

Open Space Inventory and Analysis

Shawangunk, New York

Conway School
of
Landscape Design

Conway, Massachusetts

Angela Sisson
Crystal Hitchings
Joshua Clague

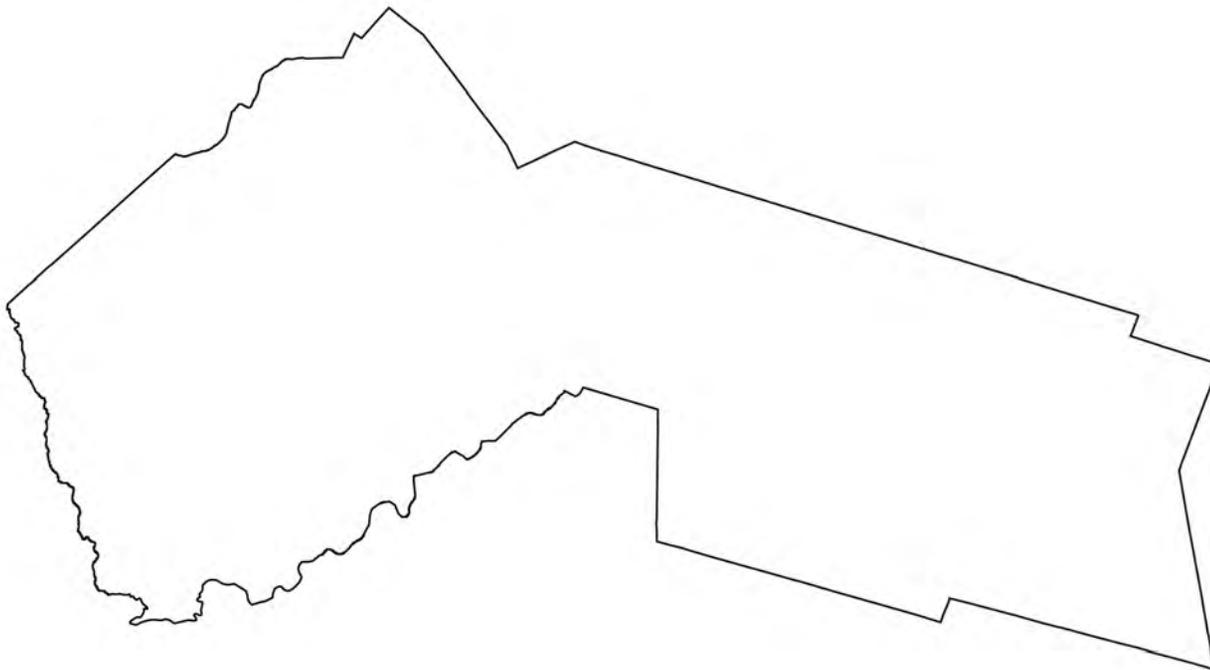
March 2004

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Abstract

The town of Shawangunk, New York, is experiencing rapid, scattered, residential growth as well as demographic changes that could alter its rural, agricultural character. On a daily basis the quality of life in Shawangunk depends on the natural areas and open agricultural fields that offer recreational opportunities, scenic views, and a peaceful, rural existence. Just as important to daily life are clean and abundant water and the presence of wildlife. Residents of Shawangunk want to protect the town's heritage and quality of life, and recognize the need for wise growth through active town planning and the preservation of Shawangunk's open spaces and natural resources. Shawangunk's Comprehensive Plan, completed in 2003, suggests that an inventory of the town's open space be compiled.

Based on this recommendation, the town engaged graduate students from the Conway School of Landscape Design to develop an inventory and analysis of Shawangunk's open spaces. Using comprehensive planning surveys and information from the Open Space Committee, six open space categories were determined to be vital to the town's future. These categories are agricultural land, scenic views, historical sites, recreation land, water quality protection zones, and wildlife habitat. These six categories, and subcategories within them, are inventoried and analyzed in this report, with recommendations given for protection methods within each category. A composite layer of each open space category is included in this document. These composites can be overlain with each other in various combinations to further explore open space in Shawangunk. This technique for processing information serves as an updateable, interactive planning tool for open space protection efforts and for guiding careful development practices that consciously preserve the town's most valuable natural and cultural open space resources.

This document was compiled from January, 2004 to March, 2004.

Acknowledgements

We would like to express special thanks to the members of the Shawangunk Open Space Committee, Anne Bienstock, Andrew Dolton, Curt Schoeberl, Judith Powell, Liana Hooded, and Kris Pedersen, and many thanks to Town Supervisor, John Valk, Jr.

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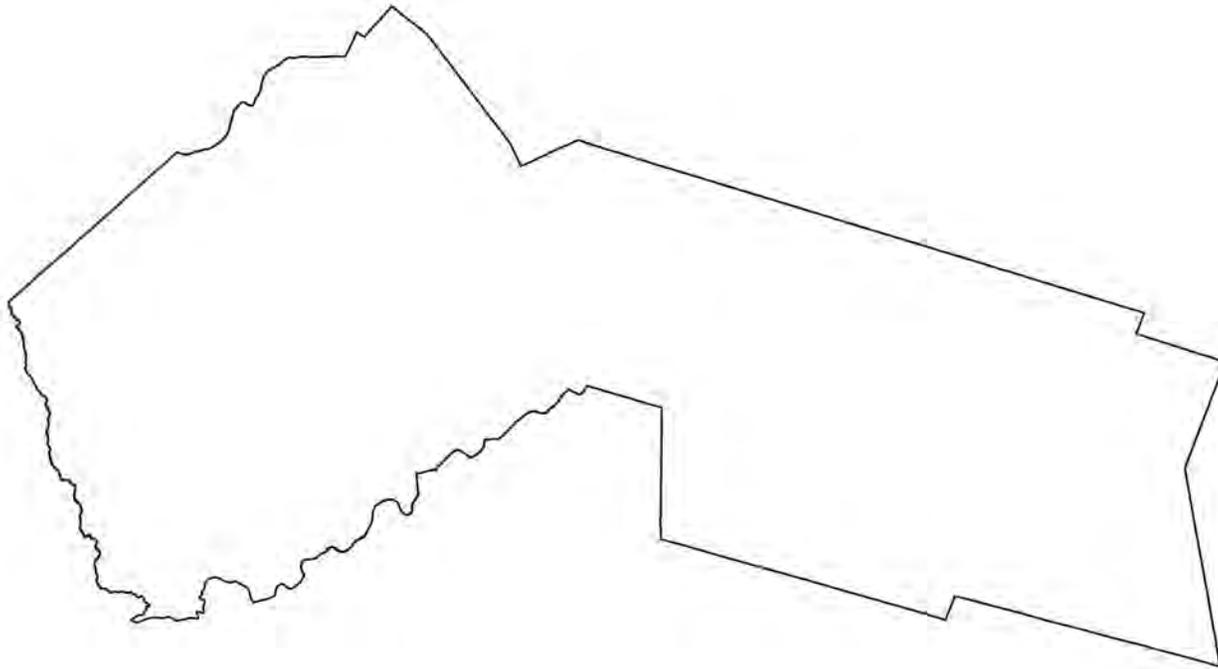
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Section 1: Introduction



Section 1: Introduction

A. Statement of Purpose

This Open Space Inventory and Analysis for the Town of Shawangunk, New York, is an outgrowth of the town's Comprehensive Plan completed in July, 2003. The Comprehensive Plan recommends that the town should "create an open space inventory and plan to encourage efforts to preserve large areas of open space." (Fairweather Consulting, page 19)

The Comprehensive Plan indicates that agriculture has traditionally been Shawangunk's largest provider of open space and stresses that the town is committed to being farm friendly. Therefore, agricultural land in the town is an area of special concern, a concern aggravated by the fact that farms continue to vanish from the region.

The Town of Shawangunk is seventy-five miles north of New York City. This proximity has led to increased development pressures. One of the first types of land to be developed is farmland, rolling, treeless land which is a major component of Shawangunk's open space. Since 1950, New York has witnessed a 48% decline in total farmland acreage. For a town like Shawangunk, whose identity and heritage is based largely on agriculture, this is a significant figure.

In addition to agricultural land, many natural areas occur within Shawangunk and connect the town to adjacent municipalities. These natural areas, including the Shawangunk Ridge, the Wallkill River, Shawangunk Kill, and the Shawangunk Grasslands National Wildlife Refuge, are an integral part of quality of life in Shawangunk and the larger region. These important areas are protected in whole, in part, or not at all.

Open space lands add to the daily quality of life in Shawangunk, and give the town its identity. Proactive planning is needed now to ensure the preservation of open space lands for the future.

B. Project Scope

A team of graduate students from the Conway School of Landscape Design (CSLD), Angela Sisson, Crystal Hitchings, and Joshua Clague, conducted the Open Space Inventory and Analysis study. The Town of Shawangunk's Open Space Committee members, Andrew Dolton, Anne Bienstock, Curt Schoeberl, Judith Powell, Kris Pedersen, and Liana Hooded, along with Town Supervisor, John Valk, Jr., provided guidance, information, and materials.

Under Section 247 of the General Municipal Law of New York State, "open space" is defined as "land characterized by natural scenic beauty, lands whose condition enhances surrounding developable lands, lands containing valuable natural resources, and lands used for agricultural production." Using that definition and the results of the comprehensive planning surveys, specific open space categories were established as important to the town of Shawangunk and its residents: agriculture; scenic roads; historical sites; recreation; water quality; and wildlife habitat.

Within these identified categories, open space includes public or private property, whether protected or unprotected. An inventory of these important open space lands will provide the town with a tool for evaluating the need to purchase or otherwise protect available land for public open space use, as well as giving the town a tool for working with developers to develop properties in a manner that least disturbs important open space resources.

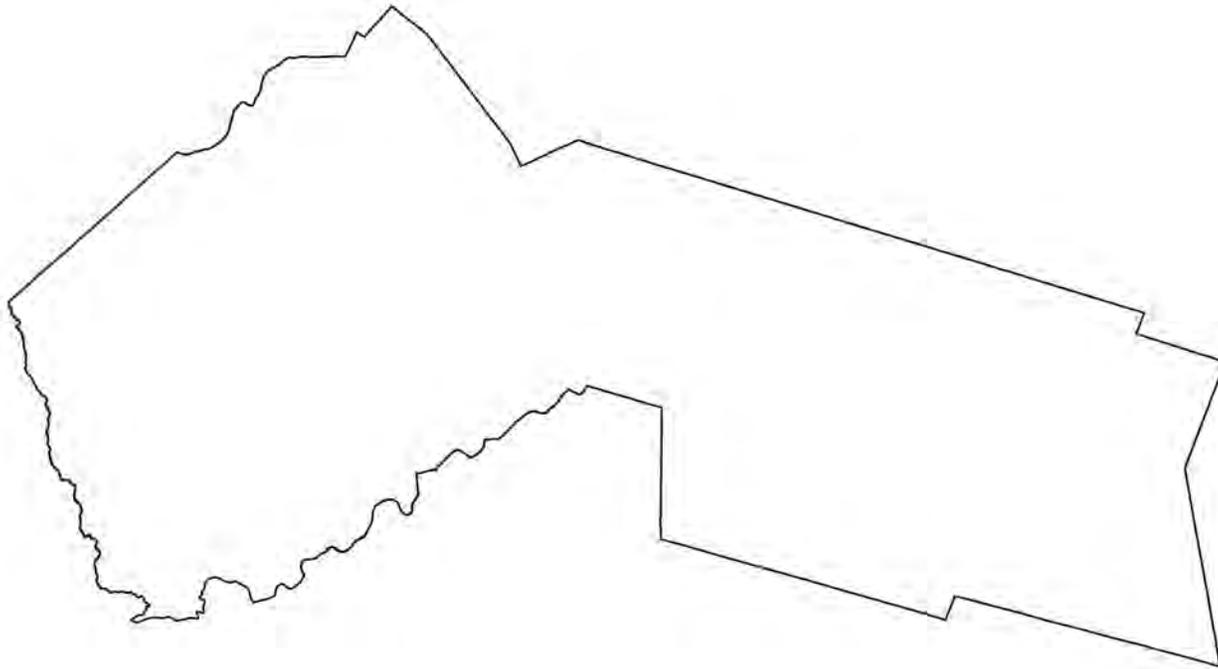
This Open Space Inventory and Analysis report begins with a regional and historical description of the town, including population character and development trends. Next, an in-depth analysis is given for each of the six open space categories. Each analysis describes the overall importance of the particular resource and includes recommendations for open space protection. Following the analyses is a summary of recommendations that includes methods which the town might use in the creation of open space protection plans. Finally, the report includes examples of ways in which the town might turn the information gathered within the report into an interactive, updateable planning tool. A bibliography of resources and an in-depth appendix completes the report.

