

Normans Kill

Riparian Corridor Study

2007

Aerial photography provided by Daniel Driscoll

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Executive Summary

The Normans Kill and its tributaries constitute one of the largest and most important watersheds in the Capital District. While most of the main stream corridor is relatively undeveloped, recent trends suggest that certain areas are under increasing development pressure, which may seriously impact the creek in terms of water quality, bank stability, habitat diversity, and recreational opportunities. The purpose of this report is to present an overview of the existing natural and physical conditions that define the Normans Kill corridor; consider current and future threats to the corridor; and propose recommendations for public use that are compatible with the long-term structural and functional integrity of the corridor.

This study of a 1-km corridor on either side of the Normans Kill in Albany County was conducted in order to highlight the value of the stream and surrounding land as a buffer and habitat as well as to explore the opportunities for passive recreation both in the stream and on adjacent land. The resulting document is meant to serve as an overview of natural and recreational resources in the corridor and a basis for moving forward toward protecting habitat and enhancing recreational uses. The scope of this study included:

- Review of local plans and zoning to identify existing land and water protection strategies currently in place
- Contacting riparian landowners
- Field analysis of riparian conditions
- Compilation of GIS coverages including environmental conditions, water quality data, land use data, zoning, recreational resources, and aerial photography
- Mapping of current land use using existing aerial imagery
- Mapping of the study area, parks and recreational areas, floodplains and wetlands, land use, zoning, water quality and fisheries data, steep clay slopes, and Department of State Designated Significant Coastal Fish and Wildlife Habitat
- Summarizing existing data on biodiversity
- Recommendations on development of recreational opportunities and trail connections
- Identification of stakeholders and contacts to become involved in future watershed planning and recreational and preservation activities.

An analysis of the information collected for this study revealed that there are many valuable environmental features along the Normans Kill corridor, a healthy diversity of plants and animals, as well as several opportunities to improve access to the stream and expand passive recreational uses in the corridor.

Land use mapping indicated that there are over 11,000 acres of forest, oldfield, agricultural land, and other undeveloped land in the corridor, in addition to

concentrated areas of residential development and several large residential subdivisions recently constructed and proposed along the stream. There is some concern about the impact that development will have on stream bank stability and water quality as the currently developed areas appear to be more impacted by erosion and sedimentation problems. Previous studies of the Normans Kill documented landslides and areas along the stream that are slippage-prone due to soil type and slope. While an analysis of current planning and zoning laws found that there are some protections provided to riparian areas and steep slopes, there may be room to enhance local plans and laws to further protect the Normans Kill and the adjacent land that buffers it.

In order to preserve important habitat and species diversity; prevent erosion, landslides, and flooding; and protect water quality, it appears that the best use of the riparian corridor is for passive recreation such as kayaking/canoeing, hiking, fishing, and wildlife observation. Toward this end, recommendations for improved recreational access and use include the following:

- Explore the possibility of a footpath connection between Western Turnpike Golf Course in Guilderland and the Pine Bush Preserve trail network
- Connect trails at the Normans Kill Farm in the City of Albany to other proximate trail systems
- Look for ways to extend the City of Albany's trail network beyond the municipal golf course into Bethlehem possibly using easements along the creek from new developments
- Work with the Department of Environmental Conservation to establish public fishing access points and easements
- Establish formal canoe/kayak launch sites and consider developing a water trail
- Pursue possibilities for facilitating public use of the area currently limited by conflicts associated with the National Guard Rifle Range in the Town of Guilderland
- Encourage and facilitate formation of a Normans Kill Watershed Council consisting of interested stakeholders including residents, government agencies, businesses, and private not-for-profits to examine the potential for trail connections, boating and fishing access, and habitat protection in the corridor.

□ Introduction

The Normans Kill is a medium gradient, perennial warmwater stream that flows over 40 miles through Schenectady and Albany counties, with a drainage basin of over 170 square miles of farmland, woodland, wetlands, and developed area. Within Schenectady County, the Normans Kill and its tributaries drain a large portion of the towns of Duanesburg, Princetown, and Rotterdam before crossing into Albany County in the Town of Guilderland where it enters the north basin of the Watervliet Reservoir. It then traverses Albany County in a generally southeasterly direction until its outlet to the Hudson River in the City of Albany. The Normans Kill is one of the major tributaries of the Hudson River and the largest one in Albany County. The lower section of the creek includes an approximately 1-mile segment of tidal zone, which is a critical spawning area for anadromous fish.

Considering that the course of the Normans Kill meanders through the heart of the Capital District, the majority of the corridor is relatively undeveloped. The riparian zone associated with the creek provides valuable habitat for diverse flora and fauna, in addition to providing a variety of recreational opportunities such as fishing, kayaking and canoeing, hiking, cross-country skiing, bird watching, and picnicking. Many of these activities are available in existing parks and preserves located along the corridor. The riparian corridor also serves an important role in slowing down stormwater runoff to reduce erosion, minimize flooding, and filter out non-point source pollutants before they reach the stream.



The Normans Kill, Albany-Bethlehem Border

Gaining an understanding and appreciation of existing physical and natural conditions in the stream corridor is an important step toward developing a strategy to secure sensitive areas, protect important habitats, and enhance recreational opportunities. Using Geographic Information Systems (GIS) to display natural and manmade features in the corridor allows planners to get a comprehensive view of the area and serves as an important tool for making land use decisions and also for identifying opportunities to link parks, preserves, and trail systems. GIS maps can also be useful in identifying areas that require low impact development plans as well as areas that may be a priority for conservation.

In addition to GIS coverages, a summary of land use laws that currently provide protections to the corridor have been included in this report. Considering these in combination with current land uses, one can get a good idea of potentially vulnerable portions of the corridor and focus on best management practices where necessary or appropriate.

□ Study Objectives

The Normans Kill Riparian Corridor Study is an inventory and analysis of natural and recreational resources within a 1-km area on both sides of the creek (see **Map 1**). The study area was defined in Audubon New York's Hudson River Estuary Program grant application and includes an area from the northern boundary of Albany County to the confluence with the Hudson River in the City of Albany, a land area of approximately 17,200 acres. This study is intended to provide a foundation for educating the public about the value of this stream corridor, encouraging stewardship, and improving access and use of the corridor as a recreational resource. It may also serve as a basis to develop a plan to guide preservation and use of the corridor and to recommend optimal areas for recreation and conservation efforts. Taking a comprehensive look at this important Hudson River tributary also contributes to advancing the natural resource protection goals of the Hudson River Estuary Action Plan to protect and conserve natural resources and ecosystem health.



Aerial photography provided by Daniel Driscoll

Aerial photo looking east to the Normans Kill's confluence with the Hudson River

Map 1

Normans Kill Watershed and Study Area

SEE MAP BOOK

Stream Conditions

While the majority of the Normans Kill through the study area is characterized by areas of riffles and rapids, depth and flow in some sections are highly variable, particularly in the vicinity of the Watervliet Reservoir dam.



Falls upstream from the New York State Thruway crossing

Stream conditions are also variable with respect to the structure and composition of the underlying substrate. In the Guilderland portion or, generally, the western portion of the study area, most of stream courses through sandy soils with areas of bedrock and cobble mix. However, downstream of Tawasentha Park, there are steep rock ravines leading to deeper, slower moving water. In these areas, soils range from a mixture of clay and silt to heavy clay and some steep clay banks are present. After the Delaware Avenue Bridge in the Town of Bethlehem, there is a small set of falls followed by relatively shallow depths and moderate flow over a gravelly substrate for approximately 1 mile through a wooded gorge. A mix of steep shale ravines and clay banks runs downstream to the tidal portion of the study area, which is referred to on some maps as "Island Creek." This lower mile of the creek flows over a deep substrate of silt and clay and is characterized by wide mud flats extending to the Normans Kill's confluence with the Hudson River.

Part of the tidal portion of the Normans Kill has been channelized to accommodate industrial use of the area east of State Route 32 proximate to the Port of Albany. West of Route 32, however, the tidal stream and associated riparian zone remain in a relatively natural condition. Habitat disturbance in this area is generally limited to road and rail crossings, litter, and discharges of stormwater runoff from paved surfaces.

Stream Classification

Streams in New York State are classified by the NYS Department of Environmental Conservation (DEC) based on the best use of the waterbody. These classifications affect standards and restrictions related to the water quality and use.

Class A waters are used for drinking water supplies, culinary or food processing, and contact recreation and fishing. These waters must also be suitable for fish propagation and survival. Class B waters are best used for contact recreation and fishing and should support fish propagation and survival. Class C waters are best used only for fishing and also support fish propagation and survival. The quality of Class C water must also be suitable for contact recreation although other factors may limit its use for that purpose. In Albany County, the Normans Kill is Class A above the Watervliet Reservoir, Class B from the Reservoir to the Delaware Avenue Bridge, and Class C to the confluence with the Hudson River (see **Map 2**).¹

Since macroinvertebrates are sensitive to impacts resulting from pollution, sedimentation, turbidity, and changes in water temperature, the diversity and abundance of these organisms are frequently used as a measure of water quality. Biological sampling of resident macroinvertebrates was conducted on the Normans Kill by NYS DEC's Stream Biomonitoring Unit in August of 1993 to assess water quality (see **Map 2**). Results from this monitoring showed the Normans Kill to have slightly impacted water quality, which was similar to the findings of a comparable 1974 study (see **Appendix A**).² Impacts to water quality appear to be related to discharges from combined sewers and sewage treatment plants, with non-point source nutrient enrichment and siltation being the primary stressors.³ Other sampling done in 1991, 1992, 1997, and 1998 at the Delaware Avenue Bridge showed similar results to the 1993 survey.

In addition to periodic water sampling, DEC conducts 5-year updates of their Waterbody Inventory/Priority Waterbodies List (WI/PWL), which is a statewide inventory of all surface water bodies in New York State. It is used by the Department to track the status of water quality in the state. For each waterbody, the WI/PWL characterizes available information on general water quality and the degree to which designated water uses (e.g., water supply, recreation) and

¹NYS DEC Water Quality Regulations Title 6, Chapter X Parts 700-706

²Biological Stream Assessment Normans Kill 1993 Survey, Novak et al., DEC/DOW, BWAR, Jan. 1994

³NYS DEC 30-year Trends in Water Quality of Rivers and Streams in New York State Based on Macroinvertebrate Data 1972-2002. published 2004

Map 2

Water Quality

SEE MAP BOOK

healthy aquatic life are supported, and provides information on the identification of water quality problems, sources, and restoration and protection efforts.

The 1999 Lower Hudson River Basin WI/PWL published by DEC in June of 2000 notes water quality impairments along the Normans Kill (see **Map 2**). The stream segment from the Watervliet Reservoir to the Hunger Kill is identified as an impacted segment. Aquatic life was found to be impaired due to hydrologic habitat modification caused by the Watervliet Reservoir dam. The stream regularly goes dry during the summer when no water is released from the reservoir.

Water quality impairments to aquatic life and aesthetics are noted as possible and suspected in the segment from the Hunger Kill to the mouth, as well as in the segment north of the reservoir; however, the types of pollutants and sources have not yet been identified. The impairments are suspected to be related to sediment and nutrients from urban runoff and construction; combined sewer overflows below the reservoir; and agricultural runoff and failing on-site septic systems above the reservoir.

The Watervliet Reservoir is also listed as impacted by algal blooms and other aquatic vegetation, particularly water chestnut which covers approximately 30 percent of its surface area. Other impairments include excessive nutrients and sediment, and low dissolved oxygen. The possible sources are construction activity, municipal and private wastewater, storm sewer discharges, and agriculture (see **Appendix A**).



Aerial photography provided by Daniel Driscoll

Aerial photo of the Watervliet Reservoir

Soils

An analysis of the soils in the study area was performed using digitized soil data from the Soil Survey of Albany County, NY, completed in 1983 by USDA Soil Conservation Service (now, the Natural Resource Conservation Service) (see **Map 3**). Additional information about soil slope, percent clay, drainage, and suitability for recreation that was provided in the hard copy Soil Survey was added to the attribute table of the digital data by Albany County Office of Natural Resources. While the Soil Survey is a valuable resource for planning for natural resource protection and trail development, field investigation is needed to determine the actual condition on a site and to plan for uses in small areas.

Table 1 — Predominant Soil Types

Soil Type	Acres of Corridor Coverage
Hudson (Hu)	5,011
Scio (Sc)	1,191
Nunda (Nu)	1,139
Teel (Te)	626
Rhinebeck (Rh)	598
Chenango (Ch)	506

Predominant soils in the Corridor (over 500 acres) are Hudson, Scio, Nunda, Teel, Rhinebeck, and Chenango which range from clayey silt loam to sandy and gravelly silt loam. Soils composed of a high percentage of clay, such as the Hudson and Rhinebeck series, have moderate to severe limitations for recreation and have high potential for trail erosion. As the slope of these soils increases, the limitations and erosion hazard also increase (see **Appendix B**).

Stream Bank Erosion – Slippage Prone Soils

A 1982 study on the Normans Kill watershed prepared by SCS, Forest Service, NYS DEC, and Economic Research Service looked at stream bank erosion problems above and below the Watervliet Reservoir. Erosion was not found to be a significant problem or source of turbidity above the reservoir. A study conducted in 1981 by the Albany County Environmental Management Council (EMC) below the reservoir found erosion to be higher than that identified above the reservoir, but was still considered to be in the moderate range. The report concluded that the cost of remedial measures would not be justified.

Despite these findings, erosion and landslides appear to be persistent problems along the Normans Kill, particularly where there is stream-side development and/or significant clearing of slopes. The urban areas of the City of Albany appear to be particularly vulnerable to erosion from stormwater runoff.

On June 28, 1968, an approximately 15-acre landslide near Maher Road in Slingerlands, blocked an area of the Normans Kill resulting in upstream flooding that caused the loss of crops and threatened the property of at least 18 upstream landowners. According to a Cornell University report⁴, the slide was believed to have been triggered by filling that took place at the top of the bank.

⁴Landslides in Soils of Albany County, New York: Descriptions and Data From Maher Landslide About Four Miles East of Voorheesville, Department of Agronomy, Cornell University

Map 3

Erosion and Slippage Prone Soils and Steep Slopes

SEE MAP BOOK

The scarp of the slide was more than 300 meters long and involved an estimated 1 million cubic meters of soil. An environmental inventory completed by the EMC in 1976 showed additional areas of slippage prone soils along almost the entire portion of the Normans Kill located in the Town of Bethlehem.

In May of 2000, another major landslide occurred on Delaware Avenue in Delmar, closing a portion of the road for 3 months. This slide, believed to have been caused by long-term filling and loading of the bank, exacerbated by heavy spring rains, destroyed a produce stand and threatened neighboring buildings and the road itself. As a result, it was necessary to redirect the channel of the Normans Kill away from the base of the slide area, resulting in substantial changes to both the stream and the adjacent corridor.



Bethlehem Landslide Site

Biodiversity

While a comprehensive biodiversity inventory has not been completed specifically for the Normans Kill corridor, other recent studies and surveys which include this area reflect a high species diversity. This can be attributed to the diversity of covertypes comprising the corridor, including woody and herbaceous wetlands, mixed hardwood forests, occasional conifer stands, oldfield, open meadow, and agricultural fields.

Vegetative Covertypes

The upper portion of the corridor above the Watervliet Reservoir to Tawasentha Park is substantially undeveloped with a mix of farm fields and predominantly deciduous forest, including large mature species such as American sycamore and eastern cottonwood typically found in stream corridors and floodplains. In addition, the Tawasentha Park area has some particularly large oak trees. The lower portion of the corridor between Rockefeller Road and South Pearl Street is also dominated by mixed deciduous forest although this area tends to exhibit a denser understory of species such as sumac, gray dogwood, alder, multiflora rose, Virginia creeper, grape, poison ivy, and sapling growth of overstory species. This area also has a higher incidence of invasive species such as black locust. Much of the middle segment of the Normans Kill corridor was not easily accessible due to difficult footing, stream depth, areas of extremely thick growths of barberry and stinging nettle along the stream bank, and limited access points. Species noted during field work can be found in **Appendix C-1**.

Macroinvertebrates

Benthic macroinvertebrates refer to larger than microscopic invertebrate aquatic animals that live in and on the bottom substrate of water bodies. Common freshwater forms include a variety of mollusks (e.g., clams, mussels, snails), crustaceans (e.g., crayfish), and the larvae of various insects such as mayflies, caddisflies, and dragonflies. Since these organisms are sensitive to impacts resulting from pollution, sedimentation, turbidity, and changes in water temperature, the relative health of macroinvertebrate populations is frequently used as a measure of water quality. Therefore, while no systematic survey of macroinvertebrate life has been conducted on the Normans Kill as a measure of biodiversity, DEC's Stream Biomonitoring Unit has conducted long-term water quality testing at four sites on the creek from Altamont to Albany, which has included sampling of macroinvertebrates.

