



*Saving the Last Great Places*

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# THE GREAT SWAMP

**A Watershed Conservation Strategy**

written by  
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*“When the land does well for its owner, and the owner does well by his land – when both end up better by reason of their partnership – then we have conservation.”*

*Aldo Leopold*

1999

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# Recommended Strategies

## VISION

*A large intact wetland ecosystem that maintains high water quality, supports high levels of biodiversity, is enjoyed through managed use by local communities, and is protected through the active leadership of community members and local municipal officials.*

This chapter focuses on positive steps that can be taken to protect and improve the important functions of the wetland ecosystem. Many of these recommendations are derived from public input received via a conference on the Great Swamp held in October 1997 in which more than 75 representatives from government agencies and business, recreation and conservation organizations participated. Others derive from recommendations made by the Regional Plan associations 1991 Great Swamp Conservation Plan which have yet to be fully implemented.

These recommendations to conserve the Great Swamp and accommodate compatible economic growth are organized into six initiatives:

- **Increase public awareness of the Great Swamp**
- **Foster local leadership on wetland and watershed protection**
- **Strengthen wetland protections**
- **Improve water quality**
- **Protect plant and animal habitat**
- **Encourage compatible economic development and improved land-use planning**

Implementing these initiatives will require that public agencies, private organizations, and individual citizens work together in partnership to conserve the Great Swamp and encourage compatible economic growth. No one organization or entity has the expertise or resources to implement these initiatives independently. Successful implementation will require the united effort of all those who have influence over use and protection of the lands and waters of the Great Swamp Watershed.

## **I** NCREASE PUBLIC AWARENESS OF THE GREAT SWAMP

Although the Great Swamp is one of the largest wetlands in New York State, few people know exactly where it is, how to access it, or why it is important to protect. While broader public awareness is likely to bring greater respect for the wetland system, care must be taken to avoid overuse and possible degradation of sensitive ecosystem areas. Recommendations for increasing awareness of the Great Swamp among watershed residents include community outreach activities, signage and publicity, managed recreation access, and education initiatives.

## **EXPAND COMMUNITY OUTREACH ACTIVITIES**

The Great Swamp is an exceptional resource, but it is not easily accessible. Organized public events introduce residents to the value and beauty of the wetland while strengthening community bonds. Local conservation organizations such as Friends of the Great Swamp, Putnam County Land Trust, Oblong Land Conservancy, Wildlife Conservation Society, Trout Unlimited and The Nature Conservancy sponsor activities that involve a broad spectrum of the community in a variety of events and activities. Although many activities are already ongoing, suggested initiatives to improve community outreach include:

- **Expand naturalist-led excursions:** These include canoe trips, bird watching, wildflower viewing, and general interest hikes.
- **Continue wetland cleanup days:** This annual community event has removed many tons of polluting refuse from the wetland, including tires, furniture, and appliances.
- **Establish volunteer community monitoring programs:** These include wildlife tracking, macroinvertebrate monitoring, water quality monitoring, and amphibian monitoring.

## **CREATE SIGNAGE AND PUBLICITY**

The Great Swamp is visible from many road and rail locations, but few travelers are aware of the vast ecosystem they are passing by. Recommendations to improve recognition of the Great Swamp include:

- **Post road signs identifying the Great Swamp:** Place attractive signs at points where the wetland is traversed by well-traveled roads to inform drivers that they are near the Great Swamp. Signs should be consistent and recognizable, ideally including a Great Swamp logo.
- **Create a Great Swamp poster for Metro-North Railroad:** Metro-North Railroad's Harlem Line cuts through the Great Swamp for many miles and carries commuters to and from the watershed. Friends of the Great Swamp should work with Metro-North to design a poster that informs riders of the environment through which they are riding. The poster could be installed on passenger trains operating between Brewster North and Wassaic and at train stations within the watershed.

## **IMPROVE MANAGED RECREATION ACCESS**

The natural areas covered by wetlands, forests, and waterbodies create numerous opportunities for recreation and tourism. However, much of this



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land is privately owned, thus limiting the recreation potential for visitors and the general public. Liability concerns are a major impediment to increasing recreation opportunities on private land (see box on p.40). In the Great Swamp, recreation must be managed carefully to ensure that public use does not harm ecosystem resources or impinge on private property rights. Recommendations to enhance recreational opportunities include:

■ **Improve canoe launch sites:** Four commonly used canoe launch sites in the Great Swamp are located at Green Chimneys, Route 22 crossing, Patterson Environmental Park, and Harlem Valley Psychiatric Hospital. Each offers varying amenities, but all would benefit from improvements such as a designated parking area and a kiosk that displays a map of the watershed, information on the wetland ecosystem, and guidelines for appropriate use.

■ **Maintain vegetative debris in river channels:** When fallen trees cross the river they restrict travel, requiring portages that can be difficult and damaging to vegetation. However, vegetative debris plays an important ecosystem role by reducing the river's velocity and thus maintaining the wetlands ability to improve water quality and control flooding. Therefore, when clearing channels for watercraft, minimal openings are preferred to preserve vegetative blockages and maintain slow water flow.

■ **Establish Maybrook Rail Trail:** The former Maybrook rail line running between Danbury and Beacon (now owned by Metro-North and called the Beacon line) passes through the western portion of the Great Swamp Watershed. Plans underway to convert one of the two track beds to a rail trail should be supported. This scenic line connects Lake Tonetta, Ice Pond, Clough and Twin Hill Preserves, Towners, Holmes, Whaley Lake, and the Ap-

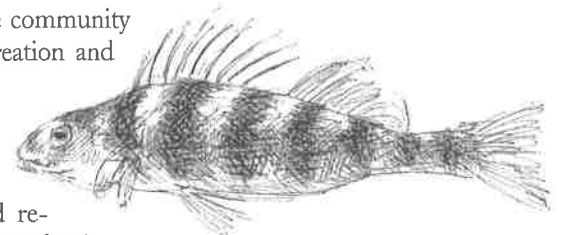
palachian Trail, and travels through the Muddy Brook extension of the Great Swamp. Design elements that prevent access by motorized off-road vehicles should be incorporated to limit habitat destruction. If fencing is erected along the rail line, care should be taken to allow wildlife migration.

■ **Acquire additional public recreation lands:** Additional recreation areas should be established on key tracts of land through acquisition and public use easements. Maintenance of sites would be established on a case by case basis and involve a partnership effort among county or municipal government, parks and recreation departments, and local conservation or recreation groups. A management plan for each of these sites should be created so that sensitive areas are not overused or degraded.

■ **Expand Greenways and trails:** Greenways link natural and scenic areas together and enhance recreational opportunities while supporting resource protection. A Great Swamp recreation trail system could link existing and future preserves, utilizing the Appalachian Trail and Maybrook Rail Trail as the backbone. The 1998 New York State Open Space Plan lists the Great Swamp as a priority project and the 1994 Northern Putnam Greenway Report highlights the Great Swamp and links it to the Pawling Pathway Project and other greenway plans. These initiatives envision a network of interconnected trails, boardwalks and natural areas that would benefit the community and provide additional recreation and tourism opportunities.

### PROMOTE EDUCATION

The Great Swamp provides an excellent laboratory and resource for studies of many academic



disciplines, including ecology, biology, chemistry, natural resources, law, history, anthropology, and the arts. Many schools already utilize the Great Swamp as an educational resource. However, little coordination or support for teachers interested in using the Great Swamp currently exists. Recommendations for improving school-based education using the Great Swamp include:

■ **Incorporate the Great Swamp into the school curriculum:** In watershed schools, incorporate lessons on the Great Swamp into the local history module of the New York State curriculum.

■ **Develop Great Swamp resource materials:** Create materials geared for use in elementary, middle, and high schools. The Up River-Down River program sponsored by Wildlife Conservation Society has begun compiling such material. A concerted effort incorporating teachers and school superintendents would ensure that these materials will be applicable throughout the watershed.

