives of garter snakes and are frequently confused with them. They are distinguished by their decidedly long, slender form (with an especially long tail) and a bold pattern consisting of three distinct stripes which run the length of their body. Ribbon snakes are commonly encountered within sight of permanent water, and are often associated with low bushes and hedges where they hunt small frogs - they are at least partially arboreal in their habits. Although abundant in parts of New Jersey, ribbon snakes are far less frequently encountered in southeastern Pennsylvania and their occurrence at the Marshlands is of definite interest.

Black Rat Snakes (*Pantherophis obsoleta*):

Black rat snakes are not a species of conservation concern, but they are beautiful creatures and a lot of fun to catch. The one sighting this year was extremely enticing. Unfortunately there is no good specific method to find black rat snakes other than general walking around and looking. On the up side, this is an activity we enjoy.

Ringneck Snake (*Diadophis punctatus*)

Ringneck snakes are small (no more than a foot and a half long), secretive snakes primarily found in the forest under surface objects such as rocks and logs. They are colored with a solid dark gray on the back, a lemon yellow belly, and a thin yellow ring around the neck. Bernard found two near the Rock Garden in 2008. One of these exhibited a rare color mutation in which the yellow pigment was missing, replaced by a pale gray.

Eastern Milk Snake (*Lampropeltis triangulum*)

Milk snakes are shiny reptile and rodent hunters attractively marked with red or brown blotches on a cream or gray background. These familiar, medium-sized constrictors have proven to be abundant in upland areas of the Marshlands, and are found frequently under artificial cover -including some of the boards which we laid out in 2010. In past seasons we have found milk snakes with regularity under the Moore Products sign, but as mentioned above they were far less common at this locale in 2013. One possible explanation is the removal of the nearby pheasant enclosure -which may have subsidized their diet in previous years with young bird and bird eggs as well as rodents attracted by the presence of bird-feed. Happily, we harbor no concerns about the health of the milk snake population in the Marshlands.

Musk Turtle a.k.a. Stinkpot (*Sternotherus odoratus*)

These are small (up to 4.5 inches) turtles, round with a reduced plastron (bottom shell), dark in color with two thin white lines on each side of the head and neck, converging at the nose. They get their name from a musk they secrete when they're threatened, which smells a little like an overheating electrical motor. We see them regularly in the Duck Pond, and they turn up from time to time in other water around the Marshlands.

Painted Turtle (*Chrysemys picta*)

Painted turtles are medium-sized (up to about 6 inches), mostly dark with bright red and yellow stripes on their legs, heads and necks, and the borders of their shells. These are the most common basking turtle in the Marsh, and we saw dozens around Catfish Pond, both Bass Ponds, Marsh Creek, and even in thick cat tail sections of the Marsh.

Eastern Box Turtle (*Terrapene carolina*)*

This is familiar land turtle with a distinctively domed carapace (top shell) and hinged plastron that allows it to seal itself when threatened. Bernard observed one female in the Rock Garden on June 8th, 2008. We are a little surprised we have not seen more of them. They may be in decline in Pennsylvania (indeed throughout their range) but their long lifespan and population dynamics make it difficult to discern long-term population trends.

Common Snapping Turtle (*Chelydra serpentina*)

This is a familiar large turtle (up to 14 inches) with a long tail, powerful jaws and legs, and a reduced plastron (bottom shell). As in previous seasons, we were delighted to spar with several of these formidable giants during 2011. No late spring day is complete for us without at least once trying our strength against a large female, and it is always refreshing to be at least a little intimidated by our quarry. We also always enjoy finding smaller snappers - cute in spite of their ugliness.

Spotted Turtle (*Clemmys guttata*)

These little gems (to about 4.5 inches) have round, relatively flat shells, black with small yellow polka dots and with stronger yellow and orange markings on the head and neck. These are turtles of shallow water and ephemeral wetlands - habitat which has become increasingly scarce in Southeast Pennsylvania (and indeed throughout much of the Northeastern United States) in recent decades, but remains uniquely abundant and intact in the Marshlands.

As always, we devoted much of our time in the Marshlands this year to capturing, measuring, photographing and marking as many adult spotted turtles as we were able to find. Methods of capture in the past have included the use of baited wire-frame mesh traps, as well as visual search and hand capture techniques. In several instances, turtles burrowed within water and mud have been successfully located by systematically probing through the mud with a wooden broom handle, listening for the characteristic hollow clunk made when a turtle shell is struck directly - a technique known as "sounding."

For each spotted turtle captured, we made careful note of the date, time, and weather conditions as well as the exact GPS coordinates where the capture was made. In addition we carefully measured and marked all turtles by filing notches in to the sides of the carapace (the top portion of a turtle's shell) in specific patterns as to allow for later identification in the event of recapture. As an additional record, we took photographs of each turtle captured.

As the seasons pass, we have been capturing turtles marked in previous years with increasing frequency. Ultimately, once we have sampled a satisfactory number of turtles over a more representative swath of the marsh, we are hopeful that the rate of recapture over several seasons will provide us with some rough estimate of the total population living and breeding in the marsh.

Thoughts for 2016

In 2015 we applied for and received from the PA Fish and Boat Commission a Scientific Collector's

Permit, and we reported all spotted turtle catches to F&B. We have received a permit renewal for 2016. Likewise we have continued to report our other herpetological findings to the Pennsylvania Amphibian and Reptile Survey - PARS. In addition to ensuring that our activities are strictly legal we are hopeful this will make it easier for our findings to be used by other researchers, and we will benefit from some of the PARS reporting and information management systems.

In early February of 2016, with much-appreciated assistance from Jim Moore, we set up our first ever “turtle-cam,” a motion-activated digital camera which we mounted overlooking a popular basking site at the spotted turtle hibernaculum downhill from the Bass Ponds. We are excited to begin retrieving data from this camera, as we hope it will give us a glimpse of the earliest emergence of spotted turtles from their overwintering sites. We suspect we may be surprised by just how early turtles are lured to the surface by the promise of fresh air and sunshine.

In 2015 we made some long-overdue headway in understanding the movements of spotted turtles occupying sections of the Marshlands north of Moore’s Lane. In the process we believe we may have identified a second overwintering site used by at least several individuals. In 2016, we look forward to expanding on these findings and exploring other areas of the Marshlands we have traditionally under-surveyed for one reason or another.

Though we found ourselves mostly visiting the Marshlands on our own in 2015, we plan to continue to enjoy the support of a small circle of friends and fellow naturalists (we find it edifying to include people who have strengths in other areas, for example birds or plants) for additional eyes and ears whenever possible, and we will continue to consult with Jim Moore in advance of any trips to the site.

Finally, for several years now, we have described plans to add a third member to our team. We continue searching for the right person, seeking someone with enough time, background knowledge, and (importantly) discretion and conservation ethic.

Conclusion

As always, preparing this report has reminded us how grateful we are to the Marshlands LLP, and to the Moore family for allowing us access to the property, and for their passion for preserving a beautiful and valuable tract of wetlands. In particular, we wish to thank Jim Moore for his continuing friendship, hospitality, and generosity with his time and ideas.

**COMESETOGA-ROVERS
& ASSOCIATES**

Route 113-555 W. Washington Ave., Ste. #128, Bala Cynwyd, PA 19004
Telephone: 610-280-0277 Facsimile: 610-280-0278
info@bala-cynwyd.com

December 5, 2001

5bush@

Reference No.4000-01

Mr. Andrew Shells
Pennsylvania Fish and Boat Commission
Non-Game and Endangered Species Unit
450 Robinson Lane
Bellefonte, Pennsylvania 16823

Ms. Carole Copeyan
United States Department of the Interior
Fish and Wildlife Service
315 South Allen Street
State College, Pennsylvania 16801-4850

Dear Ms. Cooley and Mr. Sheils:

Re: Bog Turtle Found
East Nantmeal Township, Chester County, Pennsylvania

This letter is to inform you that a bog turtle was found on June 18, 2001, in a large emergent wetland along Marsh Creek on the property of Mr. Jim Moore in East Nantmeal Township, Chester County, Pennsylvania. The turtle was a young male, and it was noted that the turtle was engaged in feeding on herbaceous leaf material. As part of the bog turtle survey conducted for the Suppice Farm site in Uwchlan Township, Chester County, Mr. Don Knorr and I were conducting a survey of these wetlands along Marsh Creek in an attempt to locate a suitable background location for our ongoing study at the Suppice Farm site and future studies. Mr. Scott E. Bush located the turtle at approximately 11:00 AM by looking under emergent vegetation (tussock sedges). The weather conditions were optimal for location the species as the day was sunny, calm, and warm (approximately 80-85 degrees F). Other than taking several photographs of the turtle, the turtle was not disturbed.

The wetlands system on the property is fairly unique in that it is very large and open and contains many of the herbaceous species associated with bog turtle habitat. Common species noted during our field visit included tussock sedge (*Carex stricta*), duck potato (*Sagittaria latifolia*), broad leaved cattail (*Typha latifolia*), jewel weed (*Impatiens capensis*), halberd leaved tearthumb (*Polygonum arifolium*), lirid sedge (*Carex lirata*), sweet flag (*Acorus calamus*), sensitive fern (*Onoclea sensibilis*), spike rush (*Eleocharis obtusa*), fox sedge (*Carex vulpinoidea*), arrow arum (*Peltandra virginica*), common rush (*Juncus effusus*), and giant bulrush (*Scirpus validus*). Soils on the site are mapped as Worham silt loam, 0 to 3 percent slopes. Extensive areas of saturated soils and pockets of shallow standing water are present throughout the site. Soils are soft and suited to the burrowing habits of the bog turtle.

December 5, 2001

Sbush @

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**CONESTOGA-ROVERS
& ASSOCIATES**

December 5, 2001

2

Reference No. 4000-01

Also observed during the field visit were painted turtles, green frogs, one eastern garter snake, and one northern water snake.

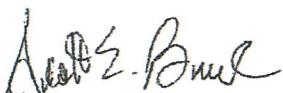
Discussions with Mr. Moore prior to the field visit indicated that bog turtles have historically been located on his property but that recent attempts (approximately 5 years ago) to locate them by the Nature Conservancy biologists had been unsuccessful. A friend of Mr. Moore was walking the property late November 2001 and reported to Mr. Moore that he observed a turtle with orange spots behind its head near the big bass pond (see attached base map of the property provided by Mr. Moore).

A copy of the Elverson, PA USGS map showing the location where the turtle was found and several photographs of the turtle and the surrounding habitat are enclosed for your files. Our site survey was conducted with Mr. Moore's knowledge and permission and Mr. Moore is aware of the importance of keeping this information confidential. We trust that this information will also be held in confidence by the trustees to protect turtles occurring on the site.

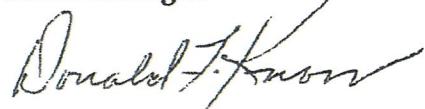
Please call me if you have any questions or require additional information.

Yours truly,

CONESTOGA-ROVERS AND ASSOCIATES



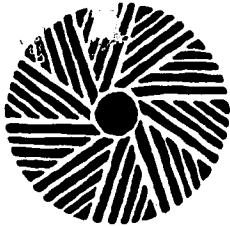
Scott E. Bush
Senior Ecologist



Donald F. Knorr
Senior Biologist

cc: Jim Moore (w/enclosures)

TESTIMONY OF
THE BRANDYWINE CONSERVANCY, INC.
MORGANSHIRE VILLAGE PRD
PROPOSAL



ENVIRONMENTAL MANAGEMENT CENTER
BRANDYWINE CONSERVANCY P.O. BOX 141 CHADDS FORD,
PENNSYLVANIA 19317 215/388-7601-459-1900

June 25, 1990

TO: East Nantmeal Board of Supervisors
FROM: H. William Sellers, Director and *H.W.S.* John M. Gaadt, Senior Planner
RE: Tentative PRD Application for Morganshire Village

We have reviewed the application referenced-above and feel strongly that we must register our opposition to the plan as tentatively proposed. The applicant, Hastings Investment Co., Inc., while attempting to dispel any concerns about development on the tract through on-site investigations and engineering analyses, has only succeeded in raising significantly more concerns about the ability of the site to accommodate development of this magnitude.

It is clear to us that the development as proposed will have a significant long-term effect on the quantity and quality of stream flows in the Marsh Creek. Such effects will have a severe impact on the long term stability of the significant periglacial marsh existing south of this property. Even a minor impact, such as a slight change in the sediment loading of the stream, could significantly impact the delicate balance of plant communities in the marsh. Other more significant changes in the marsh's ecology, due to changes in stream flow or point/nonpoint pollutant loadings, could very likely result in the destruction of whole communities of rare plants and animals.

As stated in correspondence to the Board dated April 4, 1990, the Brandywine Conservancy has a major stewardship responsibility for this geologically and biologically important periglacial marsh due to the fact that we hold a conservation easement on a significant portion of the marshland and associated areas (see Exhibit 1 - the Moore property, also called "Marshlands"). Approximately 410 acres are currently under easement. Given our concern for the protection of the periglacial marsh, our staff conducted a vegetative site inventory and analysis of Marshlands on April 22, 1990 (Exhibit 2). Of note were the 60+ species of wetland plants in and around the marsh. As part of the original site analysis performed for easement documentation, a number of rare species were also identified at the marsh as little as six years ago. Recent work by the Nature Conservancy also indicates a significant variety of wetland plants at the marsh, among them being a "Pennsylvania Threatened" rare plant, the Larger Canadian St. Johns-Wort (Exhibit 3). As indicated in the Nature Conservancy's narrative, this periglacial marsh is unique in that no other natural wetland of its

type and size exists in southeastern Pennsylvania. The ecological significance of the marsh also led to it being proposed for National Natural Landmark status. In addition, the marsh is noted as a unique natural area by the Chester County Open Space and Recreation Study of 1982.

The Marsh Creek, which feeds into the periglacial marsh, is widely known to have water of high quality. At present, the creek is classified as a Trout Stock Fishery by the State Department of Environmental Resources. Of significance to the stream's high quality is the periglacial marsh; the marsh effectively filters natural pollutants and purifies the water in the Marsh Creek, thus improving and enhancing the water quality of the entire Brandywine watershed. Development which could alter the ecosystem of the marsh, therefore, would not only lead to the loss of rare flora and fauna, but could ultimately affect the overall water quality of the Brandywine watershed as well. It is clear that great sensitivity must be used in developing any tracts of land upstream of the periglacial marsh.

We have three main concerns about possible destruction of this unique wetland plant system and associated wildlife: (1) the potential for vastly increased sedimentation to occur during development and after; (2) the potential for increased pollution from runoff and sewage systems; and (3) the certainty that stream flows will be reduced during non-storm periods due to inadequate recharge. With regards to these concerns, we have the following comments:

1. Given the number and types of buildings proposed, we believe that the design of the parking areas, as well as the number of parking spaces proposed, will be inadequate to meet the needs of the residents of the units. At 2.1 spaces per unit, the proposed recreational parking, as well as the overflow parking along E. Morganshire Drive, will be used routinely for residential parking. Given the option of utilizing the recreational parking (and walking to one's home) or parking on the street in front of one's home, most residents will choose the latter. Generally, in development of this type and magnitude in a rural area, upwards of 2.5 spaces per unit are necessary to accommodate parking needs. In addition, the design of the parking areas needs to be more considerate of the parking needs of the residents, i.e. more convenient and proximate to the resident's dwellings. Rather than enlarge the cartway of the internal road network to accommodate overflow parking, more consideration should be given to overall parking design.