The most recent results from DEC biomonitoring of the Normans Kill are from 1993, which showed little change in macroinvertebrate species richness or abundance from a previous sample in 1974. These results are indicative of very limited deterioration in water quality over that 20-year period. Similar results were obtained regarding macroinvertebrate species richness in the Normans Kill in a more recent (1998) sample as part of a DEC biological assessment of tributaries of the lower Hudson River. A copy of the 1993 Biological Stream Assessment of the Normans Kill, as well as the 1998 Normans Kill collection, both of which include a detailed taxonomic breakdown of macroinvertebrates in the respective samples, is included in **Appendix C-2**.

Fish

The Normans Kill supports a high diversity of freshwater fish in addition to providing critical spawning habitat for a variety of anadromous species. In the latter case, which includes alewife, blueback herring, and white perch, these species enter the stream for spawning between April and June, then leave shortly thereafter. Within several weeks, the eggs have hatched and larval fish begin to move downstream to nursery areas in the Hudson River. According to the NYS Department of State (DOS), the Normans Kill is considered one of only 10 significant spawning streams for these species in the upper Hudson River. Furthermore, DOS's Division of Coastal Resources has designated an approximately 2-mile portion of the Normans Kill from its confluence with the Hudson River to a falls located just downstream of the NYS Thruway bridge as a Significant Coastal Fish and Wildlife Habitat (SCFWH) (see **Map 4**). A copy of the Normans Kill's Significant Coastal Habitat rating, according to a system developed by DOS and DEC, is included in **Appendix C-3**.

In addition to DOS fisheries evaluations of the Normans Kill's tidal area, DEC conducted periodic surveys on upstream segments of the Normans Kill in 1934, 1972, 1981, and 1987. Results of these surveys indicate a high diversity of fish species ranging from American shad, striped bass, and white perch to smallmouth bass, largemouth bass, rock bass, and yellow perch. Additional sampling done by Hudsonia in the spring of 1999 found alewife and blueback herring adults at the mouth of the stream. Complete species lists for the Normans Kill based on DEC's sampling are included in **Appendix C-4**.

Amphibians and Reptiles

Although no herpetological survey data specific to the Normans Kill watershed is available, records from New York State's Amphibian and Reptile Atlas Project, conducted by DEC over a 10-year period from 1990 to 1999, were made available from which the diversity of amphibians and reptiles species in the general area of the Normans Kill could be determined. Based on those records, it would appear that at least 19 amphibian and 15 reptile species occur within the Normans Kill watershed, and 16 and 10 of these, respectively, occur within the Normans Kill corridor itself. None of the species found within the study area or surrounding drainage area are Endangered or Threatened; however, three amphibians (Jefferson salamander, blue-spotted salamander, and eastern spadefoot) and five reptiles (eastern hognose snake, eastern worm snake, spotted turtle, wood turtle, and eastern box turtle) are listed as New York State Species of Special Concern. A complete list of the 34 herptile species associated with the Normans Kill corridor or the larger watershed is provided in **Appendix C-5**.

Birds

A comprehensive survey of breeding birds in New York State was conducted over a 6-year period from 2000 to 2005. While the results of this NYS Breeding Bird Atlas have not as yet been published, preliminary results suggest a rich diversity of bird life in the general area of the Normans Kill corridor. A total of 129 species of birds considered to be at least possible breeders were recorded in this area, of which breeding status was confirmed for 87 species. Of the 129 total species

Map 4

DOS Designated Significant Coastal Fish & Wildlife Habitat



recorded, 11 species are considered to be rare or uncommon, including one State Endangered species (peregrine falcon); four State Threatened species (pied-billed grebe, least bittern, bald eagle, and northern harrier); and six State Special Concerned species (American bittern, sharp-shinned hawk, Cooper's hawk, red-shouldered hawk, whip-poor-will, and grasshopper sparrow). A complete list of all bird species recorded and their breeding status (confirmed, probable, or possible) is provided in **Appendix C-6**.

Mammals

Unlike the comprehensive distribution data available from statewide surveys of amphibians, reptiles, and birds, no such atlas or survey data are available for mammals. Nonetheless, mammal species diversity for the Normans Kill may be projected from historic distribution data, available habitat, and cursory observations made in the corridor and surrounding watershed. Based on these sources of information, it is safe to assume that most common mammals known to occur in Albany County and the surrounding Capital District such as white-tailed deer, eastern coyote, raccoon, striped skunk, red and gray fox, opossum, beaver, muskrat, woodchuck, eastern cottontail, gray and red squirrel, and a variety of small mammals occupy suitable habitats throughout the Normans Kill watershed.

Regarding other mammals, several species that may be regarded as uncommon in the area, including fisher, mink, bobcat, and porcupine are actually not rare, but rather seldom seen due to their secretive and/or nocturnal nature. Similarly, several inconspicuous species including shrews, moles, bats, and weasels are widely distributed over the Normans Kill watershed. It should also be mentioned that while noteworthy or unusual species such as black bear and moose have been recorded recently in and around the study area, these would be regarded as occasional transients and not permanent residents. Finally, with the possible exception of the Endangered Indiana bat and Special Concern small-footed bat, both of which may make occasional feeding forays in areas of the watershed, no other special status mammal species are known to inhabit the area.

Other Special Status Species

A report on rare plants and animals in the Normans Kill corridor was provided by the New York Natural Heritage Program which lists the general location of special status species that have been documented in the last 25 years and includes similar records dating to before 1980. In addition to rare vertebrate species referenced above, several other noteworthy species are known to occur in the Normans Kill watershed, including various grasses, sedges, and flowering plants, as well as a number of invertebrates. As would be expected, many of these notable species records are associated with unique portions of the watershed, such as the tidal portions of the lower Normans Kill and the pine barrens habitat found in the upper or northern portions of the corridor. A complete list of these species (without reference to specific location), is included in **Appendix C-7**.

Land Use

Land use in the corridor was mapped using 2004 digital orthoimagery obtained from the New York State GIS Clearinghouse. The land use categories that were mapped and an indication of their coverage within the corridor are included in **Table 1** (see **Maps 5** and **6**).

While topography and other environmental constraints have generally limited development in the corridor in the past, there have been several housing developments constructed recently and at least three substantial development projects proposed proximate to the stream in the towns of Guilderland and Bethlehem. Development in the sensitive riparian area has the potential to cause degradation of water quality, increased erosion and flooding, loss of wildlife habitat, and reduced opportunities for recreation along the creek.

Table 2 — Major Land Uses*

Land Use	Acres	Approximate Coverage
Residential	2045	15.00%
Urban	81	0.05%
Industrial	195	1.40%
Commercial/Services	251	1.80%
Open & vacant land	960	7.00%
Forest land	6976	50.00%
Agricultural	2583	18.00%
Recreation	989	7.00%

*Based upon land uses mapped within Albany County. These land use categories are broken down further in the digital map coverage.



Aerial photography provided by Daniel Driscoll

View of various land uses within the Normans Kill corridor

Map 5

Northwest Study Area Land Use

SEE MAP BOOK

Map 6

Southeast Study Area Land Use

SEE MAP BOOK

Land Use Planning and Zoning

A municipality's zoning ordinance, subdivision regulations, and planning process can go a long way toward protecting stream corridors and riparian habitat. Similarly, comprehensive plans can also help a community establish clear guidelines for the protection and use of lands along stream corridors. With respect to the Normans Kill, the following presents a summary of current municipal planning, zoning, and other local laws and programs which apply to land use, development, conservation, and recreation in the corridor (see **Map 7**).

Town of Bethlehem Comprehensive Plan

The Town adopted a comprehensive plan in August of 2005. While the goals and recommendations in the Town's plan do not address environmental concerns specifically related to the Normans Kill corridor, the following goals and recommendations do consider the importance of protecting water quality, improving recreational opportunities, and managing natural resources along the creek:

- Expand public, private, or non-profit active and passive recreational resources and community services available in the Town to meet the growing and changing demand for these amenities.
- Manage and protect significant environmental systems such as stream corridors and associated ravines, steep slopes, wetland systems, and in particular, the Town's Hudson River waterfront. Enhance public access to, and understanding of, these resources.
- Recognize the Town's significant cultural resources, historic resources, and natural resources (such as farm land, forest land, or mineral deposits). Develop mechanisms for protecting and enhancing these for future generations. Communicate the value of these resources to individuals and to the community.
- Work with willing landowners to conserve quality open space throughout the Town and create a network of open lands to provide wildlife habitat and potential recreational trail corridors
- Develop zoning that addresses the protection of stream corridors – It is critical that the Town protect the stream corridors from development to help reduce pollution and protect all its water resources. Such protections could include development setbacks and clearing regulations to protect water quality in the Town's streams and the Hudson River.
- Develop zoning that addresses the protection of steep slopes to protect the many ravines and steep slopes in the community from destructive development. This may be done by placing limitations on the type and amount of development that occurs in steep slope areas.

Map 7

Generalized Zoning

SEE MAP BOOK

- Coordinate with the Mohawk Hudson Land Conservancy, the Hudson River Valley Greenway, and other interested organizations in developing and maintaining a recreational trail system. These organizations can assist with the creation, funding, and maintenance of current and/or proposed trail systems.

Bethlehem Zoning Law

In addition to the Town's Comprehensive Plan, the Town of Bethlehem's Zoning Law, updated in September of 2006, provides protection to the Normans Kill and other streams. The most significant provision is the stream buffer requirement which states that "No building permit will be issued for the construction or installation of any permitted or accessory use in any district within 100 feet of the bank of the Normans Kill Creek, Vloman Kill, Onesquethaw Creek, Phillipin Kill, and the Dowers Kill south of Route 32 or within the 100-year flood zone of these waterbodies."

In addition, the code specifies that when building lots border a stream, there is no construction or installation of any accessory use in any district allowed within 100 feet of the stream's bank. The zoning code states that design plans must ensure that development will not:

- Cause silt and eroded material to enter the stream during storm events or as a result of wind movement.
- Affect the efficiency or the capacity of the stream.
- Increase flood heights.
- Cause an increase in water flow velocity.
- Obstruct, catch, or collect debris that would obstruct flow under flood conditions.

Town of New Scotland Comprehensive Land Use Plan

The Town of New Scotland has included policies and recommendations in their January 2004 comprehensive plan to guide the land development process and protect the environment. The following policies and recommendations in this plan recognize the Normans Kill as a critical environmental area in need of protection.

Policies:

- To identify floodplains, floodways, stream corridors, wetlands, water supply resources, steep slopes, vistas, cultural and historic resources, watersheds, parklands, unique geological features, and agricultural lands.
- To maximize buffer areas adjacent to stream corridors, wetlands, steep slopes, and vistas.
- To modify zoning in the Town such that environmentally critical and sensitive areas and land use for agriculture and forestry are protected and maintained.

Recommendations:

- The Normans Kill should be protected utilizing flexible zoning techniques. Mandatory cluster provisions should be used to preserve open space around the Normans Kill.
- To further protect the Normans Kill and create open space the Town could offer a “bonus” to developers who in exchange would designate riverfront land as open space for public use.
- Draft an Open Space plan to outline the Normans Kill area and designate where an open space corridor is to be established. In addition, the plan could establish an overlay district. As part of the subdivision review process, riverfront open space would have to be set aside for public use as stated in the Open Space Plan.

Town of New Scotland Zoning Law

Although the Town of New Scotland’s Zoning Law does not mention the Normans Kill or have a specific law relating to the protection of the stream, the Normans Kill falls within the Residential Conservation district in the Town.

The Residential Conservation District is considered an area that generally has soils and slopes that are unsuitable for urban development. The district is accessible to population centers and lies outside of the prime agricultural area. The purpose of this district is to discourage growth on unsuitable lands and encourage use of natural areas suitable for passive recreation. Uses allowed in this zone include forest management, agriculture, single-family homes, and public outdoor recreation.

Rural Guilderland Plan: Open Space and Farmland Protection Plan

The Rural Guilderland Plan was developed in 2004 to address the relatively rural, western part of Guilderland that is rich with natural resources and differs greatly from the commercial and intensive suburban land uses found in the eastern portion of the Town. This plan addresses issues unique to this area and recommends measures to protect sensitive environmental areas.

To assist with the protection of local streams and waterways, the Town adopted a stream buffer requirement that excludes buildings from being constructed within 50 feet on each side of a stream. In addition to the stream buffer requirement, the Town developed concepts for conservation, several of which can be applied to protection of the Normans Kill.

- Protect Significant Natural Resources – natural resources, such as the Helderberg Escarpment, Settles Hill, Black Creek Marsh, and large patches of woodlands and wetlands, contribute to the rural character of the Town. They provide for wildlife and recreational and economic opportunities for people. Protection of these natural resources should be the basis for all planning endeavors in rural Guilderland.

- **Protect Water Supply** – the Watervliet Reservoir is a primary drinking water source for the Town and the City of Watervliet. The reservoir and its watershed, including the Normans Kill, Black Creek, and Bozen Kill, should be protected to the highest extent.

The Rural Guilderland Plan also developed recommendations and actions that may apply to protection of the Normans Kill corridor and development of recreational opportunities.

- **Recommendation: Protect Water Supply**

Action: Enhance the Town's Strategy to protect drinking water quality.
Efforts to do so include:

- 1 Enhancement of municipal stream and watershed regulations. This could include larger setbacks from streams.
- 2 Continued protection of sensitive environmental areas (floodplains, wetlands, and steep slopes) through existing buffer regulations and utilization of new conservation subdivision requirements.
- 3 Reduction of overall density of development throughout the rural Guilderland study area.

- **Recommendation: Protect Significant Natural Resource Areas**

The key elements that the Town's natural resources program should focus on include:

- 1 Preservation of large tracts of woodlands to avoid fragmentation of the Town's "big woods" – a particular focus of these efforts should be the targeting of large, unbroken tracts of wooded areas and stream corridors.
- 2 Protection of scenic, wooded hills and ridges from significant development
- 3 Conservation of wildlife habitat

- **Recommendation: Enhance Human Connections to the Land**

Actions:

- 1 Provide for enhanced community/pedestrian connections throughout rural Guilderland. These pedestrian connections should follow natural features and connect residential areas with parks, other recreation areas, and commercial centers.
- 2 Enhance low-impact recreation opportunities, particularly those uses that do not adversely impact or require significant modification of the natural environment. To achieve this, the Town should investigate opportunities to formalize existing trail networks through a landowner incentive program, and expand the scope of the Guilderland Pathways initiative to include rural Guilderland.

Town of Guilderland Comprehensive Plan

The Town of Guilderland updated their Comprehensive Plan in 2001 to address current land use and other community issues. The Town developed policies and recommendations to manage the community impacts associated with the influx of businesses and demand for new housing, several of which will help protect the natural resources of the Town, including the Normans Kill corridor.

Recreation and Open Space

- Promote clustering and other innovative design measures that preserve open space, including 10 percent parkland dedication regulations to preserve land along the Normans Kill.
- Investigate potential recreational access to stream corridors.

Natural Resources

- Preservation of critical lands adjacent to the Watervliet Reservoir can be accomplished through a number of open space techniques. For the best control, the Town should purchase these lands.

Streams and Floodplains

- Buffer all stream corridors from development to protect the integrity of the stream corridor to maintain water quality, promote wildlife corridors, provide potential recreational opportunity, and protect the health, safety and welfare of the community from slope failure. The width of the buffer should not be less than 100 feet from the stream edge to prevent potential impacts of erosion and sedimentation. In the case of stream corridors with steep banks (ravines), the angle of repose should be used to define top of bank. The current 30-foot setback from the angle of repose (top of bank) as provided in the subdivision regulations should continue to be used. The 12 degree angle of repose is used to protect steep slopes and stream corridors from development.
- Require the preparation of an erosion control plan for new projects.
- Special consideration should be given to the streams that are tributary to the Watervliet Reservoir. Other regulations, such as the new National Pollutant Discharge Elimination System (NPDES) Water Pollution Control Program (Phase II) may prove to be useful in protecting the watershed from stormwater runoff from new development.
- Explore potential access opportunities to stream corridors at appropriate locations for recreational uses (primarily trails and fishing access). Emphasis should be placed on voluntary easements to achieve appropriate connections.
- Prevent encroachment into the 100-year floodplain, as delineated on the Flood Insurance Rate Maps prepared by the Federal Emergency Management Agency.

Reservoir Corridor

- Development in this area of Town should be significantly limited. The following are specific solutions for protection of this corridor:
- Develop measures to prevent impact to the Reservoir from spills along Route 20.
- Implement watershed protection regulations in accordance with an overall watershed management plan.

Town of Guilderland Zoning

The Town of Guilderland's Zoning Ordinance does provide for the protection of streams by restricting construction of structures within 100 feet of the water's edge.

Floodplain regulations add further protection to the riparian corridor by controlling the alteration of natural floodplains, stream channels, and natural protective barriers which are involved in the accommodation of floodwaters, controlling filling, grading, dredging, and other development which may increase erosion or flood damages, and regulating the construction of flood barriers which will unnaturally divert floodwaters or which may increase flood hazards to other lands.