■ **Establish a Great Swamp Interpretive Center:** Establish a resource center near the wetland that offers interpretive trails and educational information on the water resources and ecology of the area, and houses studies, documents, data, photos, maps and other information pertaining to the Great Swamp.

■ **Organize a Great Swamp Educators Conference:** Organize a forum in which a coordinated education action plan would be developed to provide resources and support for teachers utilizing the Great Swamp as an educational resource. One activity of the action plan might be a Great Swamp Youth Summit, featuring student projects and wetland-related educational activities.

## **F**OSTER LOCAL LEADERSHIP ON WETLAND AND WATERSHED PROTECTION

Both elected officials and community members have a leadership role to play in establishing local environmental and economic policies. These policies will be more effective if implemented consistently across all watershed municipalities. To foster leadership toward a watershed perspective, the following are proposed: establish a Great Swamp Watershed Advisory Council, strengthen Friends of the Great Swamp, and form a Wetland Watch Citizen Network.

■ **Establish a Great Swamp Watershed Advisory Council:** Activities within the Great Swamp Watershed are governed by numerous local, state and federal government entities and many regional and local organizations. By and large, each government, agency, and organization sets policy independently. Currently, the effects of these policies are not well monitored, regional activities are not coordinated, and no mechanism exists for information sharing and regional planning across the Great Swamp

Watershed. This results in reduced effectiveness of good local policies and a lost opportunity for improved management and coordinated decision-making.

To improve communication and cooperation and to facilitate coordinated land-use planning amongst the watershed communities, a forum is proposed — the Great Swamp Watershed Advisory Council — that will bring together each of the towns and the Village of Pawling, the two counties, NYC DEP, and representatives from business and conservation groups.

The proposed Council will be a joint public-private partnership to foster watershed-wide resource protection and compatible economic growth. The Council is not intended as an additional layer of regulation and review. Rather, by focusing on regional and intermunicipal solutions to mutual concerns, it is expected that participation in the Council will lead to sharing of information and resources that could save public funds, avoid costly law suits, and facilitate effective government.

A variety of successful models for the Great Swamp Watershed Advisory Council are currently in operation throughout New York State (see box on p.47). Each of these involve intermunicipal cooperation toward shared economic development and environmental protection goals. While these models exist, the Great Swamp Watershed Advisory Council will necessarily be unique, designed to meet the needs and interests of its members.

Funds are available to convene the Council and facilitate initial meetings. Future funding needs will be determined by the Council once the organization is established. Many grant programs seek to support cooperative, intermunicipal partnerships like this Council. Suggested activities for the Council are listed in the box on page 46.

■ **Strengthen Friends of the Great Swamp:** Friends of the Great Swamp (FrOGS) is a key community coalition that links the many individuals and groups working toward conservation of natural resources throughout the watershed. Its activities include: information sharing and coordination; education and outreach; coordination of scientific research and monitoring; and watershed protection planning. FrOGS is the citizen counterpart to the proposed Great Swamp Watershed Advisory Council.

Friends of the Great Swamp has the potential to be a guiding voice for conservation and environmentally compatible growth throughout the watershed. As a volunteer organization, FrOGS has been an effective outreach mechanism by involving the broader community in Great Swamp-related events. Increased support for this organization among municipalities, businesses, and residents would strengthen its ability to support community



activities, scientific research, and compatible land-use planning across the watershed. Such support might include: funds for administrative staff and for research, education and public outreach activities; housing for an office and information center; and inclusion on distribution lists for development proposals and issues affecting the Great Swamp.

■ **Form a Wetland Watch Citizen Network:** The effectiveness of wetland and natural resource protection is limited by the ability of government agencies to monitor and enforce their laws and regulations. Community participation can augment local and state efforts to monitor compliance with regulations, potentially averting serious problems. It can also engage local citizens to become better stewards of their communities.

A "Wetland Watch" citizen network should be formed of trained residents who watch sensitive areas, receive and screen information from the community, and report that information to local, county, and state enforcement agencies as appropriate. Friends of the Great Swamp could facilitate this initiative. Such a network increases civic participation in environmental protection and can reduce illegal dumping, poaching, and pollution. By screening

and prioritizing complaints, it also reduces the costs borne by local governments. In addition, advertising and promoting this voluntary community effort may deter violation of environmental laws.

## **S**TRENGTHEN WETLAND PROTECTIONS

The cumulative loss of wetlands, both nationally and locally, has been slowed by government regulatory oversight. However, wetland loss and degradation continue. The cumulative impacts of land-use decisions must be taken into account at all levels to ensure adequate protection of wetlands and the beneficial services they provide. Recommendations to strengthen wetland protections focus on improving implementation of state and federal wetland programs and strengthening local regulatory controls.

### **IMPROVE IMPLEMENTATION OF STATE AND FEDERAL WETLAND PROGRAMS**

■ **Re-delineate the boundaries of the Great Swamp (DP-22):** New York's wetland statute requires NYS DEC to promulgate official maps of wetlands subject to state regulatory protection. A recent Nature Conservancy analysis (see box on p.2 and

## **Suggested Activities of the Great Swamp Advisory Council**

**A**s a mechanism to foster watershed-wide resource protection and compatible development, the Great Swamp Watershed Advisory Council can promote communication and coordination across political boundaries to create a more comprehensive understanding of issues and trends affecting the region. Potential foci for the Council include:

■ **HARMONIZED AND STRENGTHENED MUNICIPAL REGULATIONS:** Local regulations regarding stormwater management, groundwater and wetland protection, and steep slopes are more effective if consistent across the watershed.

■ **WATERSHED-WIDE REGIONAL PLANNING:** Cooperative planning initiatives might include environmentally compatible economic development planning; comprehensive regional intermunicipal master planning; Route 22 land use planning for a safer and more attractive transportation corridor; review of individual municipal master plans for watershed-wide cumulative effects; and a regional recreation management plan.

■ **ENFORCEMENT:** Compliance with environmental regulations and zoning codes could be coordinated and personnel could be shared among municipalities, thereby reducing costs.

■ **POLLUTION REDUCTION:** Initiatives could include public education and improved management regarding septic systems; improved stormwater management to reduce pollutant loading from road run-off, agriculture and livestock farming, and other non-point sources of pollution; and restoration of brownfield areas.

■ **ROAD SALT:** Initiatives to reduce pollution from road salt might include covering salt and sand piles and establishing low salt application areas near wetlands and streams.

■ **TRAINING IN INNOVATIVE LAND-USE PLANNING TECHNIQUES:** The Council could organize and encourage municipal participation in land use training programs such as that provided by Pace University's Land Use Law Center. These land use techniques might include cluster development, transfer of development rights, floating zones, wetland banking, and other incentive-based land use policies.

■ **MEDIATION AND ENVIRONMENTAL DISPUTE RESOLUTION:** The Council could serve as mediator or facilitator in environmental disputes and could help bring developers and conservation organizations together for discussion, land swaps, etc.

■ **INTERMUNICIPAL AGREEMENTS:** The Council could facilitate cooperative or contractual arrangements between two or more municipalities to assist in joint planning, resource protection, intermunicipal zoning or advisory boards, or to allow for sharing of personnel such as enforcement officers or administrative staff, making efficient use of staff or consultants.