C. Planning Process and Public Participation

The town's Comprehensive Plan provided initial information regarding citizen input with respect to open space issues. Survey results from the comprehensive plan indicated that open space issues were foremost on residents' minds. Specifically, the most important categories for preservation were the Shawangunk Ridge, river corridors, aquifer resources, agriculture and farmland, rural character, and open space in general.

On March 1, 2004, a public forum was held to present the preliminary findings of the Open Space Inventory and Analysis. Responses elicited from a number of residents included suggestions and questions about scenic roads, historical sites, water quality protection zones, and wildlife habitat mapping. The community's suggestions and questions were incorporated in the final draft of the report. This draft was submitted to the Open Space Committee in March 2004.

Section 2: Community Setting



Section 2: Community Setting

A. Regional Context

Summary

The town of Shawangunk is closely connected to the surrounding region by roadways and rivers.

The Town of Shawangunk is a relatively rural town in an increasingly urban landscape. Just over 12,000 people are spread throughout the town's 36,000 acres. The center of development is within the hamlet of Wallkill.

Shawangunk is located in the mid-Hudson Valley, in lower Ulster County approximately seventy-five miles north of New York City. The Hudson River borders Ulster County along its eastern boundary. The southwest corner of the town lies at the intersection of Ulster, Orange, and Sullivan Counties, with Orange County to the south and Sullivan County to the west.

Several state routes connect the town with surrounding communities, including the Village of New Paltz, a lively college town, and the cities of Poughkeepsie and Newburgh. New York City is just an hour-and-a-half drive south by the New York State Thruway.

Two rivers, the Shawangunk Kill and the Wallkill River, dissect the town of Shawangunk. The Wallkill River originates in northern New Jersey and flows northeast for about sixty-five miles before it joins Rondout Creek, a direct tributary to the Hudson River. The Shawangunk Kill originates in the town of Greenville. It runs northeast for about thirty-five miles, through Shawangunk and into Gardiner, before joining the Wallkill River. The Shawangunk Kill is a state designated Recreational River, and both rivers attract recreational boaters and fishermen.

Shawangunk is nestled in the Wallkill River Valley at the foot of the Shawangunk Ridge, the region's most dramatic landform, which attracts hikers, campers, and biologists.

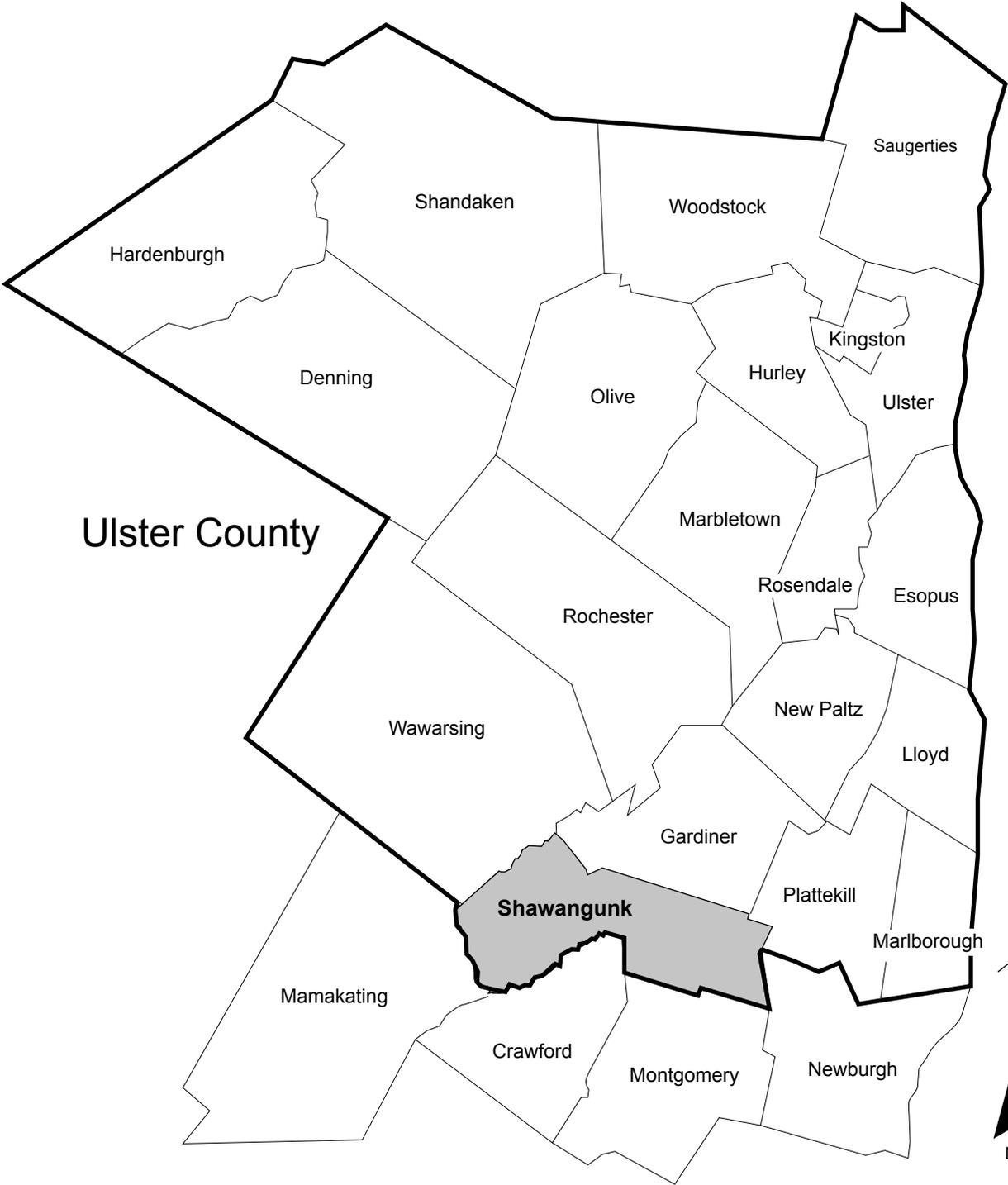
Conclusion

Shawangunk is easily accessible by car to many bustling towns, and even New York City is a short trip away.

Shawangunk's proximity to natural features attracts many people.

Location

Summary: The town of Shawangunk, New York is in southern Ulster County, and about 75 miles from New York City.



Not to Scale

Open Space Inventory and Analysis Town of Shawangunk, New York
Conway School of Landscape Design Angela Sisson, Crystal Hitchings, & Joshua Clague
March 2004
Location

B. Shared Resources

Summary

Several large state parks and preserves and the Catskill Mountains are close to Shawangunk. The proximity and accessibility of these areas creates a large seasonal influx of people to the town.

1. The Shawangunk Ridge

The Shawangunk Mountain range is a 350-mile-long ridge extending from Rosendale, New York south into New Jersey and Pennsylvania where it is respectively known as the Kittatinny and Blue Mountains. The northern section of the Shawangunk Mountain range is known as the Shawangunk Ridge. The western boundary of the Town of Shawangunk runs along the top of a portion of this ridge.

The Shawangunk Mountains contain natural communities that are unique on a local, regional, and global scale. These unique natural communities include a globally rare dwarf pine community, over 7,000 acres of pitch pine-oak-heath rocky summit community, the largest chestnut-oak forest community in New York (30,000 acres), extensive northern hardwood forest communities, and cliff, talus and ice cave communities. These unique natural communities support at least twenty-five rare plant and animal species. The New York State Open Space Conservation Plan (p. 36-37) states that “these elements of biodiversity make the Shawangunks one of the highest priority areas for biodiversity conservation in the northeastern United States.”

The Shawangunk Mountains have extremely high watershed protection value. The Northern Shawangunks in Ulster County are critical contributors of high quality water to the Rondout and Wallkill Valleys. The unfragmented forest and barrens and the fractured bedrock aquifer of the Shawangunks assure high quality ground and surface water flow. The Shawangunk Mountains annually attract 500,000 visitors to the more than a hundred miles of trails and ninety miles of carriage roads for hiking, mountain biking, rock climbing, horseback riding, and nature study, making them critical to the area’s tourism industry. Public and private entities have protected 25,000 open-space acres in the Northern Shawangunks, including Minnewaska State Park Preserve, Sam’s Point Preserve, and the Mohonk Preserve. The Shawangunk Ridge Biodiversity Partnership provides a forum for sharing scientific and land management information for further Shawangunk Mountain conservation efforts.

The following four open-space and recreational preserves are within the Shawangunk Mountains and are conveniently accessible to the town of Shawangunk.

2. Minnewaska State Park Preserve

Minnewaska State Park Preserve spreads over 13,000 acres of forested lands, cliffs and lakes in the towns of Rochester, Wawarsing, and Gardiner in Ulster County. The park's main entrance is located just northwest of Shawangunk, about ten miles from town. The park contains three lakes: Lake Minnewaska, Lake Awosting, and Lake Haseco. Since the late 1800s, use of the property has evolved from a substantial resort in a semi-wilderness setting to its present status as a limited day-use facility. Remnants of the nineteenth and twentieth century carriageways and trails constitute a network of historical as well as scenic paths that wind for miles through these forested mountains. As ascertained in the Minnewaska State Park Master Plan, the high quality of the lakes, the steep, stark shoreline cliffs, and the natural ridge lines form one of the most scenic and biologically unique resources in New York State.

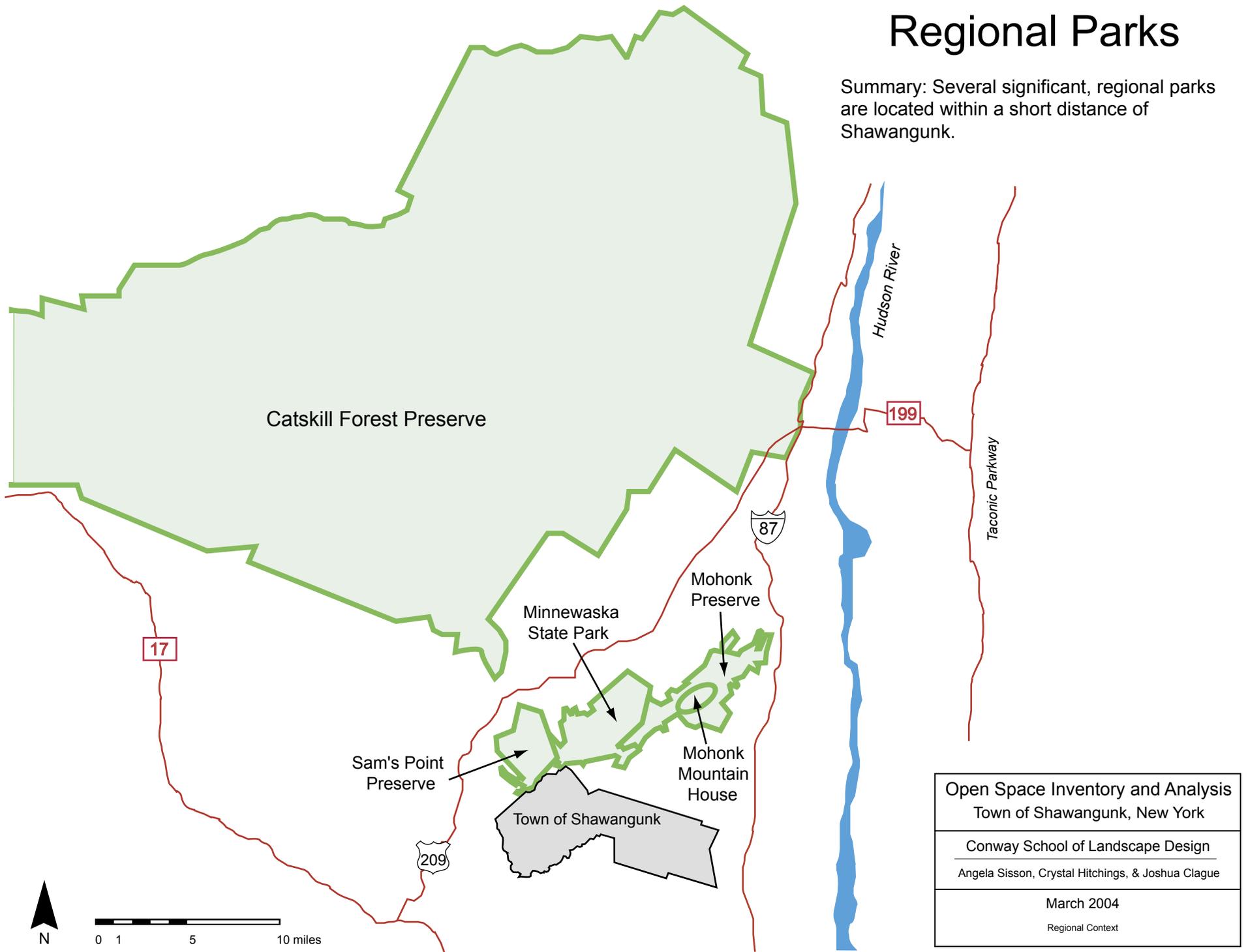
Long recognized as one of the most scenic parks in the country, Minnewaska has also been recognized locally as the best park in the Hudson Valley and as having the best hiking trails, day use area, and mountain bike system. The park receives over 250,000 visitors per year and the use level is growing, increasing the need for more land acquisitions, which are expected to be made over the next five years. The park is a recreational asset to the residents of Shawangunk and an economic asset to the town's tourism. Recreational activities include hiking, mountain biking, skiing, and bird watching (the park is a raptor migration corridor).