Normans Kill below the Watervliet Reservoir outlet

Agricultural Planning and Farmland Protection

There are approximately 2,583 acres of agricultural land within the Normans Kill corridor. The majority of the active farmland lies within County Agricultural District #3 in northern Guilderland surrounding the reservoir. Active agriculture is also found along the creek in southeastern Guilderland and the northeast corner of New Scotland. Not surprisingly, these areas also include the majority of the 3,830 acres of prime farmland and 1,574 acres of soils of statewide importance which occur in the corridor. Most of these important soils are found in and near the flood plains of the stream.

While farmland protection is regarded to be an important land use consideration, it should be noted that certain agricultural practices contribute to water quality impairment in the Normans Kill as well as the Watervliet Reservoir. These impairments include elevated nutrient levels, algal blooms, and excessive vegetative growth, which may impact aquatic life and water quality in the immediate vicinity of the farmland as well as downstream from agricultural sources. It should also be noted, however, that while agriculture is a suspected contributor to these water quality impairments, according to DEC's waterbody inventory, it is not considered the main source.

The Albany County Soil and Water Conservation District is scheduled to conduct assessments in the Normans Kill watershed in 2007-2008 as part of the Agricultural Environmental Management Program (AEM). AEM is a voluntary, incentive-based program that helps farm operators examine land management, nutrient and pesticide management, and environmental risks. An AEM farm assessment can help identify improvements that will save the operator money, minimize the farm's impact on the environment, and evaluate any risks to drinking water supplies on and around the farm. AEM assessments identify best management practices that can significantly reduce non-point source pollution,

such as establishing vegetative buffers, fencing livestock from sensitive areas, and manure management.



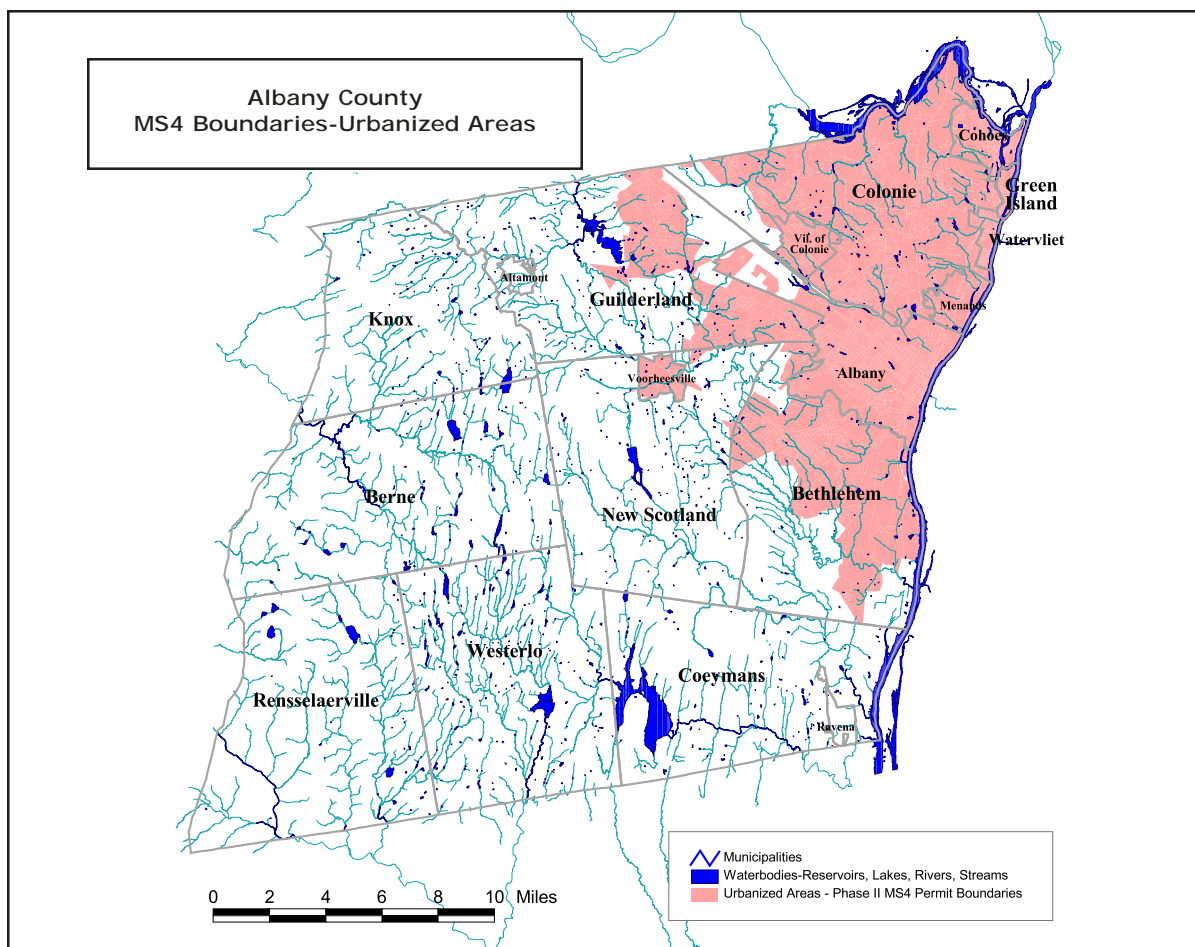
Aerial photography provided by Daniel Driscoll

Farmland in the northern portion of the stream corridor

Stormwater Management Local Laws

Under Phase II Stormwater regulations⁵ (commonly referred to as the MS4 regulations, or Municipal Separate Storm Sewer System), municipalities are required to pass a local law prohibiting illicit discharges to the storm sewer system and controlling erosion and sediment caused by construction activity. These laws must be in place by January 2008. Passage and enforcement of these laws in the Towns of Guilderland, New Scotland, and Bethlehem and the County and City of Albany will help reduce sediment and other non-point source pollutants found in stormwater runoff and improve water quality. **Map 8** highlights the urban, regulated areas (MS4 areas) within each of the relevant municipalities.

Map 8
Regulated MS4 Areas



⁵In 1990, EPA promulgated rules establishing Phase I of the National Pollutant Discharge Elimination System (NPDES) stormwater program. The Phase I program for MS4s requires operators of “medium” and “large” MS4s, that is, those that generally serve populations of 100,000 or greater, to implement a stormwater management program as a means to control polluted discharges from these MS4s. The Stormwater Phase II Rule extends coverage of the NPDES stormwater program to certain “small” MS4s, but takes a slightly different approach to how the stormwater management program is developed and implemented.

Previous Plans and Studies

The Normans Kill and its corridor have long been recognized as a unique and valuable resource as well as a sensitive area in need of careful planning. A series of studies conducted by federal, state, and local agencies have examined the Normans Kill and the affect of surrounding land uses on the stream.

A technical memorandum published in 1977⁶ examined the current conditions of the Albany-Bethlehem segment and outlined means of protecting and utilizing the stream and surrounding lands. It looked at protecting life and property, stabilizing physical and biological systems, improving water quality, and developing recreational facilities. This study advised that stabilizing eroding gullies, removing fallen trees in the stream, ceasing dumping and filling, and addressing erosion around stormwater outfalls would help reduce erosion and slippage. It also recommended avoiding grading and tree removal in the Normans Kill valley.

This study also called for development of recreational opportunities such as boat launches, fishing access, and a trail system and recommended that an intermunicipal group of governments and other interested organizations be formed to work on planning goals on a watershed basis.

This memorandum also looked closely at the geology of the corridor and the suitability for development, particularly at constraints posed by slippage-prone soils. The thick layers of clay and silt which form much of the Normans Kill valley are considered to be unstable and poorly suited for development as the unconsolidated material has a tendency to move downhill when disturbed, filled, or built on. The study includes excerpts from a report on geology and land uses in the Pine Bush⁷, which discusses the characteristics and uses in this area. Maps produced by the Albany County Environmental Management Council⁸ as part of a natural resources inventory predict the slippage-prone areas based on surficial geology and slope gradient as those areas of clay and silt having a slope gradient greater than 8 percent. Maps included in this report also show areas of actual slippage found by field survey and known by Soil and Water Conservation District staff.

This study also collected information on water quality, bank conditions, and tributary erosion. A map of present conditions and current land uses which show eroding tributaries and stormwater channels and bank slough is included in the report. Sources of degraded water quality are attributed to stream bed erosion, felled trees, and eutrophication of the Watervliet Reservoir, which is believed to cause low dissolved oxygen levels downstream as far as Delaware Avenue.

⁶ *Protection and Improvement of the Normans Kill Technical Memorandum* July, 1977, City of Albany Dept. of Urban Redevelopment Comprehensive Planning Assistance

⁷ Robert Dineen, *Geology and Land Uses in the Pine Bush*: Albany County, New York, NYS Museum and Science Service, p. 18, 1975

⁸ Albany County EMC, City of Albany: *Natural Resources Inventory* (1975) and Town of Bethlehem: *Natural Resources Inventory* (1976)

The 1978 Albany County Land Use & Development Plan describes a Normans Kill Valley Planning area from the mouth of the creek to Route 85 (New Scotland Road) which includes the Normans Kill gorge. The plan recommends the creation of special districts for flood plain zoning as well as preservation and protection of this environmentally sensitive area through the use of land conservation practices. In support of these goals, the plan also calls for consideration of this area for development of low intensity recreational opportunities.

In conclusion, previous and current studies of the creek and riparian corridor show that the soil and slopes create sensitive areas in need of careful planning to protect people and the environment and that the stream, while partially degraded, still supports a healthy diversity of plants and animals, and the scenic corridor offers the opportunity to enhance recreational opportunities for county residents.



Bank erosion along the Guilderland segment of the Normans Kill

Recreational Opportunities

Normans Kill Farm

The City of Albany purchased the Normans Kill Farm in 1980 to preserve open space along the creek and as a recreational area. The farm is located in the City of Albany just east of the Delaware Avenue Bridge over the Normans Kill. The property remains a working farm as well as the headquarters of Albany's mounted police. There is also a trail on the property, which begins along the bank of the Normans Kill, traverses an open field, and follows along a power line through Albany's municipal golf course ending at the golf course clubhouse/restaurant. The complete trail is approximately 2.5 miles one way.



Normans Kill Farm, Albany

Other amenities at the farm include a large dog park, community gardens, and picnic facilities. Also of interest is a Whipple cast & wrought iron bowstring truss bridge located on the access road to the farm. This historic bridge was designed by architect Squire Whipple and initially constructed in Syracuse in 1867. It was dismantled and rebuilt at the Normans Kill Farm in Albany around 1900 and is now listed on the National Register of Historic Places.

Normans Kill Preserve

The Normans Kill Preserve, owned and managed by the Mohawk Hudson Land Conservancy, consists of 46 acres donated by Albany County in 2005. The preserve spans both sides of the 2000 Delaware Avenue landslide and includes over a half-mile of frontage on the Normans Kill directly across from City of Albany's Normans Kill Farm.

Currently, a trail has been developed over 12 acres on the eastern end of the property. This trail runs through a wooded area, including a portion along the top of the stream bank offering views of the Normans Kill and the Normans Kill Farm. Future plans include extending the trail across a ravine to link it with adjacent parcels. The trail can be accessed from Delaware Avenue in the Town of Bethlehem just before the Normans Kill Bridge. Visitors may park in the Bagdon Environmental parking lot.

In addition, the Conservancy has recently obtained a Hudson River Valley Greenway grant to rehabilitate the Normansville bridge to provide a linkage to the City of Albany trail system.

Albany Pocket Park

A small park was added on the Albany-Bethlehem line as part of the City's New Scotland Road reconstruction. There is a gazebo and streamside picnic area here and although steep, it may be used as a take-out location for paddlers.

Map 9

Parks, Preserves and Recreational Opportunities

SEE MAP BOOK

Nott Road Park

There are five soccer and five softball fields at Nott Road Park. The park borders the Normans Kill and offers the opportunity for development of a stream-side trail with future linkage potential to trails at nearby Tawasentha Park and Western Turnpike Golf Course.

The surrounding land is relatively flat so there might also be an opportunity to develop a boat launch and fishing access here.

Tawasentha Town Park

Tawasentha Park is a 192-acre park in the Town of Guilderland, bisected by the Normans Kill. There is a summer recreation area with a swimming pool, picnic areas, playing fields, and a streamside trail on the east side and a winter recreation area and community gardens located on the west side, which offer opportunities for hiking, picnicking, cross country skiing, and wildlife observation. Three short loop trails which can be connected for a longer hike wind through open meadow, wetland, and deciduous forest with scenic vistas of the Normans Kill valley. The meadows in the wildlife management area are managed to retain early successional characteristics that provide favorable habitat for grassland birds, as well as for deer, fox, woodchuck, and a variety of small mammals.

The trails also offer a view of the privately-owned historic Battle of the Normans Kill site. It is believed that the battle that occurred here during the Revolutionary War was of great importance, and a vital factor in securing victory at the Battle of Saratoga five weeks later thus paving the way for American independence. The Town is currently exploring possibilities for obtaining ownership of this historic creek-side parcel.

The Town has recently announced plans to extend the trail system to connect areas of Tawasentha Park and the Town-owned Western Turnpike Golf Course. Combined, these areas would provide 600 acres for outdoor recreation including summer and winter trails for hiking, biking, skiing, and snowshoeing. Construction of a pedestrian bridge over the Normans Kill to connect the Winter Recreation Center to trails at Western Turnpike is planned in 2007.

Other Recreation

There are several private and public creek-side golf courses in the corridor. Albany Country Club in Guilderland and Normanside Country Club in Bethlehem are privately owned and use of the facilities is restricted to members. The municipally-owned courses in Guilderland and Albany, however, offer a variety of recreational opportunities to the public. The Town of Guilderland acquired the stream-side Western Turnpike golf course in 2002. In addition to golf, which is open to the public,



Capital Hills at Albany Golf Course

residents can also enjoy banquet and picnic facilities, hiking trails, cross country skiing trails, and ice skating. Capital Hills at Albany allows public access when the golf course is closed, which allows for hiking, cross country skiing, snow shoeing, and sledding.

Fishing

The abundant fisheries resources of the Normans Kill have the potential to provide significant opportunities for recreational fishing; however, there are no designated fishing access points or fishing areas in the study area. As such, fishing is concentrated at existing public parks and near road crossings, which limit accessibility.

Fishing appears to be popular below the Watervliet Reservoir at the dam, in addition to public access areas on the bank at Tawasentha Park, Western Turnpike Golf Course, and Nott Road Park in Guilderland; and at Capital Hills Golf Course and Normans Kill Farm in Albany. Species most commonly taken from the upper Normans Kill include, perch, pickerel, bullhead, largemouth and smallmouth bass, American eel, bluegill, pumpkinseed, and common carp. However, there is essentially no public access to tidal portions of the creek other than at the bridge crossing on Route 32, thereby limiting fishing opportunities in the Normans Kill for striped bass and American shad.

Boating

It is possible to canoe or kayak long stretches of the Normans Kill at certain times of the year, depending on the water level. Generally, the best time is in the spring or following periods of significant rainfall. The difficulty level is rated up to class II, which is suitable for novice paddlers. Potential problems include downed trees and strainers. There are a few possible spots to put in: at the road crossings of Fuller station Road just below the Watervliet Reservoir; Grant Hill Road; and State Route 155. However, even at these sites, there are no formal boat launches along the creek. Access at either the Johnston Road or the Krumkill Road crossing is difficult and not recommended. While the upper portion of the creek includes class II rapids and impressive black rock cliffs, putting in above State Route 155 is potentially dangerous and not recommended since it requires passage through a National Guard Rifle Range. Headquarters must be contacted in advance to obtain permission to float this portion and to ensure boater's safety.



Kayak launch site below Route 155 overpass.

One possible canoe or kayak route is to put in at the State Route 155 crossing in the Town of Guilderland and take out at the pocket park just before the State Route 85 crossing in Albany. This 9-mile trip is an easy paddle along a stream course which meanders through forest and farmland. The trip can be extended to take out at the parking area at the Normans Kill Farm just past Capital Hills at Albany and the Normanside golf courses. Care must be taken not to go beyond this point as there are steep drop-offs and falls just beyond the Delaware Avenue bridge.



Falls Near the NYS Thruway Bridge

Future Recreation Opportunities

The Town of Guilderland Pathways Master Plan prepared by the Guilderland Pathways Committee in 2005 looked at, among other things, opportunities for enhancing pedestrian and bicycle trails and open space linkages. Their recommendations included several options for improving access to and enjoyment of the Normans Kill corridor and for linking this area to other trail systems and natural areas. One option was to link Guilderland Center to the inactive rail corridor via the French's Mill pedestrian bridge. They also envisioned a path connecting Nott Road Park and the French's Mill Bridge along the Normans Kill. This path would connect the Dam area, the Battle of the Normans Kill historic site, Tawasentha Park, and Nott Road Park, and could be extended to Grant Hill Road. While much of the land along the creek is publicly owned, there are areas where an easement would need to be obtained from private landowners. For new developments along the creek, the Town encourages developers to include an area of dedicated open space in the riparian zone with the hope that, in the future, additional trail connections can be made. The complete master plan is available on the Town's website at <http://www.guilderland.org/>.