■ **GRANT FUNDING:** Regional coalitions are promoted through many funding mechanisms. The Council could apply for and oversee grants to help implement the activities listed above. Funding sources include U.S. Environmental Protection Agency Star Grants, New York State Environmental Bond Act funds and others.

map on p.14) identified many inaccuracies with NYS DEC's current regulatory maps. In many instances, wetland areas that exist on the ground do not appear on NYS DEC's maps. In others, lands regulated as wetlands do not actually support wetland vegetation today. On balance, The Nature Conservancy's analysis suggests that the actual extent of the Great Swamp is approximately 38% greater than that captured in NYS DEC's regulatory maps for DP-22. Other wetlands show similar discrepancies, including more than twenty that may be larger than 12.4 acres and thus qualify for state regulatory oversight. It is recommended that DEC evaluate the information provided through this study and revise wetland maps to accurately portray the true extent of the Great Swamp and other wetlands in the watershed.

■ **Re-classify wetlands connected to the Great Swamp as Class I:** New York State ranks wetlands into four classes – Class I wetlands have the highest natural resource values and permitting is most restrictive, while Class IV wetlands are the ranked least important and permitting is least restrictive. The Great Swamp (DP-22) is a Class I wetland. Based on The Nature Conservancy's analysis (see box on p.2 and map on p.14), numerous Class II wetlands appear to be part of the Great Swamp. It is recommended that these wetlands be re-ranked to Class I.

■ **Exempt the Great Swamp from Nationwide Permits:** Section 404 of the Clean Water Act mandates the United States Army Corps of Engineers to regu-

late the disposal of dredged or fill materials into wetlands of any size. The Army Corps of Engineers utilizes a variety of permit programs, including Individual, Regional General and Nationwide General Permits" for "specific minor activities in wetlands" (U.S. Environmental Protection Agency, 1994). The Great Swamp should be exempt from these Regional General Permits and Nationwide General Permits. Instead, the Army Corps of Engineers should consider the cumulative effects of each permit application in the Great Swamp and it should strictly limit filling or other activities within the wetland system.

■ **Protect wetland buffers:** Buffer areas are naturally vegetated strips of land that separate development from wetlands and waterbodies. Buffers are valuable because they trap nutrients and pollutants, slow water velocity, reduce erosion, and provide important terrestrial habitat. Although activities taking place within 100 feet of a wetland boundary are restricted by state and some local regulation, these activities are occasionally granted variances. Buffer areas should be given the same stringent degree of protection as the wetland itself.

#### **STRENGTHEN AND HARMONIZE LOCAL REGULATORY CONTROLS AND ENFORCEMENT**

The principal mechanism for local municipalities to protect their natural resources is through land-use regulations. These regulatory mechanisms help to define where and how a development will be constructed and the degree of social

## **Successful Models of Intermunicipal Cooperation**

■ **IRONDEQUOIT BAY MANAGEMENT PROJECT:** Initiated in 1986 and revised in 1997, this project features a formal intermunicipal agreement between 3 municipalities and Monroe County and an informal agreement with NYS DEC to coordinate public and private use of the area, encourage consistency among town codes, conduct public outreach, identify cumulative impacts, encourage increased public access, and work together to protect the Bay's ecosystem.

■ **MANHASSET BAY PROTECTION COMMITTEE:** Signed in 1998 by 12 local governments in Nassau County, this formal intermunicipal agreement establishes goals that include improving water quality, reducing pollution, and coordinating local laws to ensure that the harbor will be safe for swimming, fishing, and eventually shellfishing.

■ **CHADWICK BAY REGION LOCAL WATERFRONT REVITALIZATION PROGRAM:** Initiated in 1996, this program features a non-binding agreement among seven municipalities to inventory resources and conditions within the waterfront area, refine coastal policies, propose land and water uses and describe implementation techniques to improve the quality of life, attract more visitors, stim-

ulate economic development, and enhance the natural beauty within the region.

■ **HEMPSTEAD HARBOR PROTECTION COMMITTEE:** Formed in 1995 by 8 local governments and Nassau County through formal intermunicipal agreement, this group's goals include improving water quality, reducing pollution, and coordinating local laws. The communities have received over \$16.5 million in grants for water quality improvements, habitat restoration, public access and brownfields development.

■ **ALBANY PINE BUSH PRESERVE COMMISSION:** Created in 1988, this commission represents a partnership between three municipalities, one county, NYS DEC, NYS Office of Parks, Recreation and Historic Preservation, The Nature Conservancy, and three citizens appointed by the Governor. Its purpose is to encourage economic growth while protecting more than 2,200 acres of the globally rare inland pine barrens ecosystem. The commission works in partnership with landowners, local communities and corporate sponsors to design environmentally compatible development plans, buy high priority lands from willing sellers, and promote ecological protection, recreation, and education.



# The Great Swamp Wetland and Watershed: Buffer Zone Criteria



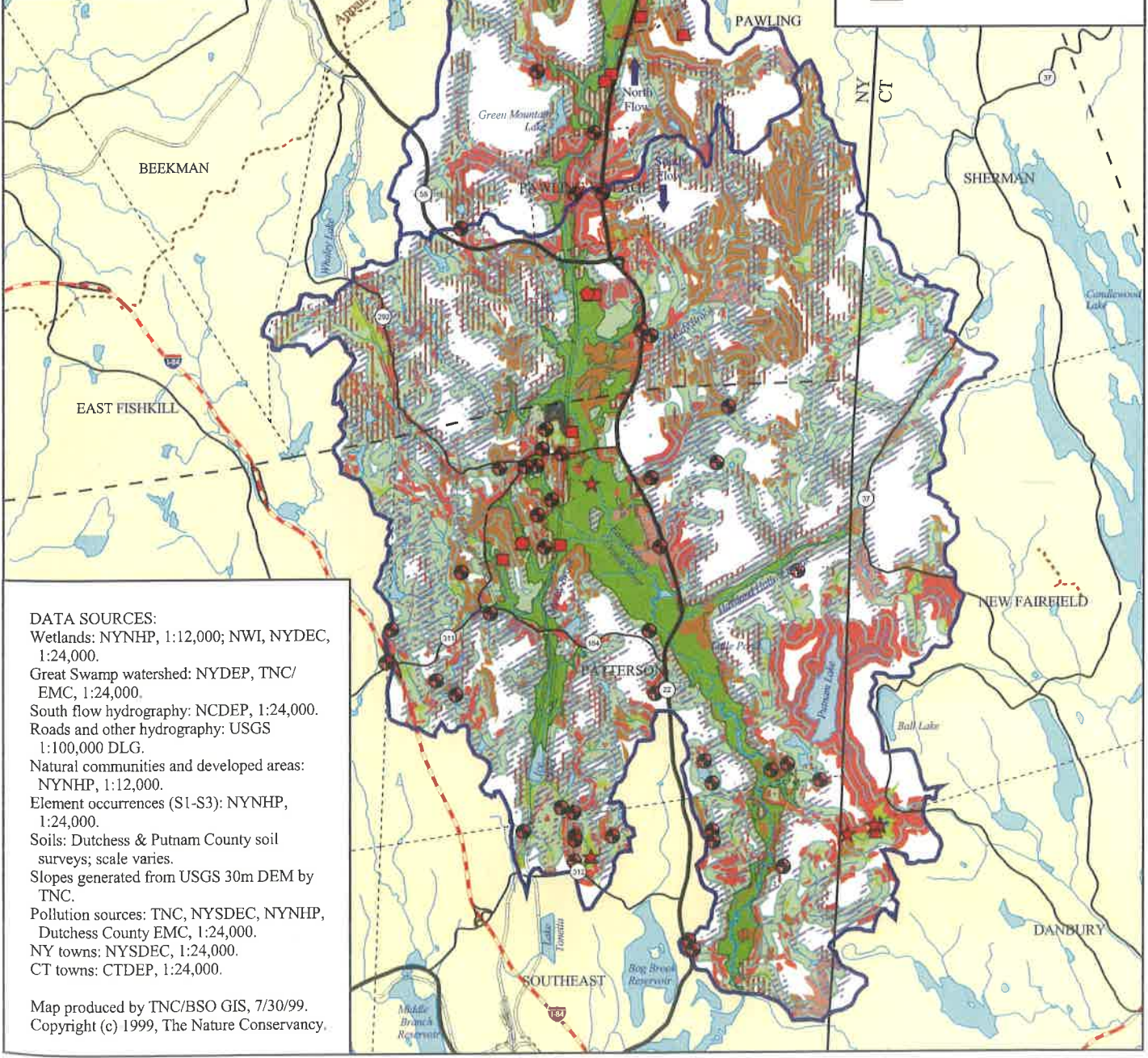
Scale 1 : 130,000

1 0 1 2 Kilometers

1 0 1 Mile

- Legend:**
- Great Swamp
  - Great Swamp watershed
  - Area 500 feet from wetland, stream, or lake