Street and parking design should also be sensitive to the natural conditions of the tract. Roads and parking areas as currently designed, not to mention the need for a greater number of parking spaces, will contribute significantly to

runoff from the tract. In addition to this increase in the quantity of runoff, automobile byproducts contribute to a reduction in the quality of the runoff. Documented byproducts from parking areas include oil, grease, and heavy metals. Given the sensitivity of the headwaters of the Marsh Creek and the periglacial marsh downstream, clearly such factors will need to be considered in the overall density of the development and the design and amount of parking to be considered. At a minimum, the use of porous paving and/or recharge beds which recharge stormwater runoff from parking surfaces and roof drainage should be required. Not coincidentally, adequately designed recharge beds have been proven to remove stormwater runoff pollutants.

2. Given the amount of impervious surface proposed on the site and the relative size and location of the stormwater management basins proposed, we do not believe that the stormwater management basins will be large enough to accommodate average storm loadings. While we realize that this is a tentative application, and therefore does not appear to require a stormwater management plan, the applicants assertion that the basins will be designed to handle 100 year storms does not go far enough to assure us that the system will be capable of handling stormwaters during and after construction. Special consideration will need to be given to increased runoff which often accompanies construction activity on a site. Exposed land should be limited to under 10 acres at any one time. The design of stormwater basins should be based upon control of runoff during development as well as after development, since runoff and sediment increase exponentially during development. At a minimum, the total volume of runoff for storms of under 2 year frequency should not be allowed to exceed pre-development conditions on the site, especially given the sensitive nature of the headwaters of the Marsh Creek and the periglacial marsh downstream. It will also be imperative that adequate measures be taken to control peak rates of flow from storms of 2 years and up, since it is these events that cause scouring of creek banks, according to research conducted by noted geohydrologist Luna Leopold.

As alluded to above, an area of considerable concern is the potential for increased sedimentation as a result of stormwater loadings on the creek. Sediment increases can originate from site runoff as well as from the scouring of stream banks which results from increased flows. Given the fact that the periglacial marsh is the low point in the flow of the stream, an increase in sedimentation will result in the settling of sediment in the marsh. This would, without doubt, severely impact the marsh.

In addition to our concerns about the ability of the basins to accommodate the volume of flow, a number of the basins are proposed on flood prone or seasonably high water table soils, thus potentially exacerbating what is an underdesigned system to begin with.

Based on our review of the plan, it also appears that the overflow/discharge of the facilities (specifically Nos. 3, 4, 5, and 7) will be directly to the Marsh Creek. Given the sensitive nature of the creek and the periglacial marsh downstream (as discussed above), this practice would be totally unacceptable.

3. We believe it is the intent of the Township's PRD ordinance to provide for the set-aside of open space through the use of flexible land use design techniques. Although the Township's ordinance requires a 150 foot buffer around the perimeter of PRD's, the applicant's design fails to consider the relative usefulness of the remaining open space to the development's inhabitants. For example, the largest proportion of open space serves the smallest cluster (W. Morganshire Drive). While this may be necessary due to environmental constraints, it appears as if very little consideration has been given to the ability of residents of E. Morganshire Drive to actively use this open space.

In addition, contrary to the applicant's assertion that 62.5% of the tract will be preserved as open space, a careful review of the applicant's submission indicates otherwise. Among other things, the existing house and proposed pool, water tower, and portions of the parking facilities all appear to exist in the calculated open space. The actual percentage of open space, therefore, is smaller than indicated. Section 1206.A of the Township's PRD article prohibits the inclusion of such facilities in areas designated as open space.

4. We question the effect well withdrawals in excess of 100,000 gallons/day will have on the headwaters and flow of the Marsh Creek. Absent special attention and facilities to balance water usage and recharge, the withdrawal of water will result in reduced stream flows, thereby altering the hydrology of the stream itself and severely impacting the periglacial marsh downstream. We believe the applicant should be required to analyze the potential long term effects of the proposed withdrawals with regards to the sensitive balance between surface and groundwater resources.
5. We note the existence of significant areas of wetlands on the site. Due to the amount of wetlands which appear to exist on the site (and given the time of year when the applicant's delineation was performed), we believe that the Township should request that the Corps of Engineers and/or the PA DER

verify the applicant's delineation. Such verification is warranted given the sensitive nature of the headwaters of the Marsh Creek.

Under current Chapter 105 regulations of the Pennsylvania Dam Safety and Encroachment Act, wetlands classified as "important" are protected from development by the imposition of a 300 foot buffer. This designation can be made on a site-by-site basis through a determination as to whether the wetland(s) in question meet the criteria contained in the Act. Given the fact that the U.S. Fish and Wildlife Service and the U.S. EPA have identified the wetlands in the periglacial marsh as "priority" wetlands and "important" wetlands, respectively, we feel justification exists for further PA DER review of both the applicant's delineation and the significance of the wetland itself.

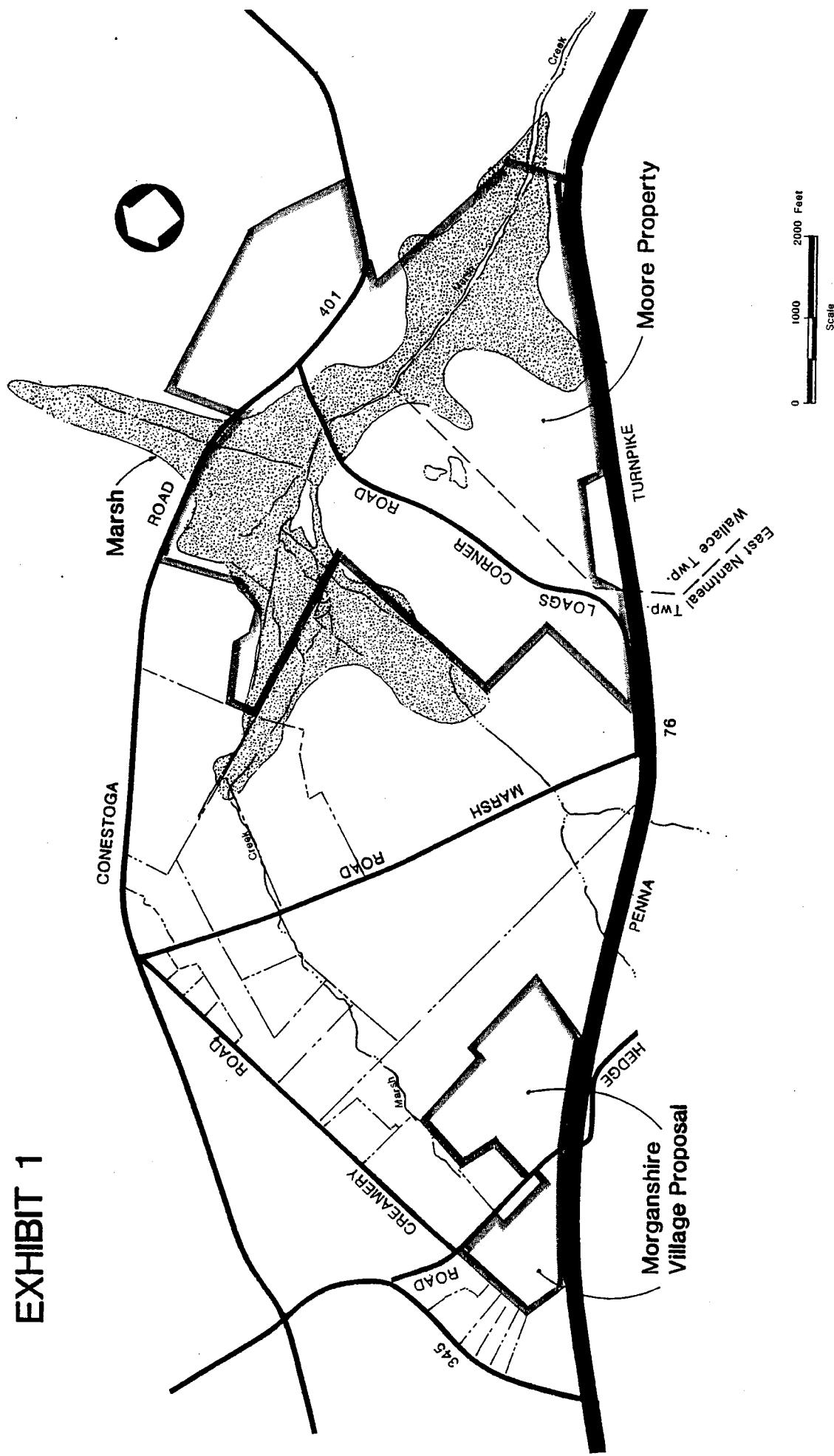
We also note that under the proposed Chapter 105 regulations, the expansion of Hedge Road, as proposed, would appear to trigger a review of any land development impacts on the wetlands. While this review may not be required presently, it does illustrate the importance of determining the boundaries and significance of the wetlands.

We also note that the applicant's plans indicate a corral in a portion of the wetlands. Such encroachment should be prohibited.

6. We note that the sewage treatment plant proposed will be built within 20 feet of the wetlands delineation line. It also appears that portions of the facility would be built on flood prone soils. We question the appropriateness of locating the plant as shown given such factors. The plant's location also appears to be such that the plant could be modified for a stream discharge. We would be opposed to any form of stream discharge to the Marsh Creek from this site.

Given the concerns expressed herein, we believe that the applicant should redesign the development to more accurately reflect the environmental constraints of the tract. To do so, we believe that the density proposed on the tract should be significantly reduced. While the applicant is entitled to higher density under the PRD standards, the statutory purpose of the PRD regulations under the Municipalities Planning Code is to promote flexible design which preserves open space and environmental amenities. A more sensitive design incorporating a reasonable number of units would still be economically attractive while at the same time preserving the environmental integrity of the site.

EXHIBIT 1



MOORE PROPERTY MARSH
SURVEYED 22 APRIL, 1990

The marsh on the Moore property is outstanding for its size, water quality, and biological diversity.

A preliminary survey of the marsh located over 60 species of wetland plants. This is an impressive number, considering that many characteristic wetland species, such as sedges, are not easily recognized this early in the season. A number of rare species have been seen in the marsh in the last six years. None were seen on this April survey, but there is no reason to believe that they are not still there, as the marsh has not been significantly disturbed recently.

The surveyors were impressed by the age of some of the marsh plants, and the development of the different plant communities in a delicate balance with water levels. Changes in the quantity, quality, and sediment load of water entering the marsh would have a severe impact on this balance, and possibly destroy not only rare plants, but also whole communities of plants and animals.

MOORE PROPERTY MARSH
SURVEYED 22 APRIL, 1990

| Scientific Name | A | Common Name |
|---------------------------------|---|--------------------------|
| ACERACEAE | | MAPLE FAMILY |
| <i>Acer negundo</i> | | Box elder |
| <i>Acer rubrum</i> | | Red maple |
| ALISMACEAE | | WATER-PLANTAIN FAMILY |
| <i>Alisma plantago-aquatica</i> | | Water plantain |
| APIACEAE | | PARSLEY FAMILY |
| <i>Cicuta maculata</i> | | Water hemlock |
| AQUIFOLIACEAE | | HOLLY FAMILY |
| <i>Ilex verticillata</i> | | Winterberry |
| ARACEAE | | ARUM FAMILY |
| <i>Acorus americana</i> | | Sweet flag |
| <i>Symplocarpus foetidus</i> | | Skunk cabbage |
| ★ <i>Peltandra virginica</i> | | Tuckahoe |
| ASTERACEAE | | ASTER FAMILY |
| <i>Aster</i> spp. | | Asters |
| <i>Eupatorium</i> sp. | | Joe-pye-weed |
| <i>Euthamia graminifolia</i> | | Lance-leaved goldenrod |
| <i>Solidago</i> spp. | | Goldenrods |
| <i>Vernonia noveboracensis</i> | | Ironweed |
| BALSAMINACEAE | | JEWEL-WEED FAMILY |
| <i>Impatiens capensis</i> | | Orange jewelweed |
| BETULACEAE | | BIRCH FAMILY |
| <i>Alnus serrulata</i> | | Common alder |
| BORAGINACEAE | | BORAGE FAMILY |
| <i>Myosotis</i> sp. | | Forget-me-not |
| BRASSICACEAE | | CRESS FAMILY |
| <i>Cardamine bulbosa</i> | | Spring cress |
| <i>Cardamine pensylvanica</i> | | Pennsylvania bittercress |
| <i>Nasturtium officinale</i> | A | Water cress |
| CALLITRICHACEAE | | WATER-STAR FAMILY |
| <i>Callitricha</i> species | | Water starwort |
| CAPRIFOLIACEAE | | HONEYSUCKLE FAMILY |
| <i>Sambucus canadensis</i> | | Elderberry |
| <i>Viburnum prunifolium</i> | | Black haw |
| <i>Viburnum recognitum</i> | | Arrowwood viburnum |
| CARYOPHYLLACEAE | | PINK FAMILY |
| <i>Stellaria longifolia</i> | | Long-leaved chickweed |
| CLAUSIACEAE | | ST.JOHN'S-WORT FAMILY |
| <i>Hypericum</i> sp. | | St. John's-wort |
| CORNACEAE | | DOGWOOD FAMILY |
| <i>Cornus amomum</i> | | Swamp dogwood |

MOORE PROPERTY MARSH

PAGE 2

CYPERACEAE

Carex spp.
Carex stricta
Eleocharis sp.
Scirpus spp.

SEDGE FAMILY

Sedge
 Tussock sedge
 Spike-rush
 Sedge

ERICACEAE

Lyonia ligustrina (?)
Vaccinium corymbosum

HEATH FAMILY

Maleberry
 Highbush blueberry

FAGACEAE

Quercus palustris

BEECH FAMILY

Pin oak

IRIDACEAE

Iris veersicolor

IRIS FAMILY

Larger blue-flag

JUNCACEAE

Juncus effusus
Luzula multiflora

RUSH FAMILY

Soft rush
 Woodrush

LAMIACEAE

Lycopus sp.
Mentha sp.

MINT FAMILY

Bugleweed
 Mint

LAURACEAE

Lindera benzoin

LAURAL FAMILY

Spicebush

LEMNACEAE

Lemna minor

DUCKWEED FAMILY

Duckweed

LIMNANTHACEAE

Floerkea proserpinacoides

FALSE MERMAID FAMILY

False mermaid

NYMPHAEACEAE

Nuphar luteum

WATERLILY FAMILY

Spatterdock

ONAGRACEAE

Epilobium coloratum
Ludwigia alternifolia
Ludwigia palustris

EVENING-PRIMROSE FAMILY

Willow herb
 Seedbox
 Water purslane

OSMUNDACEAE

Osmunda cinnamomea

ROYAL-FERN FAMILY

Cinnamon fern

POACEAE

Phalaris arundinacea

GRASS FAMILY

Reed-canary grass

POLYGONACEAE

Polygonum arifolium
Polygonum sagittatum

BUCKWHEAT FAMILY

Halberd-leaved tearthumb
 Arrow-leaved tearthumb

POLYPODIACEAE

* *Dryopteris cristata*
Onoclea sensibilis
Thelypteris palustris

FERN FAMILY

Crested fern
 Sensitive fern
 Marsh fern

RANUNCULACEAE

Thalictrum pubescens

BUTTERCUP FAMILY

Tall meadow rue

MOORE PROPERTY MARSH

ROSACEAE

Agrimonia parviflora
Crataegus species
Rosa palustris
Rubus hispida
* *Sanguisorba canadensis*

RUBIACEAE

Cephalanthus occidentalis
Galium asprellum

SALICACEAE

Salix nigra

SCROPHULARIACEAE

Chelone glabra

SPARGANIACEAE

Sparganium sp.