The Town of Bethlehem is also interested in developing a trail system along the Normans Kill. A recently completed plan recommends a trail along the Normans Kill beginning near New Scotland Avenue crossing. The Town may be able to work with the City of Albany to connect trails at the golf course and Normans Kill Farm.

Of further interest regarding trail systems connecting to the Normans Kill is Albany County's proposal to develop a rail trail along a 9.1-mile segment of abandoned rail corridor. The County is currently in the process of negotiating the purchase of the corridor from Canadian Pacific Railway for that purpose. The abandoned segment begins just east of South



Abandoned Rail Corridor, Albany

Pearl Street in the City of Albany, extends through a busy commercial area in the hamlet of Delmar, and continues through a mixture of residential, commercial, agricultural, and undeveloped areas in the hamlet of Slingerlands and the Town of New Scotland before terminating in the Village of Voorheesville. The acquisition phase of this initiative will involve funding assistance from the Scenic Hudson Land Trust, Inc., as well as a park acquisition grant from the New York State Office of Parks, Recreation and Historic Preservation.

The proposed rail trail will be developed along the entire length of the abandoned rail line, which runs parallel and adjacent to the Normans Kill in the City of Albany for a distance of approximately 1.2 miles. This segment offers spectacular views of falls and rapids over exposed rock formations near the Route 9W bridge. The rail line also crosses the Normans Kill at the Bethlehem Town line via a unique 188-foot iron and steel truss bridge constructed in 1884, which will be incorporated into the rail trail. The County has had preliminary conversations with the City of Albany and Mohawk Hudson Land Conservancy regarding opportunities to connect the rail trail to other trails in the Normans Kill corridor. In addition to these internal linkages, the east terminus of the rail trail will connect to the existing Mohawk-Hudson Bike-Hike Trail, eventually yielding approximately 50 miles of continuous trail northward along the Hudson River to Cohoes and westward along the Mohawk River to Rotterdam Junction in Schenectady County.



Iron and steel truss railroad bridge over the Normans Kill

Recommendations for Recreational Use

In order to preserve open space and important habitats; minimize erosion, landslides, and flooding; and protect water quality, it appears that the best use of the Normans Kill corridor is for passive recreation such as canoeing and kayaking, hiking, fishing, and wildlife observation. Unstable soils and slopes and floodplain areas along the creek suggest it would not be an ideal site for a bike path, except along the abandoned D&H rail line in the Albany and Bethlehem portions of the corridor.

Based on mapping of the existing trail network within the study area it appears that there may be several opportunities to link parks and trails throughout the corridor. One such possibility is a connection to the nearby Albany Pine Bush Preserve. While the Preserve is outside of the corridor study area, it is within the Normans Kill watershed and represents an important regional natural, cultural, and recreational resource area. There is an extensive trail system, and an environmental education center is scheduled to open at the Preserve in the summer of 2007. The Pine Bush trail network is located less than 1 mile from the entrance to Western Turnpike golf course, which borders the Normans Kill, so it may be possible to link the two recreation areas either by road or by a combination of roads and trails through surrounding open space if the parcels can be purchased or easements can be obtained.

Another important opportunity for trail linkages involves the proposed rail trail along the abandoned D&H rail corridor. Following development of the rail trail, connections may be made to the Normans Kill Farm and Normans Kill Preserve via Rockefeller Road and Old Delaware Avenue. The Rockefeller Road Bridge over the rail line that connects Albany and Bethlehem is currently closed to vehicles; however, if it is safe for pedestrian traffic, this approximately 0.7-mile route would easily connect these two recreation areas. Another bridge that crosses the Normans Kill on Old Delaware Avenue is scheduled to be restored so that it is safe for pedestrians. This bridge would afford connections between the Normans Kill Preserve on the Bethlehem side of the creek and the trail along the Normans Kill on the Albany side, which extends into the Normans Kill Farm.

A newly released pedestrian study prepared for the Town of Bethlehem recommends developing a trail along the Normans Kill in the New Scotland Avenue area that may be linked to existing trails in the City of Albany. Such a trail would likely require acquisition in fee or obtaining an easement on privately-owned land and cooperating with the City of Albany. Challenges in this area related to trail development include periodic flooding, heavy vegetative growth, and areas of steep slope.

There is a large undeveloped and relatively inaccessible stretch of the Normans Kill beyond New Scotland Avenue, to Johnson Road. This stretch would link the major existing recreation areas in Guilderland and Albany. The challenges with developing a trail in this area are that the majority of the parcels are privately owned and there are several sections with severely steep slopes.

Another major obstacle in developing a continuous land or water trail along the Normans Kill is the National Guard Rifle Range just north of the Grant Hill Road Bridge. This area is used as a shooting range for the National Guard and State Police. Apparently it is possible to call ahead to get permission to paddle through the area; however, public access is generally not permitted. As long as the National Guard continues to operate a rifle range, opportunities for public use in this portion of the corridor are limited. If a change of use occurred, it would allow for a continuous water trail along the entire stream from the Watervliet Reservoir in Guiderland to the Delaware Avenue Bridge in Bethlehem. It could also open an impressive gorge section of the stream to the public and enhance the opportunity to link existing recreation areas along the corridor.

There is also a need to improve public access for fishing and for canoes and kayaks. While there are currently certain locations that are popularly used for these purposes, there are no formal public fishing access or launch sites for canoes and kayaks. In the case of launches, establishment of put-in and take-out sites would help boaters safely access the stream without trespassing on private property or degrading bank conditions. Possible sites include the crossing at Frenchs Mill Road, Tawasentha Park, and Western Turnpike Golf Course. It is important to note that a trip beginning from these locations would require passage through the rifle range area. Downstream of the rifle range, ideal locations for fishing and boat launching and take-out include Nott Road Park and State Farm Road crossing in Guiderland, the pocket park at the New Scotland Avenue crossing in Albany, and at Normans Kill Farm trail head parking just before the Delaware Avenue Bridge.



Shale Banks at Grant Hill Road Crossing, Guiderland

Another recreational deficiency relates to limited access to the tidal portion of the stream. There may be a suitable area to establish fishing access in the tidal area near the South Pearl Street (State Route 32) crossing. New York State Department of Environmental Conservation has established a procedure for acquiring public fishing rights and can work with groups to navigate this process.

In order to work toward these recommendations and examine the potential for trail connections, boating and fishing access, and habitat protection in the corridor, formation of a Normans Kill Watershed Council should be encouraged and facilitated. This council should consist of interested residents and agency stakeholders such as those listed in the following section.

Stakeholders and Contacts

There are several municipal and not-for-profit groups in Albany County that may be interested in working together to educate the public about the value of stream corridors and how to protect them and to encourage conservation efforts and enhance recreational opportunities in the Normans Kill corridor. Below is a listing of groups and organizations along with a brief description of their interest and involvement in the Normans Kill corridor.

Audubon Society of the Capital Region-<http://www.capitalregionaudubon.org>
Established in 1969 as a chapter of the National Audubon Society, Capital Region Audubon aims to protect and conserve birds and wildlife habitat, building a culture of conservation through advocacy and education. Contact the President, at president@capitalregionaudubon.org.

NYS Department of Environmental Conservation, Hudson River Estuary Program - <http://www.dec.state.ny.us/website/hudson/hrep.html> The Hudson River Estuary Program is a regional partnership designed to protect, conserve, restore, and enhance the Hudson River estuary using grants, community planning, and biodiversity studies.

NYS Department of Environmental Conservation, Region 4, Fisheries - <http://www.dec.state.ny.us/website/dfwmr/fish/fishmail.html>

NYS Department of State Coastal Resources Division - <http://nyswaterfronts.com/index.asp> The Department of State has designated the tidal portion of the Normans Kill as a Significant Coastal Fish and Wildlife Habitat. As such, a habitat map and narrative was created that provides site-specific information, including a description of the habitat, its fish and wildlife values, and an impact assessment.

City of Albany - <http://www.albanyny.org/>

Town of Bethlehem - <http://www.townofbethlehem.org/>

Town of Guilderland – <http://www.guilderland.org>

Town of New Scotland - <http://www.townofnewscotland.com/>

Mohawk Hudson Land Conservancy - <http://www.mohawkhudson.org> The Conservancy, founded by area residents in 1992, is dedicated to the protection and stewardship of natural, cultural, and scenic areas in and around their region. They have recently acquired land along the Normans Kill in the Town of Bethlehem and have begun establishing trails, which they hope to extend and connect to other trail systems in the future.

Albany County Department of Economic Development, Conservation, and Planning / Office of Natural Resources - <http://www.albanycounty.com>
This Department studies the planning, economic development, and conservation needs of Albany County and conducts specialized research and investigation regarding the planning, management, and conservation of the County's natural resources.

Albany County Water Quality Coordinating Committee - <http://www.albanywater.org> The Albany County Water Quality Coordinating Committee (ACWQCC), formed in 1991, is comprised of individuals, non-governmental organizations, and governmental agencies, who are all stakeholders in the quest to protect & enhance the quality of Albany County's surface and sub-surface waters. The Committee focuses its efforts on non-point source pollution prevention and protection of the county's water bodies and water supplies. The Committee also serves as a clearinghouse for water quality information, a funding source for small water quality improvement projects, and a forum where stakeholders can collaborate on projects and activities that protect and enhance the quality of the county's water resources. The committee considers the lower Normans Kill to be a high priority for targeted efforts to improve water quality.

United States Geologic Survey - <http://ny.water.usgs.gov> Phone: (518) 285-5600 The U.S. Geological Survey (USGS) collects, monitors, analyzes, and provides scientific understanding about natural resource conditions, issues, and problems. USGS currently has a monitoring station at the Normans Kill Farm where they are monitoring velocity and water level and plan to analyze the effects of this tributary on the Hudson River.

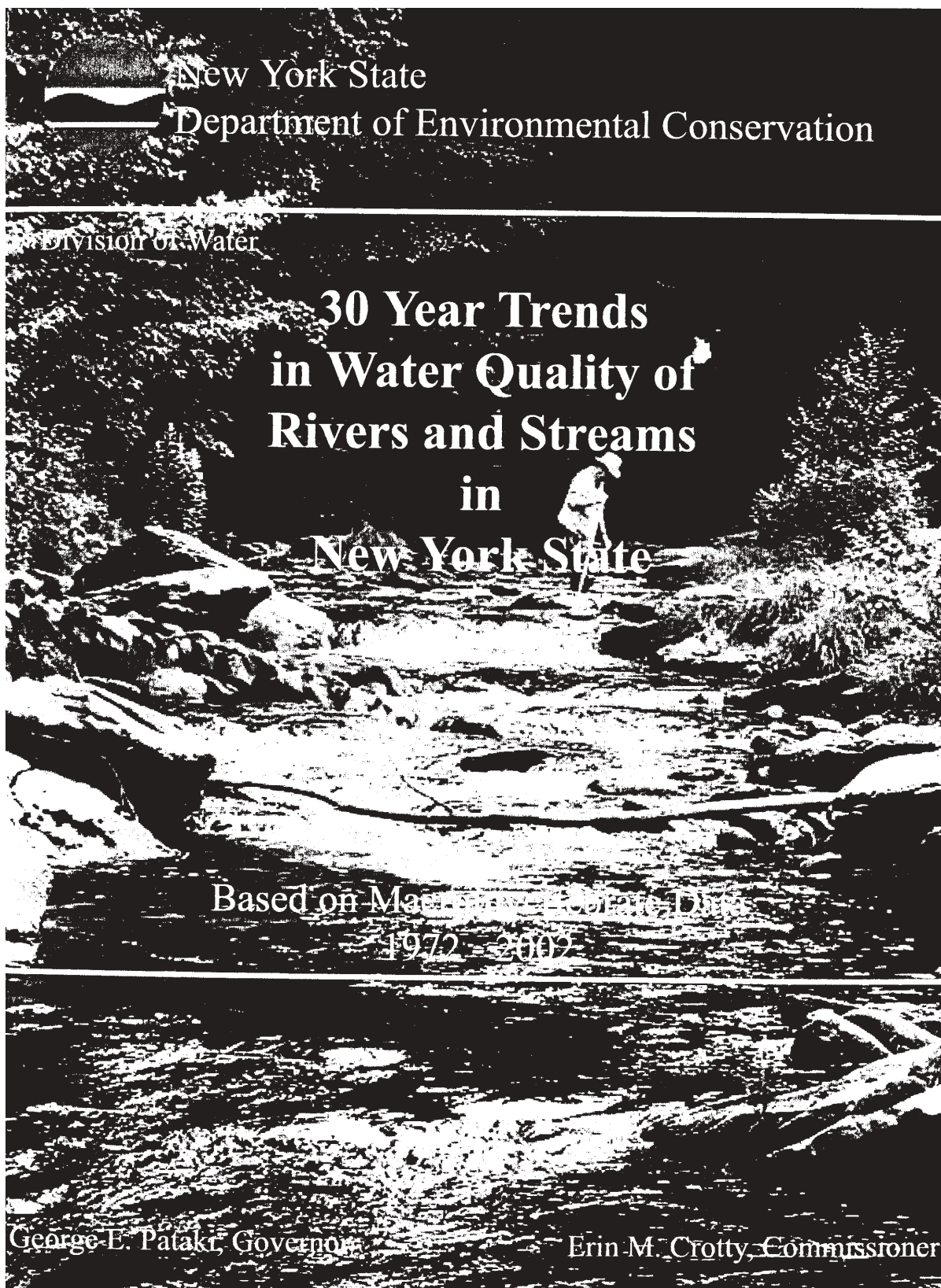
Albany Pine Bush Preserve Commission - <http://www.albanypinebush.org> The Albany Pine Bush Preserve Commission was created by the NYS Legislature in 1988 to protect and manage the unique and endangered natural communities and species of the Albany Pine Bush for ecological, recreational, and educational benefits. While the preserve does not fall within the corridor study area, most of the preserve land is within the Normans Kill watershed. In addition, sections of the Pine Bush Preserve trail system are close to the corridor and offer possibilities for trail extensions and connections.

Delaware Avenue Neighborhood Association (DANA)
<http://www.delawareneighborhood.com/> The Delaware Avenue Neighborhood includes the area of the Normans Kill Farm. Members of DANA have been active in historic preservation and education related to the Normans Kill Farm.

Appendices



Route 32 crossing the Normans Kill in the City of Albany



 New York State
Department of Environmental Conservation

Division of Water

30 Year Trends in Water Quality of Rivers and Streams in New York State

Based on Maximum Exceedance Data
1972-2002

George E. Pataki, Governor

 Erin M. Crotty, Commissioner

Normans Kill, Reserv to Hunger Kill (1311-0002)

Impacted Seg

Waterbody Location Information

Revised: 12/29/99

Water Index No:	H-221- 4 (portion 2)	Drain Basin:	Lower Hudson River
Hydro Unit Code:	02020006/030	Str Class:	B
Waterbody Type:	River	Flow Cat:	Low
Waterbody Size:	5.0 Miles	Reg/County:	4/Albany Co. (1)
Seg Description:	from Watervliet Reservoir to Hunger Kill (Trib -8)		

Water Quality Problem/Issue Information

(CAPS indicate PRIMARY Impair/Poll/Source)

Use Impairment(s)	Severity	Problem Documentation
AQUATIC LIFE	Impaired	Known

Type of Pollutant(s)

Known: WATER LEVEL/FLOW
Suspected: ---
Possible: ---

Source(s) of Pollutant(s)

Known: HYDRO/HABITAT MODIF.
Suspected: ---
Possible: ---

Resolution/Management Information

Lead Agency/Office: DOW/Reg4
Issue Resolvability: 1 (Needs Verification/Study (see STATUS))
Verification Status: 4 (Source Identified, Strategy Needed)
TMDL/303d Status: 2c (TMDL Unlikely (Other Control Actions More Appropriate))

Resolution Potential: Medium

Further Details

Aquatic life support including fish populations in this portion of the Normans Kill below the Watervliet Reservoir is impaired as a result of hydrologic modification. Specifically, no water is released from the reservoir to the creek during dry weather, a regular summertime occurrence, causing the creek to go dry. In light of the increasing growth in the surrounding areas, water demands on the reservoir are expected to increase. (DEC/DOW, Region 4, 1996)

A 1993 biological (macroinvertebrate) survey found slightly impacted conditions in this reach. (Normans Kill Biological Assessment Report, Novak et al, DEC/DOW, BWAR, January 1994) These conditions were confirmed by sampling in 1997 and 1998. (DEC/DOW, BWAR, SBU, December 1999)

Watervliet Reservoir (1311-0001)

Impacted Seg

Waterbody Location Information

Revised: 10/06/99

Water Index No:	H-221- 4-P270	Drain Basin:	Lower Hudson River
Hydro Unit Code:	02020006/030	Str Class:	A
Waterbody Type:	Lake(R)	Reg/County:	4/Albany Co. (1)
Waterbody Size:	403.3 Acres	Quad Map:	VOORHEESVILLE (K-25-1)
Seg Description:	entire reservoir		

Water Quality Problem/Issue Information

(CAPS indicate PRIMARY Impair/Poll/Source)

Use Impairment(s)	Severity	Problem Documentation
WATER SUPPLY	Stressed	Suspected
Aquatic Life	Stressed	Suspected
Aesthetics	Stressed	Suspected

Type of Pollutant(s)

Known: AESTHETICS (algal blooms, vegetation)
Suspected: Nutrients, Silt/sediment, Oxygen Demand
Possible: - - -

Source(s) of Pollutant(s)

Known: - - -
Suspected: CONSTRUCTION (resid/comm development), Municipal (Altamont WWTP), Private System (Thatcher St.Pk.), Storm Sewers
Possible: Agriculture

Resolution/Management Information

Lead Agency/Office:	DOW/Reg4	Resolution Potential:	High
Issue Resolvability:	1 (Needs Verification/Study (see STATUS))		
Verification Status:	2 (Problem Verified, Cause Unknown)		
TMDL/303d Status:	1 (Problem Identified, But Insufficient Pollutant/Source Data)		

Further Details

Various uses of the Watervliet Reservoir, including water supply, recreation, fishery and aesthetics are limited by occasional algal blooms and excessive aquatic weed growth. Water chestnuts proliferate to the point that they need to be harvested on a regular basis. Low dissolved oxygen and high turbidity that may restrict the fishery have also been noted. Suspected sources of nutrient and other pollutant loads include upstream sewage treatment plant discharges from the Village of Altamont and Thatcher State Park plants. Urban runoff from various residential and commercial development projects in the watershed may also affect water quality in the reservoir. Storm sewers in an industrial park discharge into Black Creek (Trib -1-1), a trib to the Bozen Kill and the reservoir. Some agriculture activity still exists in the watershed but it is not extensive. (DEC/DEW, Region 4, 1996)

Normans Kill, Hunger Kill to mouth (1311-0010)

Need Verific

Waterbody Location Information

Revised: 10/05/99

Water Index No:	H-221- 4 (portion 1)	Drain Basin:	Lower Hudson River
Hydro Unit Code:	02020006/030	Str Class:	SeeBlw
Waterbody Type:	River	Flow Cat:	Med.
Waterbody Size:	12.0 Miles	Reg/County:	4/Albany Co. (1)
Seg Description:	from Hunger Kill (Trib -8) to mouth	Quad Map:	ALBANY (K-25-2)...