- Features within 1000' of a wetland, stream, or lake:
- Pollution point source
- Element occurrences (by SRANK):
- S1
  - S2
  - S1S2
  - S3
  - Coarse soils
  - Steep slopes (>15%)
  - Palustrine community
  - Agriculture
  - Mowed lawn
  - Developed area
  - Mine



**DATA SOURCES:**  
 Wetlands: NYNHP, 1:12,000; NWI, NYDEC, 1:24,000.  
 Great Swamp watershed: NYDEP, TNC/EMC, 1:24,000.  
 South flow hydrography: NCDEP, 1:24,000.  
 Roads and other hydrography: USGS 1:100,000 DLG.  
 Natural communities and developed areas: NYNHP, 1:12,000.  
 Element occurrences (S1-S3): NYNHP, 1:24,000.  
 Soils: Dutchess & Putnam County soil surveys; scale varies.  
 Slopes generated from USGS 30m DEM by TNC.  
 Pollution sources: TNC, NYSDEC, NYNHP, Dutchess County EMC, 1:24,000.  
 NY towns: NYSDEC, 1:24,000.  
 CT towns: CTDEP, 1:24,000.

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# Building Constraints in the Great Swamp Watershed



Scale 1 : 130,000



### Legend

- Great Swamp
- Great Swamp watershed
- Protected open space

Wetland (DEC regulatory):

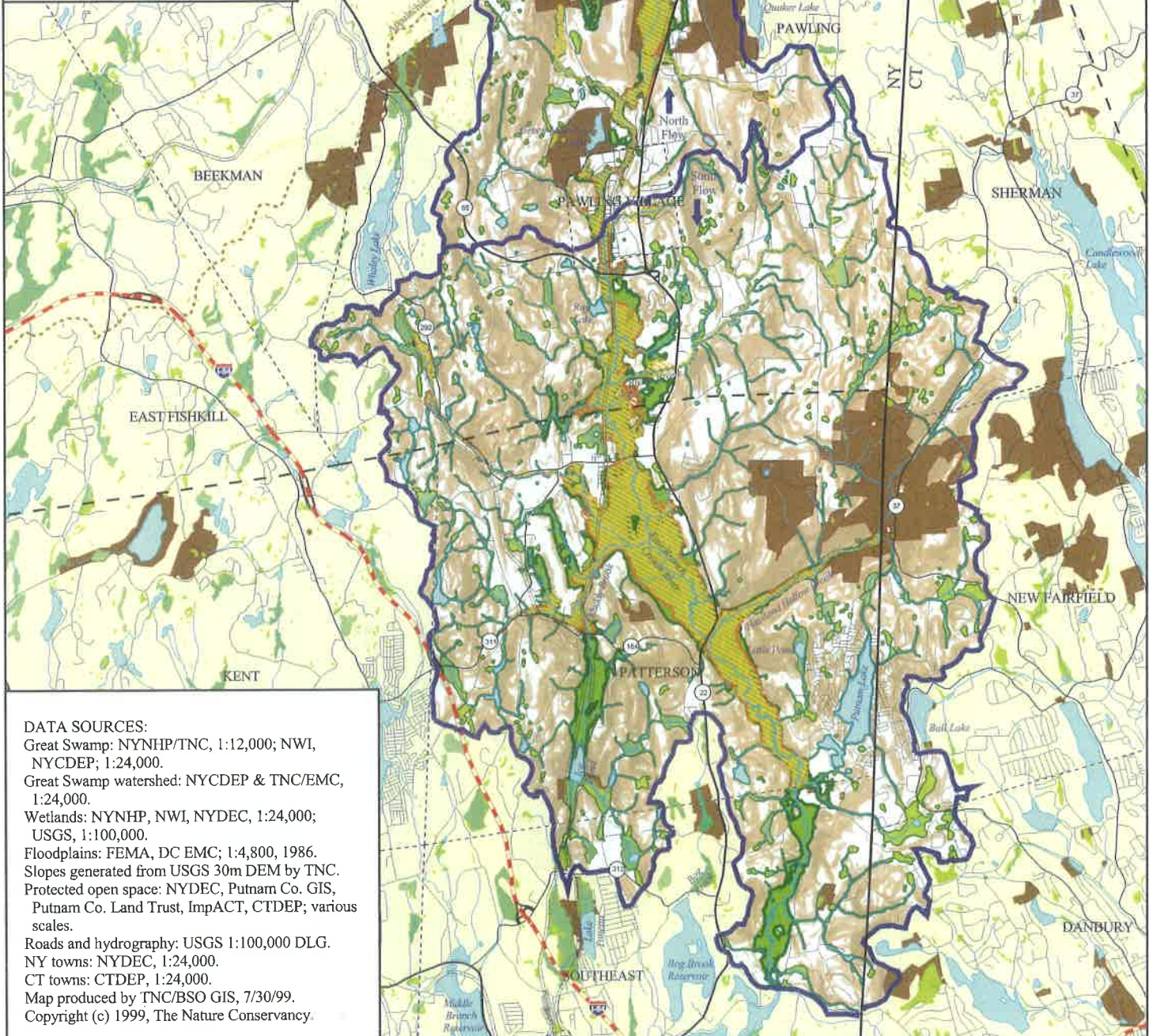
- Class I
- Class II
- Class III

Wetland (NWI/USGS)

- 100 foot wetland and open water buffer
- River or stream
- Open water
- 100 year floodplain
- 500 year floodplain

Steep slopes:

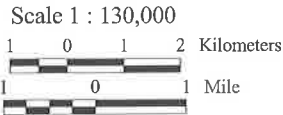
- 10% - 15%
- 15% - 25%
- > 25%



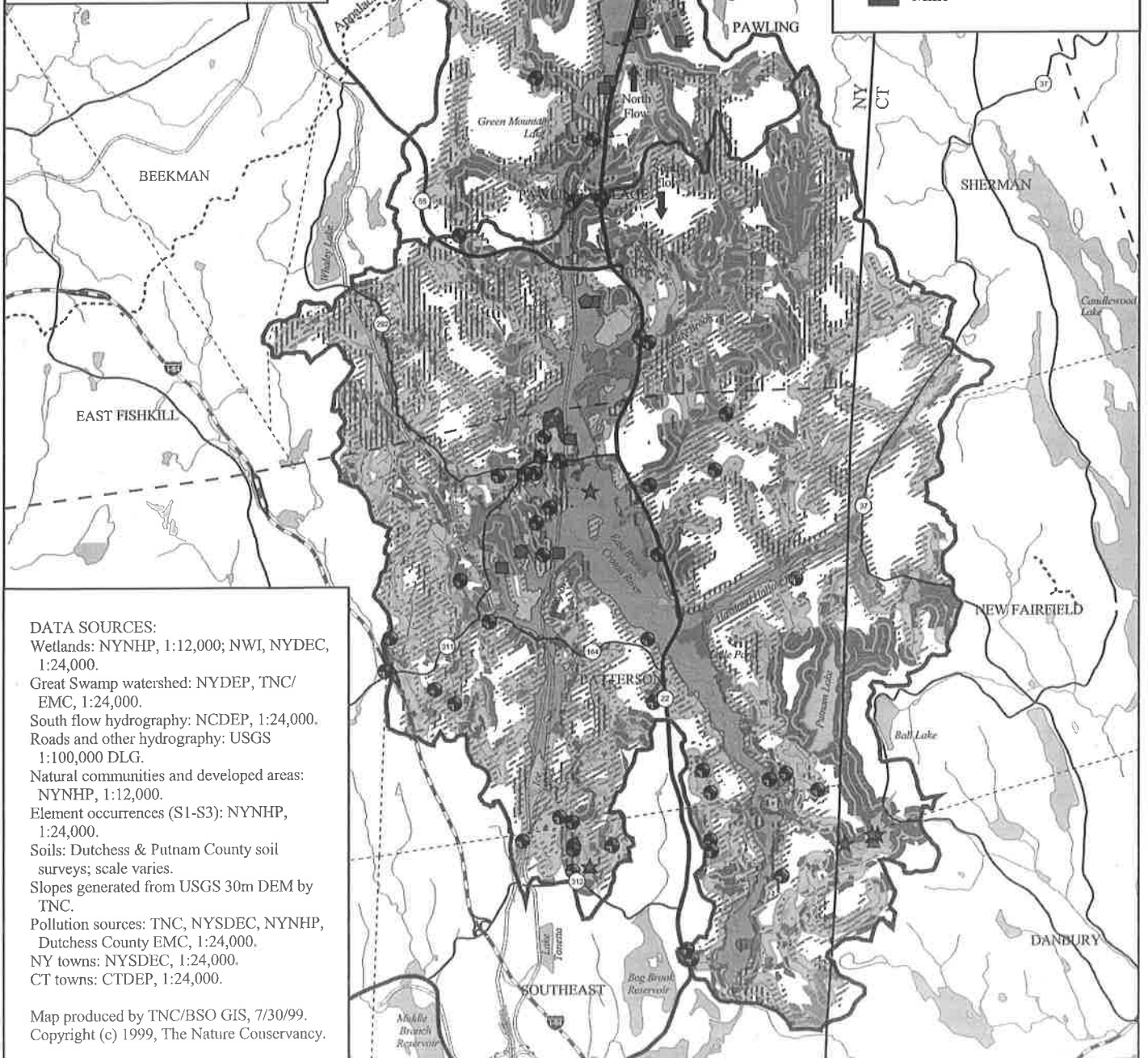
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 Wetlands: NYNHP, NWI, NYDEC, 1:24,000; USGS, 1:100,000.  
 Floodplains: FEMA, DC EMC; 1:4,800, 1986.  
 Slopes generated from USGS 30m DEM by TNC.  
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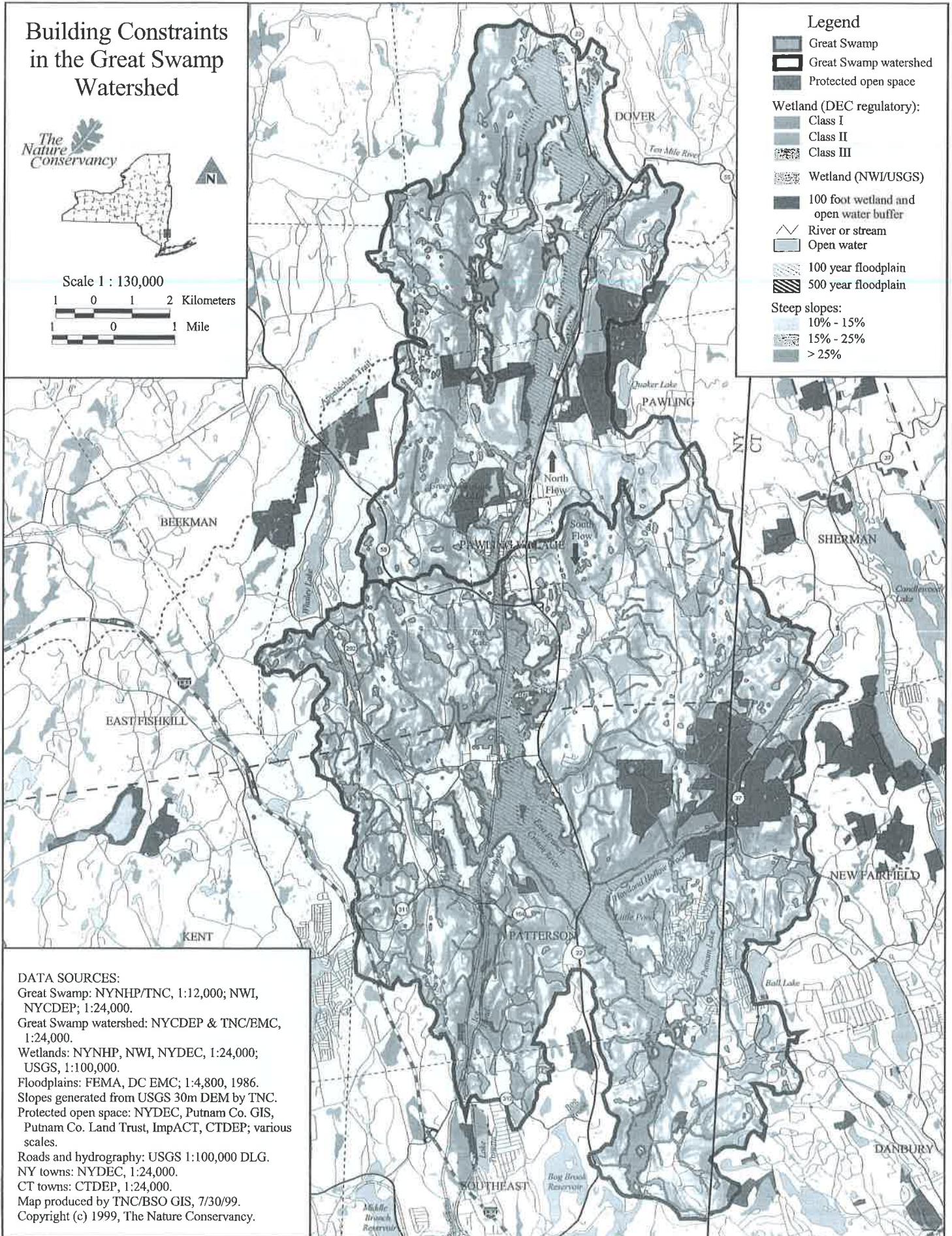
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  - Class II
  - Class III
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and environmental impact it will have. Each municipality has enacted policies that protect and improve their local natural resources. Ideally, each of the watershed municipalities would enact consistent and appropriately stringent regulatory controls to ensure that equal protection is given throughout the watershed. To be effective, compliance with regulatory controls must be monitored and enforced.

Below are recommendations for watershed-wide land-use regulations, many originally proposed by the Regional Plan associations 1991 Great Swamp Conservation Plan:

■ **Regulate wetlands 1/4-acre or larger:** It is recommended that the towns of Dover, Patterson and Southeast and the Village of Pawling adopt or revise local wetlands ordinances to regulate wetlands 1/4-acre or larger in size (the Town of Pawling currently does this).

■ **Extend wetland and stream buffer zones:** It is recommended that all five municipalities adopt or revise local wetlands ordinances to regulate the area within 300-500 feet of wetlands and streams where conditions warrant (see box on p.8 and map on p.48).

■ **Restrict building in floodplains:** It is recommended that all five municipalities revise their flood damage ordinances to prohibit all buildings for human habitation, reduce permitted densities of commercial and agricultural structures, and require setbacks for construction within the 100-year floodplain.