3. Sam's Point Preserve

Sam's Point Preserve, a National Natural Landmark, is managed by the Nature Conservancy and owned by Open Space Institute. The preserve entrance is reached through the hamlet of Cragmoor, off Route 52 between Pine Bush and Ellenville, about seven miles from Shawangunk. Sam's Point Preserve encompasses 4,600 acres and boasts one of the few ridgetop dwarf pine barrens remaining in the world, making the preserve a unique educational asset and creating an opportunity to protect this endangered ecosystem. Factors contributing to the existence of a ridgetop pine barrens on the Shawangunk Ridge include limited water during the growing season, exposure to direct sun and wind, shallow, highly erodible soils, and the regular occurrence of fires. These processes, and perhaps other unknown factors, have worked over time to shape the plant and animal communities that thrive in the dwarf pine barrens of Sam's Point Preserve.

Regional Parks

Summary: Several significant, regional parks are located within a short distance of Shawangunk.



Open Space Inventory and Analysis Town of Shawangunk, New York
Conway School of Landscape Design Angela Sisson, Crystal Hitchings, & Joshua Clague
March 2004 Regional Context

Sam's Point Preserve receives 20,000 visitors per year. Recreational activities in the preserve include hiking and nature study. Several hiking trails lead to popular destinations such as Sam's Point, Verkeerder Kill Falls (in the Town of Shawangunk), and the Ice Caves. The Ice Caves trap snow in the winter and hold ice throughout the summer months. A year-round visitor center is scheduled to open in the fall of 2004.

4. Mohonk Preserve

Managing 6,500 acres and hosting 150,000 visitors annually, Mohonk Preserve is the largest member- and visitor- supported nature preserve in New York State. The preserve entrance and visitor center is about eight miles from Shawangunk on Route 44-55. The first land trust established to protect the Shawangunk Ridge, Mohonk Preserve is also one of the oldest land conservation organizations in the Hudson Valley region. Through research, education, and land management, the preserve carries out its mission to safeguard this land and to promote a wider understanding of the environment and its role in daily life.

Mohonk Preserve protects lands containing special natural features of the Shawangunks, such as its deep ravines, sparkling streams, and bird migration routes, and cultural elements such as the vestiges of the once-thriving Trapps Mountain hamlet. Mohonk Preserve recreational opportunities include hiking, rock climbing, skiing, and nature study.

5. Mohonk Mountain House

The Mohonk Mountain House lands encompass 2,200 acres located within the Mohonk Preserve's 6,500 acres. The Mohonk Mountain House entrance is located about thirteen miles from Shawangunk. The Mountain House, a resort hotel built in the nineteenth century, is a National Historic Landmark and a regional anchor for heritage and eco-tourism. (Smiley family stewardship dates back to 1869.) The Mohonk Mountain House offers scenic mountain trails just outside the door and sixty miles of old carriage trails, making the Mohonk Mountain House a regular haven for New York City guests. Recreational opportunities at the Mohonk Mountain House include hiking, skiing, and nature study.

6. The Catskill Mountains

In addition to the listed Shawangunk Ridge lands, Shawangunk residents are within an hour's drive of the Catskill Park in the Catskill Mountains to the north. The Park is accessible from many points and from various routes including the New York State Thruway (I-87) and New York Route 17.

Over 60% of Catskill Park is privately owned. The rest is the publicly-owned Catskill Forest Preserve, state land that serves as watershed, recreation area, and ecological and scenic reserve. Recreational opportunities in the Catskill Park include hiking, camping, hunting, fishing, skiing, snowshoeing, and nature study.

Conclusion

Shawangunk serves as a gateway community to several natural areas. The proximity of the town to these natural areas makes Shawangunk a recipient of high seasonal tourism and some vacation home development.

C. Protected Parcels

Summary

Numerous properties in Shawangunk are protected to varying degrees against subdivision and change in land use. These protected properties offer open space value that benefits all residents of Shawangunk.

Protection ranges from legally defined conservation easements to institutional lands unlikely to be sold. Protection can be broken down into two levels: permanent and temporary protection.

Parcels with permanent protection can be broken down again into two sub-categories: conservation easements and town parks. Included in the conservation easement sub-category are nine parcels totaling approximately 1500 acres and a 125-acre parcel on Oregon Trail protected under the Forever Wild clause of the New York State constitution. The town parks sub-category includes two town-owned parks: Verkeerder Kill Park, an 83-acre parcel on route 52, and a 55-acre parcel on Long Lane that is part of the former Galeville airport.

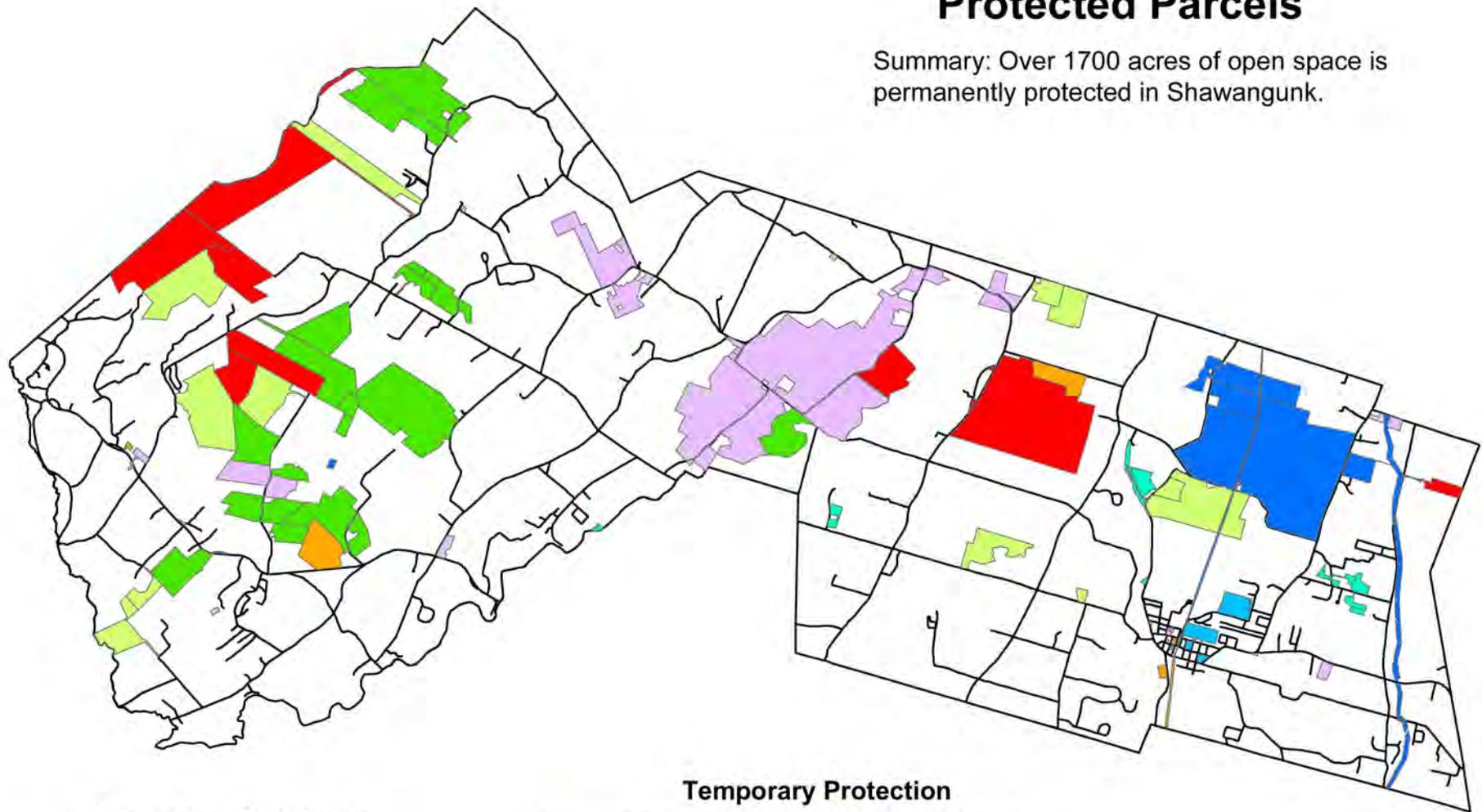
The temporary protection category can be broken into six sub-categories: New York City and New York State property; churches and cemeteries, schools; parcels with the 480-a forestry exemption; rod and gun clubs; and town properties. No legal restrictions prevent a change in land use on these parcels but, because of the nature of current ownership and land-use, these parcels are unlikely to be subdivided or to undergo a change in ownership.

Conclusion

Approximately 1763 acres of open space—5% of the town—is permanently protected in Shawangunk. The long-term status of protection for other important open space properties is not certain.

Protected Parcels

Summary: Over 1700 acres of open space is permanently protected in Shawangunk.



Permanent Protection

- Town Parks
- Conservation Easement & Forever Wild

Temporary Protection

- Churches & Cemeteries
- NYS & NYC Property
- Public Schools
- Rod & Gun Clubs
- Forest Exemption (480-a)
- Town Properties



0 0.5 1 2 3 4 Miles

Open Space Inventory and Analysis
Town of Shawangunk, New York

Conway School of Landscape Design

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March 2004

GIS Data Source: Ulster County Planning Department

D. History of the Community

Summary

Shawangunk has a long history of agriculture and industry, especially along its two main rivers. Many historical place-names, structures, and communities remain to tell the story.

Native Americans inhabited the Wallkill River valley for hundreds of years before Henry Hudson made his voyage up the river in 1609. Using slash and burn methods, the early Native Americans had grown corn, beans, and squash. Green forests surrounded fields of maize (corn) along the river banks. Native Americans of the Esopus and Lenape tribes still lived in small villages in the mid-1700s.