TYPHACEAE

Typha latifolia

URTICACEAE

Boehmeria cylindrica

VERBENACEAE

Verbena hastata

VITACEAE

Vitis sp.

67 Species in 40 Families

A = Species alien to Chester County

* = Uncommon species

PAGE 3

ROSE FAMILY

Small-flowered agrimony
Hawthorn
Swamp rose
Swamp dewberry
Canada burnet

MADDER FAMILY

Buttonbush
Rough bedstraw

WILLOW FAMILY

Black willow

FIGWORT FAMILY

Turtlehead

BUR-REED FAMILY

Bur-reed

CAT-TAIL FAMILY

Cattail

NETTLE FAMILY

False nettle

VERBENA FAMILY

Blue vervain

GRAPE FAMILY

Grape

EXHIBIT 3

Elements of Special Concern
at
Periglacial Marsh

| No. | Element | Common Name | Status | TNC/State | Comments |
|-----|------------------------------|----------------------------------|--------------|---------------|---|
| 1 | <u>Hypericum majus</u> | Large Canadian St. Johns-Wort | Threatened | G5S2 Penn. | This rare plant favors wet meadows and shores. Only 1 confirmed site in E. PA. |
| 2 | <u>Poanes massasoit</u> | Mulberry Wing | G4S3 none | | This rare lepidopteran, although widespread, favors vulnerable, specialized wetland habitats, making it very local. Only 1 confirmed site in E. Pennsylvania. |
| 3 | <u>Euphyes conspicua</u> | Black Dash | G4S3 none | | This skipper favors fresh-water marshes, bogs and boggy creeks. Caterpillar host plant is sedges, particularly <u>Corex strida</u> . Only 2 confirmed locations in E. PA. |
| 4 | Graminoid Marsh | (Community) | G?S3 none | | Dominated by non-robust grasses, sedges, or rushes. Best remaining wetland of its type in S.E. PA. Relatively pristine quality. |
| 5 | Circumneutral Shrub Swamp | (Community) | G?S3 none | | A shrub dominated permanent or semi-permanent body of water. Large, high quality. |

Prepared by Phillip deMaynadier, 4/24/90
 The Nature Conservancy

ECOLOGICAL IMPORTANCE OF THE MARSH CREEK BASIN

Marsh Creek is a small, shallow stream that flows into the North Branch of the Brandywine Creek. At its headwaters, the creek forms a broad level basin which is the former site of a large periglacial lake. The term periglacial refers to areas that were peripheral to the last glaciation. Today this area forms the largest inland marsh in southeastern Pennsylvania.

The stream flows over a variety of geological substrates, mainly graphitic gneiss, quartz monzonite, and a small amount of limestone. The soils of the marsh, derived from these substrates and organic matter, are a fine silt loam which is mainly acidic, mottled, and poorly drained. In areas overlaying the limestone, the soils are more basic.

Because of its large size and relatively pristine condition, the periglacial marsh is unique. There is no other natural wetland of its type and size in southeastern Pennsylvania.

The marsh itself is dominated by herbaceous and shrubby vegetation which grades into woodland as the elevation rises. The herbaceous vegetation consists primarily of tussock sedge and other sedges, rushes, rice cut-grass, touch-me-not, sensitive fern, and cattails. The shrubby vegetation is dominated by swamp rose, buttonbush, and viburnums. Pin oak and red maple dominate the low-lying wooded areas.

A plant of special note in the herbaceous marsh is the larger St. Johns wort (Hypericum majus). This plant is rare in Pennsylvania and is found in only three other locations. Its characteristic habitat is a marly (limestone) marsh or lake shore. A complete plant list for the marsh is included in the appendix.

The vast expanse of marsh and open water provides excellent habitat for many species of birds. The Valley Forge Audubon Society has done a thorough inventory of the bird life at the marsh. Of special note are the American bittern and the least bittern. The area is heavily used both by spring and fall migrants and a substantial population of over-wintering

waterfowl. Two unusual butterflies have also been collected from the marsh, the black dash (Euphyes conspicua) and the mulberry winged skipper (Poanes massasoit). The latter species has declined dramatically in its former range, and both species require large marshes dominated by tussock sedge for their survival.

In 1950, Mr. Edward Wollman commissioned the Academy of Natural Science of Philadelphia to conduct a stream survey of Marsh Creek. Their findings suggested the creek supported a healthy complement of invertebrate stream organisms and had high water quality. The fish recorded at that time included the redfin pickerel, creek chub sucker, common carp, common shiner, fall fish, brown bull head, pumpkinseed and johnny darter. There have been no significant land-use changes since the study was completed, other than the restoration of a dam resulting in a 15-acre lake.

The ecological significance of the marsh was recognized in a 1975 report on significant inland freshwater wetlands of the eastern United States by Drs. R. Goodwin and W. A. Niering. This report proposed the marsh for National Natural Landmark status.

In addition to the ecological significance of Periglacial Marsh, the area also provides many other amenities. The extensive marsh effectively filters and purifies the water in Marsh Creek, thus increasing the overall water quality of the Brandywine watershed. The marsh and lake are very scenic and provide a welcome respite from the hectic, congested environment of the Philadelphia area.

The combination of active farmland, woodland, and wetlands results in one of the most scenic areas in Chester County. Such land use is in harmony with wildlife and low-density human use. This area could serve as a model to many other areas and deserves long-term protection.

GRANT OF EASEMENT AND DECLARATION OF RESTRICTIVE COVENANTS

THIS GRANT OF EASEMENT AND DECLARATION OF RESTRICTIVE COVENANTS, hereinafter referred to as the "Grant and Declaration," made this 18th day of December the year of our Lord One Thousand Nine Hundred and Eighty-five,

BETWEEN FRANCES OAKFORD MOORE, of Uwchland Township,
Chester County, Pennsylvania, party of the first part,
hereinafter referred to as "Grantor,"

AND

BRANDYWINE CONSERVANCY, INC., a non-profit corporation of the State of Delaware, party of the second part, hereinafter referred to as the "Grantee,"

W I T N E S S E T H:

WHEREAS, Grantor is the owner of certain tracts of ground, known as "Marshlands" and located in East Nantmeal and Wallace Townships, Chester County, Commonwealth of Pennsylvania, containing approximately 557 acres of land, be the same more or less, hereinafter referred to as the "Property," which includes a certain parcel designated "Easement Parcel 2" and containing approximately 185 acres of land, as shown on a legal survey dated November 3, 1978, and described by legal description dated December 22, 1978, attached hereto and made a part hereof as Exhibits "A" and "B," respectively, and prepared by Yerkes Associates, Inc.; and

WHEREAS, the Property is unique in Chester County as it contains one of the largest and most extensive periglacial marshes in Pennsylvania, as well as woodlands, active agricultural land, extensive wildlife habitat, and a large variety of uncommon plants; and

WHEREAS, the Periglacial Marsh is identified as a "unique natural area" in the Chester County Open Space and Recreation Study," which was adopted by the Chester County Planning Commission and Chester County Parks and Recreation Board on June 16, 1982, and, accordingly, is worthy of protection; and

WHEREAS, the Property is transected by Marsh Creek and contains headwaters of Brandywine Creek which serves as a major source of potable water for New Castle County, Delaware, including the City of Wilmington; and

WHEREAS, Brandywine Creek, from headwaters to the Delaware state line, is a top-priority candidate for Pennsylvania Scenic River status, and a funded study to pursue this designation has been initiated; and

169205 44

WHEREAS, the wetlands of the Property play a valuable role in maintaining the base flow in Marsh Creek and the draining of such areas adversely affects stream flows; and

WHEREAS, the Property includes alluvial floodplains, woodlands, hillsides, and other important areas which would be highly susceptible to erosion damage and an increase in stormwater run-off which could adversely affect stream water quality and flooding patterns if the trees or other vegetation were improvidently removed; and

WHEREAS, the Property is visible from Pennsylvania Route 401, which transects Easement Parcel 2, and the Pennsylvania Turnpike, which forms the southwestern boundary of the Property; and

WHEREAS, approximately 225 acres of the Property were placed under conservation easement in 1978 to protect the natural, agricultural, and scenic resources described supra; and

WHEREAS, protection of Easement Parcel 2 is essential to fulfill the goal of preserving the natural, agricultural, and scenic resources of the Property; and

WHEREAS, Grantor desires to preserve the natural, agricultural, and scenic state of the Property and further desires to conserve and protect the Property from soil erosion, water pollution, natural disruption, man-induced disturbance, and other occurrences which might interfere with the public's enjoyment of this watershed and its resources; and

WHEREAS, Grantee is a publicly-supported charity organized for the purpose of preserving historic sites, natural areas, and areas important to the management of water resources.

NOW THEREFORE, Grantor, for and in consideration of the sum of FIVE DOLLARS (\$5.00), lawful money of the United States of America, the receipt whereof is hereby acknowledged, and intending to be legally bound hereby, grants, declares, and covenants as follows:

1. Grantor hereby unconditionally and absolutely grants and conveys unto Grantee, its successors and assigns, a perpetual Easement in Gross, to have and to hold the same for the purpose of perpetually conserving and protecting in accordance with this Declaration of Restrictive Covenants that portion of the Property indicated as Easement Parcel 2 on Exhibit "A" and further described by legal descriptions in Exhibit "B" from any actions by Grantor, her heirs, successors, and assigns, which would adversely affect the scenic, natural, agricultural, and water resource values of the Property, subject to the qualifications hereinafter set forth. As hereinafter

used, "Easement" means the easement granted by this paragraph 1, and "Owner" means the Grantor or any successor owner of Easement Parcel 2.

2. In furtherance of the foregoing, Grantor for herself and her heirs, successors, and assigns hereby declares that the Easement shall permit public access to Easement Parcel 2 for the educational and scientific purposes described in sub-paragraph (A) of this paragraph 2 and subject to the limitations contained in sub-paragraph (B) of this paragraph 2.

A. The public shall be permitted access to Easement Parcel 2 for the following activities except and to the extent that Grantee determines that such activities are inconsistent with the conservation purposes for which the Easement is granted:

(i) Nature study and education, including bird watching and the study of other fauna and flora, supervised by Grantee; and

(ii) Scientific research, including the study of ecological and hydrological systems and terrestrial and aquatic flora and fauna, authorized by Grantee.

B. All activities described in sub-paragraph (A) of this paragraph 2 shall be conducted in such manner as to preserve and protect the sensitive natural resources of Easement Parcel 2 as set forth in paragraph 1 supra, and in this connection the following limitations shall apply with respect to the public use of Easement Parcel 2 and are enforceable by the Owner or, at its discretion, by the Grantee:

(i) The use of any motorized recreational vehicle or similar mechanical means of locomotion, including snowmobiles, motorcycles, or other all-terrain vehicles shall be prohibited;

(ii) Horses, dogs, or other domesticated animals shall be prohibited;

(iii) The smoking of tobacco or other substances, or the lighting of fires of any kind shall be prohibited;

(iv) The consumption of alcoholic beverages or the use of intoxicants or drugs shall be prohibited;

(v) The hunting or trapping of animals with firearms, bow and arrow, traps, or any other form of arms or weapons shall be prohibited, except if permission for hunting or trapping on Easement Parcel 2 is granted by the Owner thereof;

(vi) Public access to Easement Parcel 2 for nature study and education shall be restricted to trails to be located within the areas indicated on Exhibit "C" as "Trail Easement Areas"; provided, however, the public shall be permitted use of access trails on other parts of the Property, as shown on Exhibit "C," in order to access the Trail Easement Areas. The trails shall not exceed ten (10) feet in width. The

exact location of the trails with the Trail Easement Areas may be changed from time to time by Grantee to insure safe access and protection of natural resources; and

(vii) Public access to Easement Parcel 2 for nature study and education shall be limited to four (4) days per calender year, except if permission for additional visits is granted by the Owner thereof; and

(viii) Public access for scientific research shall not be unreasonably withheld.

In addition, Grantee shall have the right to require an Owner to keep the trail over that Owner's portion of Easement Parcel 2 open and clear of obstructions, and Grantee shall have the right to impose such additional limitations with respect to the trails as it may deem necessary or desirable in order to preserve and protect the environmental resources of Easement Parcel 2, as set forth above.

Provided, however, the Owner shall not be held responsible for providing toilet or other facilities for persons permitted access to Easement Parcel 2 under this paragraph 2. Further provided, the Owner and Grantee shall not be held liable for any accident, injury or other such occurrence to persons permitted access hereunder.

3. In order to accomplish the intent of the Easement, Grantor hereby declares and imposes the following restrictions upon the use and enjoyment of Easement Parcel 2, shown and described in Exhibits "A" and "B":

A. No building shall be placed, built or maintained in Easement Parcel 2 with the exception of the following;

(i) Existing structures as shown on Exhibit "A" and described in Exhibit "C"; and

(ii) Structures as provided for in sub-paragraph (D) of paragraph 4; provided, however, that such structures are limited to roadways, facilities used to provide utilities, and other improvements used to transport people or services across Easement Parcel 2 to other portions of the Property not affected by this Easement.

B. No signs, billboards or outdoor advertising structures shall be placed, erected, or maintained in Easement Parcel 2 other than a reasonable number of signs not exceeding two feet by three feet for each of the following purposes:

(i) to state the name of the property and the names and address of the occupants;

(ii) to advertise an activity permitted under the provisions of this Grant and Declaration;

(iii) to post Easement Parcel 2 against activities either prohibited or not specifically permitted under the provisions of this Grant and Declaration; and
(iv) to advertise the sale or lease of Easement Parcel 2.

Provided, however, that this sub-paragraph (B) shall not limit the right of Grantee to display on Easement Parcel 2, at its discretion, such signs as it may customarily use to identify lands under conservation easement or agreement to Grantee and the terms of such agreement or easement.

C. No quarrying or removal of rocks, minerals, gravel, sand, topsoil or other similar materials from Easement Parcel 2 shall occur, except as may be required for the placement and enjoyment of structures as provided for in sub-paragraph (D) of paragraph 4.

D. No depositing, dumping, or abandoning of any solid waste or junk shall occur in Easement Parcel 2.

E. No subdivision of Easement Parcel 2 shall take place except with the prior written approval of Grantee. Such written approval shall not be withheld provided the intent of this Easement as set forth in paragraph 1 and prior sections of this document is not violated, and provided the Owner, prior to subdivision, agrees to provide Grantee with such funds as shall be fairly determined by Grantee to be adequate to cover the additional expenses that Grantee would necessarily incur in carrying out its future obligation to monitor the subdivision areas.

F. Under no circumstances shall Easement Parcel 2, or any portion thereof, be considered part of the gross tract area for the purpose of density calculations, open space requirements, et cetera under otherwise applicable laws, regulations, or ordinances controlling land use and design on any property not subject to this Easement, including but not limited to other portions of this Property.

G. No toxic, carcinogenic, mutagenic, corrosive, or otherwise hazardous materials shall be stored, dumped, disposed of, or used on Easement Parcel 2 in any manner which could result in contamination of ground or surface waters, the protection of which is the intent of this Grant and Declaration.