■ **Strengthen stormwater discharge ordinances:** It is recommended that the towns of Dover, Patterson and Southeast and the Village of Pawling require the use of best management practices through a stormwater ordinance to control the quality of stormwater discharge from development sites and impervious surfaces. No direct untreated discharges should be allowed (the Town of Pawling regulates this under its Soil Erosion and Sediment Control Ordinance). Compliance with SPDES stormwater permit requirements should be monitored by Planning Boards. Regional stormwater facilities could be considered through intermunicipal planning.

■ **Strengthen erosion and sediment control ordinances:** It is recommended that the towns of Dover, Patterson and Southeast and the Village of Pawling enact and enforce ordinances that reduce erosion and the flow of sediment into streams, tributaries, lakes and wetlands (the Town of Pawling currently does this).

■ **Restrict building on steep slopes:** It is recommended that all five municipalities limit road and building construction to slopes of less than 15% for reasons of public safety and erosion control.

■ **Give special consideration to the Great Swamp in site plan review:** It is recommended that all five mu-

nicipalities revise their site plan ordinances to require applicants to include the Great Swamp as a protected natural feature in site plan designs.

■ **Establish wetland overlay zones:** It is recommended that all five municipalities adopt wetland conservation overlay zones prohibiting most wetland fills and drainage in the Great Swamp and other high quality wetlands. These overlay zones would help to direct development to less sensitive areas and provide incentives for protection of resources. This overlay zone would be superimposed over existing zoning, and would require special permits or restrictions for activities proposed within its boundaries.

■ **Adopt no net loss of wetlands policy:** It is recommended that all municipalities adopt a policy that prohibits the net loss due to human activities of wetland diversity and function for wetlands of any size.

■ **Give special consideration to the Great Swamp during SEQRA review:** Because the Great Swamp is designated a Critical Environmental Area by both Putnam and Dutchess counties, actions within or contiguous to it deserve special consideration by municipalities under a SEQRA review process. An analysis of potential impacts to the Great Swamp and the measures needed both to avoid and to mitigate those impacts should always be included (see box on p.52). It is recommended that interested local groups such as Friends of the Great Swamp be included in the review process.

■ **Establish wetland tax policy:** Because wetlands are often unbuildable, they have limited economic value. However, taxes are often assessed based on zoning. This results in higher than appropriate tax levies that lead to high default rates on wetland properties. These defaults place a tax burden on remaining landowners and an administrative burden on town, village and county agencies. It is recommended that all municipalities review tax assessments on wetland properties and reduce them where appropriate to encourage continued private stewardship of these parcels.

■ **Limit variances in wetlands:** While sometimes appropriate, variances should be reserved for very special circumstances where a compelling need exists and where the detrimental effects on a wetlands functions and values can be minimized.

■ **Strengthen enforcement of environmental codes:** Enforcement of regulatory controls are most effective if each municipality identifies a person responsible for this task. This person should be trained and authorized to oversee adherence of environmental laws such as wetland delineation, stormwater management, residential septic discharge, SPDES permits, dumping, etc. The present municipal Code Enforcement Officer could be given this role, though other options include creating a specific position on a regional basis jointly funded by intermunicipal agreement.





## **I**MPROVE WATER QUALITY

Water quality in the Great Swamp is impacted by residential septic systems, salt application on roads, livestock waste from horse and cattle farming, and other sources. Recommendations to improve water quality focus on initiatives to reduce pollution and improve protection and monitoring of water resources.

### **REDUCE POLLUTION**

**SEPTIC SYSTEMS:** Collectively, residential septic systems are a significant source of pollution in the watershed. Nitrate levels increase in direct proportion to the density of residential septic systems within a given stream basin (Heisig, oral comm., 1998). The Putnam County and Dutchess County Environmental Management Councils, in cooperation with the municipalities, county health departments, NYC DEP, and other interested agencies, should actively explore options for reducing residential sewage discharge and helping homeowners better manage existing septic systems. Recommendations for improved septic management include:

- **Ensure adequate septic spacing:** Sufficient area between septic fields is necessary to avoid over-loading ground-water flows with excessive nitrate discharges. Recommended minimum lot size varies with soil type and water usage, ranging from .5 acres on thick sand and gravel to 8 acres on lacustrine clay-silt (Chazen Companies, 1999).
- **Establish regular pumping and inspections:** Problems with septic systems could be minimized or prevented if septic owners were required, through local ordinance, to regularly pump and inspect their systems. This is especially important in flood hazard and high ground-water areas.
- **Create septic pump-out districts:** Scheduling regular septic cleaning dates could be facilitated by municipality-established septic pump-out districts. These districts would improve septic maintenance and reduce costs through economies of scale.
- **Promote septic education programs:** Establish an educational program, carried out by municipalities, to inform homeowners of the importance of septic maintenance.

**ROAD SALT:** Salt application during winter roadway de-icing is associated with increased chloride concentrations in ground-water-fed streams in the watershed (Heisig, oral comm., 1998). To reduce the input of salt and chlorides into ground-water and the wetland ecosystem, it is recommended that New York State Department of Transportation, county and municipal highway departments:

- **Remove salt piles** from present positions at the

edge of the Great Swamp.

- **Cover salt piles** with protective domes.
- **Explore alternatives to the use of salt** as a de-icing agent.
- **Mark roadways** within 1000 feet of the Great Swamp as low salt areas where possible without compromising road safety (Lowenstein, 1998).
- **Limit sand-salt mix:** Sand, which is sometimes used in conjunction with salt for road application, tends to degrade streams through increased siltation. Sand is not recommended for use around streams, wetlands, and waterbodies.

**LIVESTOCK WASTE AND AGRICULTURAL RUN-OFF:** Animal waste contributes nitrogen (nitrate and ammonia) and phosphorus to surface-water where livestock farming occurs (Heisig, oral comm., 1998). Agricultural fertilizers, herbicides, and insecticides are also suspected of contributing nutrients to the wetland system. County Soil and Water Conservation Districts provide technical and financial help on implementing conservation farm practices and NYC DEP has developed a whole farm planning program to reduce pollution run-off. In addition, the environmental benefits of farming can be increased and pollutant run-off can be reduced significantly by the following:

- **Create natural vegetation buffers:** These permanently vegetated areas or strips are designed to intercept pollutants, improve water quality, and enhance wildlife habitat. Examples include filter strips, riparian (streamside) forest buffers, contour buffer strips, and field borders.
- **Modify tillage practices:** Incorporate tillage practices that reduce sediment, chemical and nutrient losses.
- **Construct on-farm catchments:** Construct ponds or wetlands to catch and assimilate farm run-off before it impacts streams or the ground-water system. Natural wetlands should not be used for this purpose.

**STORMWATER MANAGEMENT:** Run-off from agriculture and farm fields, golf courses, residential lawns, and impervious surfaces (e.g., parking lots, roads, and buildings) may have high concentrations of coliform, nutrients, fuels and solvents. Numerous technologies are available to separate pollutants from stormwater. Where practical, natural systems such as grassed swales and bioretention areas are preferred. Pollutant loads from stormwater can be reduced by the following:

- **Create first flush catchments:** Settling ponds, biofilters, special treatment facilities, or combined storm drainage and sewer systems can treat stormwater run-off before it enters wetlands and waterbodies. Technologies should be appropriate to site characteristics and be designed to achieve maximum water quality benefits.
- **Maintain stormwater systems:** These systems hold the first flush from storm events, typically contain-

### The Great Swamp: A Critical Environmental Area

The Great Swamp is considered a Critical Environmental Area (CEA) by both Dutchess and Putnam counties due to its exceptional and unique character. Any action within or substantially contiguous to a CEA requires a closer level of scrutiny under the State Environmental Quality Review Act (SEQRA). When preparing to review a development proposal near the Great Swamp, the following should be specifically considered:

- Presence of rare plants, animals, or significant ecological communities
- Presence of scenic views
- Location of existing or potential recreation areas
- Potential of the site to function as a filter for surface or ground water resources
- Potential of the site to control floodwaters
- Cumulative impacts of related projects

In addition to impacts on and near the Great Swamp, the impact of proposed actions should also be judged by their potential to affect connected wetlands and contributing tributaries of the Great Swamp.

ing the majority of pollutants. While initially reducing pollution inputs to streams and wetlands, they become highly concentrated pollution sources. If not maintained, the concentrated pollutants can leak out and cause severe impacts to water quality.