Water Quality Problem/Issue Information

(CAPS indicate PRIMARY Impair/Poll/Source)

Use Impairment(s)	Severity	Problem Documentation
AQUATIC LIFE	Stressed	Possible
Aesthetics	Stressed	Suspected

Type of Pollutant(s)

Known: ---
Suspected: SILT/SEDIMENT, Nutrients
Possible: Unknown Toxicity

Source(s) of Pollutant(s)

Known: ---
Suspected: URBAN RUNOFF, Construction (resid/comm development)
Possible: Comb. Sewer Overflow

Resolution/Management Information

Lead Agency/Office:	DOW/Reg4	Resolution Potential:	Medium
Issue Resolvability:	1 (Needs Verification/Study (see STATUS))		
Verification Status:	1 (Waterbody Nominated, Problem Not Verified)		
TMDL/303d Status:	0		

Further Details

The fishery and aesthetics in the lower Normans Kill may be affected by considerable residential and commercial development in the watershed. Silt/sediment and nutrients from urban, lawn and golf course runoff are potential sources. The creek runs quite turbid at times. (DEC/DOW, Region 4, 1996)

Biological (macroinvertebrate) sampling was conducted along the main stem of the Normans Kill and its larger tributaries in August 1993. Multiple locations exhibited some slight impacts, but the character of the stream (slow moving water, upstream reservoir influences) make rapid biological assessment less reliable. Nonetheless, no significant water quality problems were noted. Several small municipal WWTPs discharge to the creek and its tribs, and various nonpoint sources may affect the creek. CSO discharges have also been reported by regional staff. The unknown toxic pollutants cited refer to inputs detected in some of the tributaries. (Normans Kill Biological Stream Assessment Report, Bode et al, January 1994)

Stream classification of the Normans Kill is Class B from the Watervliet Reservoir to the Delaware Avenue bridge in Normansville, and Class C from there to the mouth.

Normans Kill

The overall assessment of water quality for the Normans Kill is slightly impacted. Four mainstem sites were sampled from Westmere to Albany in 1993, and determined to be slightly impacted. Nonpoint source nutrient enrichment and siltation are the primary stressors. Macroinvertebrate sampling at the downstream site in 1991, 1992, 1997, and 1998 also showed similar impacts.

LOWER HUDSON RIVER DRAINAGE BASIN SAMPLING SITES, 1972-2002

<u>STATION</u>	<u>LOCATION</u>	<u>YEAR SAMPLED</u>									
NORMANS KILL (NORM)											
04	Westmere, above State Farm Rd bridge									93	
05	Voorheesville, below Normans Kill Rd									93	
09	Albany, Albany Municipal Golf Course; opp 14th hole									93	
10	Delmar, above Delaware Ave bridge	91	92	93				97	98		02
NORTH CREEK (NORC)											
01	Mellenville, below Rte 217 bridge										02
NORTH LAKE OUTLET (NRTH)											
01	North Lake Campground, 15 m above STP discharge									90	
02	North Lake Campground, 15 m below STP discharge									90	
03	North Lake Campground, 150 m below STP discharge									90	
04	North Lake Campground, 300 m below STP discharge									90	
NORTH PETERS KILL (NPET)											
01	Whitfield, below Canyon Lake Rd bridge										02
ONESQUETHAW CREEK (ONES)											
02	below Clarksville, above Rt. 32 bridge									98	
03	below Clarksville, above Onesquethaw Creek Rd. bridge									98	
04	Spawn Hollow; Hollyhock Sanctuary off Rarick Rd.;above Audubon parking lot									98	
05	South Bethlehem, below Rt. 53 bridge	84		87						98	
PATROON CREEK (PATS)											
04	Albany, above I-90 pond, Central Ave.						94			99	00
05A	Albany, below Tivoli Lake	91									
06	Albany, Pleasant Street			93	94			97	98	99	00
07	Albany, at mouth	91									
PEACH LAKE OUTLET (PEAC)											
01	Brewster, above Cobb Rd. bridge										00 01 02
PEEKSKILL HOLLOW (PEEK)											
01	Van Cortlandtville, below Pump House Rd. bridge									98	
PETERS KILL (PETK)											
01	St. Josen, above Rock Hill Rd bridge										02
PHILIPSE BROOK (PHLP)											
01	Garrison, below Rte 9D bridge										02
PLATTE KILL (PKIL) (Ulster County)											
01	Jenkinstown, above Rte 208 bridge										02
PLATTE KILL (PLAK) (Sullivan County)											
01	Burlingham, below CR 61										02

ASSESSMENTS OF WATER QUALITY OF STREAMS IN THE LOWER HUDSON RIVER DRAINAGE
BASIN, BASED ON MACROINVERTEBRATE COMMUNITIES

<u>Site/Reach</u>	<u>Water Quality Assessment</u>	<u>Change from 1992</u>
Muddy Brook, Towners	moderately impacted	no prior data
Muitzes Kill, Castleton	slightly impacted	no prior data
Muscoot River, Baldwin Place	slightly impacted	no prior data
Muscoot River, Yorktown	moderately impacted	no prior data
Normans Kill, Westmere	slightly impacted	no prior data
Normans Kill, Voorheesville	slightly impacted	no prior data
Normans Kill, Albany, Albany Municipal Golf Course	slightly impacted	no prior data
Normans Kill, Delmar, Delaware Ave.	slightly impacted	no change
North Creek, Mellenville	slightly impacted	no prior data
North Peters Kill, Whitfield	non-impacted	no prior data
Onesquethaw Creek, below Clarksville, above Rt. 32	non-impacted	no prior data
Onesquethaw Creek, below Clarksville, above Onesquethaw Creek Rd.	slightly impacted	no prior data
Onesquethaw Creek, Spawn Hollow;	slightly impacted	no prior data
Onesquethaw Creek, South Bethlehem	slightly impacted	DECLINED
Patroon Creek, Albany, above I-90 pond	moderately impacted	no prior data
Patroon Creek, Albany, Pleasant St	slightly impacted	no prior data
Peach Lake Outlet, Brewster	moderately impacted	no prior data
Peekskill Hollow, Van Cortlandtville	slightly impacted	no prior data
Peters Kill, St. Josen	slightly impacted	no prior data
Philipse Brook, Garrison	slightly impacted	no prior data
Platte Kill, Jenkinstown	non-impacted	no prior data
Platte Kill, Burlingham	non-impacted	no prior data
Plattekill Creek, Mt. Marion	non-impacted	no prior data
Plum Brook, Lake Lincolndale	slightly impacted	no prior data
Plum Brook, Lincolndale	slightly impacted	no prior data
Pocantico River, Sleepy Hollow Manor	moderately impacted	no prior data
Pochuck Creek, Newport	non-impacted	no prior data
Poesten Kill, East Poestenkill, at SR 40 bridge	non-impacted	IMPROVED
Poesten Kill, East Poestenkill, intersection of Co Rt 40 & 44	non-impacted	no prior data
Poesten Kill, Barberville	non-impacted	no change

B – Soils

Soil code	% SLOPE	% CLAY (top 2 layers)	DRAINAGE	RECREATIONAL LIMITATION	TRAIL EROSION HAZARD
Ad	N/A	----	VP	severe	yes
Ae	N/A	20-60	P	severe	yes
AnA	0-3	8-35	SP	severe	yes
AnB	3-8	8-35	SP	severe	yes
AsF	25-75	8-18	MW-SX	severe	yes
Br	0-2	3-16	VP	severe	
BuA	0-3	15-35	SP	severe	yes
BuB	3-8	15-35	SP	severe	yes
BuC	8-15	15-35	SP	severe	yes
CeA	0-3	6-15	MW	moderate-severe	
CeB	3-8	6-15	MW	moderate-severe	
ChA	0-3	6-18	SX-W	slight-severe	
ChB	3-8	6-18	SX-W	slight-severe	
ChC	8-15	6-18	SX-W	slight-severe	
ChD	15-25	6-18	SX-W	moderate-severe	
CkB	3-8	6-18	SX-W	slight-severe	
CIA	0-3	1-3	MW	moderate-severe	
CIB	3-8	1-3	MW	moderate-severe	
CoB	3-8	1-2	SX-W	slight-moderate	
CoC	8-15	1-2	SX-W	slight-severe	
CoD	15-25	1-	SX-W	moderate-severe	
CoE	25-50	1-2	SX-W	severe	
Cs	0-3	1-3	SP	severe	
Du	N/A	N/A	N/A	N/A	
EIA	0-3	2-8	MW	moderate	
EIB	3-35	2-8	MW	moderate	
EnA	0-3	2-10	MW	moderate	
EnB	0-8	2-10	MW	moderate	
Fx	N/A	----	SP-VP	----	
Gr	0-2	0-14	P-VP	severe	
Ha	0-3	5-18	W	slight-severe	
Ha	0-3	5-18	W	slight-severe	
HnA	0-3	18-60	SP	severe	yes
HnB	3-8	18-60	SP	severe	yes
HuB	3-8	20-60	MW	moderate-severe	yes
HuC	8-15	20-60	MW	moderate-severe	yes
HuD	15-25	20-60	MW	severe	yes
HuE	25-45	20-60	MW	severe	yes
In	0-3	10-35	P	severe	yes
LoC	8-15	8-18	W	slight-severe	
LoD	15-25	8-18	W	moderate-severe	
Ma	0-3	25-60	P-VP	severe	
MbB	3-8	6-18	X-W	slight-severe	
MbC	8-15	6-18	X-W	slight-severe	
MbD	15-25	6-18	X-W	moderate-severe	
MbE	25-35	6-18	X-W	Severe	
Mh	N/A	----	VP	N/A	
NaB	3-8	1-10	SX	slight-severe	
NaC	3-15	1-10	SX	slight-severe	
NrC	8-15	1-10	SX	slight-severe	
NuB	3-8	10-35	MW	moderate-severe	yes

Soil code	% SLOPE	% CLAY (top 2 layers)	DRAINAGE	RECREATIONAL LIMITATION	TRAIL EROSION HAZARD
NuC	8-15	10-35	MW	moderate-severe	yes
NuD	15-25	10-35	MW	severe	yes
NuE	25-35	10-35	MW	severe	yes
Pm	N/A	----	----	N/A	
Ra	0-3	3-16	SP-P	severe	yes
RhA	0-3	15-60	SP	severe	yes
RhB	3-8	15-60	SP	severe	yes
RkA	0-3	1-10	W	slight	
RkB	3-8	1-10	W	slight-moderate	
RkC	8-15	1-10	W	slight-severe	
ScA	0-3	2-15	MW	moderate	
ScB	3-8	2-15	MW	moderate	Yes
Sh	N/A	2-8	SP-P	severe	
St	N/A	1-10	SP	severe	
SuA	0-3	2-7	MW	slight-moderate	
SuB	3-8	2-7	MW	slight-moderate	
Te	Nearly level	5-18	MW-SP	moderate-severe	yes
To	Nearly level	5-18	W	slight-moderate	
Ud	Variable	-----	X-W	N/A	
Uf	Level-sloping	-----	X-W	N/A	
Ug	Level-sloping	-----	X-SP	N/A	
Uh	Level-sloping	-----	X-SP	N/A	
Uk	Level-sloping	-----	X-SP	N/A	
UnA	0-3	2-18	W	slight	
UnB	3-8	2-18	W	slight-moderate	yes
UnC	8-15	2-18	W	moderate-severe	yes
UnD	15-25	2-18	W	Severe	yes
Ur	0-15	----	impervious	N/A	
Ut	Level-sloping	----	----	N/A	
W	N/A	N/A	N/A	N/A	
Wa	Nearly level	10-17	SP	moderate-severe	
Wo	0-3	15-35	P-VP	severe	

Drainage classifications

X – excessively drained
 SX -somewhat excessively drained
 W – well drained
 MW – moderately well drained
 SP – somewhat poorly drained
 P – poorly drained
 VP – very poorly drained

C–1 Field Findings

Observations recorded while walking the stream bank summer, 2006

South Pearl St. – Rockefeller Rd.

Plants and Trees	Birds	Fish	Amphibians /Reptiles	Mammals
Ostrich Fern, Lady Fern, Sensitive fern, ebony spleenwort, marginal wood fern grey dogwood, may apple, hickory, raspberry, honey suckle, wild mint, northern red oak, red maple, white oak, white pine,	Spotted sandpiper, great blue heron, immature bald eagle, robin, catbird, goldfinch, downy woodpecker (see NYS Breeding Bird Atlas records)	None recorded	None recorded	Chipmunk, grey squirrel

Watervliet Reservoir to Tawasentha Park

Plants and Trees	Birds	Fish	Amphibians /Reptiles	Mammals
Water lily, broadleaf arrowhead, oak, sliver maple, gray dogwood, black cherry, hop hornbeam, basswood, American beech, shagbark hickory, sycamore, white ash, witch hazel, buckhorn, white pine, hemlock, eastern cottonwood, gray birch	Great Blue Heron (see NYS Breeding Bird Atlas records)	Largemouth bass, bluegill sunfish, crayfish	Green Frog, bull frog, painted turtle	Chipmunk, gray squirrel, white-tailed deer, beaver



New York State
Department of Environmental Conservation

Division of Water

Biological assessment of tributaries of the Lower Hudson River

January, 2001



GEORGE E. PATAKI, Governor

JOHN P. CAHILL, Commissioner

C-2 Macroinvertebrates

STREAM SITE: Normans Kill Station 10
 LOCATION: Delmar, NY, Route 443 bridge
 DATE: 1 Oct 1998
 SAMPLE TYPE: Kick sample
 SUBSAMPLE: 100 individuals

MOLLUSCA			
GASTROPODA	Physidae	Physella sp.	2
PELECYPODA	Sphaeriidae	Sphaerium sp.	6
ARTHROPODA			
CRUSTACEA			
AMPHIPODA	Gammaridae	Gammarus sp.	18
INSECTA			
EPHEMEROPTERA	Baetidae	Baetis intercalaris	4
COLEOPTERA	Psephenidae	Ectopria sp.	1
	Elmidae	Stenelmis crenata	2
TRICHOPTERA	Hydropsychidae	Cheumatopsyche sp.	11
		Hydropsyche morosa	2
		Hydropsyche scalaris	2
		Hydropsyche sparna	1
	Leptoceridae	Oecetis avara	1
LEPIDOPTERA	Pyrilidae	Petrophila sp.	1
DIPTERA	Simuliidae	Simulium vittatum	10
	Chironomidae	Thienemannimyia gr. spp .	20
		Cricotopus bicinctus	2
		Nanocladius rectinervis	1
		Orthocladius nr. dentifer	1
		Parakiefferiella triquetra gr.	1
		Paratrichocladius sp.	2
		Microtendipes pedellus gr. 1	
		Phaenopsectra dyari?	2
		Polypedilum convictum	4
		Pseudochironomus sp.	1
		Tanytarsus glabrescens gr.	3
		Tanytarsus guerlus gr.	1

SPECIES RICHNESS 25 (good)
 BIOTIC INDEX 5.86 (good)
 EPT RICHNESS 6 (good)
 MODEL AFFINITY 47 (poor)
 ASSESSMENT slightly impacted

DESCRIPTION The indices denoted slight impact at this site, although the predominantly bedrock substrate in part controls the fauna. Impact Source Determination showed nutrient enrichment, siltation, and possible municipal/industrial sources.