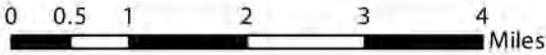
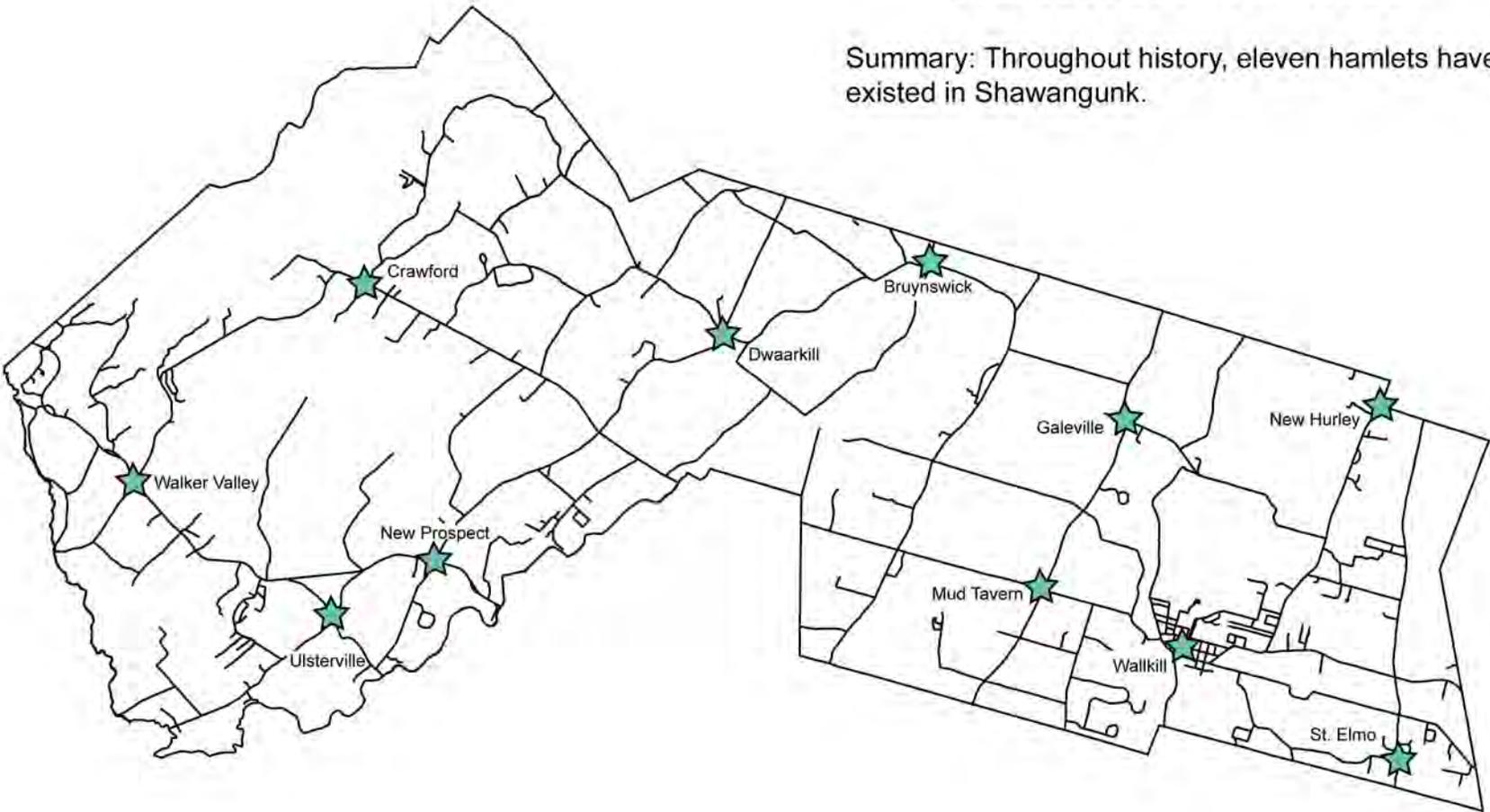
Probably the first white people to set foot in what is now the Town of Shawangunk were twenty-three women and children captives taken when the Native Americans raided Hurley and Kingston in June 1663. The captives were rescued by Captain Kreigier and fifty-five of his men. They attacked the Esopus Native Americans at “New Fort,” four miles west of the hamlet of Wallkill on the east bank of the Shawangunk Kill. Twenty years passed before the first permanent settler, the widow Gertrude Bruyn, purchased property in 1682 (all of the land named “Sawankonck”) from five Esopus Native Americans. Her home stood on land now in the Town of Gardiner. The 1600-foot cliff of the Shawangunk Ridge overlooking this land is called “Gertrude’s Nose.”

Europeans first settled along the Shawangunk Kill between 1680 and 1700, and along the Wallkill River between 1710 and 1730. Settlement mostly occurred along rivers for access to water for personal use, power, and ease of travel. Communities organized along the Shawangunk Kill and Wallkill River were only a few miles apart. Settlements typically started with a grist mill to grind grain. Eventually a blacksmith shop, and maybe a tavern, a hotel, and, by the 1800s, perhaps a sawmill would be added. These communities declined during the twentieth century as their commercial establishments closed, leaving behind a church and a cluster of houses. These historical hamlets are still occupied, but, because of the existence of a railroad, the hamlet of Wallkill emerged as Shawangunk’s primary population center. Many descendants of the early Dutch, Norwegian, English, Scottish, Swedish, and German settlers still live in the area.

Initially, rough trails were the only roads in town. Bruyn Turnpike and Albany Post Road were begun as early as 1700 to facilitate travel between settlements and to the Hudson River. Increased travel on roads brought people to inns and taverns in Wallkill on their way to New York, Albany, and Newburgh. Getting goods to market required access to the Hudson River, which was considered the roadway of New York. By the mid-1800s farms had evolved beyond self-sufficiency with many products to sell, including wheat, potash, maple sugar, lumber, whiskey, and wool.

Historical Hamlets

Summary: Throughout history, eleven hamlets have existed in Shawangunk.



Historical Hamlets



State, County and Town Roads

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March 2004
GIS Data Source: Ulster County Planning Department

In 1868 the railroad came and changed Wallkill from a town of inns and mills into a community of families. Wallkill was the first area of the town to have rail service. John Borden settled in Wallkill and established the Borden Estate which eventually comprised two thousand acres. His father Gail Borden invented the condensed milk process and Wallkill became the center of the condensed milk business for fifty years. Over the years the Borden family had made significant contributions to the town including establishing the library; introducing electricity to the town; gifting the property for the school and funding the school construction; and gifting the property for the library, town hall, and fire department.

Another significant historical business began near Galeville in 1872 with the J.B. Crowell and Son Brick Mould. A history of the town written in 1955 celebrates the special character of the factory at that time: “The brick mould is the only one in these parts and is unique due to the fact that one family has become skilled along with the employees, in the making of so many various types of moulds. Some of the men working in the plant have been there for many years and others followed their fathers into the occupation” (Hasbrouch p. 22). The history asserts that the factory “is not only interesting in itself as a historical landmark but also for the part it plays in the business world today... This concern is one which has served the public for generations” (p. 22). According to a statement made by James Crowell II in 1988, the factory produced more brick moulds than any other plant in the U.S.A. The brick mould continues to operate today (Mauritz; 1988).

Conclusion

A large part of Shawangunk’s character today comes from the visibility of its historical heritage. An inventory of important historical sites will help town planners preserve those areas most integral to the town’s identity and will also help planners to incorporate historical sites into modern development plans.

E. Population Characteristics

Summary

Shawangunk's rural character, intact natural features, and proximity to New York City make it one of the fastest growing towns in Ulster County. This rapid-growth trend is rapidly changing the town's demographics and is likely to alter its rural, agricultural character.

According to the 2000 census, the population of Shawangunk is 14,524, including the Jehova's Witness Watchtower Farm, Wallkill Correctional Facility, and Shawangunk Correctional Facility populations (group quarters). The population of the town is up 19.4 percent from 1990. Shawangunk is the fifth most populous and third fastest growing town in Ulster County. Shawangunk encompasses over fifty-seven square miles (36,480 acres), and its residents are dispersed in such a manner that the town remains quite rural.

Development pressure resulting in recent population growth has caused a change in the town's demographics. The comprehensive plan suggests that residents are more affluent and more educated and often seek jobs outside of town in the fields of management, professional, craft, and specialty occupations. Newer residents move to Shawangunk seeking the quality of life found here, but either keep or find work elsewhere. Lower proportions of the working population are involved in local administrative support positions, manufacturing, and agriculture. In fact, many of the active agricultural parcels in Shawangunk are worked by residents of other towns.

Conclusion

Agriculture as a business and a way of life is disappearing from Shawangunk, replaced by scattered residential development and white-collar workers. Continuation of these trends could result in Shawangunk becoming a bedroom community. Planning for preservation, promoting agriculture, and creating a stronger internal community business center could help Shawangunk become a thriving, more self-supporting town.

F. Growth and Development Patterns

Summary

Shawangunk is divided into two geographical regions because of natural features and road patterns. Currently, town infrastructure easily supports the needs of its population, but further growth may require other resources.

1. Patterns and Trends

Over the years the Town of Shawangunk has evolved into two areas, geographically divided by the Shawangunk Kill running through the center of town. Residents in the western half of town inhabit the slopes and foothills of the Shawangunk Ridge, use the Pine Bush School System, and associate more with the hamlet of Pine Bush. Residents in the eastern half of Shawangunk inhabit the Wallkill River Valley, use the Wallkill School System, and associate more with the Village of New Paltz to the north. Current trends show more weekend and vacation homes being built, and show that year-round residents more often commute to work, shopping, and school outside of town.

Historically, development has concentrated in the hamlet of Wallkill and along state, county and town roads. In recent years, however, these areas show no more development than other areas. In addition, over the last thirty to forty years previously undeveloped property, such as property in the Shawangunk Ridge accessible from Route 52, has been subdivided and developed.

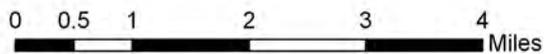
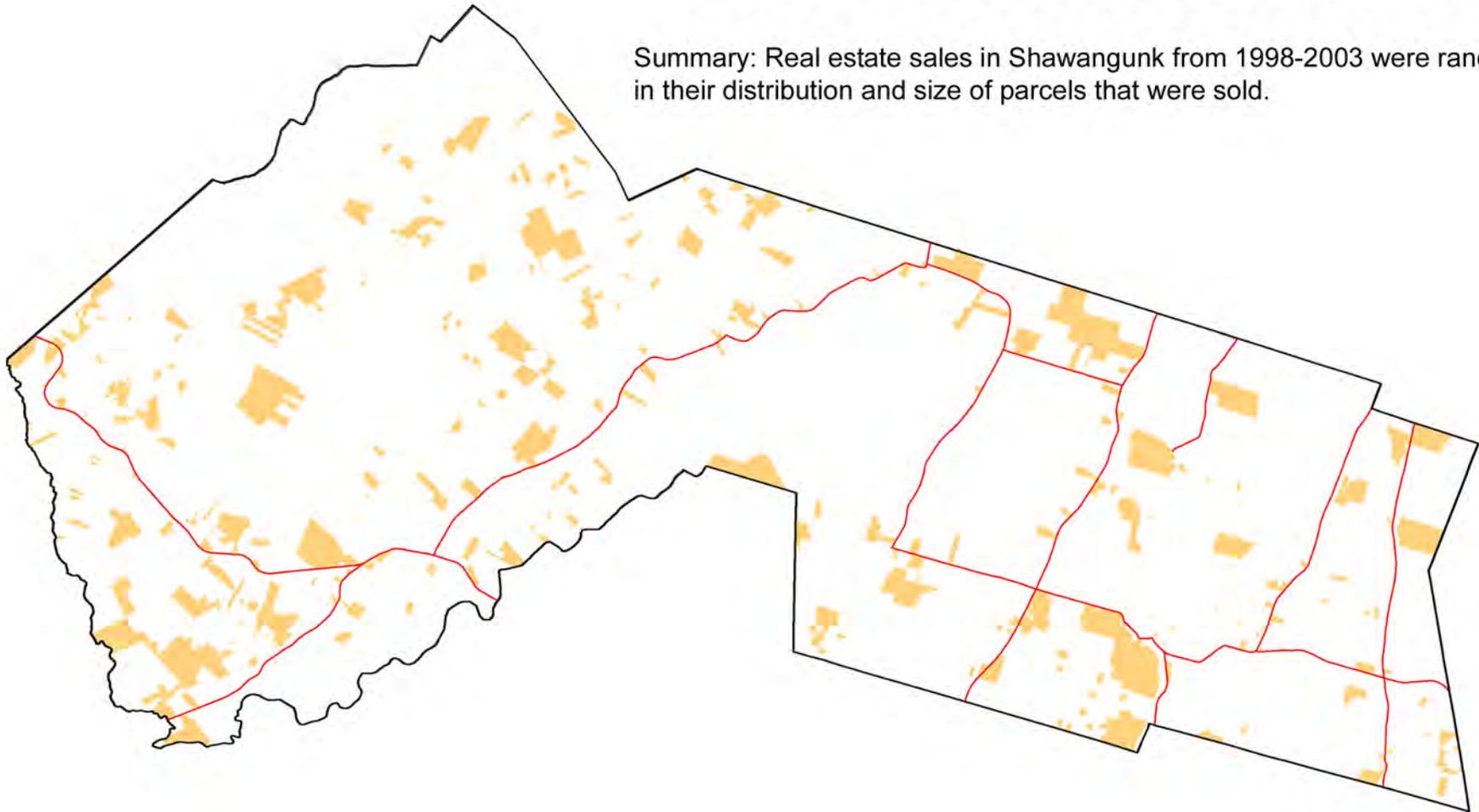
A map of real estate sales in Shawangunk from 1998 through 2003 reveals no distinguishable pattern in regards to the size or location of the parcels that were sold. These findings are consistent with the notion that it is the quality of life throughout Shawangunk that draws in new residents, rather than specific locations within the town.

2. Transportation System

Shawangunk has 132 miles of road. Three state highways provide access to and from the town. Route 52 extends across the western portion of the town from the Town of Wawarsing south to Pine Bush in Orange County. Route 208 runs from the Town of Gardiner south through the hamlet of Wallkill and into Orange County. Route 300 begins at Route 208 in the hamlet of Wallkill and runs southeast into Orange County. In addition to the state highways, there are 90 miles of town road and 32 miles of county highway. The intersection of two major highways, Interstate 87 (New York State Thruway) and Interstate 84, is within twenty minutes of the hamlet of Wallkill.

Real Estate Sales from 1998-2003

Summary: Real estate sales in Shawangunk from 1998-2003 were random in their distribution and size of parcels that were sold.