4. In addition to the actions which are prohibited forever by paragraph 3, supra, and in order to accomplish the intent of the Easement, Grantor further declares to impose forever the following restrictions and covenants upon the use and enjoyment of Easement Parcel 2, except with the prior written approval of the Grantee, which approval shall be given only to the extent that the intent of the Easement is not violated:

A. No industrial or commercial activities shall be conducted or permitted excepting other than farming and agricultural activities, which are operated in compliance with all of the following requirements:

- (i) Good conservation practices must be employed to minimize soil erosion and other damaging occurrences;
- (ii) Plowing or tillage shall not be conducted on slopes greater than fifteen percent (15%) in grade or within one hundred (100) feet of streams;
- (iii) Manure and compost piles and pits shall not be located within 100 feet of streams; and
- (iv) Pesticides, fertilizers or other soil, flora, or fauna additives shall not be used in a manner which would cause significant deterioration of surface or ground water quality.

In addition, Grantee may require an Owner to install stormwater management or waste treatment measures where agricultural activities may impair the quality of ground or surface water.

B. No depositing, dumping, or abandoning of any liquid wastes or chemical substances on or in the ground shall be conducted or permitted excepting:

- (i) Effluent from improvements existing in Easement Parcel 2 at the time of this Grant and Declaration and shown on Exhibit "A";
- (ii) Effluent from structures or improvements permitted hereunder; and
- (iii) Biological and chemical substances used in agricultural and horticultural activities, including but not limited to animal manure used for fertilization, provided that such substances shall be used in accordance with section (iv) of sub-paragraph (A) of this paragraph 4 and shall not be deposited, dumped, or abandoned within one hundred (100) feet of streams.

C. No cutting or removing of trees shall be permitted, except under the following conditions:

- (i) To remove those trees which are fallen, dead, diseased or dangerous;
- (ii) To thin woods in accordance with a woodlot management plan of selective cutting which satisfies all of the following conditions:
 - (a) Neither shall mature specimens be significantly reduced in number nor shall immature specimens be harvested in any manner which would limit their potential to replace the mature trees and to perpetuate the mature quality of the woodlands;

(b) The representation of any single species shall not be endangered through discriminatory cutting, unless such discrimination is to upgrade the quality of the woodlands or to remove invasive species which endanger the health of other species;

(c) No trees shall be removed within twenty-five (25) feet of stream banks unless fallen, dead, diseased, dangerous, or threatening the stability of the stream bank; and

(d) The woodlot management plan shall be submitted to Grantee for review and written approval prior to the cutting of any trees.

D. No excavation, construction, or placement of any structures or works thereon including sheds, public or private roads, driveways, parking lots, pipelines, poles, or any facilities normally used in connection with supplying utilities or removing effluent and any other impervious surfaces which might, among other things, result in increased runoff or erosion, shall be permitted. Provided, however, that Grantor hereby reserves to herself, her heirs, personal representatives, successors, and assigns, as appurtenant to the remaining parts of the Property, the right to construct and maintain a roadway extending from parts of the Property not subject to this Easement to and from other parts of the Property not subject to this Easement, at the location marked A to A on Exhibit "A." Said right includes the right to lay out, locate, construct, maintain, improve, repair, replace, and use the same, for all purposes for which streets and ways are now or may hereafter customarily be used in said Wallace and East Nantmeal Townships, including without limiting the foregoing generality the installation of utility services, and of such width and other specifications as are now or may hereafter be required, by zoning or subdivision laws or other applicable laws or governmental regulations, to qualify and entitle said roadway to be and to serve as a lawful access way to those parts of the Property not subject to this Easement and to any subdivision or development thereof hereafter made, and in connection therewith the right to use and remove such trees and soil materials and to provide such drainage from said roadway onto and over Easement Parcel 2, at the location marked A to A on Exhibit "A," as may be necessary and appropriate.

A plan describing the exact location and ground surface coverage of any proposed improvements must be submitted to Grantee for review and written approval prior to the construction, placement, or maintenance of said structure or improvement on Easement Parcel 2. Said improvements shall be constructed by methods which are attentive to minimizing disturbances to the environment, including but not limited to minimal removal of vegetation, minimal movement of earth and minimal clearance of access routes for construction vehicles.

E. No mining or removal of groundwater from Easement Parcel 2 shall occur, except as may be required for residential, agricultural, and horticultural uses on the Property.

5. The Owner of Easement Parcel 2, prior to conducting, performing, or permitting any activities described in this Grant and Declaration on Easement Parcel 2 which require prior written approval of Grantee, its successors or assigns, hereby agrees to submit to Grantee for review and approval the required information described supra in writing via United States certified mail, return receipt requested. Grantee agrees in such cases to review the Owner's proposal and to execute, acknowledge, and deliver to the Owner a written instrument granting approval or stating the reason for denial within one hundred twenty (120) days of written request from the Owner. In the event that Grantee fails to respond to the Owner's written request within one hundred twenty (120) days, approval shall be deemed granted on the one hundred twentieth (120th) day after submission of the request. Following approval of a proposal, the Owner, its successors or assigns, shall have five (5) years from the date of approval to complete approved actions. If the construction of a previously-approved activity is not fifty percent (50%) completed within five (5) years, the Owner must re-submit the request to Grantee for review and approval according to the procedures described supra in this paragraph 5.

6. Nothing herein shall be construed as a grant to the general public or to a person or persons other than Grantee, its servants, successors or assigns or its duly authorized agents, including persons engaged in nature study and education or scientific research as provided for in paragraph 2, supra, of the right to enter upon any parts of Easement Parcel 2. Grantor reserves unto herself and her successors in title to Easement Parcel 2 all rights, privileges, powers, and immunities in respect to Easement Parcel 2 including, without limitation, the right of exclusive possession and enjoyment subject only to the restrictions and easements herein set forth, and the terms and covenants of this Grant and Declaration.

7. Grantee shall have the right to enter upon Easement Parcel 2 set forth herein to inspect for violations of the aforesaid provisions; to remove or eliminate any such violations; and to perform such restoration as may be deemed necessary to restore the land to its prior condition after removal of said violations. Grantee shall have the right to seek any legal action or remedy at law or in equity to enforce the provisions set forth herein and granted hereunder, including, without limitation, by the remedies of specific performance or injunction. In the event the Owner of Easement Parcel 2 is found to have violated any of the obligations, such Owner shall reimburse Grantee for any costs or expenses incurred

in connection therewith, including but not limited to court costs and attorneys' fees.

8. Grantee shall be under no obligation to maintain Easement Parcel 2 or pay taxes or assessments thereon.

9. The Owner must request in writing at least thirty (30) days prior to the closing of any sale or transfer of legal title to Easement Parcel 2 or portion thereof or the commencement of the term of any long term (ten years or more) lease of Easement Parcel 2, or portion thereof, a written instrument from Grantee stating that the Owner is in compliance with the terms and conditions of this Grant and Declaration, or if the Owner is not in compliance with this Grant and Declaration, stating what violations of this Grant and Declaration exist. Grantee agrees in such cases or at any other time to execute, acknowledge, and deliver to the Owner, to any mortgagee, transferee, purchaser, or lessee and to any title insurance company issuing policy of title insurance with respect to any estate or interest in or lien upon Easement Parcel 2 or portion thereof, a written instrument concerning compliance within thirty (30) days of written request from the Owner. The Owner shall provide a copy of Grantee's compliance statement dated not more than ninety (90) days preceding the date of execution and delivery of any agreement of sale, long term lease or mortgage with respect to Easement Parcel 2 or portion thereof to the purchaser, mortgagee or long term lessee hereunder and shall advise the Grantee in writing at least ten (10) days in advance of the closing of any transfer of legal title to Easement Parcel 2 or portion thereof, or the commencement of the term of any long term lease of Easement Parcel 2 or portion thereof. Any reasonable costs incurred by the Grantee in determining compliance and advising the Owner as to compliance, all of which shall be billed to the Owner simultaneously with the delivery to the Owner of Grantee's compliance statement, and costs, if any, incurred as a result of the Owner's failure to notify Grantee of transfer, sale, assignment, or long term lease of Easement Parcel 2 or portion thereof shall be paid by the the Owner, its successors and assigns.

10. Grantor and each Owner of Easement Parcel 2 or portion thereof who conveys his, her, its, or their interest in Easement Parcel 2 or portion thereof shall have no liability for the observance or performance of the covenants and obligations of Grantor hereunder on that portion of Easement Parcel 2 which said party has conveyed, provided that the provisions of paragraph 9, supra, have been fulfilled and all obligations thereunder discharged.

11. If at any time any organization, agency or person having rights or duties hereunder as Grantee, whether as a party hereto or as an assignee, shall fail to fully enforce the easement and restrictions set forth in this Grant and Declaration, Grantor or any governmental unit of Chester County

shall have the right to bring suit against Grantee for specific performance.

12. Grantee, and any succeeding assignee of Grantee's interest herein, as provided for in paragraph 13 hereof, shall have the right to assign, either wholly or partially, its right, title and interest hereunder to any public agency having and performing governmental functions, or to any publicly supported charitable organization described in Section 170(h)(3) and Section 2522(a) of the Internal Revenue Code or corresponding provisions of successor laws.

13. In the event Grantee shall cease to be an organization described in Section 170 (h)(3) and Section 2522 (a) of the Internal Revenue Code, then its rights and duties hereunder shall succeed to and become vested in and fall under the Natural Lands Trust, a non-profit corporation of the Commonwealth of Pennsylvania, and in the event that at such time the Natural Lands Trust shall refuse to accept such rights and duties or shall thereafter fail to enforce the provisions contained herein its rights and duties hereunder shall become vested in and fall upon the following named entities to the extent they shall evidence acceptance of and fully enforce same, in the following order:

A. The County of Chester, a political subdivision of the Commonwealth of Pennsylvania.

B. The Townships of East Nantmeal and Wallace, political subdivisions of the Commonwealth of Pennsylvania.

C. Other such organization having similar purposes to which such rights and duties shall be awarded under the doctrine of cy pres by a Court of competent jurisdiction; provided however, that at the time of such acceptance, such entity shall be either an organization described in Section 170(h)(3) and Section 2522(a) of the Internal Revenue Code or corresponding provisions of successor laws or a public agency performing governmental functions.

14. It is intended that this Easement shall constitute a "qualified conservation contribution" within the meaning of Section 170(h)(a) of the Code and the provisions hereof shall be construed and applied accordingly.

15. In the event that any provision or restriction of this Grant and Declaration or the application thereof to any person or circumstance is found to be invalid, the remainder of the provisions and restrictions of this Grant and Declaration, and the application of such provision or restriction to persons or circumstances other than those as to which it is found to be invalid, shall not be affected thereby.

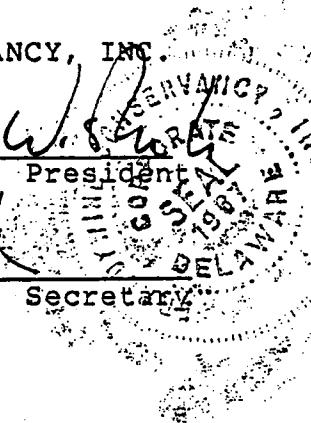
16. The provisions hereof shall inure to and be binding upon the executors, administrators, devisees, successors and assigns, as the case may be, of the parties hereto and of any Owner as defined herein with respect to Easement Parcel 2 and shall be covenants running with the land in perpetuity.

IN WITNESS WHEREOF, and again stating their intention to be legally bound hereby, the said parties have hereunto set their hands and respective seals the 18th day of December 1985.

Jeffrey R. Moore
Witness

Frances Oakford Moore
FRANCES OAKFORD MOORE

BRANDYWINE CONSERVANCY, INC.

By Michael R. Walker
President
Attest M 
Secretary

Montgomery County)
Pennsylvania) SS.
)

BE IT REMEMBERED that on this 18th day of DECEMBER 1985,
personally appeared before me, the Subscriber, a Notary Public for
the State and County aforesaid, FRANCES OAKFORD MOORE, party to
this Indenture, known to me personally to be such, and severally
acknowledged this Indenture to be her deed.

GIVEN under my Hand and Seal of Office, the day and year
aforesaid.

Beatrice Frazier
Notary Public

BEATRICE FRAZIER Notary Public
Lansdale Boro, Montgomery Co.,
My Commission Expires June 16, 1989



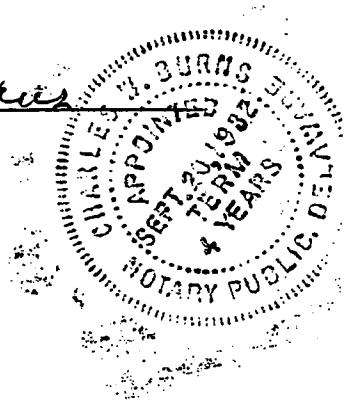
1697M 55

COUNTY OF NEW CASTLE)
STATE OF DELAWARE) SS.
)

BE IT REMEMBERED that on this 16th day of DECEMBER 1985,
personally appeared before me, the Subscriber, a Notary Public for
the State and County aforesaid, WILLIAM R. WISTER President
of the Brandywine Conservancy, Inc., a corporation existing under
the laws of the State of Delaware, party to this Agreement, known
to me personally to be such, and acknowledged this Agreement to be
his act and deed and the act and deed of said corporation; that
the signature of the President thereto is in his own proper
handwriting and the seal affixed is the common and corporate seal
of said corporation, and that his act of sealing, executing,
acknowledging and delivering said Indenture was duly authorized by
a resolution of the Board of Directors of said corporation.

GIVEN under my Hand and Seal of Office, the day and year
aforesaid.

Charles A. Burns
Notary Public



16981 56

REG. NO. 169
in 169
D-44



YERKES
Associates Inc.

December 22, 1978

EASEMENT PARCEL NO. 2

The following is a description of all that certain tract of land situate in East Nantmeal and Wallace Townships, Chester County, Pennsylvania according to an Easement Plan Made for Frances O. Moore, showing easement to the Brandywine Conservancy as prepared by Yerkes Associates, Inc., Kennett Square, Pennsylvania, being Plan No. K25-1, dated November 3, 1978.

Beginning at a point on or near the south side of Loag's Corner Road, said point being also on the northerly line of the access to the Pennsylvania Turnpike Rest Area, said point being located South 4 deg. 30 min. East, approximately 20 feet from the title line in the bed of Loag's Corner Road; thence from said beginning point and along the Southerly side of Loag's Corner Road, North 85 deg. 30 min. East, 588.42 feet to a point; thence by Tract C as shown on the abovementioned plan, North 88 deg. 22 min. 03 sec. East, 3,702.35 feet to a point; thence by other lands of Frances O. Moore, South 79 deg. 28 min. 35 sec. East, and crossing over Conestoga Pike, 1,201.34 feet to a point; thence by the aforementioned Tract C, South 68 deg. 00 min. East, 200.00 feet to a point; thence by land of various owners the 6 following courses and distances to wit:

1. South 16 deg. 30 min. West, 649.11 feet to a point on the south side of Conestoga Pike;
2. North 70 deg. 45 min. West, 620.90 feet to a point;
3. South 11 deg. 00 min. East, 660.00 feet to a point;
4. South 6 deg. 30 min. East, 1,443.92 feet to a point;
5. South 32 deg. 00 min. East, 138.77 feet to a point;
6. South 62 deg. 30 min. West, crossing over the Marsh Creek, 709.50 feet to a point on the northerly line of the Pennsylvania Turnpike;

thence along the northerly line of the Pennsylvania Turnpike on a line curving to the left in a northwesterly direction, said line having a radius of 1,910.00 feet and an arc distance of 507.60 feet and a chord of North 49 deg. 38 min. 12 sec. West, 506.11 feet to a point; thence still by the same, North 57 deg. 15 min. West, 2,799.00 feet to a point; thence leaving said northerly line of the Pennsylvania Turnpike, partly by the turnpike rest area and partly by other lands of Frances O. Moore, North 13 deg. 00 min. East, 905.00 feet to a point; thence still by other lands of Frances O. Moore, North 61 deg. 13 min. 58 sec. West, 829.84 feet to a point; thence still by the same, South 51 deg. 00 min. West, 415.00 feet to a point on line of the Pennsylvania Turnpike rest area; thence by said rest area the 3 following courses and distances to wit:

1. North 57 deg. 15 min. 00 sec. West, 330.00 feet to a point;
2. South 78 deg. 44 min. 37 sec. West, 475.00 feet to a point;
3. North 63 deg. 58 min. 45 sec. West, 320.00 feet to the first mentioned point and place of beginning.