**OTHER SOURCES OF POLLUTION:** Potential pollution from other sources can be reduced by the following:

■ **Enroll golf courses in environmental certification program:** Golf courses can be pollution sources due to pesticide and fertilizer run-off, or they can be managed to provide valuable habitat for plants and animals. Audubon International has developed a six-phase certification process that entails a variety of steps to improve biological diversity and reduce pollution. It is recommended that golf courses in the Great Swamp Watershed enroll to be certified as an "Audubon Cooperative Sanctuary."

■ **Limit railroad herbicide spraying:** Metro-North Railroad should limit herbicide spraying near wetlands to protect water quality and species health. Furthermore, it should not apply herbicide between May and July when turtles are likely to lay their eggs along rocky open areas of the railroad right of way.

■ **Prevent dumping:** Annual cleanup days have revealed a continuing problem with dumping of refuse in the Great Swamp. The recent public opinion survey showed that more than 4 out of 5 residents were "very concerned" about illegal

dumping in the area. To address this problem, signs could be placed in areas prone to dumping stating the fine for this action. Suggested sites include wetland areas bisected by River Road, Kitchen Road, and Dodge Road in Pawling; Pleasant Ridge Road in Wingdale; Old Doansburg Road cul-de-sac in Southeast; Haviland Hollow Road in Patterson and others as identified. It is recommended that municipalities explore ways to encourage proper disposal of commonly dumped materials such as tires, furniture, and appliances.

■ **Hold additional hazardous waste disposal days:** Inappropriate disposal of household hazardous waste (oil, insecticide, herbicide, cleaning solvents, paints, etc.) has the potential to cause significant damage to water quality and wildlife. Public education regarding both alternatives to these substances and proper disposal of them would be beneficial. Joint sponsorship of additional well-publicized hazardous waste disposal days by county Environmental Management Councils and local municipalities would make it easier for residents to dispose of these substances when necessary. The opportunity to dispose of these substances safely and cheaply makes it less likely that they will be dumped improperly and potentially leach into drinking water supplies or wetland areas.

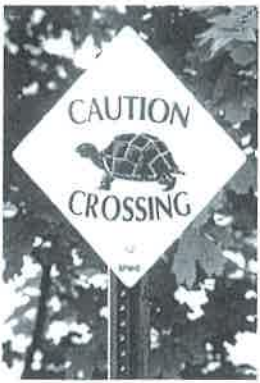
■ **Improve Putnam Lake water quality:** The Putnam Lake and Long Pond Monitoring Program, (Siver, 1987) a study conducted for Putnam County, suggests that excessive phosphorus loading from the Putnam Lake and Long Pond watersheds were responsible for the lake's deteriorated water quality. It is recommended that NYC DEP, Putnam Lake Community Council, the Town of Patterson, the Putnam County Division of Planning and Putnam Lake area residents work together to improve water quality in both Putnam Lake and its watershed. The first step would be to cooperatively develop a watershed management program designed to reduce phosphorus loadings, possibly as part of the Croton Watershed Plan. Many common lake management techniques, ranging from sewerage and septic system control to chemical and mechanical lake management techniques, would help improve the lake's water quality.

#### PROTECT AND MONITOR WATER RESOURCES

■ **Re-classify trout streams:** New York State Department of Environmental Conservation should re-classify streams known to support trout to "trout maintenance" (t) or "trout spawning" (ts) standards. This reclassification would help maintain water quality by requiring that proposed discharges meet stricter requirements.

■ **Monitor water resources:** To better understand the Great Swamp's water regime, a watershed scale hydrologic accounting and monitoring program across both the north and south flow should be es-





established among watershed municipalities, NYC DEP, Friends of the Great Swamp and The Nature Conservancy. Such a program would involve monitoring water quantity and quality in wetlands, streams and a network of wells over time and tracking the impacts during periods of heavy storms or drought. Results could point to sources of water pollution or identify the need for aquifer or wellhead protection measures. Macroinvertebrate monitoring, which provides insight into longer-term water quality trends, should be implemented in conjunction with surface and well monitoring.

## **P**ROTECT PLANT AND ANIMAL HABITAT

The survival of many plant and animal species in the Great Swamp is threatened by loss and fragmentation of habitat. Integrating conservation and compatible economic growth requires sufficient knowledge of species habitat needs and the effects of various land uses on biological integrity. This information guides protection efforts and informs land use policies. Protection of the Great Swamp's biological diversity focuses on protection of habitat and further assessment and monitoring of species.

### **ACQUIRE HABITAT AND RECREATION LAND**

■ **Create a land protection and management plan:** A detailed land protection and management plan involving both public and private land acquisition efforts should be designed. Local municipalities, land trusts, and other conservation and recreation organizations should develop this comprehensive strategy together, either through the Great Swamp Watershed Advisory Council or some other mechanism. Management of these fragile ecological resources requires that public access, recreation development, and resource extraction not impact the ecological processes that support these critical areas. Such a plan would include habitat protection for rare plants, animals, and natural communities; recreation lands and public access sites; and wetland buffer areas.

■ **Acquire lands forfeited due to tax delinquency:** Protection of valuable natural resource areas and open space lands can be economically accomplished through public acquisition of tax default properties. Putnam County has protected valuable areas of the Great Swamp through Resolutions 555, 629 and 630, which allow the county to acquire Great Swamp parcels forfeited due to non-payment of taxes. Dutchess County could also benefit from a similar policy.

■ **Pursue land conservation efforts:** Land trusts and conservation organizations should continue their efforts to work with private land owners interested in conserving wetland and open space. A variety of methods are available, including gifts of

land, easements to land trusts, and acquisition by state, county, and local governments.

### **PROTECT AND MONITOR SPECIES AND HABITAT**

■ **Conduct additional species surveys:** Recent animal and natural community surveys underscore the wealth of biodiversity in the Great Swamp and point to the need for additional plant and animal inventory work. Conservation organizations, research institutes, county agencies, local governments and local naturalists should continue working together to survey the Great Swamp for rare and common species.

■ **Continue studying the effects of land-use practices on biodiversity:** Wildlife Conservation Society and others should continue to gather data on the effects of various land-use practices on wildlife habitat loss, fragmentation, and degradation and provide recommendations for ways in which development and land-use can be altered to reduce impacts on habitat.

■ **Protect the bog turtle and its habitat:** The Great Swamp supports known populations of the federally protected bog turtle and provides good quality habitat. Efforts to ensure the long-term viability of bog turtles in the Great Swamp include: protection and restoration of critical habitat areas; contacts with local landowners who own bog turtle habitat to enlist their cooperation in supporting land uses that are compatible with bog turtle protection; participation in the New York State and federal bog turtle recovery planning and implementation process; and additional research to understand the extent of migration and habitat use within the Great Swamp.

■ **Post turtle crossing signs:** A major cause of turtle mortality is road crossings. Signs on roadways traversing turtle habitat, such as those used in Pawling, can warn drivers and reduce road mortality.

■ **Identify and protect vernal pools:** A conservation program for vernal pools should be initiated throughout the watershed. Such a program would involve mapping, land owner education, and municipal regulatory protections similar to larger wetlands.