-  Real estate sales 1998-2003
-  State and county roads

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Conway School of Landscape Design Angela Sisson, Crystal Hitchings, & Joshua Clague
March 2004 GIS Data Source: Ulster County Planning Department

Traffic volumes are highest in the hamlet of Wallkill along Route 208, with average annual daily traffic estimated at 8,057 vehicles, and the second highest volume occurs along Route 300 with average daily traffic estimated at 5,439 vehicles (Fairweather Consulting, p. 8). Traffic volume has increased along both of these routes and will continue to expand as the population grows.

3. Water Supply System

The town has a central water supply serving approximately 1,500 users in the hamlet of Wallkill. The remaining population of the town relies on private well water.

Although public water supplies meet the current demand, the comprehensive plan recommends seeking a second water source for the town's public water system. "Smart growth" development patterns suggested in the comprehensive plan call for clustered, denser growth in existing population centers. If the town follows through with these denser growth pattern suggestions, the current central water supply for the hamlet of Wallkill will prove inadequate.

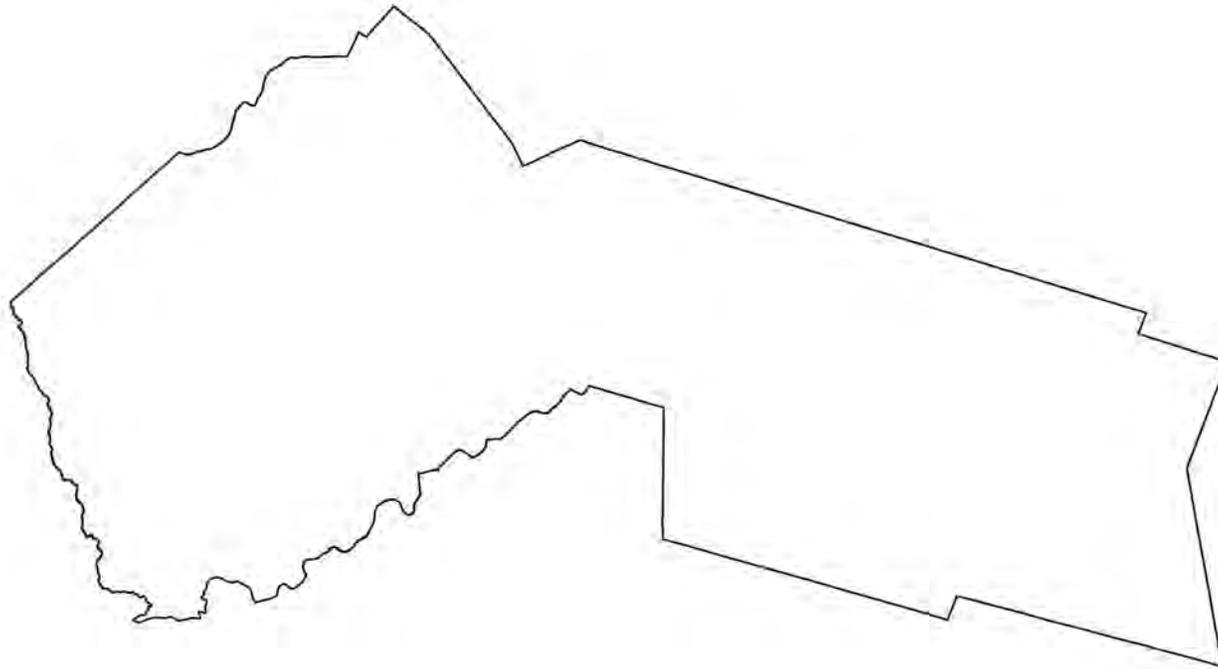
4. Sewer Service

The town's central sewer system serves approximately 2,500 users in the hamlet of Wallkill and the Wallkill and Shawangunk Correctional Facilities. The Wallkill Sewer District has a capacity of 635,000 gallons per day and the average daily usage is 400,000 gallons per day in dry weather. Outside of the hamlet of Wallkill residents use septic tanks and leaching fields, relying on the permeability of the soils to filter out septic contaminants before waste water reaches groundwater supplies.

Conclusion

Because the population of Shawangunk is expected to continue increasing, it is certain that public infrastructure will need to expand and that the natural resources of the town may become stressed in coming years. Concentrating infrastructure will enable the town to maintain the necessary open spaces required to protect such valuable natural resources as clean and abundant drinking water and uncontaminated groundwater.

Section 3: Open Space Inventory and Analysis



Section 3: Open Space Inventory and Analysis

A. Introduction

An in-depth inventory was conducted for each of the six categories (agriculture, scenic roads, historical sites, recreation, water quality, and wildlife habitat.) The important components within each of these categories were analyzed. Recommendations for methods of open space protection are given at the end of each inventory and analysis section.

Open space can be divided into cultural and natural resource open spaces. Cultural open space—agriculture, scenic roads, historical sites, and recreation—evolved through a process of human use and development. Cultural open spaces tend to attract community attention in terms of preservation and access. However, it is the natural resources—water quality and wildlife habitat—which provide the underpinnings for cultural open spaces. Without these natural resources, cultural open spaces would be degraded or insufficient. For example, without wildlife habitat, the recreation, and scenic-roads might not exist. Without water quality, rivers and streams wouldn't be fit for fishing or swimming and residents wouldn't be able to rely on their well water for drinking. The cultural open spaces bring attention to the issue of natural resource protection.

Some categories are made up of more components than other categories. For instance, wildlife habitat components include vernal pools, wetlands, floodplains, unfragmented forests, and riparian travel corridors. The historical sites category, however, includes only listed and unlisted sites. The important components of each category were mapped individually and then were put together onto a single map. This map of the total components that make up a category becomes a layer depicting important open space within that category. A layer is created for each category, and at the end of the inventory and analysis process, these six layers are combined into a final open space composite. The components, the layers, and the composite, together with the written inventory and analysis and recommendations, become a planning tool. The last section of this report gives a detailed explanation of the various methods of using the planning tools in a layering process.

B. Agriculture

B. Agriculture

Summary

Agriculture has played a significant role in the lives of Shawangunk residents since the town was first settled. In the last fifty years, much of the town's farmland has been converted to residential and other land uses. The remaining agricultural land is valued for both its productivity and scenic qualities. The best soils for farming, identified by the USDA as capability classes I and II, are concentrated in the eastern two-thirds of the town. The agricultural open space layer consists of current farmland that occupies such soils.

1. Introduction

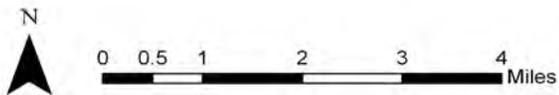
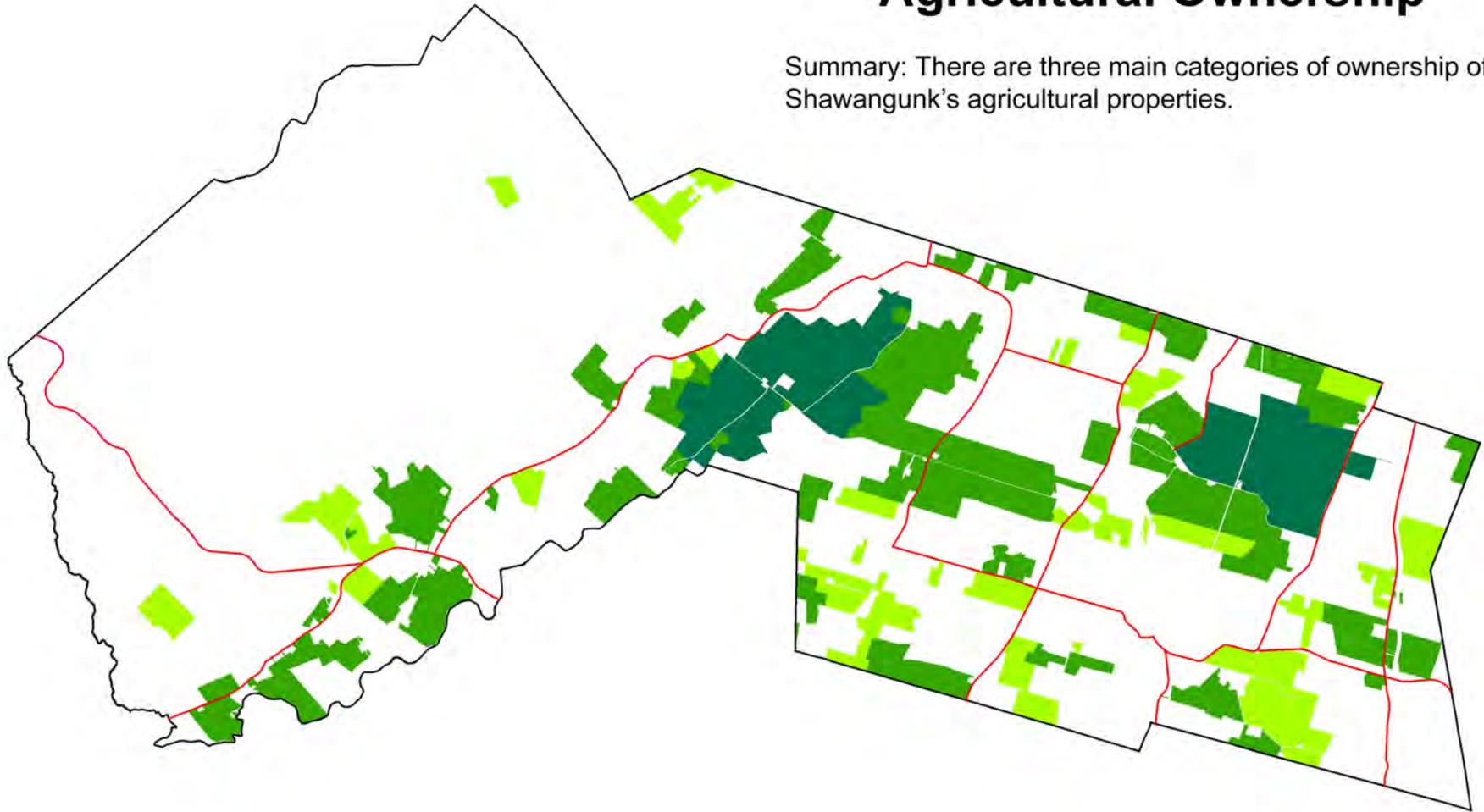
Agriculture has been the primary land use in Shawangunk ever since the Europeans first settled in the lower Hudson valley. Historically, farmland covered most of the Wallkill River Valley and extended well into the foothills of the Shawangunk Ridge. During the second half of the twentieth century, much of the farmland in New York State was subdivided and converted into commercial and residential use. According to the American Farmland Trust, 89,100 acres of New York farmland were removed from agricultural use from 1992 to 1997. This was a 141% increase in the rate of loss from the previous five years.

Dutchess County to the east of the Hudson River, and Orange County immediately to the south of Shawangunk, have both been identified as having high quality farmland that is in the process of being highly developed. Parts of Ulster County, including roughly half of Shawangunk, have been identified as high quality farmland experiencing low levels of development. Although the extent of agricultural activity in Shawangunk today is not what it once was, there are still almost 9000 acres of land associated with agriculture, occurring primarily in the eastern two-thirds of the town. These lands comprise over 25% of Shawangunk's total land area.

Based upon ownership there are three distinct categories of agricultural land in Shawangunk: parcels that are farmed by the owners, parcels that are farmed by renters, and parcels that are farmed by large institutional entities. The institutions in this last category are the Jehovah's Witness Watchtower Farms, the Wallkill Correctional Facility, and the Shawangunk Correctional Facility. Watchtower Farms does not pay property taxes and therefore claims no agricultural exemption. Although the state prisons do not claim an agricultural exemption, they do pay property taxes. (Unlike non-profit properties, state-ownership of property does not necessarily remove it from property tax roles.)

Agricultural Ownership

Summary: There are three main categories of ownership of Shawangunk's agricultural properties.



-  Institutional agriculture parcels
-  Owner operated agriculture parcels
-  Rented agriculture parcels
-  State and County Roads

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Conway School of Landscape Design Angela Sisson, Crystal Hitchings, & Joshua Clague
March 2004 GIS Data Source: Ulster County Planning Department

2. Geology and Soils

Geology

Geological processes affect the viability of farmland. The geology of Shawangunk can be divided into two sections: the quartz conglomerate known as the Shawangunk Ridge on the western boundary of town and a shale bedrock beginning at the foot of the Shawangunk Ridge and covering the rest of the town. It is this lower, flatter portion of Shawangunk that has historically been farmed.

Above the shale bedrock, Shawangunk is covered by glacial till that was left behind as continental glaciers melted and North America emerged from the last ice age, about 15,000 years ago. Accumulations of earth and stones carried forward and deposited by a glacier, glacial till is mostly derived from the bedrock over which it occurs, thus leading to soils that are closely related to the bedrock type.