CONTAINING an easement area of 185.00 +- acres of land be the same more or less.

1,697 AC 57

RESUME

H. WILLIAM SELLERS
901 Denton Hollow Road
West Chester, PA 19380

Personal Data:

Born: June 8, 1941, New Orleans, Louisiana

Experience:

Brandywine Conservancy, Inc.
P. O. Box 141
Chadds Ford, PA 19317

Director, Environmental
Management Center
1975-present

Ohio Environmental Protection
Agency
Columbus, OH 43216

Senior Policy Analyst,
Office of Policy Development
and Chief, Division of
Planning, 1973-1975

The Mid-Ohio Health Planning
Federation
Columbus, OH 43216

Director, Environmental
Health Planning and Compre-
hensive Health Planning
Coordinator, 1970-1972

The Ohio State University
Research Foundation
Columbus, OH 43216

Research Associate
1968-1970

Mid-Ohio Regional Planning
Commission
Columbus, OH 43216

Planning Intern
1967-1968

U.S. Army Transportation Corps
Kassel, Germany

Detachment Commander
Captain, USAR 1964-1966
1967-1968 Army Reserve

Social Science Consultants
New Orleans, Louisiana

Research Assistant
1964

Education:

Masters, City Planning, 1968, The Ohio State University
Completed first year law, 1964, Tulane University, New Orleans
B.A., 1963, Tulane University, New Orleans, Louisiana

RESUME

JOHN M. GAADT
28 School Lane
Ardmore, PA 19003

Senior Planner
1988-present

Brandywine Conservancy, Inc.
P. O. Box 141
Chadds Ford, PA 19317

Work with local governments on environmental and land use planning with specialization in water quantity/quality issues, sewer planning, energy resources, and solid waste planning.

Experience:

| | |
|---|---|
| Montgomery County Planning Commission Norristown, PA | Asst. Chief of County Planning, Senior Planner, Environmental Planner 1985-1987 |
| NRG/New Resource Group, Inc. Milford, New Hampshire | Planner 1983-1984 |
| Creative Energy Associates Chapel Hill, North Carolina | Energy Planning Consultant |
| "carolina planning" magazine Chapel Hill, North Carolina | Graphics Editor 1980-1982 |
| The U. of N. C. at Chapel Hill Dept. of City and Regional Planning | Research Assistant 1981-1982 |
| Department of Planning Durham, North Carolina | Planning Intern 1981 |
| Department of Planning Wilmington, Delaware | Planning Intern 1979 |

Education:

Master of Regional Planning, 1982, The University of North Carolina at Chapel Hill, North Carolina
Bachelor of Arts, Magna Cum Laude, 1980
West Virginia University, Morgantown, West Virginia

Community Service:

Parkersburg, West Virginia
Wilmington, Delaware

American Red Cross
American Red Cross

RESUME OF JANET EBERT

EDUCATION:

Bachelor of Science in Geology from Penna. State University, 1968

Master of Science in Geology from Stanford University, 1971

BOTANICAL WORK EXPERIENCE:

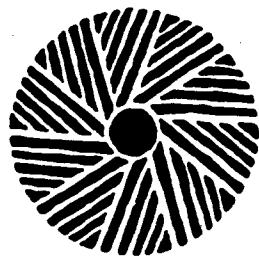
Special plant surveys for the Brandywine Conservancy:
1984 King Ranch, Chester County, PA
1985 Andelot, Kent County, MD

1986 to present: Botanical consultant to Brandywine Conservancy conducting plant surveys and vegetation analysis for new easements and Environmental Impact Assessment Reports

1987 Plant survey of White Clay Nature Preserve for Pennsylvania and Delaware

1988 Searching for rare plants in Piedmont area of Delaware for Delaware Natural Heritage Inventory

1988 Plant survey of Wawa Tract Nature Area for Middletown Township, Delaware County, PA



BRANDYWINE CONSERVANCY

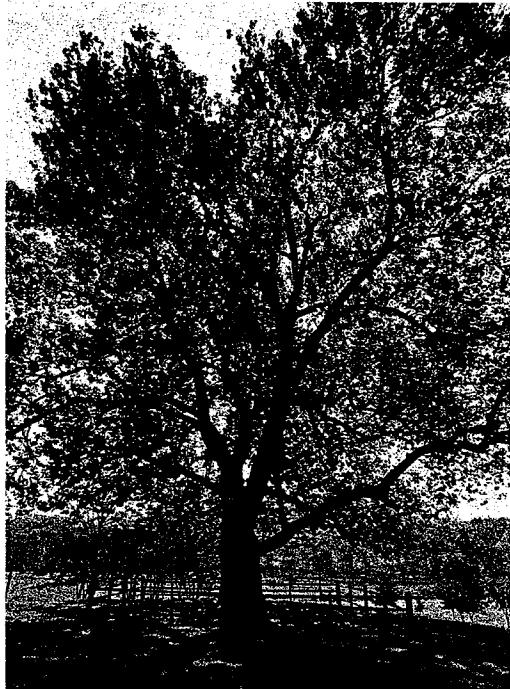
ENVIRONMENTAL MANAGEMENT CENTER

P.O. Box 141 • Chadds Ford, Pennsylvania 19317

OUR COMMITMENT

The Brandywine Conservancy's Environmental Center (the EMC) is unique among conservation organizations in the United States. Although its main focus has been local, the EMC has had tremendous impact on the Middle Atlantic region and on conservation efforts nationwide.

Unlike many environmental groups concentrating on direct governmental action, the EMC has pioneered in the use of economically attractive initiatives for private landowners as corollaries to well-seasoned governmental regulation. In most cases, the EMC has stressed conservation rather than preservation. While much of our effort is put into research, we are also known for decisive action. In an age when old values are disappearing, the EMC has taken special pride in establishing a reputation of trust between our organization and the public groups and private individuals with whom we are involved.



SOME ACCOMPLISHMENTS

- Permanently protected more than 18,000 acres of natural areas, historic sites, woodlands and open space.
- Provided land use and environmental planning and regulatory assistance to over 60 governmental units in Pennsylvania and Delaware.
- Organized and managed scenic river and scenic road studies for the Brandywine and Red Clay Creeks for Pennsylvania and Delaware.
- Organized and coordinated Chester County Historic Sites Survey of 10,000 historic properties.
- Involved in plans to improve land use and traffic controls in the Route 202 and Route 1 corridors.

CURRENT PROJECTS

- Agricultural Land Preservation: develop a program to assist farmers with farmland preservation focusing on the Octorara, White Clay and Elk Creek watersheds.
- Downingtown Region Water Resources Protection: encouraging new approaches to wastewater and storm water management by local governments and developers for such projects as Rovse's Churchill development.
- Assisting organized community groups in the development of protected greenways along the Brandywine, Ridley, Red Clay and other nearby watersheds.
- Conducting community open space preservation studies for ten Pennsylvania townships.
- Working with landowners to protect 4,000 acres of critical ground water recharge areas.

WATER AND LAND RELATIONSHIPS: SOME GOVERNMENTS WAKING UP

For twenty years, the Conservancy has been sending messages about our water supply. First, you cannot protect the quality and amount of water in an area if you do not preserve important open lands, including flood plains, wetlands, aquifers, recharge areas, and woodlands. Second, businesses and industries should recycle pollutants or eliminate them instead of putting them into sewers whose treatment plants will discharge to our streams and eventually to vital estuaries. We also have urged that only biodegradable wastes be discharged to sewers and that treated waste water be applied to land to complete the treatment process and to recharge ground water. Third, the only way to limit or eliminate flood damages is to prevent *all building* in the flood plain (and use it for farming, nature preserves, or recreation sites) and establish storm water management regulations which will insure maximum recharge of ground water and will prevent increases in total amounts and rates of runoff. Natural hydrologic cycles should be maintained.

The common thread in our messages has been that the usual patterns of city and suburban development are obsolete. These patterns of development crammed houses and businesses together all over the landscape. As a result, wells, rivers and bays were polluted and drinking water was taken from rural neighbors by the damming up of creeks and rivers creating gigantic reservoirs in areas such as the Catskills, Poconos, Berkshires, Brandywine highlands. Mining immense ground water reserves such as the Pine barrens, the Everglades, or other sand, gravel, or limestone areas has also taken its toll on our water resources. These methods were never ecologically acceptable and their continuation today will lead to certain disaster. Instead of insuring that the water in our individual or community backyards is protected and our use limited to what we can find there and treat in our front yard, we have covered over our well sites with asphalt, stolen our upstream neighbors' ground or surface water, and dumped our poorly treated wastes in our streams so that others can drink them, swim in them, or marvel at their ability to destroy wildlife.

Until recently, the federal government paid little attention to burgeoning ground water pollution problems. Congressional debates about flooding and flood damage concentrated on how much compensation would be provided victims or how much to charge property owners for the federal flood insurance program which was originally promoted by the developers of hurricane-prone coastal resorts and flood-prone river front properties. No one ever questioned whether a business or individual should be compensated by our government for damages resulting from building in flood-prone areas.

In 1986, Congress amended the Safe Drinking Water Act by creating two ground water protection programs. The first program involves management of "wellhead protection areas," and requires states to encourage zoning or subdivision regulations to prevent wellhead area contamination. This includes special septic tank or storm water management regulations, the use of cluster development, and transferable development rights. The second program provides money for communities to fund demonstration programs to protect

aquifers that are the sole source of drinking water for a community. These demonstration funds could be used for acquiring conservation easements or land in aquifer areas, or for developing the zoning, storm water, or special sanitary regulations noted above. These are good ideas and ones which the Conservancy has promoted, particularly in limestone/marble areas such as East Marlborough and West Whiteland Townships.

While the Conservancy has sought to protect aquifer areas in the interest of the local community and down gradient stream users, the first of these federal programs seems designed to reward the poorly planned community in the same way that flood relief and flood insurance programs reward bad planning. This is because most communities such as New Castle County and now Chester County permit their best aquifers to be built on or contaminated. Then they want federal help to insure that supplies (wells or streams) outside their communities on which they become dependent are not ruined by development similar to that which they have so greedily sought.

What is interesting about the federal program is the clear recognition that most solutions to water problems must start at the local level with zoning, acquisition of interests in land, and other regulations. The same realization is occurring among agencies involved with flood disaster relief and flood insurance, to wit: it would be far better to spend a little money assisting local groups and local governments who wish to acquire conservation restrictions or purchase land in flood plains or flood prone areas than to throw a lot of money to those foolish enough to build or purchase homes there. The other advantage of acquisition programs is that "greenways" of protected open space possibly with public trails would also be established as part of the flood protection program. In 1980, the Conservancy tried to educate Congress to the fact that conservation easement programs concentrating on stream valleys could save the Federal Treasury billions of dollars in disaster relief and flood insurance. At that time, the idea of using federal tax deductions to prevent disasters was viewed by several lawmakers as meaningless. This past February, several federal agencies discussed the value of protecting flood plain "greenways" in a special meeting in Washington to which we were invited to speak. Our message now has new supporters!

The long-term solution to many of our water problems is to establish clear rights and responsibilities of land-owners for the water which falls on and is found on or under their land and to establish community and regional rights and responsibilities for surface and ground water. Instead of licensing pollution of water and licensing theft of ground water sources through state issuance of pollution discharge and ground water well permits, we need to establish the legal principle that rights to land development and needed water must be owned or purchased and that each landowner has certain rights to water on the land and responsibilities to protect those water resources through adequate storm water management and protection of wetlands, flood plains and other natural

storage areas.

Few states are doing anything innovative about ground water protection, although Delaware and Pennsylvania are clearly among the most hesitant in the Northeast in seriously discussing the issues.

The problems of ground water protection in Chester County have been highlighted in a U.S. Geological Survey publication assessing the impacts of urbanization on eastern Chester County. This study of wells, streamflows, and sewage flows identified a number of serious problems, particularly in limestone areas (which are also found in central and southern sections of the County): 1) High tech industries' discharge of rare chemicals was contaminating ground water and streamflows; 2) sewers in limestone areas were depleting streamflows because they were draining more ground water from their collection sewage areas due to ground water infiltration of poorly constructed, and sealed, sewage lines; 3) the pumping of water in limestone quarries was reducing water levels in neighboring wells and helping to move organic contaminants (e.g., trichlorethylene) over a larger area exposing more wells to contamination; and 4) streamflows in some basins are being reduced and increased in others due to inter-

basin transfer of water by sewers. In Pennsylvania most regulation of such problems is at the township level (apart from the state's mining permit) and apart from the limited regulations in limestone areas initiated by East Marlborough and West Whiteland, little has been done. Birmingham Township (Chester County) is developing a fairly sophisticated water impact assessment procedure which will bear watching as experience is gained in its use.

The Brandywine watershed and others in Chester and New Castle Counties are under serious assault by land developers. Future water suppliers are threatened by disjointed approaches. County governments have appeared mesmerized and overwhelmed by development pressures and are providing little practical support to either local governments or to the protection of water resources in general. While there are hopeful signs of change in both governments, the Conservancy's continuing efforts to acquire conservation easements from private landowners becomes increasingly important due to the simplicity and the modest costs of the program.

May, 1988

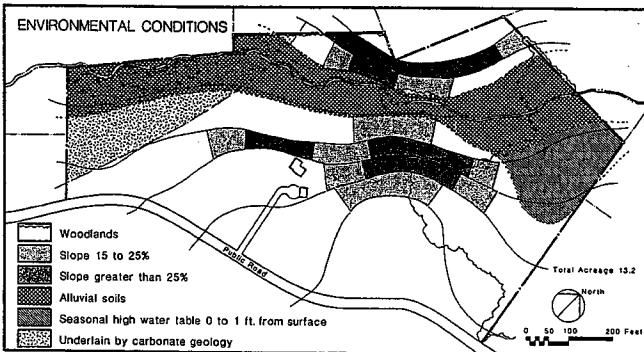
PLATINUM ANNIVERSARY OF 1ST EASEMENT DONATIONS: A REMARKABLE PARTNERSHIP

1989 marked the 20th anniversary of the first conservation easements donated to the Brandywine Conservancy. In 1969, four pioneering landowners guided by the first Conservancy staff member and volunteer legal advisors perpetually restricted 363 acres of contiguous lands along the Brandywine.