■ **Control invasive species:** The spread of invasive plant species such as purple loosestrife (*Lythrum salicaria*) and common reed (*Phragmites australis*) is one of the most destructive trends impacting biological diversity in the watershed. A program for control and removal of non-desirable plants should be initiated throughout the watershed. The large patches of these and other invasive species serve as a staging area for further invasion and should therefore be a focus of management efforts.

■ **Incorporate ecological concerns during railroad maintenance:** Rail lines act as a barrier between habitats for some species, especially turtles. Future maintenance and adjustments to rail lines in the Great Swamp Watershed should accommodate

## Recommended Strategies

### Tax Advantages of Land Donations

When a landowner donates the full title of wetlands or conservation restrictions and easements to a government body, publicly supported charity, or private charitable foundation, the following tax benefits may be available:

■ **CAPITAL GAINS:** Section 170(b) of the Internal Revenue Code allows landowners to deduct the fair market value of long-term capital gain on donated property with some restrictions.

■ **BARGAIN SALES:** Section 1011(b) allows for tax savings when appreciated property is sold at less than fair market value to a charitable organization as a "bargain sale."

■ **ESTATE TAXES:** Section 2055(a) permits deduction from the gross estate of the value of all bequests of property to a qualified charitable organization or government body.

■ **GIFT TAXES:** Internal Revenue code provides that gifts that qualify as charitable contributions under Section 170 are not subject to lifetime gift taxes.

Swamp Critical Environmental Area. If NYS DEC expands the boundary of DP-22 (the Great Swamp wetland), both Putnam and Dutchess counties should amend their maps to ensure that the borders of the Critical Environmental Area are expanded to encompass the new boundaries of the Great Swamp.

■ **Incorporate Great Swamp Conservation in the Croton Plan for the New York City Watershed:** The Croton Plan is a regional strategy designed to recommend measures to protect water quality and community character in the New York City Watershed. Work on this plan began in 1998 and is expected to be completed in 2002. Because wetlands play an important role in maintaining surface water quality and because the Great Swamp is the most significant wetland within New York City's Croton Watershed, special attention should be paid to incorporating Great Swamp conservation efforts into the Croton Planning process in Patterson and Southeast.

■ **Utilize available land-use planning tools:** Numerous land-use planning tools are available to municipalities and should be considered when appropriate. These include: overlay zoning, floating zones, cluster development, incentive zoning, transfer of development rights, agricultural zones, and intermunicipal agreements. 🌿

ecological needs by using environmentally responsible construction practices, facilitating safe animal migratory passage across railroad tracks, and reducing herbicide spraying near wetlands and waterbodies.

### ENCOURAGE COMPATIBLE ECONOMIC GROWTH AND LAND-USE PLANNING

Compatible development is the production of goods and services, the creation and maintenance of businesses, and the pursuit of land uses that conserve the environment, enhance the local economy and achieve community goals (Center for Compatible Economic Development, 1997). Such land-use planning has the potential to enhance the tax base while minimizing impacts to water resources, natural habitats, and open space. The following are recommended to help achieve these goals:

■ **Design a watershed conservation and development plan:** A comprehensive watershed land-use plan should be devised that identifies sensitive wetlands, natural resources, floodplains, steep slopes, wildlife migration corridors, conservation open space, and other unbuildable areas. The remaining buildable lands should be identified and developers should be encouraged through a variety of incentive mechanisms to direct residential, commercial, and industrial development toward those areas.

■ **Adopt a Great Swamp Critical Environmental Area Management Plan:** Putnam and Dutchess counties should adopt management plans for the Great

▼ "Before the Storm,"  
River Road, Pawling.



MICHAEL HUESTIS

## Endnotes

1. Information in this section is derived from the following sources: Kelley-Moberg, 1997; Dutchess County Department of Planning and Development, 1993; Pawling Chamber of Commerce, 1998; Town of Patterson, 1997; and Southeast Museum, 1998.

2. In this survey, three hundred fifty registered voters living in Southeast, Patterson, Pawling, and Wingdale/Dover were interviewed by telephone in a random sample taken August 27-29, 1997. Respondents were screened for voter registration and the sample was balanced according to all known demographic factors. The margin of error for this survey is + 5.2%, with a 95% confidence level. The survey was commissioned by The Nature Conservancy and conducted by a professional public opinion research firm.

3. Wetlands in the Adirondack Park are regulated under different size restrictions by the Adirondack Park Agency.

4. This section is derived from Sullivan, 1998.

5. The Croton System supplies between 10% - 29% of New York City's in-city consumption (Metcalf & Eddy, et al., 1997).

6. The relationship between wetland characteristics and functions such as improved water quality is an active area of research. While it is agreed that wetlands perform important ecological functions, many of which benefit water quality, there is much debate about whether every wetland improves all water quality parameters. Color and dissolved organic carbon levels have been correlated with wetland acreage in catchment areas. Wetlands may be a source or a sink for phosphorus, and this may vary with the wetland, its setting, and the season. NYC DEP is currently working with United States Fish and Wildlife Service to conduct a landscape classification of wetlands in selected watersheds to help determine how specific wetland characteristics affect water quality protection, flood

storage, and other wetland functions (New York City Department of Environmental Protection, 1999).

7. Information in this section is derived from cited sources and from U.S. Environmental Protection Agency, 1997 and U.S. Geological Survey, 1995. Water Quality parameter ranges and median values are provided by NYC DEP and are derived from stream sampling data collected semi-monthly between January 1993 and December 1997 at three sites along the East Branch Croton River in Patterson (Route 311 crossing and Route 22 crossing) and Southeast (Doansburg Road).

8. The Total Maximum Daily Load is the amount of a particular substance or pollutant that a water body can receive without violating water quality standards. The Clean Water Act requires states to develop TMDLs for waterbodies that do not meet water quality standards. In the New York City watershed, TMDLs are calculated for phosphorus (Kane, 1998)

9. This estimate was first reported by Paul Heisig, USGS, and later confirmed by New York State Department of Transportation (Griemsmann, oral comm., 1998). According to NYS DOT, average road salt usage between 1993-1997 on 141 lane miles of state road around the Great Swamp in Putnam County (Routes 22, 311, 312, 292) was 2,500 tons, or 17.73 tons per lane mile. Two lane state roads thus received 35.46 ton of salt per mile, while four-lane road areas received 70.92 tons per mile. Town and Village salt application varies by municipality and often contains a mix of sand and salt. Thus, actual salt application may vary by locality.

10. This estimate is based on an informal survey of groups known to organize tours of the Great Swamp. The survey was conducted by Friends of the Great Swamp.

11. These Army Corps of Engineers permit programs are currently undergoing review and revision.

## Acronyms

**µg/l** micrograms per liter

**µS/cm** micro Siemens per centimeter

**µS/l** micro Siemens per liter

**ACOE** Army Corps of Engineers

**AT** Appalachian Trail

**CEA** Critical Environmental Area

**cfu** Colony forming unit

**DEC** New York State Department of Environmental Conservation

**DEP** New York City Department of Environmental Protection

**DOH** Department of Health

**DOT** Department of Transportation

**DP-22** The Great Swamp wetland as designated by New York State

**EIS** Environmental Impact Statement

**EMC** Environmental Management Council

**EPA** United States Environmental Protection Agency

**FrOGS** Friends of the Great Swamp

**FWS** United States Fish and Wildlife Service

**GIS** Geographic Information System

**mg/l** milligrams per liter

**NHP** Natural Heritage Program

**NWI** National Wetlands Inventory

**NYC** New York City

**NYC DEP** New York City Department of Environmental Protection

**NYS** New York State

**RPA** Regional Plan Association

**SEQRA** State Environmental Quality Review Act

**SPDES** State Pollution Discharge Elimination System

**STP** Sewage treatment plant

**SUNY** State University of New York

**TNC** The Nature Conservancy

**USFWS** United States Fish and Wildlife Service

**USGS** United States Geological Survey