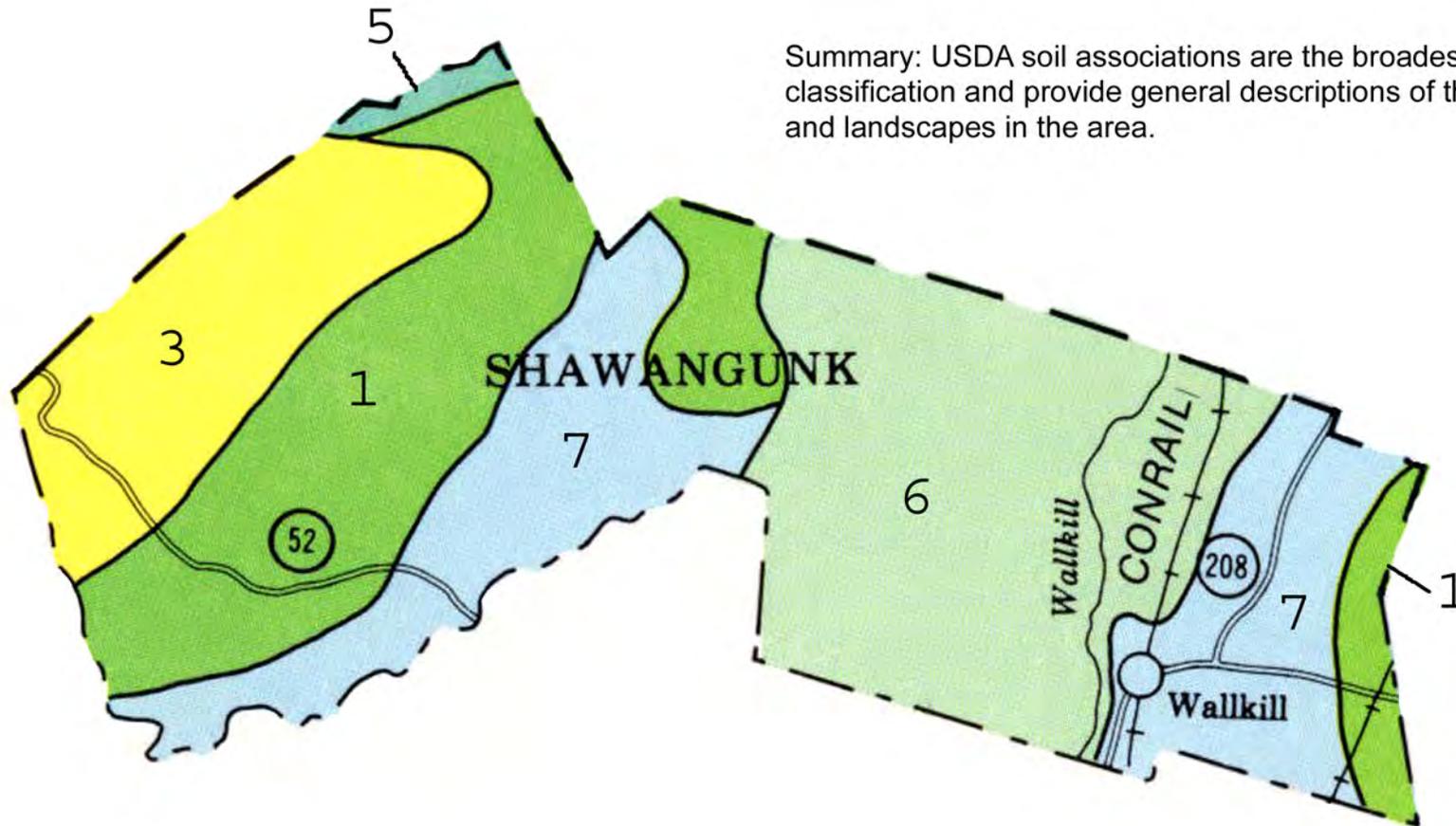
Soil Associations

The USDA Natural Resources Conservation Service (NRCS, formerly the Soil Conservation Service) classifies soils into associations, series, and types. An association is the broadest classification and provides a general description of the soils and landscapes in the survey area. Due to the large scale of the association boundaries, they are not suitable for detailed planning purposes such as choosing a home site or small-scale farm management. Associations are, however, appropriate for comparing the potential of large pieces of land for general types of land use.

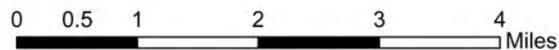
The USDA Soil Survey of Ulster County identifies five soil associations within the town of Shawangunk. The soils on the eastern edge of town fall within the Bath-Nassau association, described as deep, well-drained, and medium textured. To the west lie soils from the Hoosic-Schoharie-Chenango association, also identified as deep and well-drained, but with a coarse texture. The primary soil association to the west of the Wallkill River is Churchville-Rhinebeck-Madalin, a deep, poorly-drained association with medium texture. To the west of the Shawangunk Kill lie once again the Bath-Nassau and Hoosic-Schoharie-Chenango associations. The southwest corner of Shawangunk falls within the Wellboro-Wurtsboro-Swartswood association, described as deep, well-drained, moderately coarse and very bouldery. A small portion of the northwest corner of Shawangunk is of the Lordstown-Arnot-Mardin association, documented as having deep to shallow, excessively drained, medium textured soils in a dominantly sloping landscape.

Soil Associations

Summary: USDA soil associations are the broadest soil classification and provide general descriptions of the soils and landscapes in the area.



- 1 Bath-Nassau
- 3 Wellboro-Wurtsboro-Swartswood
- 5 Lordstown-Arnot-Mardin
- 6 Chuchville-Rhinebeck-Madalin
- 7 Hoosic-Schoharie-Chenango



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March 2004 Source: USDA Soil Survey - Ulster County, New York

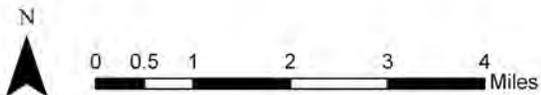
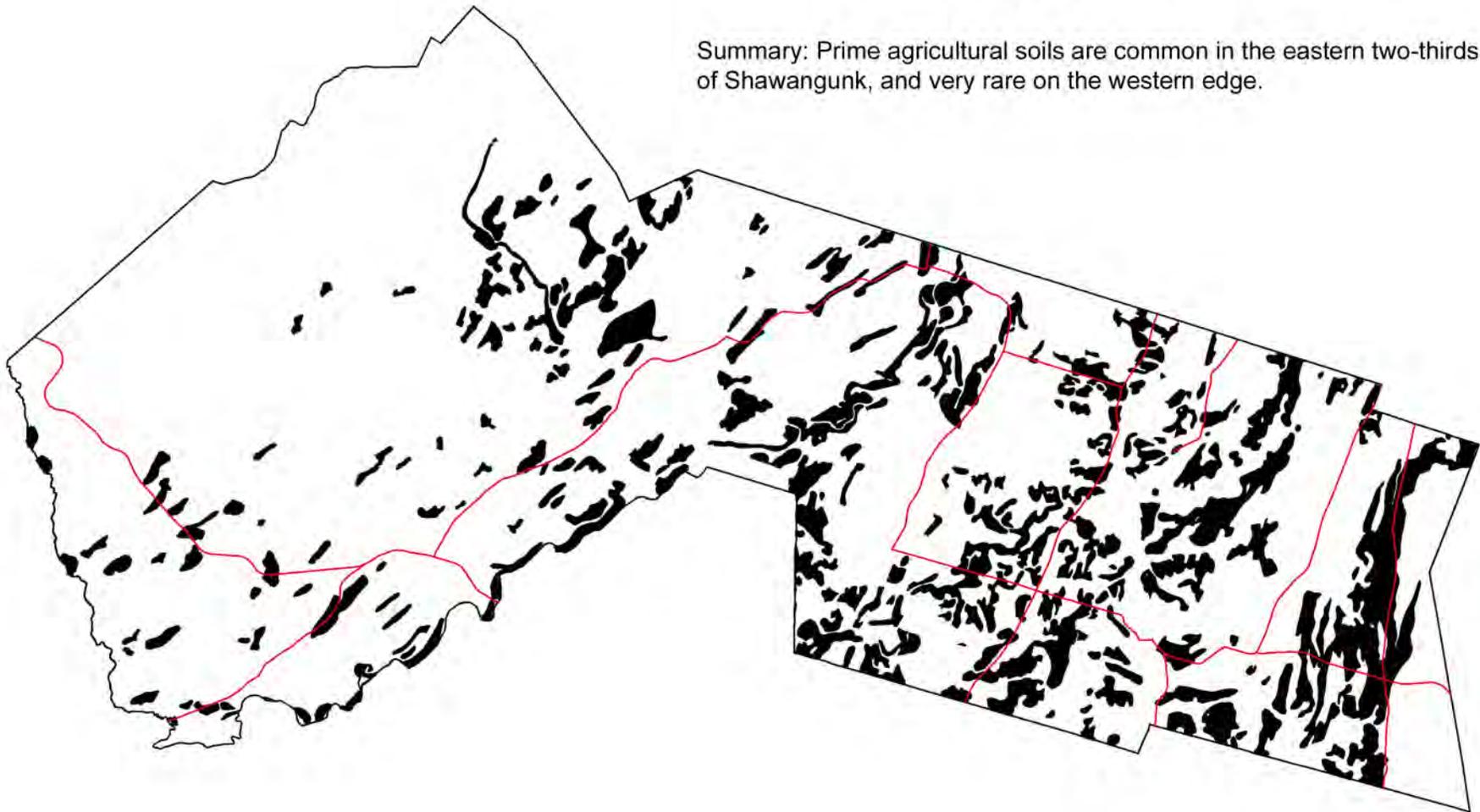
3. Capability Classes

In an effort to identify soils that are appropriate for agriculture, the NRCS created a capability class system that describes the general suitability of Ulster County's soils for most kinds of field crops. Each soil series is placed in one of eight classes, with Classes I and II being the most suitable for farming, Classes III-VI being somewhat-to-severely unsuitable, and classes VII and VIII being impossible or nearly impossible for use in crop production.

The most suitable farming soils in Shawangunk, falling within Classes I and II, are found throughout the eastern two-thirds of the town. Around both the Wallkill River and Shawangunk Kill, as much as 50% of the land fits within these two classes. Suitable soils for agriculture are nearly absent in the Shawangunk Ridge and areas immediately around it.

Prime Agricultural Soils

Summary: Prime agricultural soils are common in the eastern two-thirds of Shawangunk, and very rare on the western edge.



-  Prime agricultural soils
-  State and county roads

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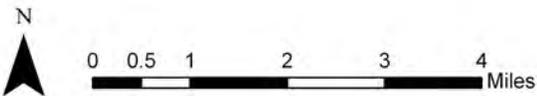
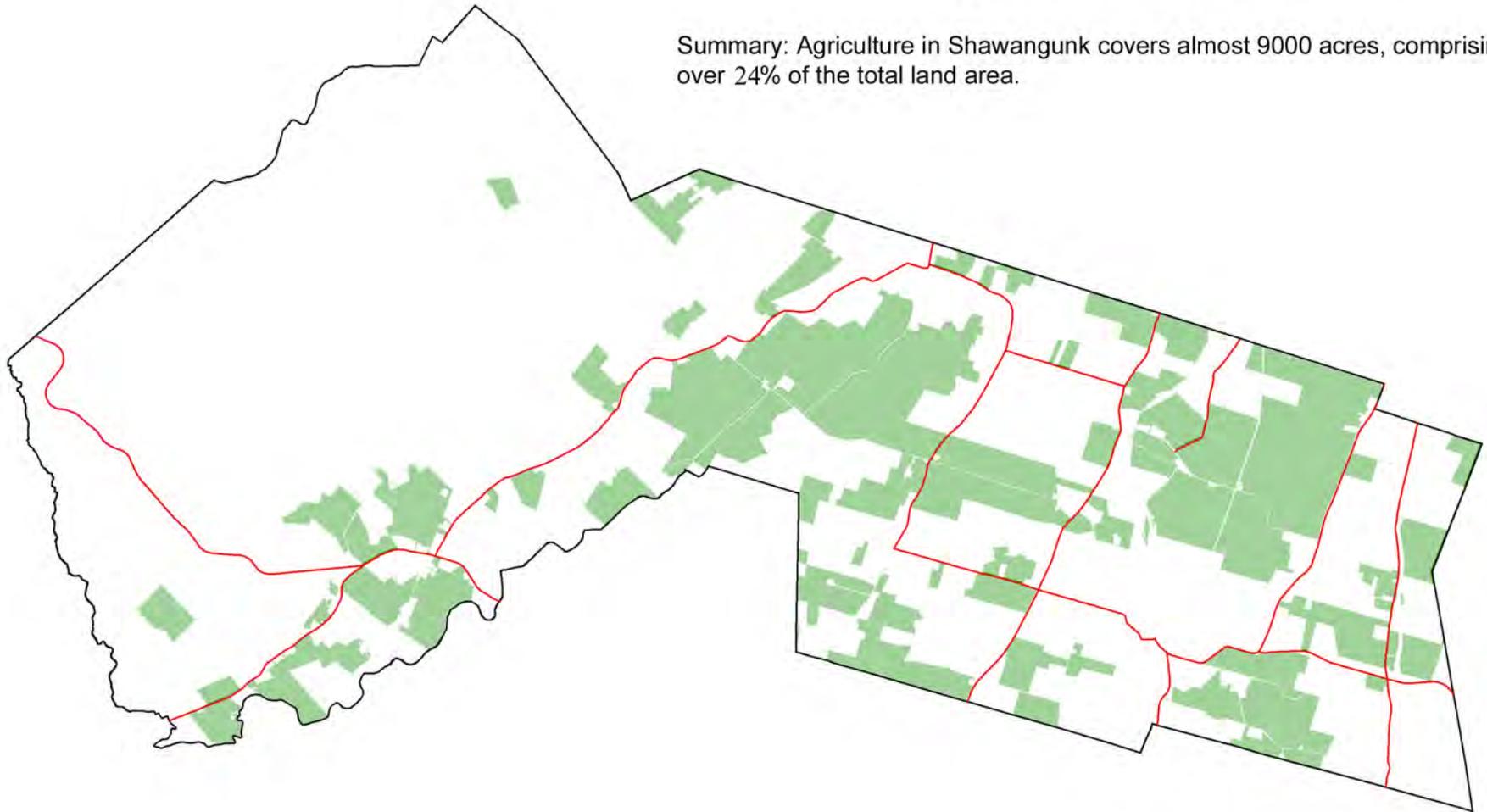
GIS Data Source: Ulster County Planning Department.
Additional Source: USDA Soil Survey - Ulster County, New York