The donations of conservation easements was a novel idea in 1969. Easements had first been promoted in this country at the turn of the century by Charles Eliot and Frederick Law Olmsted, and had been purchased by the federal government along the Rock Creek, Blue Ridge, Natchez Trace, and other national parkways beginning in the 1930s. The donation of conservation easements had only recently gained popular interest with a 1964 IRS ruling that such donations were deductible and with the widespread publicity given to the publication by West Chester native, William H. Whyte, of *The Last Landscape*, in which conservation easements were explained and encouraged. The first Conservancy Director, Ken Wood, had been bloodied in the mid-1960s as the point man in a Chester County water resources program to acquire conserva-

tion easements in the upper East Branch of the Brandywine. In that program, easement acquisition by friendly purchase or condemnation was promoted in order to reduce flooding damages and to protect water quality. The spectre of condemnation power had unleashed such powerful emotions and strident invective that the program was shelved and the very concept of a conservation easement in the Brandywine had all the allure of a tar baby to many people.

The Conservancy's Land Committee (precursor of today's Environmental Committee), its Trustees, and staff had limited information to guide them in designing and drafting the first easements. A 1969 tax code amendment stated simply that an open space easement in gross in perpetuity was not an undivided interest and thus would qualify as a charitable contribution. *The Plan and Program for the Brandywine*, (the upper East Branch study) and earlier studies by Dr. Anne Louise Strong, Ian McHarg, and other early environmental planners at the University of Pennsylvania, as well as ecological analyses by Dr. Ruth Patrick and others at the Academy of



The first step in the development of a conservation easement is a careful look at the character of the tract at hand, from physical constraints (as mapped at left) to historic resources and visual quality.

Natural Sciences of Philadelphia, had indicated the critical importance of protecting the flood plains, wetlands, and steep slopes along river corridors. To some Conservancy advisors, "scenic view" protection (as opposed to water resources protection) was considered a judgmental art best left to purchased easement situations. Information about the administrative problems of donated easements was not generally available. Given the lack of regulatory direction and administrative experience and following the time-honored principle that a new idea should be introduced in the simplest and most clear-cut manner, the first easements were short documents (four pages) whose restrictions applied only to those portions of a property which included the major floodplains, wetlands, and steep slopes. The format and restrictions were mostly those developed for the upper East Branch study. They prohibited building, dumping, quarrying, or tree cutting in the easement areas and allowed Conservancy access for inspections. Anxious to get the program started and unaware of the costs of continued administration, the Conservancy paid all of the donors' easement costs and sought no endowment.

Many changes have occurred in twenty years. At the national level, Congress flirted for one year (1976-1977) with 30 year term easements and then revised the whole statutory approach in 1980. During the 1980 Congressional discussions of a new statute, the Conservancy coordinated a national effort by land trusts to protect the deductibility of easements designed to protect water resources, scenic areas, and agricultural areas. The success of that effort and our subsequent involvement in the Land Trust Exchange's formulation of regulatory suggestions for IRS put the Conservancy in the forefront of evolving concepts of easement design and administrative theory. The Exchange's *Conservation Easement Handbook* and *Appraising Easements* were two publication projects strongly urged and supported by the Conservancy and to which we made a number of contributions.

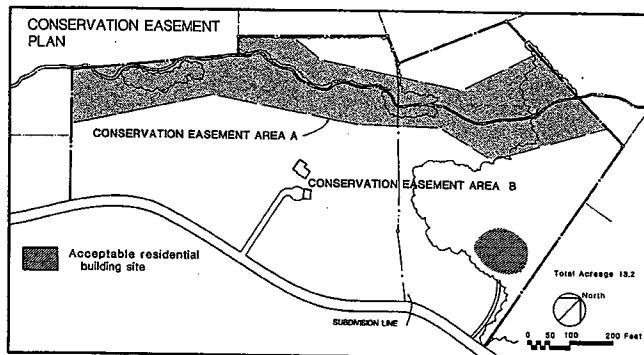
Since 1969, we have placed over 17,000 acres under easement and the number continues to grow. At the same time, our easement plans and legal documents have become increasingly sophisticated and detailed reflecting the new tax code, our administrative experiences, and the increased knowledge

Conservation easements today normally are designed to cover an entire tract, dividing easement areas by degree of restriction imposed. As shown here, Easement Area A would carry greater restrictions, reflecting the location of maximum environmental constraint. Easement Area B, in this case comprising the remainder of the tract, would be less restricted. A specified amount of future development might be allowed, as illustrated here by the designation of an "acceptable residential location."

gained about ecological relationships and land management. For the past eight years, we have been applying restrictions in most cases to a donor's *entire* property with more stringent restrictions on the ecologically sensitive areas. The easement is drafted in concert with the development of an overall conservation land use plan which considers the donor's long and short-term goals, community and Conservancy land protection objectives, and the critical environmental and scenic features of the property. Our easement documents now average over ten pages in order to cover vital administrative issues and to clarify the rights of the landowner and the Conservancy. For the past fifteen years, landowners have been paying most of the costs of easement preparation. Easement endowment contributions by donors have been sought since 1979 when it became obvious that long-term monitoring and annual administrative costs would be substantial. Without a growing endowment, we would have to give up seeking new easements in order to cover the administrative costs of existing easements. Notwithstanding our commitment to making the program pay its way, the Trustees and Environmental Committee have repeatedly stated that an important easement project should not fail because of a landowner's financial difficulty in covering our costs.

The Conservancy's Environmental Committee's responsibilities in the easement area have grown exponentially since 1980. In addition to reviewing all proposed easements, the Committee has had to make increasingly difficult determinations concerning the administration of older easements. Growth and development have introduced threats of condemnation of easement areas for road widening, sewer lines, gas lines, power lines, etc., and the Committee has had to wrestle with appropriate solutions to these growing problems. In a very real sense, the Committee, in addition to its two decades old role of guiding Environmental Management Center programs, has become a quasijudicial body in its role of interpreting easement provisions. Over the years, the Conservancy has been fortunate to have Committee members with high ethical and environmental standards and substantial commitment to the Conservancy and the community.

November, 1989



WHAT ARE THE RIGHTS OF THE WATERMEN?

For over 200 years, the lives of many residents of the Delmarva peninsula have been intimately tied to the natural

cycles and health of the oysters, crabs, clams, fish, and other bounties of the Chesapeake and Delaware Bays. The "watermen" who harvest this natural bounty are legendary for their independence, physical and mental resilience, and stoicism about the vagaries of nature and life in general. Though it has not always been so, they have, in recent time,

recognized that there are limits to what they can take from the Bays if they wish to sustain a certain level of harvest. In many areas where oyster beds are leased, the levels of harvest are very clearly defined. The rights of these small businessmen to pursue their businesses have over the years been abridged by government regulators (limiting harvest) and by other businesses and communities whose airborne and waterborne wastes have polluted the Bays. The watermen have thus learned to live with the limits of a common property, the fish and crabs of the Bays, but they have been victimized by other's use of the common properties of air and water.

In his 1970 State of the Union address, President Nixon said, "We no longer can afford to consider air and water common property, free to be abused by anyone without regard to the consequences. Instead, we should begin now to treat them as scarce resources, which we are no more free to contaminate than we are to throw garbage in our neighbor's yard...the price of goods should be made to include the costs of producing and disposing of them without damage to the environment." In the past 11 years, some progress has been made in the Delaware and Chesapeake Bays, the Brandywine, and many other areas of the country to bring about the changes suggested by President Nixon. However, as a recent meeting on the problems of the Chesapeake has pointed out, that Bay has not been vastly improved and there are serious concerns that the seafood industry and migratory wildfowl face increasing pollution problems in the near future even if present environmental regulations are continued.

Today, however, many people are suggesting that we have had environmental overkill and that regulations should be relaxed on air and water pollution. The question must be raised: what is going to happen to the watermen? They are a prime example of what we might call the pollutees; those businesses, communities, and individuals who are (or could be) down river or down wind of sources of pollution which can destroy their livelihood or impair their health. The watermen are perhaps a worst case example of the pollutees because rivers carrying a vast assortment and amount of wastes and sediment of many states (six in the Chesapeake) empty into the Bays and these wastes are further stirred up by the dredging of ship channels. However, all of us face pollutants which can disrupt our businesses or our lives. As an example, one industry in this area cannot use water from the Brandywine because a trace pollutant in the water befoils its laboratory experiments.

The Reagan Administration has made headlines with environmental organizations with recent proposals to support states rights by returning regulatory responsibilities to the

states. Having worked at the state level during the early 1970s when Federal environmental agencies were centralizing power in Washington, I resented the intrusion of distant professionals trying to dictate means as well as ends to every problem. We had neither rights nor responsibilities to do a good job. The Administration has reopened the debate on the nature of federalism at an interesting time, because there is adequate reason to believe that most states could administer environmental programs without benign detailed instructions from Washington.

Some environmental problems are, of course, intrastate problems. If, however, there is no responsibility to control pollutants which cross state lines, coupled with Federal enforcement of those responsibilities, the country will be further torn by interstate strife and all "watermen" will be the losers.

After Earth Day 1970, Congress and the President set in motion a great environmental crusade. At that time, and even after the Oil Embargo of 1973, very few of us recognized that a corollary and complementary need was for major business investment in new industrial plants. We needed major tax incentives for new facilities which would reduce energy usage and reduce pollutants as well as increase the quality and productivity of our industries. Wasted energy and the waste of resources, which most pollutants are, have both contributed to the shaky positions of many industries. It seems somewhat counter-productive at this time to talk about investment in new industrial plants without also encouraging measures to conserve energy and reduce wastes. What many critics of the Environmental Protection Agency have overlooked is the fact that many of their regulatory requirements for new sources of pollution have been based on applying new technology which would reduce waste of resources and make the industry more productive. Unfortunately, a strict regulatory approach has hurt many small businesses which really needed assistance in identifying and installing state of the art technology.

In some cases, state of the art technology was only applicable to large industries and the regulators felt no need to help the little guy.

In the Brandywine, in the Chesapeake and Delaware Bays, and across the country, most people's hopes for a brighter tomorrow include both economic improvement and improvements in the quality of life. For many "watermen" economic improvement depends on communities and industries making major investments in pollutant controls and having some government responsible and willing to assist them in getting it done.

March, 1982

WASTE NOT, WANT NOT: RESTORING AMERICA'S COMPETITIVE EDGE

As a result of legislation recently signed into law by the governor, Pennsylvanians will be required to change their approach to the handling and disposal of trash. Under the new mandatory recycling law, municipalities with populations of more than 10,000 will be required within two years of passage of the bill to implement recycling programs. Communities with populations between 5,000 and 10,000 with a density of

more than 300 people per square mile must implement programs within three years of the passage of the bill. These municipalities will be required to recycle at least three recyclable materials identified in the bill.

Across the country, states and local governments have been passing legislation to eliminate throwaway packaging, establish deposits on beverage containers, require the separa-

tion of trash into usable material and recycle glass, metals, and paper for reuse in some form.

Americans are no strangers to the "waste not, want not" philosophy. During World War II, we recycled more than 11 million pounds of pots and pans for vitally needed aluminum. In 1944 alone, 604,000 tons of paper and upwards of 280 millions pounds of tin were recycled. During the 50s and 60s, when our competition in the world was still weak, we became more profligate in energy use and developed a "throwaway" ethic. Convenience packaging came into vogue. As a nation, we achieved the dubious distinction of generating more garbage and consuming more energy per capita than any other nation in the world. According to a July 12, 1988, article in the *Wall Street Journal*, the average American produces hundreds of pounds more solid waste per year than the average West German or Japanese, our most formidable economic competitors.

It has been estimated that in Pennsylvania alone, upwards of \$100 million of products could be produced out of the recyclable portion of the 9 million tons of domestic solid wastes citizens produce each year. Such a recycling commitment would result in energy savings sufficient to heat 500,000 homes, reduce air pollution in manufacturing more than 20%, reduce water pollution in manufacturing more than 50%, and save more than 40% of the water needed in manufacturing.

Solid waste recycling by private individuals and businesses is but one example of our society's growing recognition that reducing wastes of materials, water, or energy also pays dividends in an improved environment and a more productive and competitive economy. When energy and raw materials were cheap and easily available in the United States, individuals, businesses, industry, and government pursued wasteful practices, simply throwing things away. In many cases, pollution problems occurred because we didn't want to be bothered with separating a resource which might be reused from a minor contaminant. One prominent steel company in eastern Pennsylvania paid \$1 million a year for many years to dispose of oil contaminated with metal filings until a small investment was made for equipment to remove the filings so the oil could be reused. In other cases, we have mixed small amounts of different wastes together in "waste soups" which could rarely be disposed of without serious environmental impacts.

Many countries that have never had the energy and other natural resources we have had learned long ago to wisely use the resources and materials they did have. They minimized and optimized the use of energy and materials and they reused, reclaimed, or recycled whatever they could. Not only did this reduce the amount and costs of virgin materials imported, but reclamation generally was cheaper and reduced the country's dependency on others for needed resources.

It's time for all Americans to recognize that, in addition to cleaning up our environment, our competitiveness in world markets will increasingly depend on how effectively we conserve resources. Reducing the amount of raw materials and energy used in manufacturing and recycling or reclaiming what we have viewed as "wastes" will preserve precious resources for successive generations, protect our environment, and save dollars often needlessly spent in converting raw materials into useful products or in disposing of what could be recyclable wastes. Perhaps what is needed is the same kind of

national commitment made during WWII.

How can we save energy and resources in production, in our offices, and in our lives? Industry can invest time and effort in developing or adapting technology which will permit it to reuse materials to produce new products or reduce energy demands. Waste reduction and minimization has become a major corporate emphasis of the DuPont Company and a number of other chemical companies. The *Wall Street Journal* (Sept. 20, 1988) reports that Dow Chemical's production efficiency index, which is regularly reviewed by management as a result of management attention, shows process wastes as a percentage of production. Dow says air wastes have been reduced by 30 percent, water wastes by 20 percent, and solid wastes by 15 percent (through production changes, not pollution control). One plant saved raw materials worth \$800,000 by eliminating 10.5 million pounds of air pollutants. Recycling of solid wastes also pays big dividends in resources and energy saved and environmental damage avoidance. Japanese and Taiwanese industries for example, took some of the 4.2 million tons of waste paper the United States exported last year and transformed it into TV and stereo packaging boxes for shipment back to the U.S.

Governments can get involved in energy and resource management through creative initiative to encourage waste reduction, reclamation, and recycling by industry and citizens alike. According to published reports, states and governments here and abroad have begun setting a three-tiered set of priorities for disposal of solid wastes: source reduction (discouraging the use of materials that become waste), source separation (separation of wastes that are recyclable as provided in the Pennsylvania legislation), and large scale incineration and burial of wastes only as a last resort. Similar approaches are also possible in water pollution control and air pollution control.

For Pennsylvania families facing the new recycling law the diligence required to separate trash may seem tedious, and the need to reduce landfill space does not have the inspirational appeal of a holy war. However, recycling and its concomitant energy savings are important elements in improving our society's ability to compete in world markets and to reduce local, national, and global pollution. If separating our trash can save American jobs and clean up our environment, we would be feckless to continue our thoughtless habits.

November, 1988

These articles were written by H. William Sellers, director of the Environmental Management Center of the Brandywine Conservancy. "Waste Not, Want Not: Restoring America's Competitive Edge" was co-authored by H. William Sellers, and John M. Gaadt, senior planner for the Environmental Management Center.