Department of Environmental Conservation

Division of Water

Biological Stream Assessment

Normans Kill

1993 Survey



New York State Department of Environmental Conservation
MARIO M. CUOMO, Governor THOMAS C. JORLING, Commissioner

C-2 Macroinvertebrates

MACROINVERTEBRATE SAMPLE

STREAM/SITE: Normans Kill, Station 4
 LOCATION: Westmere, State Farm Road
 DATE: 9 August 1993
 SAMPLE TYPE: Kick sample
 SUBSAMPLE: 100 Individuals

OLIGOCHAETA	Tubificidae	Undet. Tubificid w/o cap setae	2
MOLLUSCA			
GASTROPODA	Physidae	Physa sp.	2
ARTHROPODA			
INSECTA			
EPHEMEROPTERA	Baetidae	Baetis flavistriga	2
COLEOPTERA	Elmidae	Stenelmis bicarinata	10
		Stenelmis crenata	4
TRICHOPTERA	Hydropsychidae	Hydropsyche bronta	15
		Hydropsyche morosa	1
		Hydropsyche sparna	3
DIPTERA	Tipulidae	Antocha sp.	3
	Rhagionidae	Atherix sp.	3
	Empididae	Hemerodromia sp.	2
	Chironomidae	Thienemannimyia gr. spp.	2
		Cricotopus bicinctus	5
		Cricotopus tremulus gr.	16
		Cricotopus trifascia gr.	17
		Euklefferiella devonica gr.	1
		Parametriocnemus lundbecki	1
		Tvetenia vitracies	6
		Polypedilum convictum	2
		Polypedilum illinoense	1
		Cladotanytarsus sp.	2

SPECIES RICHNESS: 21
 BIOTIC INDEX: 5.93
 EPT VALUE: 4
 MODEL AFFINITY: 54
 ASSESSMENT: slightly impacted

DESCRIPTION: At this location, all major clean water organism groups were present in the field evaluation, but the fauna appeared to be influenced by enrichment and an abundant midge species, Cricotopus tremulus, is often associated with areas of toxic input. Mayfly abundance in the 100-organism subsample was low. The site was assessed as slightly impacted.

C-2 Macroinvertebrates

MACROINVERTEBRATE SAMPLE

STREAM/SITE:	Normans Kill, Station 5		
LOCATION:	Voorheesville, Normans Kill Rd.		
DATE:	9 August 1993		
SAMPLE TYPE:	Kick sample		
SUBSAMPLE:	100 individuals		
PLATYHELMINTHES	Turbellaria	Undet. Turbellaria	1
OLIGOCHAETA	Naididae	Ophidonais serpentina	1
MOLLUSCA			
GASTROPODA	Ancylidae	Ferrissia rivularis	1
ARTHROPODA			
CRUSTACEA			
ISOPODA	Asellidae	Caecidotea sp.	1
AMPHIPODA	Gammaridae	Gammarus sp.	2
INSECTA			
EPHEMEROPTERA	Baetidae	Acentrella sp.	1
		Baetis flavistriga	16
		Baetis intercalaris	1
	Heptageniidae	Undetermined Heptageniidae	1
	Ephemerellidae	Serratella deficiens	2
COLEOPTERA	Elmidae	Stenelmis bicarinata	12
		Stenelmis crenata	12
MEGALOPTERA	Sialidae	Sialis sp.	1
TRICHOPTERA	Hydropsychidae	Hydropsyche bronta	12
		Hydropsyche morosa	1
		Hydropsyche scalaris	1
		Hydropsyche slosonae	3
	Hydroptilidae	Hydroptila sp.	2
DIPTERA	Rhagionidae	Atherix sp.	9
	Chironomidae	Thienemannimyia gr. spp.	2
		Potthastia gaedii	1
		Cricotopus trifascia gr.	4
		Cricotopus vierriensis	1
		Parametriochnemus lundbecki	2
		Tvetenia vitracies	8
		Polypedilum convictum	1
		Rheotanytarsus exiguus gr.	1
SPECIES RICHNESS:	27		
BIOTIC INDEX:	4.90		
EPT VALUE:	10		
MODEL AFFINITY:	72		
ASSESSMENT:	slightly impacted		

DESCRIPTION: Two subsamples were taken from the sample collected at this site, since the first was inconclusive in determining whether to assess water quality as non- or slightly impacted. Indices from both subsamples were averaged, according to Quality Assurance protocols (Bode *et al.*, 1991); the averaged values resulted in an assessment of slightly impacted. However, all measured indices showed improvement from the upstream site at State Farm Rd. *Cricotopus tremulus*, a midge associated with toxic inputs, and present at the upstream location, was not present in either 100-organism subsample at this site. Numbers of mayfly individuals, as well as EPT value increased at this location.

C-2 Macroinvertebrates

MACROINVERTEBRATE SAMPLE

STREAM/SITE:	Normans Kill, Station 9		
LOCATION:	Albany, Albany Municipal Golf Course		
DATE:	9 August 1993		
SAMPLE TYPE:	Kick sample		
SUBSAMPLE:	100 individuals		
OLIGOCHAETA	Tubificidae	Undet. Tubificid. w/o cap. setae	1
MOLLUSCA			
PELECYPODA	Sphaeriidae	Sphaerium sp.	17
GASTROPODA	Physidae	Physa sp.	2
ARTHROPODA			
CRUSTACEA			
AMPHIPODA	Gammaridae	Gammarus sp.	1
INSECTA			
EPHEMEROPTERA	Baetidae	Baetis intercalaris	7
	Caenidae	Caenis sp.	1
COLEOPTERA	Hydrophilidae	Berosus sp.	1
	Elmidae	Optioservus trivittatus	2
		Stenelmis concinna	6
TRICHOPTERA	Hydropsychidae	Cheumatopsyche sp.	8
		Hydropsyche betteni	9
		Hydropsyche morosa	3
		Hydropsyche scalaris	5
DIPTERA	Simuliidae	Simulium fibrinflatum	11
	Empididae	Hemerodromia sp.	2
	Chironomidae	Thienemannimyia gr. spp.	1
		Cricotopus bicinctus	2
		Dicrotendipes neomodestus	1
		Polypedilum convictum	6
		Polypedilum scalaenum	1
		Rheotanytarsus exiguus gr.	9
		Tanytarsus glabrescens gr.	4
SPECIES RICHNESS:	22		
BIOTIC INDEX:	5.74		
EPT VALUE:	6		
MODEL AFFINITY:	58		
ASSESSMENT:	slightly impacted		

DESCRIPTION: The substrate at this site was mostly bedrock; the kick sample was taken in small pockets of rubble. In the field, the fauna appeared balanced, and the field assessment was of non-impacted water quality. However, richness, EPT value, and percent model affinity were lower than would be expected for a non-impacted site; the overall water quality assessment assigned was slightly impacted.

C-2 Macroinvertebrates

MACROINVERTEBRATE SAMPLE

STREAM/SITE:	Normans Kill, Station 10		
LOCATION:	Albany, Delaware Avenue bridge		
DATE:	9 August 1993		
SAMPLE TYPE:	Kick sample		
SUBSAMPLE:	100 individuals		
ANNELIDA			
OLIGOCHAETA	Tubificidae	Limnodrilus hoffmeisteri	9
HIRUDINEA	Glossiphoniidae	Undetermined Hirudinea	1
MOLLUSCA			
PELECYPODA	Sphaeriidae	Sphaerium sp.	16
GASTROPODA	Physidae	Physa sp.	4
ARTHROPODA			
CRUSTACEA			
AMPHIPODA	Gammaridae	Gammarus sp.	10
INSECTA			
EPHEMEROPTERA	Baetidae	Acentrella sp.	1
		Baetis intercalaris	5
	Ephemerellidae	Serratella deficiens	1
COLEOPTERA	Elmidae	Stenelmis crenata	5
TRICHOPTERA	Hydropsychidae	Cheumatopsyche sp.	7
		Hydropsyche morosa	2
		Hydropsyche scalaris	3
		Macrostemum zebratum	2
	Hydroptilidae	Hydroptila sp.	1
	Leptoceridae	Oecetis avara	1
	Helicopsychidae	Helicopsyche borealis	3
DIPTERA	Simuliidae	Simulium fibrinflatum	9
	Empididae	Hemerodromia sp.	1
	Chironomidae	Thienemannimyia gr. spp.	4
		Cricotopus bicinctus	1
		Chironomus sp.	1
		Dicrotendipes fumidus	1
		Polypedilum convictum	6
		Polypedilum scalaenum	1
		Pseudochironomus sp.	1
		Tribelos atrum	1
		Rheotanytarsus exiguus gr.	1
		Tanytarsus glabrescens gr.	1
		Tanytarsus guerlus gr.	1
SPECIES RICHNESS:	29		
BIOTIC INDEX:	6.04		
EPT VALUE:	10		
MODEL AFFINITY:	56		
ASSESSMENT:	slightly impacted		

DESCRIPTION: The substrate at this site was similar to that upstream; small pockets of rubble on bedrock were sampled. The field assessment and the overall water quality assessment were both judged to one of slight impact.

C-2 Macroinvertebrates

FIELD DATA SUMMARY SHEET				
STREAM NAME: Normans Kill REACH: Westmere to Albany FIELD PERSONNEL INVOLVED: Abele, Novak				
STATION ARRIVAL TIME AT STATION LOCATION		04 2:15 State Farm Rd.	05 1:15 Normans Kill Rd.	09 11:30 Mun. Golf Course
				10 10 Dela Ave.
PHYSICAL CHARACTERISTICS Width (meters) Depth (meters) Current speed (cm per sec)		20 0.3 83	7 0.2 111	30 0.2 63
Substrate (%) rock (> 10 in. or bedrock) rubble (2.5-10 in.) gravel (0.08-2.5 in.) sand (0.06-2.0 mm) silt (0.004-0.06 mm) clay (less than 0.004 mm)		20 50 20 10	40 40 40 20	3 4 2 1
Embeddedness (%)		50	10	-
CHEMICAL MEASUREMENTS Temperature (oC) Specific conductance (umhos) Dissolved Oxygen (mg per l) pH		18.8 750 13.7 8.6	20.0 758 10.9 8.3	22.2 827 12.9 8.5
BIOLOGICAL ATTRIBUTES Canopy (%)		5	10	0
Aquatic Vegetation algae - water column algae - filamentous algae - diatoms macrophytes; moss		present	present	present
Occurrence of Macroinvertebrates Chironomidae (midges) Trichoptera (caddisflies) Ephemeroptera (mayflies) Plecoptera (stoneflies) Coleoptera (beetles) Oligochaeta (worms) Other (**)		X X X X X X	X X X X X X	: : : : : :
ESTIMATED BIOMASS		medium	low	v.high
FIELD ESTIMATE OF WATER QUALITY		n/s	n/s	non
FIELD COMMENTS				

**scuds, crane flies, hellgrammites, fingernail clams, snails, black

C-2 Macroinvertebrates

FIELD DATA SUMMARY SHEET				
STREAM NAME: Normans Kill tributaries REACH: Altamont to Albany FIELD PERSONNEL INVOLVED: Abele, Novak				
STATION ARRIVAL TIME AT STATION LOCATION	KRUM 12:30	VLY4 1:40	BLOK 2:40	BOZN 3:35
PHYSICAL CHARACTERISTICS Width (meters) 5 6 4 2 Depth (meters) 0.2 0.2 0.2 0.2 Current speed (cm per sec) 67 59 77 71 Substrate (%) rock (> 10 in. or bedrock) 20 10 20 rubble (2.5-10 in.) 50 50 40 40 gravel (0.08-2.5 in.) 20 30 20 30 sand (0.06-2.0 mm) 10 10 20 20 silt (0.004-0.06 mm) 10 clay (less than 0.004 mm) Embeddedness (%) 40 30 40 20				
CHEMICAL MEASUREMENTS Temperature (oC) 18.6 23.1 20.1 20.5 Specific conductance (umhos) 1465 888 795 518 Dissolved Oxygen (mg per l) 8.7 12.5 7.2 12.4 pH 7.9 8.7 8.2 8.4				
BIOLOGICAL ATTRIBUTES Canopy (%) 70 50 90 10 Aquatic Vegetation algae - water column algae - filamentous algae - diatoms macrophytes; moss Occurrence of Macroinvertebrates Chironomidae (midges) X X X Trichoptera (caddisflies) X X X Ephemeroptera (mayflies) X X Plecoptera (stoneflies) X X Coleoptera (beetles) X X Oligochaeta (worms) X X Other (**) X				
ESTIMATED BIOMASS	low	-	low	medium
FIELD ESTIMATE OF WATER QUALITY	-	non	slt	n/s
FIELD COMMENTS				

** dragonflies, snails, crane flies, sowbugs, hellgrammites

C-2 Macroinvertebrates

LABORATORY DATA SUMMARY

STREAM NAME Normans Kill DRAINAGE 13
 DATE SAMPLED 08/09/93 COUNTY Albany
 SAMPLING METHOD Traveling kick

STATION	04	05 *	09	10
LOCATION	State Farm Rd.	Normans Kill Rd.	Albany Mun. Golf Course	Albany - Delaware Av
DOMINANT SPECIES\% CONTRIBUTION\TOLERANCE\COMMON NAME				
Genus and species names are abbreviated here to accommodate format. Complete names are reported elsewhere in this report. Intolerant = not tolerant of poor water quality; Facultative = occurring over a wide range of water quality; Tolerant = tolerant of poor water quality.	1. Cricotopus trifasc 17 facultative midge	Baetis flavistr 16 intolerant mayfly	Sphaerium sp. 17 facultative clam	Sphaerium sp. 16 facultative clam
	2. Cricotopus tremulus 16 facultative midge	Stenelmis bicarina 12 facultative beetle	Simulium fibrin 11 facultative black fly	Gammarus sp. 10 facultative scud
	3. Hydropsyche bronta 15 facultative caddisfly	Stenelmis crenata 12 facultative beetle	Rheotany exiguus 9 facultative midge	Limnodrilus hoffmeis 9 tolerant worm
	4. Stenelmis bicarina 10 facultative beetle	Hydropsyche bronta 12 facultative caddisfly	Hydropsyche betteni 9 facultative caddisfly	Simulium fibrin 9 facultative black fly
	5. Tvetenia vitracie 6 facultative midge	Atherix sp. 9 intolerant snipe fly	Cheumatopsy sp. 8 facultative caddisfly	Cheumatopsy sp. 7 facultative caddisfly
% CONTRIBUTION OF MAJOR GROUPS (NUMBER OF TAXA IN PARENTHESES)				
Chironomidae (midges)	53 (10)	20 (8)	24 (7)	19 (11)
Trichoptera (caddisflies)	19 (3)	19 (5)	25 (4)	19 (7)
Ephemeroptera (mayflies)	2 (1)	21 (5)	8 (2)	7 (3)
Plecoptera (stoneflies)	0 (0)	0 (0)	0 (0)	0 (0)
Coleoptera (beetles)	14 (2)	24 (2)	9 (3)	5 (1)
Oligochaeta (worms)	2 (1)	1 (1)	1 (1)	9 (1)
Others (**)	10 (4)	15 (6)	33 (5)	41 (6)
TOTAL	100 (21)	100 (27)	100 (22)	100 (29)
SPECIES RICHNESS	21	27	22	29
HBI INDEX	5.93	4.90	5.74	6.04
EPT VALUE	4	10	6	10
PMA VALUE	54	72	58	56
FIELD ASSESSMENT	non- to slt	non- to slt	no impact	slt impact
OVERALL ASSESSMENT	slightly impacted	slightly impacted	slightly impacted	slightly impacted

** snails, clams, black flies * see text for explanation of this sample

C-3 Significant Coastal Fish & Wildlife Habitat Rating

COASTAL FISH & WILDLIFE HABITAT RATING FORM

Name of Area: **Normans Kill**

Designated: **November 15, 1987**

County: **Albany**

Town(s): **Albany, Bethlehem**

7½' Quadrangle(s): **Albany, NY; Delmar, NY**

Score Criterion

- 16** Ecosystem Rarity (ER)
One of the major freshwater tributaries of the upper Hudson River, which is relatively undisturbed and accesible to anadromous fishes.
- 0** Species Vulnerability (SV)
No endangered, threatened or special concern species reside in the area.
- 4** Human Use (HU)
Recreational fishing opportunities attract many Albany County anglers to the area.
- 6** Population Level (PL)
One of only 10 significant spawning streams for anadromous fishes in the upper Hudson River:
geometric mean; $(4 \times 9)^{1/2} = 6$.
- 1.2** Replaceability (R) Irreplaceable
-

$$\begin{aligned}\text{SIGNIFICANCE VALUE} &= [(ER + SV + HU + PL) \times R] \\ &= \mathbf{31}\end{aligned}$$

DESIGNATED HABITAT: NORMANS KILL

LOCATION AND DESCRIPTION OF HABITAT:

The Normans Kill is located on the west side of the Hudson River, on the boundary between the City of Albany and the Town of Bethlehem, Albany County (7.5' Quadrangles: Albany, N.Y.; and Delmar, N.Y.). The fish and wildlife habitat is an approximate two mile segment of this freshwater tributary, extending from its mouth on the Hudson River to a falls which is located just downstream from the New York State Thruway (Interstate Route 87) bridge. The Normans Kill is a relatively large, medium gradient, perennial, warmwater stream, with a drainage area of over 170 square miles, and an average annual discharge volume of approximately 150 cubic feet per second. Municipal water withdrawals upstream reduce flows year-round by more than 7 cubic feet per second. The first mile of stream below the falls flows through a steep-sided wooded gorge, and is relatively shallow, with a gravelly substrate. The lower mile of the creek (referred to as "Island Creek") is within the tidal range of the Hudson River, and is relatively deep, with a silt and clay substrate. At least part of this segment appears to have been channelized in the past, in conjunction with nearby commercial and industrial developments. Despite its proximity to the Port of Albany, the Normans Kill and its associated riparian zone remain in a relatively natural condition. Habitat disturbance in the area is generally limited to the presence of road and railroad crossings, litter, and discharges of stormwater runoff from paved areas.