Over half of the most suitable agriculture soils in Shawangunk do not fall within existing agricultural parcels. It is not known when or if these patches of soil were ever active farmland, but given Shawangunk's agricultural past, it is likely that most of them were used for agricultural purposes at some point. Current trends suggest that if land is not currently in agriculture, it most likely never will be again.

Agriculturally suitable soils are of high value. Good soils directly affect the productivity and profitability of a farm. Although farms can be profitable in the absence of good soil, agriculturally suitable soils allow for a greater flexibility in crop choices and provide the potential for a higher profit margin. Criteria used to establish agricultural open space are existing agricultural parcels (those with agricultural exemptions and also Watchtower Farms and the state prison lands) and suitable agricultural soils. The overlap of suitable soils with existing agricultural parcels has been mapped as the agricultural open space layer.

Agricultural Use

Summary: Agriculture in Shawangunk covers almost 9000 acres, comprising over 24% of the total land area.

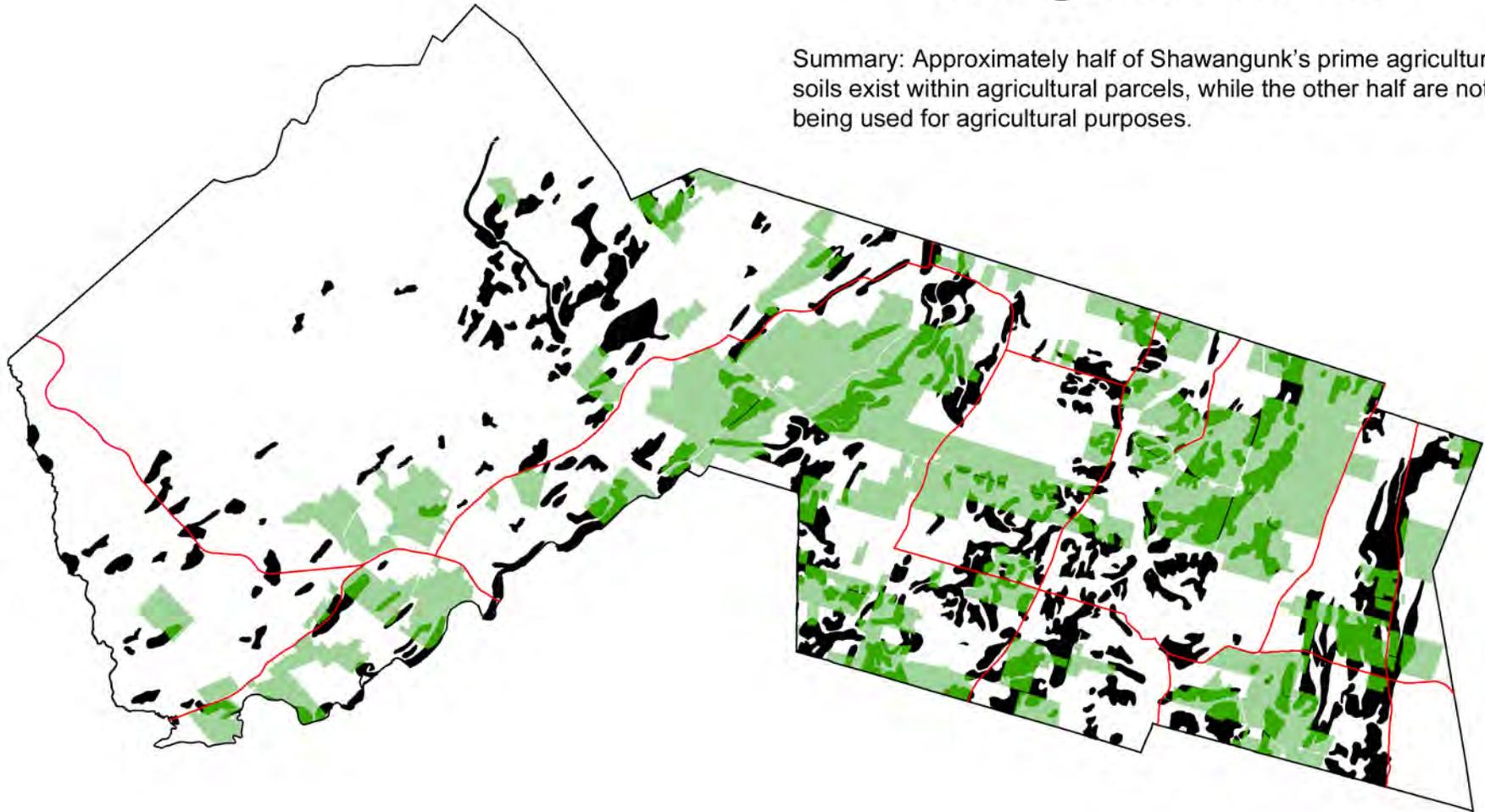


-  Agricultural parcels
-  State and county roads

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GIS Data Source: Ulster County Planning Department Additional Source: USDA Soil Survey - Ulster County, New York

Prime Agricultural Soils and Agricultural Use

Summary: Approximately half of Shawangunk's prime agricultural soils exist within agricultural parcels, while the other half are not being used for agricultural purposes.



-  Agricultural parcels
-  Prime soils outside of agriculture parcels
-  Prime soils within agricultural parcels
-  State and county roads



0 0.5 1 2 3 4 Miles

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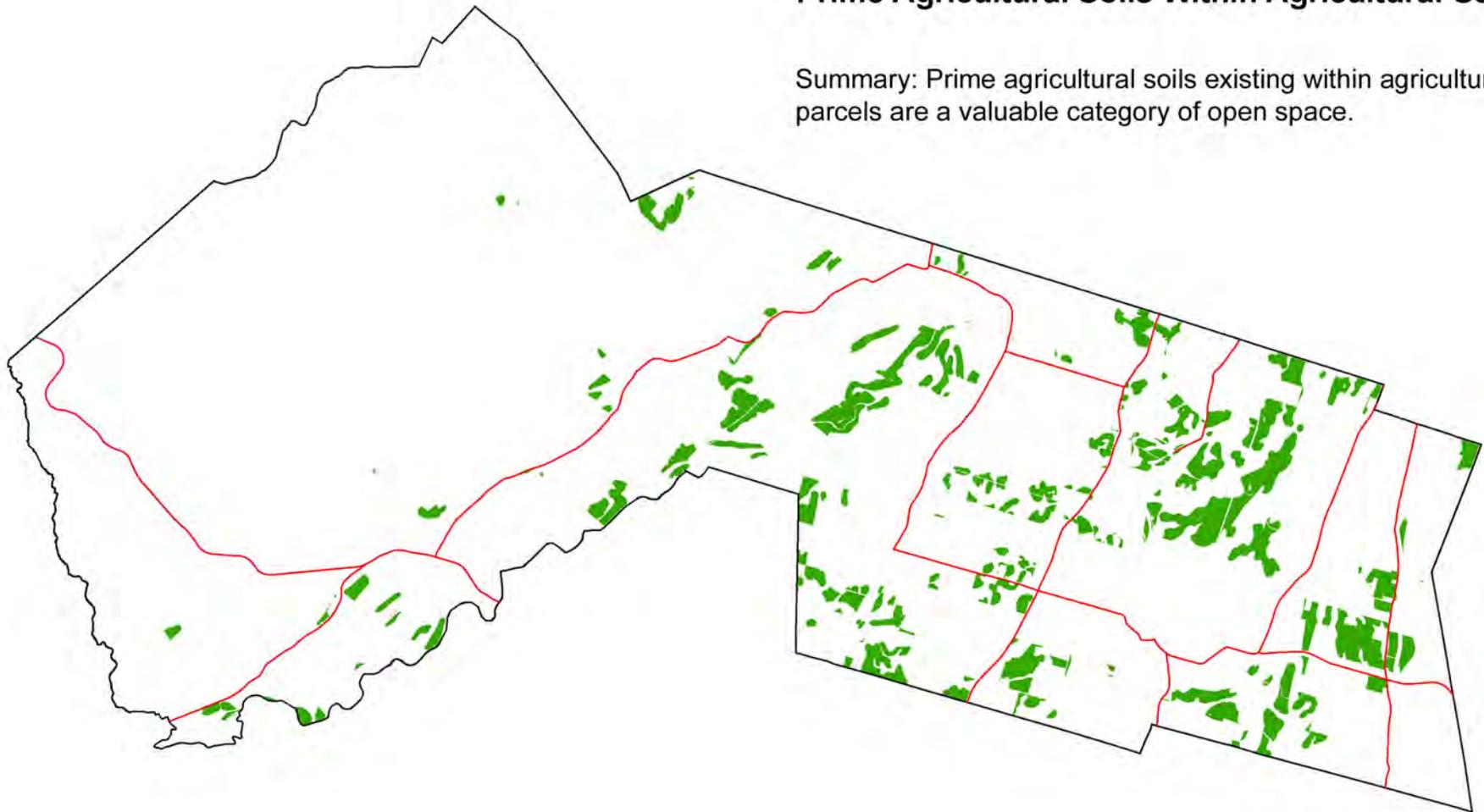
March 2004

GIS Data Source: Ulster County Planning Department
Additional Source: USDA Soil Survey - Ulster County, New York

Agriculture

Prime Agricultural Soils Within Agricultural Use

Summary: Prime agricultural soils existing within agricultural parcels are a valuable category of open space.



-  Prime soils within agricultural parcels
-  State and county roads

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GIS Data Source: Ulster County Planning Department Additional Source: USDA Soil Survey - Ulster County, New York

4. Recommendations

Not all of the farms existing in Shawangunk today will remain in active agricultural production. The criteria for productive agricultural lands can overlap with the criteria for ideal commercial and residential development (i.e. minimal slope, good drainage, accessibility). By identifying the most suitable soils for agriculture *within* current agriculture use, it is possible to locate the parcels with the most potential for long-term agricultural viability, therefore in the most need of preservation as agricultural resources.

Changes in land use should be prevented on the agricultural lands that contain agriculturally suitable soils. If a development or subdivision is proposed on an agricultural property, all efforts should be made to retain agricultural production on that portion of the property where there are agriculturally suitable soils. By focusing farmland preservation on the parcels with agriculturally suitable soils, the town of Shawangunk will provide the most economically viable means for the survival of the town's agricultural community and rural character.

A full list of the criteria for successful farmland goes well beyond the productivity of the land itself and includes a self-supporting local economy. Such an economy can be encouraged with Farmland Preservation Districts that act as a growth management tool by encouraging numerous active farms. The presence of more farms creates the need for farm supply stores, tool and equipment providers, processors, farm stands, field labor, etc.

C. Scenic Roads

C. Scenic Roads

Summary

Views of the Shawangunk Ridge and surrounding natural landscapes enhance daily quality of life for residents and visitors alike. An inventory of roadways with the most scenic views is a preliminary step in the process of protecting scenic road open spaces.