TESTIMONY OF THOMAS L. SMITH

PENNSYLVANIA SCIENCE OFFICE
THE NATURE CONSERVANCY

BEFORE THE
EAST NANTMEAL TOWNSHIP SUPERVISORS

JULY 19, 1990

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TESTIMONY OF THOMAS L. SMITH
PROGRAM COORDINATOR, PLANT ECOLOGIST,
PENNSYLVANIA SCIENCE OFFICE, THE NATURE CONSERVANCY
BEFORE THE EAST NANTMEAL TOWNSHIP SUPERVISORS

JULY 19, 1990

This testimony is in regard to the biological significance of the Great Marsh, Chester County, Pennsylvania, and is presented by Thomas L. Smith, The Nature Conservancy's Program Coordinator and Plant Ecologist for its Pennsylvania Science Office. The Pennsylvania Science Office is part of a network of Nature Conservancy-coordinated conservation data centers located in each of the fifty states, ten Latin American countries, the Tennessee Valley Authority jurisdiction, the Navajo Nation, The Nature Conservancy of Canada, and three national parks. This network consists of over 500 biologists and computer technicians working to assemble and manage information on ecosystems and species, their biology, habitats, locations, conservation status and management needs. This network represents the most comprehensive, continually updated, computer assisted inventory of the biological and ecological features and biodiversity preservation of the western hemisphere. When the Pennsylvania Science Office makes an assessment on a species or ecosystem it is made from a scientifically based, global perspective.

The Great Marsh holds undisputed title as the largest inland marsh in eastern Pennsylvania. It is nothing short of miraculous

that the marsh has survived almost fully intact despite a three-century tradition in the region of large-scale draining and filling of wetlands. The Great Marsh makes up the core of a 700-acre wetland complex which also includes shrub swamps, swamp forests, and a corridor of floodplain forest extending to the reservoir at Marsh Creek State Park. The marsh and the associated wetlands along the headwaters of Marsh Creek support large populations of migratory water birds including great blue heron, green-backed heron, black duck, wood duck, and many more common species such as canada goose. Because of its highly recognized significance for waterfowl, which have dramatically declined in numbers throughout North America, the area has been designated a priority area for conservation by the Pennsylvania Game Commission and the North American Waterfowl Management Plan. The plan is a joint undertaking by the United States and Canadian governments along with numerous national private organizations including Ducks Unlimited. The Great Marsh has also been identified as a Priority Wetland by the U.S. Fish and Wildlife Service in the Regional Wetlands Concept Plan of the Emergency Wetlands Resources Act. This 1986 Act of Congress calls for the identification of wetlands that should receive priority attention for acquisition by federal and state agencies using Land and Water Conservation Fund monies. The Great Marsh has also been officially identified as an Important Wetland by the U.S. Environmental Protection Agency.

The Great Marsh has survived so well in part because it

receives runoff from an exceptionally small, shallow, bowl-shaped watershed of only about five square miles. Historically the watershed has contained only a few farms and part of the tiny village of Marsh. With settlement never exceeding a few dozens in total population, the watershed's runoff patterns have changed little in the 300 years since farming began there.

Like other inland wetlands the Great Marsh acts as a reservoir holding back storm water and thus preventing floods before they can happen. It detains immense quantities of precipitation and runoff, channelling some into recharging the local groundwater system, evaporating large amounts from the water's surface and through the vast leaf surfaces of abundant wetland vegetation, and slowly releasing the remainder downstream. Because of its great size and relatively pristine condition, the Great Marsh hosts a vast diversity of animal and plant species including several endangered, threatened, and rare species.

Several marsh birds of reclusive habits whose numbers have declined drastically due to wetland destruction have been reported from the marsh. The marsh wren, classified by the Pennsylvania Science Office with a rank of State Two, or state threatened, has been documented as nesting at the marsh in 1990. The sedge wren, classified as State Threatened by the Pennsylvania Game Commission and as State One by the Pennsylvania Science Office has been reported at the marsh. The American bittern, classified as State Threatened by the Pennsylvania Game

Commission and as State One by the Pennsylvania Science Office has been documented at the marsh. Henslow's sparrow, classified as State Threatened by the Pennsylvania Game Commission, has also been reported as nesting in the area of the marsh.

The bog turtle (Clemmys muhlenbergii), classified as State Endangered by the Pennsylvania Fish Commission, as a candidate for Federal Listing by the U.S. Fish and Wildlife Service, and as State Two by the Pennsylvania Science Office, has been documented at the marsh. The most recent sighting of the turtle in the marsh was on May 30, 1990.

Two butterflies, the black dash (Euphyes conspicua) and the mulberry-winged skipper (Poanes massasoit), ranked as State Three (rare in the state) by the Pennsylvania Science Office, have been documented at the marsh. The site has not been surveyed for other invertebrate species, but based on the great diversity of plant life providing many potential niches for specialist feeders, it is a certainty that future research will show that the site harbors additional species of special concern.

Larger Canadian St. John's-wort (Hypericum majus) has been documented at the marsh. Known from only one other location in Pennsylvania, this plant species is classified as State Threatened by the Pennsylvania Department of Environmental Resources and as State Two by the Pennsylvania Science Office. It is important to note that this species along with several of those mentioned above have been ranked as State Two and not State One, that is, they are classified as State Threatened and not

Endangered, because they are known to occur in the Great Marsh, a site that was assumed to be protected from ecological degradation such as the proposed "Morganshire Village" development.

As is the case for invertebrates, plants have been under-investigated by scientists at the marsh. The site quite probably harbors other plant species on Pennsylvania's endangered, threatened and rare list. The large size and relatively undisturbed condition of the marsh means that it most certainly harbors a larger number of plant species than any other marsh in the region. The likelihood of any one species going extinct within a circumscribed habitat such as a marsh diminishes with increasing space to sustain larger populations. Conversely, reducing the amount of acreage unmodified by human disturbance increases the probability that extinctions will occur. These disturbances are discussed below.

The biological rarities all are species with special, exacting requirements fulfilled only in undegraded wetland ecosystems. Their populations are barometers, in a sense, of the severity of change brought about in the wetland complex and its watershed by human activity. When natural conditions are interfered with, the number of individuals of a given specialist species dwindle. When natural conditions are restored, their population may rebound, if there are enough remaining individuals to repopulate the habitat. If human-caused interference is allowed to persist or increase, populations of the rare, specialist species will fall below the point of recovery. The

result is local extinction. Estimates for the total number of species supported by planet earth start at 1.5 million and range as high as 300 million because so little is known about the invertebrate and plant life of so many of our rapidly disappearing habitats. Species are currently disappearing from the earth at the rate of 100 or more per day. As conditions continue to degrade, this figure will increase to astronomical proportions by the end of the decade, given the current rate. Uncontrolled population growth and development with concomitant habitat destruction is the reason.

The proposed "Morganshire Village" residential development would place 360 family dwelling units, approximately 1000 people, on the 97-acre Mast Farm tract. This tract includes part of the upper end of the Great Marsh and a reach of Marsh Creek itself. Effluent from a proposed sewage treatment facility and runoff from rooftops, landscaped areas, roads, driveways, and parking areas would flow directly into Marsh Creek after passing through the proposed treatment facilities. Approximately 3.5 miles of the stream flows from the Mast Farm tract through the center of the wetland complex to the lower end of the marsh. While the treatment facilities are the acknowledged state of the art in design our concern is that current state of the art is far from perfect. These basins will not filter out the inevitable periodic surges of organic chemicals from such sources as crankcase oil and radiator coolant that has leaked or been dumped onto the parking lots. Under ideal design conditions small

In summary, the Great Marsh serves many important functions including the following:

1. It performs important natural biological functions including food chain production; supplying specialized wetland habitat; and provision of nesting, spawning, rearing, and resting sites for many common and endangered aquatic and terrestrial plant and animal species (see attached species lists).

2. Much of it has been protected and set aside as a sanctuary for educational and scientific study and to preserve biological diversity by three conservation organizations, The Nature Conservancy, the Brandywine Conservancy, and the French and Pickering Creeks Conservation Trust.

3. Its size and placement makes it one of the most significant wetlands in eastern Pennsylvania in terms of improving and maintaining local water quality through natural filtration.

4. It detain immense quantities of precipitation and runoff serving as a valuable storage area for storm and flood waters.

5. The vast quantities of water processed through the marsh are a major source of local groundwater recharge.

The Great Marsh clearly meets and exceeds five of the six criteria for designation as an Important Wetland under Section 105 of the Pennsylvania Dam Safety and Encroachment Act (it does not meet number six because this criterion applies to only to coastal areas). The Chapter 105 regulations prohibit development activity within 300 feet of an Important Wetland unless the

public benefits of the project outweigh the damage to the wetlands resource, feasible alternative sites do not exist, and the cumulative effect of numerous such piecemeal changes will not result in a major impairment of the wetland resources.

It is The Nature Conservancy's opinion as stated in this testimony that this project is not in the public interest, alternative sites do exist, and this project alone will have significant impacts upon the marsh, apart from consideration of the potential effects of additional developments of this type.

While the 300-foot buffer required around any designated Important Wetland would not alleviate the potential drop in the level of the basin's groundwater addressed in this report it would help protect the marsh from some of the runoff impacts. A 300-foot buffer would allow enhanced filtration of surface water runoff and enhanced filtration of waters leaving the sedimentation basins. The 300-foot buffer requirement was established to help protect important Pennsylvania wetlands from human-induced impacts, including buffering wildlife from human activities and providing for the enhanced filtration of runoff waters before they reach the wetland. It is The Nature Conservancy's hope that this 300-foot requirement will be respected for one of the most important inland wetlands in the Northeastern United States, the Great Marsh.

APPENDIX A
 SPECIES OF SPECIAL CONCERN
 THE GREAT MARSH

| | | | Rank | Status | |
|---------------------------------|------------------------------|--|--------|---------|-------|
| | | | Global | Federal | State |
| | | | State | State | State |
| BIRDS | | | | | |
| American bittern | <u>Botaurus lentiginosus</u> | | G4 | S1 | PT |
| Henslow's sparrow | <u>Ammodramus henslowii</u> | | G4 | S3 | PT |
| Marsh wren | <u>Cistothorus palustris</u> | | G5 | S2 | N |
| Sedge wren | <u>Cistothorus platensis</u> | | G5 | S1 | PT |
| REPTILES | | | | | |
| Bog turtle | <u>Clemmys muhlenbergii</u> | | G4 | S2 | C2 |
| | | | | | PE |
| BUTTERFLIES | | | | | |
| Black dash | <u>Euphyes conspicua</u> | | G4 | S3 | |
| Mulberry-winged skipper | <u>Poanes massasoit</u> | | G4 | S3 | |
| PLANTS | | | | | |
| Larger Canadian St. John's-wort | <u>Hypericum majus</u> | | G5 | S2 | PT |

FEDERAL AND STATE ENDANGERED SPECIES CATEGORIES

FEDERAL STATUS

U.S. FISH AND WILDLIFE SERVICE CATEGORIES OF ENDANGERED
AND THREATENED PLANTS AND ANIMALS

The following definitions are extracted from the September 27, 1985 U.S. Fish and Wildlife Service notice in the Federal Register:

LE--Taxa formally listed as endangered.

LT--Taxa formally listed as threatened.

PE--Taxa proposed to be formally listed as endangered.

PT--Taxa proposed to be formally listed as threatened.

S--Synonyms.

C1--Taxa for which the Service currently has on file substantial information on biological vulnerability and threat(s) to support the appropriateness of proposing to list them as endangered or threatened species.

C2--Taxa for which information now in possession of the Service indicates that proposing to list them as endangered or threatened species is possibly appropriate, but for which substantial data on biological vulnerability and threat(s) are not currently known or on file to support the immediate preparation of rules.

C3--Taxa that are no longer being considered for listing as threatened or endangered species. Such taxa are further coded to indicate three categories, depending on the reason(s) for removal from consideration.

3A--Taxa for which the Service has persuasive evidence of extinction.

3B--Names that, on the basis of current taxonomic understanding, usually as represented in published revisions and monographs, do not represent taxa meeting the Act's definition of "species".

3C--Taxa that have proven to be more abundant or widespread than was previously believed and/or those that are not subject to any identifiable threat.

STATE STATUS

PE - Pennsylvania Endangered - A classification of plant species which are in danger of extinction throughout most or all of their natural range within this Commonwealth, if critical habitat is not maintained or if the species is greatly exploited by man. This classification shall also include any populations of plant species that have been classified as Pennsylvania Extirpated, but which subsequently are found to exist in this Commonwealth.

PX - Pennsylvania Extirpated - A classification of plant species believed by the Department to be extinct within this Commonwealth. These plant species may or may not be in existence outside this Commonwealth. If plant species classified as Pennsylvania Extirpated are found to exist, the species automatically will be considered to be classified as Pennsylvania Endangered.

PR - Pennsylvania Rare - A classification of plant species which are uncommon within this Commonwealth. All species of native wild plants classified as Disjunct, Endemic, Limit of Range and Restricted are included within the Pennsylvania Rare classification.

PT - Pennsylvania Threatened - A classification of plant species which may become endangered throughout most or all of their natural range within this Commonwealth, if critical habitat is not maintained to prevent further decline in this Commonwealth, or if the species is greatly exploited by man.

PV - Pennsylvania Vulnerable - A classification of plant species which are in danger of population decline within Pennsylvania because of their beauty, economic value, use as a cultivar, or other factors which indicate that persons may seek to remove these species from their native habitats.

TU - Tentatively Undetermined - A classification of plant species which are believed to be in danger of population decline, but which cannot presently be included within another classification due to taxonomic uncertainties, limited evidence within historical records, or insufficient data.

N - None - A classification of plant species which are believed to be endangered, rare, or threatened, but which have not yet been included within another classification due to delays created by required regulatory review processes.

The following state statuses are used by the Pennsylvania Fish Commission and the Pennsylvania Game Commission for animal species. The definitions for these statuses are presently being re-evaluated.

LE - Listed Endangered

LT - Listed Threatened

LS - Listed Special Concern

N - Not Listed

THE NATURE CONSERVANCY GLOBAL AND STATE ELEMENT RANKS

GLOBAL ELEMENT RANKS

G1 = Critically imperiled globally because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.

G2 = Imperiled globally because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.

G3 = Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range or because of other factors making it vulnerable to extinction throughout its range; in terms of occurrences, in the range of 21 to 100.

G4 = Apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery.

G5 = Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.

GH = Of historical occurrence throughout its range, i.e., formerly part of the established biota, with the expectation that it may be rediscovered (e.g., Bachman's Warbler).

GU = Possibly in peril range wide but status uncertain; need more information.

GX = Believed to be extinct throughout its range (e.g., Passenger Pigeon) with virtually no likelihood that it will be rediscovered.

STATE ELEMENT RANKS

S1 = Critically imperiled in state because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extirpation from the state.

S2 = Imperiled in state because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extirpation from the state.

S3 = Rare or uncommon in state (on the order of 21 to 100 occurrences).

S4 = Apparently secure in state, with many occurrences.

S5 = Demonstrably secure in state and essentially in eradicable under present conditions.

SA = Accidental in state, including species which only sporadically breed in the state.

SE = An exotic established in state; may be native elsewhere in North America (e.g., house finch).

SH = Of historical occurrence in the state with the expectation that it may be rediscovered.

SN = Regularly occurring, usually migratory and typically nonbreeding species for which no significant or effective habitat conservation measures can be taken in the state.