FISH AND WILDLIFE VALUES:

The Normans Kill is the largest tributary stream in Albany County, and is one of about 4 major tributaries emptying into the northern portion of the Hudson River estuary. The considerable length of stream channel accessible to migratory fishes, and the lack of significant human disturbance in the upper portion of the creek, provide favorable habitat conditions for a variety of anadromous as well as resident freshwater fish species. The Normans Kill is an important spawning area for alewife, blueback herring, and white perch; it is one of only 10 significant spawning streams for these anadromous fishes in the upper Hudson River. Generally, these species enter the stream between April and June; the adults leave the area shortly after spawning, and within several weeks, the eggs have hatched, and larval fish begin moving downstream to nursery areas in the Hudson River. A substantial population of smallmouth bass also occurs in the Normans Kill throughout the year. Adults move into the upper section of the creek in May and early June to spawn, and return to deeper areas as water temperatures rise. Freshwater inflows from the Normans Kill are also important for maintaining water quality in the Hudson River estuary.

The abundant fisheries resources of the Normans Kill provide significant opportunities for recreational fishing. Although no developed public access facilities exist, the area is popular among Albany County anglers, especially for smallmouth bass fishing during the summer months. Fishing pressure is concentrated on the lower section of the creek, near road crossings.

IMPACT ASSESSMENT:

A **habitat impairment test** must be met for any activity that is subject to consistency review under Federal and State laws, or under applicable local laws contained in an approved local waterfront revitalization program. If the proposed action is subject to consistency review, then the habitat protection policy applies, whether the proposed action is to occur within or outside the designated area.

The specific **habitat impairment test** that must be met is as follows.

In order to protect and preserve a significant habitat, land and water uses or development shall not be undertaken if such actions would:

- destroy the habitat; or,
- significantly impair the viability of a habitat.

Habitat destruction is defined as the loss of fish or wildlife use through direct physical alteration, disturbance, or pollution of a designated area or through the indirect effects of these actions on a designated area. Habitat destruction may be indicated by changes in vegetation, substrate, or hydrology, or increases in runoff, erosion, sedimentation, or pollutants.

Significant impairment is defined as reduction in vital resources (e.g., food, shelter, living space) or change in environmental conditions (e.g., temperature, substrate, salinity) beyond the tolerance range of an organism. Indicators of a significantly impaired habitat focus on ecological alterations and may include but are not limited to reduced carrying capacity, changes in community structure (food chain relationships, species diversity), reduced productivity and/or increased incidence of disease and mortality.

The *tolerance range* of an organism is not defined as the physiological range of conditions beyond which a species will not survive at all, but as the ecological range of conditions that supports the species population or has the potential to support a restored population, where practical. Either the loss of individuals through an increase in emigration or an increase in death rate indicates that the tolerance range of an organism has been exceeded. An abrupt increase in death rate may occur as an environmental factor falls beyond a tolerance limit (a range has both upper and lower limits). Many environmental factors, however, do not have a sharply defined tolerance limit, but produce increasing emigration or death rates with increasing departure from conditions that are optimal for the species.

The range of parameters which should be considered in applying the habitat impairment test include but are not limited to the following:

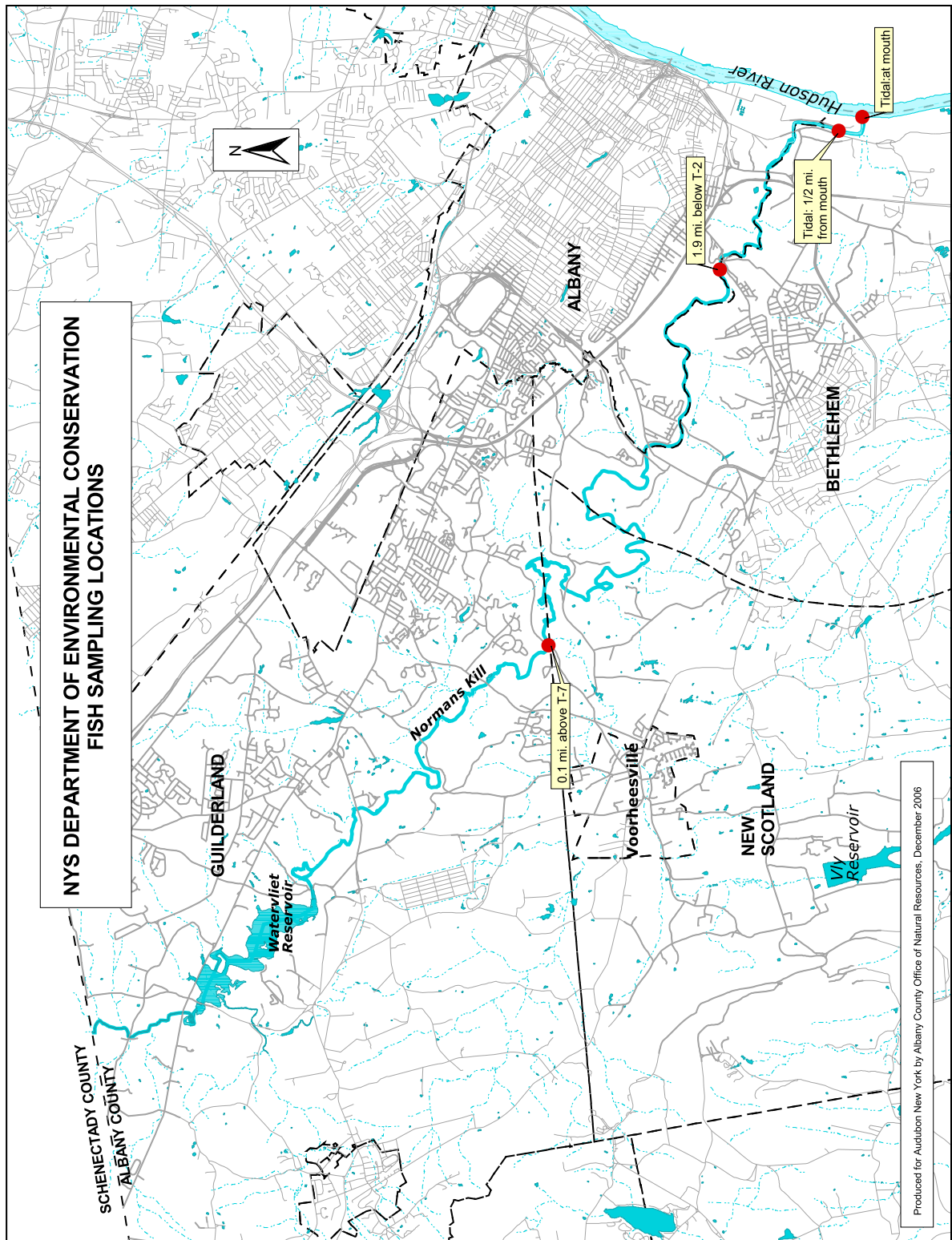
1. physical parameters such as living space, circulation, flushing rates, tidal amplitude, turbidity, water temperature, depth (including loss of littoral zone), morphology, substrate type, vegetation, structure, erosion and sedimentation rates;
2. biological parameters such as community structure, food chain relationships, species diversity, predator/prey relationships, population size, mortality rates, reproductive rates, meristic features, behavioral patterns and migratory patterns; and,
3. chemical parameters such as dissolved oxygen, carbon dioxide, acidity, dissolved solids, nutrients, organics, salinity, and pollutants (heavy metals, toxics and hazardous materials).

C-3 Significant Coastal Fish & Wildlife Habitat Rating

Although not comprehensive, examples of generic activities and impacts which could destroy or significantly impair the habitat are listed below to assist in applying the habitat impairment test to a proposed activity.

Any activity that would substantially degrade water quality, increase turbidity or sedimentation, reduce flows, or increase water temperatures in the Normans Kill would result in significant impairment of the habitat. Discharges of sewage or stormwater runoff containing sediments or chemical pollutants (including fertilizers, herbicides, or insecticides) Could result in significant impairment of the habitat. Of particular concern are the potential effects of upstream disturbances, including water withdrawals, impoundments, stream bed disturbances, and effluent discharges. Barriers to fish migration, whether physical or chemical, would have a significant impact on fish populations in this Creek, as well as in the Hudson River. Habitat disturbances would be most detrimental during fish spawning and incubation periods. Existing woodlands bordering the Normans Kill and its tributaries should be maintained to provide bank cover, soil stabilization, and buffer areas. Development of appropriate public access to the area may be desirable to ensure that adequate opportunities for compatible human uses of the fisheries resources are available.

C-4 Fish Species in the Normans Kill



Tidal: at mouth

Year = 1934	Common Name	Genus	Species
	American Eel	Anguilla	rostrata
	White Sucker	Catostomus	commersonii
	Tessellated Darter	Etheostoma	olmstedii
	Banded Killifish	Fundulus	diaphanus
	Mummichog	Fundulus	heteroclitus

Tidal: 1/2 mile from mouth

Year = 1934	Common Name	Genus	Species
	Rock Bass	Ambloplites	rupestris
	Brown Bullhead	Ameiurus	nebulosus
	American Eel	Anguilla	rostrata
	White Sucker	Catostomus	commersonii
	Satinfin Shiner	Cyprinella	analostana
	Spotfin Shiner	Cyprinella	spiloptera
	Johnny Darter	Etheostoma	nigrum
	Tessellated Darter	Etheostoma	olmstedii
	Cutlip Minnow	Exoglossum	maxillingua
	Banded Killifish	Fundulus	diaphanous
	Mummichog	Fundulus	heteroclitus
	Eastern Silvery Minnow	Hybognathus	regius
	Redbreast Sunfish	Lepomis	auritus
	Pumpkinseed	Lepomis	gibbosus
	Common Shiner	Luxilus	cornutus
	Largemouth Bass	Micropterus	salmoides
	Golden Shiner	Notemigonus	crysoleucas
	Spottail Shiner	Notropis	hudsonius
	White Crappie	Pomoxis	annularis
	Black Crappie	Pomoxis	nigromaculatus

Year = 1972	Common Name	Genus	Species
	American Shad	Alosa	sapidissima
	American Eel	Anguilla	rostrata
	Goldfish	Carassius	auratus
	White Sucker	Catostomus	commersonii
	Common Carp	Cyprinus	carpio
	Pumpkinseed	Lepomis	gibbosus
	White Perch	Morone	Americana
	Striped Bass	Morone	saxatilis
	Golden Shiner	Notemigonus	crysoleucas
	Spottail Shiner	Notropis	hudsonius

Freshwater 1.9 mile below T2

Year = 1972	Common Name	Genus	Species
	American Eel	Anguilla	rostrata
	White Sucker	Catostomus	commersonii
	Cutlip Minnow	Exoglossum	maxillingua
	Redbreast Sunfish	Lepomis	auritus
	Common Shiner	Luxilus	cornutus
	Smallmouth Bass	Micropterus	dolomieu
	Blacknose Dace	Rhinichthys	atratus
	Fallfish	Semotilus	corporalis
Year = 1981			
	Rock Bass	Ambloplites	rupestris
	American Eel	Anguilla	rostrata
	White Sucker	Catostomus	commersonii
	Common Carp	Cyprinus	carpio
	Tessellated Darter	Etheostoma	olmstedii
	Cutlip Minnow	Exoglossum	maxillingua
	Redbreast Sunfish	Lepomis	auritus
	Common Shiner	Luxilus	cornutus
	Smallmouth Bass	Micropterus	dolomieu
	Largemouth Bass	Micropterus	salmoides
	Emerald Shiner	Notropis	atherinoides
	Spottail Shiner	Notropis	hudsonius
	Longnose Dace	Rhinichthys	catractae
	Fallfish	Semotilus	corporalis

Freshwater: 0.1 mile above T7

Year 1981	Common Name	Genus	Species
	Rock Bass	Ambloplites	rupestris
	American Eel	Anguilla	rostrata
	White Sucker	Catostomus	commersonii
	Cutlip Minnow	Exoglossum	maxillingua
	Redbreast Sunfish	Lepomis	auritus
	Common Shiner	Luxilus	cornutus
	Smallmouth Bass	Micropterus	dolomieu
	Spottail Shiner	Notropis	hudsonius
	Blacknose Dace	Rhinichthys	atratus
	Longnose Dace	Rhinichthys	catractae
	Creek Chub	Semotilus	atromaculatus
	Fallfish	Semotilus	corporalis
Year = 1987			
	Rock Bass	Ambloplites	rupestris
	American Eel	Anguilla	rostrata
	White Sucker	Catostomus	commersonii
	Satinfin Shiner	Cyprinella	analostana
	Common Carp	Cyprinus	carpio
	Cutlip Minnow	Exoglossum	maxillingua
	Redbreast Sunfish	Lepomis	auritus
	Pumpkinseed	Lepomis	gibbosus
	Common Shiner	Luxilus	cornutus
	Smallmouth Bass	Micropterus	dolomieu
	Largemouth Bass	Micropterus	salmoides
	Spottail Shiner	Notropis	hudsonius
	Yellow Perch	Perca	flavescens
	Creek Chub	Semotilus	atromaculatus
	Fallfish	Semotilus	corporalis

Freshwater: below Watervliet Reservoir to T7

Year = 1934	Common Name	Genus	Species
	American Eel	Anguilla	rostrata
	Tessellated Darter	Etheostoma	olmstedii
	Cutlip Minnow	Exoglossum	maxillingua
	Banded Killifish	Fundulus	diaphanous
	Pumpkinseed	Lepomis	gibbosus
	Golden Shiner	Notemigonus	crysoleucas
	White Crappie	Pomoxis	annularis
Year = 1972	American Eel	Anguilla	rostrata
	White Sucker	Catostomus	commersonii
	Tessellated Darter	Etheostoma	olmstedii
	Cutlip Minnow	Exoglossum	maxillingua
	Redbreast Sunfish	Lepomis	auritus
	Pumpkinseed	Lepomis	gibbosus
	Common Shiner	Luxilus	cornutus
	Smallmouth Bass	Micropterus	dolomieu
	Largemouth Bass	Micropterus	salmoides
	Blacknose Dace	Rhinichthys	atratus
	Fallfish	Semotilus	corporalis
Year = 1981	Rock Bass	Ambloplites	rupestris
	American Eel	Anguilla	rostrata
	White Sucker	Catostomus	commersonii
	Redbreast Sunfish	Lepomis	auritus
	Pumpkinseed	Lepomis	gibbosus
	Bluegill	Lepomis	macrochirus
	Smallmouth Bass	Micropterus	dolomieu
	Largemouth Bass	Micropterus	salmoides
	Golden Shiner	Notemigonus	crysoleucas
	Black Crappie	Pomoxis	nigromaculatus

Freshwater: above Watervliet Reservoir to T21

year = 1972	Common Name	Genus	Species
	Rock Bass	Ambloplites	rupestris
	Brown Bullhead	Ameiurus	nebulosus
	American Eel	Anguilla	rostrata
	White Sucker	Catostomus	commersonii
	Tessellated Darter	Etheostoma	olmstedii
	Cutlip Minnow	Exoglossum	maxillingua
	Banded Killifish	Fundulus	diaphanus
	Northern Hog Sucker	Hypentelium	nigricans
	Pumpkinseed	Lepomis	gibbosus
	Bluegill	Lepomis	macrochirus
	Common Shiner	Luxilus	cornutus
	Largemouth Bass	Micropterus	salmoides
	Blacknose Dace	Rhinichthys	atratus
	Longnose Dace	Rhinichthys	cataractae
	Creek Chub	Semotilus	atromaculatus
	Fallfish	Semotilus	corporalis