SR = Reported from the state, but without persuasive documentation which would provide a basis for either accepting or rejecting (e.g., misidentified specimen) the report.

SRF = Reported falsely (in error) from the state but this error persisting in the literature.

SU = Possibly in peril in state but status uncertain; need more information.

SX = Apparently extirpated from the state.

APPENDIX B

BIRD SPECIES LIST, THE GREAT MARSH

(Source: Valley Forge Audubon Society)

| | |
|---------------------------|-------------------------------|
| Pied-billed grebe | Red-headed woodpecker |
| American bittern | Red-bellied woodpecker |
| Least bittern | Yellow-bellied sapsucker |
| Great egret | Downy woodpecker |
| Green-backed heron | Hairy woodpecker |
| Black-crowned night-heron | Northern flicker |
| Great blue heron | Pileated woodpecker |
| Canada goose | Olive-sided flycatcher |
| Muscovy duck | Eastern wood pewee |
| Wood duck | Yellow-bellied flycatcher |
| American black duck | Acadian flycatcher |
| Mallard | Least flycatcher |
| Northern shoveler | Eastern phoebe |
| American Wigeon | Great crested flycatcher |
| Black vulture | Willow flycatcher |
| Turkey vulture | Eastern kingbird |
| Osprey | Purple martin |
| Northern harrier | Tree swallow |
| Sharp-shinned hawk | Southern rough-winged swallow |
| Cooper's hawk | Barn swallow |
| Broad-winged hawk | Blue jay |
| Red-tailed hawk | American crow |
| American kestrel | Fish crow |
| Ring-necked pheasant | Black-capped chickadee |
| Ruffed grouse | Carolina chickadee |
| Northern bobwhite | Tufted titmouse |
| Common moorhen | Red-breasted nuthatch |
| Killdeer | White-breasted nuthatch |
| Greater yellowlegs | Brown creeper |
| Solitary sandpiper | Carolina wren |
| Spotted sandpiper | House wren |
| Common snipe | Winter wren |
| American woodcock | Marsh wren |
| Ring-billed gull | Golden-crowned kinglet |
| Rock dove | Ruby-crowned kinglet |
| Mourning dove | Blue-gray gnatcatcher |
| Black-billed cuckoo | Eastern blubbird |
| Yellow-billed cuckoo | Veery |
| Common barn owl | Gray-cheeked thrush |
| Great horned owl | Swainson's thrush |
| Long-eared owl | Hermit thrush |
| Common nighthawk | Wood thrush |
| Chimney swift | American robin |
| Ruby-throated hummingbird | Gray catbird |
| Belted kingfisher | Northern mockingbird |

| | |
|---|------------------------|
| Brown thrasher | Louisiana waterthrush |
| Cedar waxwing | Kentucky warbler |
| European starling | Mourning warbler |
| White-eyed vireo | Common yellowthroat |
| Solitary vireo | Wilson's warbler |
| Yellow-throated vireo | Hooded warbler |
| Warbling vireo | Canada warbler |
| Red-eyed vireo | Yellow-breasted chat |
| Blue-winged warbler | Scarlet tanager |
| Golden-winged warbler | Northern cardinal |
| Golden-winged x blue-winged (Lawrence's) warbler | Rose-breasted grosbeak |
| Tennessee warbler | Indigo bunting |
| Nashville warbler | Rufous-sided towhee |
| Northern parula | American tree sparrow |
| Yellow warbler | Chipping sparrow |
| Chestnut-sided warbler | Field sparrow |
| Magnolia warbler | Fox sparrow |
| Cape May warbler | Song sparrow |
| Black-throated blue warbler | Swamp sparrow |
| Yellow-rumped warbler | White-throated sparrow |
| Black-throated green warbler | Dark-eyed junco |
| Pine warbler | Snow bunting |
| Prairie warbler | Red-winged blackbird |
| Palm warbler | Eastern meadowlark |
| Bay-breasted warbler | Rusty blackbird |
| Blackpoll warbler | Common grackle |
| Black-and-white warbler | Brown-headed cowbird |
| American redstart | Northern oriole |
| Prothonotary warbler | Purple finch |
| Worm-eating warbler | House finch |
| Ovenbird | American goldfinch |
| Northern waterthrush | Evening grosbeak |
| | House sparrow |

APPENDIX C

PARTIAL LIST OF PLANT SPECIES, THE GREAT MARSH

Sources: Leo P. Bruederle; Sara Davison;
Thomas L. Smith; Paul Somers; Steve Somers

| | |
|--|--------------------------|
| <u>Acalypha gracilens</u> | A three-seeded mercury |
| <u>Acer rubrum</u> | Red maple |
| <u>Achillea millefolium</u> | Yarrow |
| <u>Agrimonia gryposepala</u> | An agrimony |
| <u>Alisma subcordatum</u> | A water-plantain |
| <u>Alisma</u> sp. | A water-plantain |
| <u>Allium</u> sp. | Wild onion |
| <u>Ambrosia artemisiifolia</u> | Ragweed |
| <u>Anemone quinquefolia</u> | Wood anemone |
| <u>Apocynum cannabinum</u> | Indian-hemp |
| <u>Arisaema triphyllum</u> | Jack-in-the-pulpit |
| <u>Aster</u> spp. | Asters |
| <u>Athyrium filix-femina</u> | Lady-fern |
| <u>Barbarea vulgaris</u> | Common winter-cress |
| <u>Berberis thunburgii</u> | Japanese barberry |
| <u>Bidens aristosa</u> | A tickseed-sunflower |
| <u>Boehmeria cylindrica</u> | False nettle |
| <u>Calamagrostis canadensis</u> | A reed grass |
| <u>Calamagrostis neglecta</u> | A reed grass |
| <u>Callitricha</u> sp. | Water-starwort |
| <u>Caltha palustris</u> | Marsh-marigold |
| <u>Campanula aparinoides</u> | Marsh bellflower |
| <u>Cardamine pensylvanica</u> | A bitter cress |
| <u>Cardamine rotundifolia</u> | A bitter cress |
| <u>Carex comosa</u> | A sedge |
| <u>Carex lacustris</u> var. <u>lacustris</u> | A sedge |
| <u>Carex lurida</u> | A sedge |
| <u>Carex scoparia</u> | A sedge |
| <u>Carex stipata</u> | A sedge |
| <u>Carex stricta</u> | A sedge |
| <u>Carex tribuloides</u> | Tussock sedge |
| <u>Carex vulpinoidea</u> | A sedge |
| <u>Carex</u> spp. | Sedges |
| <u>Carpinus caroliniana</u> | American hornbeam |
| <u>Carya ovata</u> | Shagbark hickory |
| <u>Cephalanthus occidentalis</u> | Buttonbush |
| <u>Chrysosplenium americanum</u> | Golden saxifrage |
| <u>Cicuta maculata</u> | Poison hemlock |
| <u>Cinna arundinacea</u> | Reed-grass |
| <u>Claytonia virginica</u> | Spring-beauty |
| <u>Commelina communis</u> | Day-flower |
| <u>Cornus alternifolia</u> | Alternate-leaved dogwood |
| <u>Cornus amomum</u> | Silky dogwood |
| <u>Cuscuta</u> sp. | A dodder |

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|-----------------------------------|-----------------------------------|
| <u>Cyperus strigosus</u> | An umbrella-sedge |
| <u>Dichanthelium clandestinum</u> | Deer-tongue grass |
| <u>Dioscorea villosa</u> | Wild yam |
| <u>Dryopteris marginalis</u> | Marginal wood fern |
| <u>Dryopteris cristata</u> | Crested wood fern |
| <u>Dryopteris intermedia</u> | Intermediate wood fern |
| <u>Dulichium arundinaceum</u> | Three-way sedge |
| <u>Eleocharis tenuis</u> | Slender spike-rush |
| <u>Epilobium coloratum</u> | Purple-leaved willow-herb |
| <u>Epilobium glandulosum</u> | Northern willow-herb |
| <u>Erythronium americanum</u> | Trout-lily |
| <u>Eupatorium fistulosum</u> | Hollow Joe-pye weed |
| <u>Eupatorium perfoliatum</u> | Boneset |
| <u>Eupatorium purpureum</u> | Sweet Joe-pye weed |
| <u>Fagus grandifolia</u> | American beech |
| <u>Fraxinus americana</u> | White ash |
| <u>Galium sp.</u> | A bedstraw |
| <u>Geum sp.</u> | An avens |
| <u>Glyceria canadensis</u> | Rattlesnake-grass |
| <u>Glyceria striata</u> | Fowl-meadow grass |
| <u>Gratiola neglecta</u> | A hedge-hyssop |
| <u>Hamamelis virginiana</u> | Witch-hazel |
| <u>Hypericum majus</u> | Larger Canadian St. Johns-wort |
| <u>Ilex verticillata</u> | Winterberry |
| <u>Impatiens spp.</u> | Jewelweeds |
| <u>Iris versicolor</u> | Blue flag |
| <u>Juncus effusus</u> | Soft rush |
| <u>Lactuca spp.</u> | Wild lettuces |
| <u>Leersia oryzoides</u> | Rice cutgrass |
| <u>Lemna sp.</u> | A duckweed |
| <u>Lindera benzoin</u> | Spicebush |
| <u>Liriodendron tulipifera</u> | Tuliptree |
| <u>Lonicera japonica</u> | Japanese honeysuckle |
| <u>Lonicera sp.</u> | A honeysuckle |
| <u>Ludwigia alternifolia</u> | Seed-box |
| <u>Ludwigia palustris</u> | Water-purslane |
| <u>Lycopodium lucidulum</u> | Shining clubmoss |
| <u>Lycopodium obscurum</u> | Ground-pine |
| <u>Lycopus americanus</u> | Cut-leaved water-horehound |
| <u>Lycopus rubellus</u> | Stalked water-horehound |
| <u>Lysimachia ciliata</u> | Fringed loosestrife |
| <u>Lysimachia nummularia</u> | Moneywort |
| <u>Maianthemum canadense</u> | Wild lily-of-the-valley |
| <u>Microstegium vimineum</u> | Japanese stiltgrass |
| <u>Mimulus ringens</u> | Monkeyflower |
| <u>Mitchella repens</u> | Partridge-berry |
| <u>Nymphaea odorata</u> | Fragrant waterlily |
| <u>Nuphar luteum</u> | Spatterdock |
| <u>Nyssa sylvatica</u> | Blackgum |
| <u>Onoclea sensibilis</u> | Sensitive fern |
| <u>Osmunda cinnamomea</u> | Cinnamon fern |

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|------------------------------------|--------------------------|
| <u>Panicum capillare</u> | Witch grass |
| <u>Panicum</u> sp. | A panic grass |
| <u>Parthenocissus quinquefolia</u> | Virginia creeper |
| <u>Phleum pratense</u> | Timothy grass |
| <u>Phryma leptostachya</u> | Lopseed |
| <u>Pilea pumila</u> | Clearweed |
| <u>Platanus occidentalis</u> | American sycamore |
| <u>Poa</u> spp. | Bluegrasses |
| <u>Podophyllum peltatum</u> | May-apple |
| <u>Polygonum arifolium</u> | Halberd-leaved tearthumb |
| <u>Polygonum natans</u> | Water smartweed |
| <u>Polygonum sagittatum</u> | A tear-thumb |
| <u>Polygonum virginianum</u> | Jumpseed |
| <u>Potentilla</u> spp. | Cinquefoils |
| <u>Prunus serotina</u> | Black cherry |
| <u>Quercus palustris</u> | Pin oak |
| <u>Ranunculus septentrionalis</u> | Swamp buttercup |
| <u>Ranunculus</u> sp. | A buttercup |
| <u>Rhynchospora capitellata</u> | A beak-rush |
| <u>Ribes</u> sp. | Gooseberry |
| <u>Rorippa palustris</u> | Marsh watercress |
| <u>Rosa palustris</u> | Swamp rose |
| <u>Rubus hispida</u> | Dewberry |
| <u>Rubus phoenicolasius</u> | Wineberry |
| <u>Rubus</u> sp. | A blackberry |
| <u>Rumex</u> sp. | A dock |
| <u>Sagittaria engelmanniana</u> | An arrowhead |
| <u>Sagittaria</u> sp. | An arrowhead |
| <u>Sambucus canadensis</u> | Common elderberry |
| <u>Sanquisorba canadensis</u> | Wild burnet |
| <u>Scirpus atrovirens</u> | A bulrush |
| <u>Scirpus cyperinus</u> | Wool-grass |
| <u>Scirpus validus</u> | Great bulrush |
| <u>Scutellaria galericulata</u> | Marsh skullcap |
| <u>Scutellaria lateriflora</u> | Mad-dog skullcap |
| <u>Sium suave</u> | Water-parsnip |
| <u>Smilax</u> spp. | Greenbriers |
| <u>Solidago gigantea</u> | A goldenrod |
| <u>Solidago</u> spp. | Goldenrods |
| <u>Sparganium americanum</u> | A bur-reed |
| <u>Sparganium chlorocarpus</u> | A bur-reed |
| <u>Sphagnum strictum</u> | A sphagnum moss |
| <u>Spiraea alba</u> | A meadow-sweet |
| <u>Spiraea</u> sp. | A spirea |
| <u>Spirodela polyrhiza</u> | A duckweed |
| <u>Symplocarpus foetidus</u> | Skunk-cabbage |
| <u>Thalictrum polygamum</u> | Tall meadow-rue |
| <u>Thalictrum</u> sp. | A meadow-rue |
| <u>Thelypteris palustris</u> | Marsh fern |
| <u>Toxicodendron radicans</u> | Poison-ivy |
| <u>Triadenum virginicum</u> | Marsh St. John's-wort |
| <u>Typha latifolia</u> | Broad-leaved cattail |

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|------------------------------|-----------------------|
| <u>Ulmus americana</u> | American elm |
| <u>Uvularia</u> sp. | Bellwort |
| <u>Vaccinium corymbosum</u> | Highbush blueberry |
| <u>Vallisneria americana</u> | Tape grass |
| <u>Verbena hastata</u> | Blue vervain |
| <u>Verbena stricta</u> | A vervain |
| <u>Vernonia</u> sp. | An ironweed |
| <u>Viburnum prunifolium</u> | Black-haw |
| <u>Viburnum recognitum</u> | Northern arrowwood |
| <u>Viburnum dentatum</u> | Southern arrowwood |
| <u>Viburnum acerifolium</u> | Maple-leaved viburnum |
| <u>Viola affinis</u> | Blue violet |
| <u>Viola pallens</u> | White violet |
| <u>Viola</u> spp. | Violets |
| <u>Vitis labrusca</u> | Fox grape |
| <u>Vitis</u> sp. | A grape |

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- A. Map of the territory served by The Nature Conservancy's Conservation Data Center network (area colored green)
- B. Open water and emergent vegetation (mainly spatterdock, Nuphar luteum) owned by The Nature Conservancy near the southern end of the Great Marsh (J. Lepore)
- C. Aerial view of the Great Marsh, at a tract under conservation easement to the Brandywine Conservancy; Pennsylvania turnpike and service area in background (J. Lepore)
- D. A portion of the Great Marsh in late summer (dominated by tickseed-sunflower, Bidens aristosa) owned by The Nature Conservancy north of Pa. Route 401 (R. E. Latham)
- E. Wood duck, Aix sponsa, present at the Great Marsh and associated wetlands during both the breeding season and migration (W. Greene)
- F. American black duck, Anas rubripes, present at the Great Marsh principally during migration (J. R. Woodward)
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