Freshwater: T21 to T29

year = 1972	Common Name	Genus	Species
	Brown Bullhead	Ameiurus	nebulosus
	Grass Pickerel	Esox	americanus vermiculatus
	Northern Hog Sucker	Hypentelium	nigricans
	Pumpkinseed	Lepomis	gibbosus
	Bluegill	Lepomis	macrochirus
	Common Shiner	Luxilus	cornutus
	Largemouth Bass	Micropterus	salmoides
	Blacknose Dace	Rhinichthys	atratus
	Longnose Dace	Rhinichthys	cataractae
	Creek Chub	Semotilus	atromaculatus

Freshwater: T29 to source

year = 1934	Common Name	Genus	Species
	Brown Bullhead	Ameiurus	nebulosus
	White Sucker	Catostomus	commersonii
	Cutlip Minnow	Exoglossum	maxillingua
	Redbreast Sunfish	Lepomis	auritus
	Common Shiner	Luxilus	cornutus
	Golden Shiner	Notemigonus	crysoleucas
	Yellow Perch	Perca	flavescens
	Bluntnose Minnow	Pimephales	notatus
	Fathead Minnow	Pimephales	promelas
	Blacknose Dace	Rhinichthys	atratus
	Creek Chub	Semotilus	atromaculatus
	Fallfish	Semotilus	corporalis
year = 1972			
	Brown Bullhead	Ameiurus	nebulosus
	American Eel	Anguilla	rostrata
	White Sucker	Catostomus	commersonii
	Grass Pickerel	Esox	americanus vermiculatus
	Tessellated Darter	Etheostoma	olmstedii
	Cutlip Minnow	Exoglossum	maxillingua
	Northern Hog Sucker	Hypentelium	nigricans
	Redbreast Sunfish	Lepomis	auritus
	Pumpkinseed	Lepomis	gibbosus
	Common Shiner	Luxilus	cornutus
	Golden Shiner	Notemigonus	crysoleucas
	Bluntnose Minnow	Pimephales	notatus
	Fathead Minnow	Pimephales	promelas
	Blacknose Dace	Rhinichthys	atratus
	Longnose Dace	Rhinichthys	catractae
	Creek Chub	Semotilus	atromaculatus

C-5 Amphibians and Reptiles

NORMANS KILL AMPHIBIANS AND REPTILES

<u>AMPHIBIAN SPECIES</u>	<u>WATERSHED</u>	<u>CORRIDOR</u>
Common Mudpuppy ¹	*	*
Jefferson Salamander Complex (SC)	X	X
Blue-spotted Salamander (SC)	X	X
Spotted Salamander	X	X
Red-spotted Newt	X	X
Northern Dusky Salamander	X	X
Northern Redback Salamander	X	X
Four-toed Salamander	X	
Northern Two-lined Salamander	X	X
Eastern Spadefoot (SC)	X	
Eastern American Toad	X	X
Fowler's Toad	X	X
Gray Treefrog	X	X
Northern Spring Peeper	X	X
Bullfrog	X	X
Green Frog	X	X
Wood Frog	X	X
Northern Leopard Frog	X	X
Pickerel Frog	X	
<u>REPTILE SPECIES</u>	<u>WATERSHED</u>	<u>CORRIDOR</u>
Northern Water Snake	X	X
Northern Brown Snake	X	X
Northern Redbelly Snake	X	X
Common Garter Snake	X	X
Eastern Hognose Snake (SC)	X	X
Northern Ringneck Snake	X	
Eastern Worm Snake ² (SC)	*	
Smooth Green Snake	X	
Eastern Milk Snake	X	X
Common Snapping Turtle	X	X
Spotted Turtle (SC)	X	
Wood Turtle (SC)	X	X
Eastern Box Turtle (SC)	X	
Common Map Turtle ³	*	*
Painted Turtle	X	X

¹ The NYS Museum Biological Survey includes a 1924 record for the Normans Kill.

² One 1986 watershed record exists from the Town of Guilderland near Crossgates Mall.

³ This record is suggested by confirmations along the west shore of Hudson River immediately north and south of its confluence with the Normans Kill.

SC - State Species of Special Concern (Section 182.2(i) of 6 NYCRR Part 182).

Source: New York State Amphibian and Reptile Atlas Project data base (1990-1999)
except where otherwise noted by an *.

*Bird Species in Area of Normans Kill Corridor
Derived from NYS Breeding Bird Atlas, 2000-05*

<i>Species</i>		<i>Breeding Code and Category</i>	
Canada Goose	Branta canadensis	NY	Confirmed
Wood Duck	Aix sponsa	ON	Confirmed
American Black Duck	Anas rubripes	FL	Confirmed
Mallard	Anas platyrhynchos	FL	Confirmed
Mallard x Am. Black Duck Hybrid	Anas platyrhynchos x A. rubripes		FL Confirmed
Hooded Merganser	Lophodytes cucullatus	FL	Confirmed
Ruffed Grouse	Bonasa umbellus	D2	Probable
Wild Turkey	Meleagris gallopavo	NE	Confirmed
Pied-billed Grebe	Podilymbus podiceps	FL	Confirmed
Double-crested Cormorant	Phalacrocorax auritus	X1	Possible
American Bittern	Botaurus lentiginosus	S2	Probable
Least Bittern	Ixobrychus exilis	T2	Probable
Great Blue Heron	Ardea herodias	NY	Confirmed
Green Heron	Butorides virescens	FL	Confirmed
Turkey Vulture	Cathartes aura	X1	Possible
Bald Eagle	Haliaeetus leucocephalus	UN	Confirmed
Northern Harrier	Circus cyaneus	X1	Possible
Sharp-shinned Hawk	Accipiter striatus	FY	Confirmed
Cooper's Hawk	Accipiter cooperii	NY	Confirmed
Red-shouldered Hawk	Buteo lineatus	X1	Possible
Broad-winged Hawk	Buteo platypterus	FL	Confirmed
Red-tailed Hawk	Buteo jamaicensis	NY	Confirmed
American Kestrel	Falco sparverius	NY	Confirmed
Peregrine Falcon	Falco peregrinus	NY	Confirmed
Virginia Rail	Rallus limicola	FL	Confirmed
Sora	Porzana carolina	X1	Possible
Common Moorhen	Gallinula chloropus	FL	Confirmed
Killdeer	Charadrius vociferus	NE	Confirmed
Spotted Sandpiper	Actitis macularia	FL	Confirmed
Wilson's Snipe	Gallinago delicata	S2	Probable
American Woodcock	Scolopax minor	FL	Confirmed
Rock Pigeon	Columba livia	NY	Confirmed
Mourning Dove	Zenaida macroura	NY	Confirmed
Monk Parakeet	Myiopsitta monachus	ON	Confirmed
Black-billed Cuckoo	Coccyzus erythrophthalmus	S2	Probable
Yellow-billed Cuckoo	Coccyzus americanus	T2	Probable
Eastern Screech-Owl	Megascops asio	T2	Probable
Great Horned Owl	Bubo virginianus	NY	Confirmed
Barred Owl	Strix varia	X1	Possible
Whip-poor-will	Caprimulgus vociferus	X1	Possible
Chimney Swift	Chaetura pelagica	ON	Confirmed
Ruby-throated Hummingbird	Archilochus colubris	FL	Confirmed
Belted Kingfisher	Ceryle alcyon	FY	Confirmed
Red-bellied Woodpecker	Melanerpes carolinus	FY	Confirmed

C-6 Bird Species of the Normans Kill Corridor

Species

Breeding Code and Category

Yellow-bellied Sapsucker	Sphyrapicus varius	S2	Probable
Downy Woodpecker	Picoides pubescens	FY	Confirmed
Hairy Woodpecker	Picoides villosus	NY	Confirmed
Northern Flicker	Colaptes auratus	FY	Confirmed
Pileated Woodpecker	Dryocopus pileatus	NY	Confirmed
Eastern Wood-Pewee	Contopus virens	T2	Probable
Alder Flycatcher	Empidonax alnorum	S2	Probable
Willow Flycatcher	Empidonax traillii	FY	Confirmed
Least Flycatcher	Empidonax minimus	T2	Probable
Eastern Phoebe	Sayornis phoebe	NY	Confirmed
Great Crested Flycatcher	Myiarchus crinitus	FY	Confirmed
Eastern Kingbird	Tyrannus tyrannus	NY	Confirmed
Yellow-throated Vireo	Vireo flavifrons	T2	Probable
Blue-headed Vireo	Vireo solitarius	S2	Probable
Warbling Vireo	Vireo gilvus	FL	Confirmed
Red-eyed Vireo	Vireo olivaceus	NE	Confirmed
Blue Jay	Cyanocitta cristata	FY	Confirmed
American Crow	Corvus brachyrhynchos	NE	Confirmed
Fish Crow	Corvus ossifragus	X1	Possible
Common Raven	Corvus corax	X1	Possible
Purple Martin	Progne subis	X1	Possible
Tree Swallow	Tachycineta bicolor	NY	Confirmed
Northern Rough-winged Swallow	Stelgidopteryx serripennis	ON	Confirmed
Bank Swallow	Riparia riparia	ON	Confirmed
Barn Swallow	Hirundo rustica	NY	Confirmed
Black-capped Chickadee	Poecile atricapillus	FY	Confirmed
Tufted Titmouse	Baeolophus bicolor	NY	Confirmed
Red-breasted Nuthatch	Sitta canadensis	D2	Probable
White-breasted Nuthatch	Sitta carolinensis	NY	Confirmed
Brown Creeper	Certhia americana	P2	Probable
Carolina Wren	Thryothorus ludovicianus	NY	Confirmed
House Wren	Troglodytes aedon	NY	Confirmed
Winter Wren	Troglodytes troglodytes	X1	Possible
Marsh Wren	Cistothorus palustris	T2	Probable
Blue-gray Gnatcatcher	Poliophtila caerulea	FY	Confirmed
Eastern Bluebird	Sialia sialis	NY	Confirmed
Veery	Catharus fuscescens	NE	Confirmed
Hermit Thrush	Catharus guttatus	S2	Probable
Wood Thrush	Hylocichla mustelina	NY	Confirmed
American Robin	Turdus migratorius	NY	Confirmed
Gray Catbird	Dumetella carolinensis	FY	Confirmed
Northern Mockingbird	Mimus polyglottos	NY	Confirmed
Brown Thrasher	Toxostoma rufum	FL	Confirmed
European Starling	Sturnus vulgaris	NY	Confirmed
Cedar Waxwing	Bombycilla cedrorum	FY	Confirmed
Blue-winged Warbler	Vermivora pinus	FL	Confirmed
Nashville Warbler	Vermivora ruficapilla	X1	Possible
Yellow Warbler	Dendroica petechia	NE	Confirmed
Chestnut-sided Warbler	Dendroica pensylvanica	FY	Confirmed
Black-throated Blue Warbler	Dendroica caerulescens	DD	Confirmed

C-6 Bird Species of the Normans Kill Corridor

Species

Black-throated Green Warbler
Pine Warbler
Prairie Warbler
Black-and-white Warbler
American Redstart
Ovenbird
Louisiana Waterthrush
Common Yellowthroat
Hooded Warbler
Scarlet Tanager
Eastern Towhee
Chipping Sparrow
Field Sparrow
Savannah Sparrow
Grasshopper Sparrow
Song Sparrow
Swamp Sparrow
White-throated Sparrow
Dark-eyed Junco
Northern Cardinal
Rose-breasted Grosbeak
Indigo Bunting
Bobolink
Red-winged Blackbird
Eastern Meadowlark
Common Grackle
Brown-headed Cowbird
Orchard Oriole
Baltimore Oriole
Purple Finch
House Finch
Red Crossbill
Pine Siskin
American Goldfinch
House Sparrow

Dendroica virens
Dendroica pinus
Dendroica discolor
Mniotilta varia
Setophaga ruticilla
Seiurus aurocapilla
Seiurus motacilla
Geothlypis trichas
Wilsonia citrina
Piranga olivacea
Pipilo erythrophthalmus
Spizella passerina
Spizella pusilla
Passerculus sandwichensis
Ammodramus savannarum
Melospiza melodia
Melospiza georgiana
Zonotrichia albicollis
Junco hyemalis
Cardinalis cardinalis
Pheucticus ludovicianus
Passerina cyanea
Dolichonyx oryzivorus
Agelaius phoeniceus
Sturnella magna
Quiscalus quiscula
Molothrus ater
Icterus spurius
Icterus galbula
Carpodacus purpureus
Carpodacus mexicanus
Loxia curvirostra
Carduelis pinus
Carduelis tristis
Passer domesticus

Breeding Code and Category

X1 Possible
P2 Probable
FY Confirmed
T2 Probable
B2 Probable
FL Confirmed
X1 Possible
FY Confirmed
S2 Probable
FY Confirmed
FL Confirmed
NE Confirmed
FY Confirmed
FL Confirmed
X1 Possible
NE Confirmed
FY Confirmed
X1 Possible
S2 Probable
NY Confirmed
FY Confirmed
FY Confirmed
FY Confirmed
FY Confirmed
NE Confirmed
NE Confirmed
X1 Possible
NY Confirmed
D2 Probable
NY Confirmed
X1 Possible
S2 Probable
FY Confirmed
NY Confirmed

C-7 New York Natural Heritage Program

NEW YORK NATURAL HERITAGE PROGRAM Report on Rare Plants and Rare Animals

Within 1 mile of the NORMANS KILL in Albany County

The locations provided in this report are general enough that this report may be included in documents intended for public distribution. However, please be aware that information that discloses the precise locations of rare plants or animals may lead to the collection or disturbance of those plants or animals. Therefore, precise locations and directions to precise locations should not be included in any reports or maps made available to the public. This report The New York Natural Heritage Program can offer guidance on presenting rare species location information in such a way as to minimize the risks to the plants and animals.

Prepared November, 2006, from the Biodiversity Databases of the New York Natural Heritage Program, NYS DEC, 625 Broadway, Albany, NY, 12233-4757.

	COMMON NAME	SCIENTIFIC NAME	NY STATE LISTING	NY STATE RANK*
Last Documented within the last 25 years				
<u>Hudson River</u>				
Fish	Shortnose Sturgeon	<i>Acipenser brevirostrum</i>	Endangered	S1
Mussel	Alewife Floater	<i>Anodonta implicata</i>		S1S2
<u>Glenmont</u>				
Plants	Side-oats Grama	<i>Bouteloua curtipendula</i> var. <i>curtipendula</i>	Endangered	S1
	Violet Wood-sorrel	<i>Oxalis violacea</i>	Threatened	S2S3
<u>Watervliet Reservoir</u>				
Bird	Bald Eagle	<i>Haliaeetus</i> <i>leucocephalus</i>	Threatened	S2S3

Last Documented before 1980; exact locations often unknown.

<u>Normans Kill Below Rt 9W</u>				
Mussels	Eastern Pondmussel	<i>Ligumia nasuta</i>		S2S3
	Tidewater Mucket	<i>Leptodea ochracea</i>		S1
	Yellow Lampmussel	<i>Lampsilis cariosa</i>		S3
Plant	Nodding Pogonia	<i>Triphora trianthophora</i>	Endangered	S2
<u>Hudson River</u>				
Mussel	Yellow Lampmussel	<i>Lampsilis cariosa</i>		S3

C-7 New York Natural Heritage Program

	COMMON NAME	SCIENTIFIC NAME	NY STATE LISTING	NY STATE RANK*
<u>Kenwood</u>				
	Dragonfly Cobra Clubtail	<i>Gomphus vastus</i>		SH
<u>Albany Port</u>				
Plants	Delmarva Beggar-ticks	<i>Bidens bidentoides</i>	Rare	S3
	Hop Sedge	<i>Cyperus lupulinus</i> ssp. <i>lupulinus</i>	Threatened	S2S3
	Mock-pennyroyal	<i>Hedeoma hispida</i>	Threatened	S2S3
	Small's Knotweed	<i>Polygonum buxiforme</i>	Endangered	S1
	Troublesome Sedge	<i>Carex molesta</i>	Threatened	S2S3
<u>Glenmont</u>				
Plants	Green Rock-cress	<i>Boechera missouriensis</i>	Threatened	S2
	Large Twayblade	<i>Liparis liliifolia</i>	Endangered	S1
	Northern Bog Violet	<i>Viola nephrophylla</i>	Endangered	S1
	Swamp Lousewort	<i>Pedicularis lanceolata</i>	Threatened	S2
	Troublesome Sedge	<i>Carex molesta</i>	Threatened	S2S3
	Woodland Agrimony	<i>Agrimonia rostellata</i>	Threatened	S2
<u>Guilderland</u>				
Buttefly	Karner Blue	<i>Lycaeides melissa samuelis</i>	Endangered	S1
Plant	Woodland Agrimony	<i>Agrimonia rostellata</i>	Threatened	S2
<u>Voorheesville</u>				
Plant	Carey's Smartweed	<i>Persicaria careyi</i>	Threatened	S1S2

* Rarity in NYS as ranked by NY Natural Heritage Program on a 1 to 5 scale:

S1 = Critically imperiled;

S2 = Imperiled;

S3 = Rare or uncommon;

S4 = Abundant and apparently secure;

S5 = Demonstrably abundant and secure;

SH = Historical records only; no recent information available.