1. Introduction

The scenic character of a region may be the very reason why people choose to live there. The Town of Shawangunk is blessed with spectacular views of the ridge, along with expansive views of farms and fields. Most people, residents as well as visitors, experience these views as they drive through the town. Many of Shawangunk's roads are relatively untouched by development. The scenic roads category is intended to identify stretches of roads that afford extensive views of natural landscapes, farms, and historical structures.

The criteria used to establish which roads fall in the scenic roads category are:

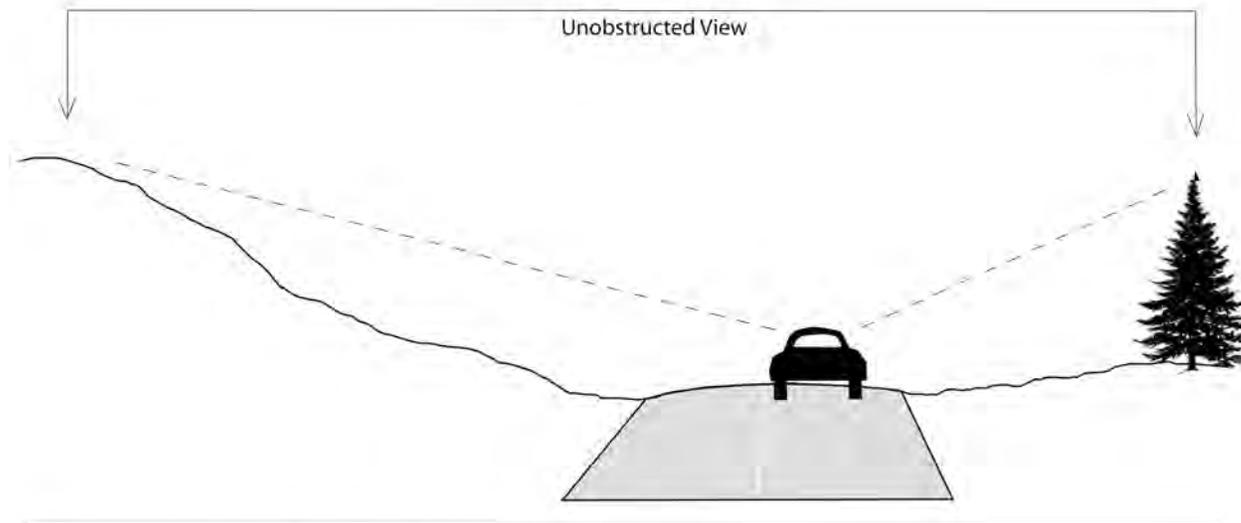
- State or county roads, or
- Roads with views of the ridge or other extensive views, or
- Roads with views of farms or undeveloped land

Small roads with scenic views have been identified with the help of town residents.

2. Mapping Scenic Roads

The roads themselves do not constitute open space. Areas adjacent to the road that affect the view into the landscape are considered scenic road open space. Scenic road open space is mapped using the elevations from a topographical map and checked against an aerial photo to determine how woods or structures may be an impediment to the view. Even then, the map must be field tested for validity. Field testing will verify where visual obstructions block the immediate views along the road. The layer included in this report offers a model for future delineation but should be field tested and revised as elements in the landscape change.

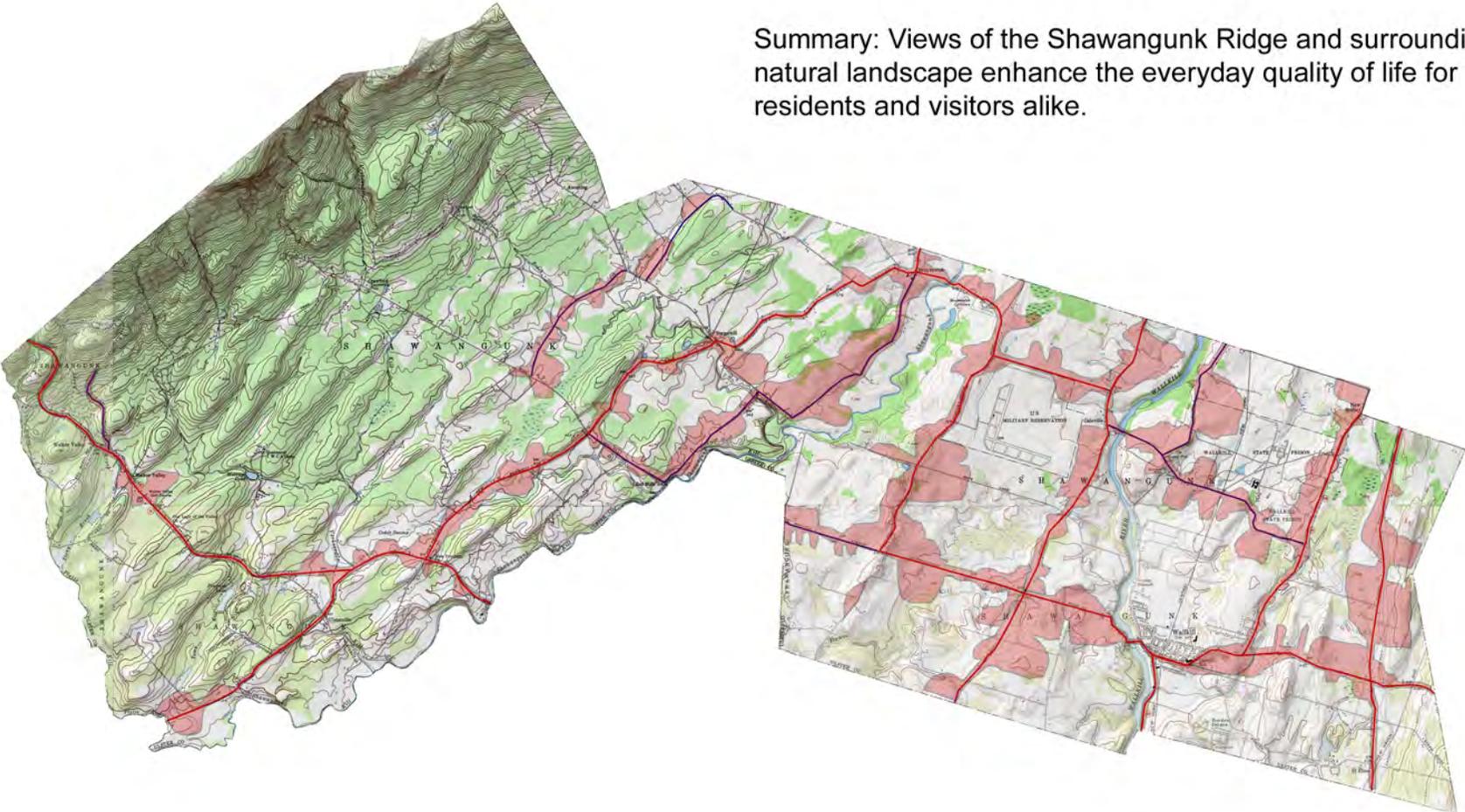
Diagram of Roadside View Areas



Roadside views are everything that can be seen from the road before the first obstruction. These views are significant in how they affect the everyday quality of life.

Scenic Roads

Summary: Views of the Shawangunk Ridge and surrounding natural landscape enhance the everyday quality of life for residents and visitors alike.



0 0.5 1 2 3 4 Miles

 Roadside View Area

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Conway School of Landscape Design Angela Sisson, Crystal Hitchings, & Joshua Clague
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GIS Data Source: Ulster County Planning Department Additional Source: United States Geological Survey

3. Scenic Byway

One section of road within Shawangunk is the route of the proposed, state-designated Shawangunk Mountains Scenic Byway. The byway route travels through western Shawangunk along Route 52 from Pine Bush at the south end into the Town of Wawarsing at the north end. The eastern Shawangunk portion of the byway route travels north along Albany Post Road from the Orange County line to Bruyn Turnpike, then heads east on the turnpike into the hamlet of Wallkill where it picks up Route 208 and continues north into the Town of Gardiner.

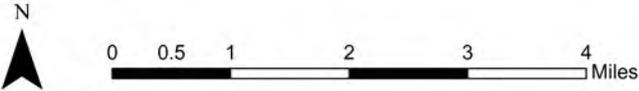
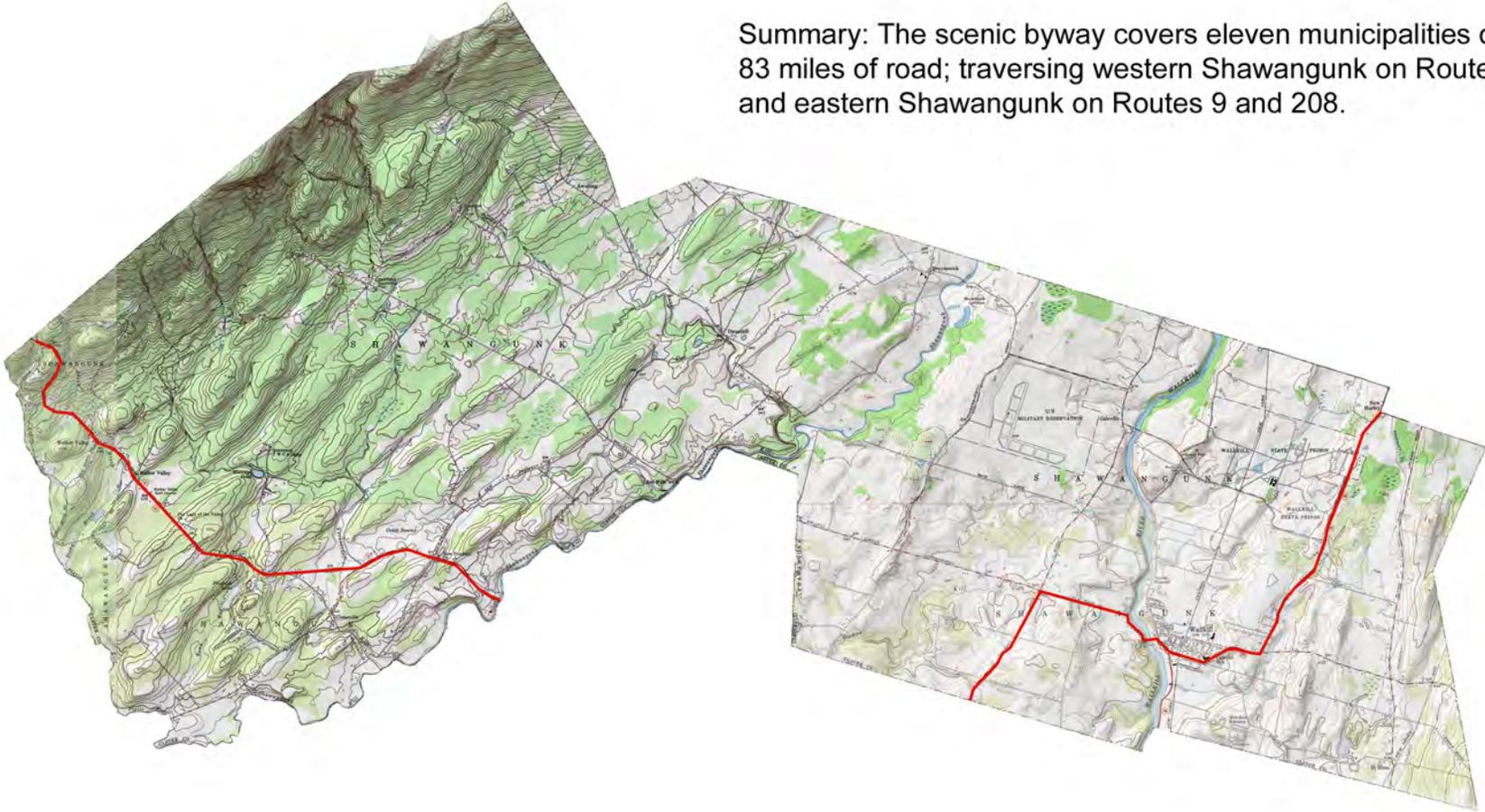
4. Recommendations

A roadside open space plan will provide town planners with a tool for working with developers, homeowners, and landowners to preserve those views that are most important to the town. Once the mapping process and field testing is completed, the most important scenic views can be protected through zoning, conservation easements, planned development, or public acquisition.

Roads that meet the scenic road open space criteria but are not included on these maps should be added, and the map should be revised periodically.

Proposed Shawangunk Mountains Scenic Byway

Summary: The scenic byway covers eleven municipalities on 83 miles of road; traversing western Shawangunk on Route 52 and eastern Shawangunk on Routes 9 and 208.



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GIS Data Source: Ulster County Planning Department
Additional Source: United States Geological Survey

D. Historical Sites

D. Historical Sites

Summary

Approximately half of the significant historical sites shown in this section are listed on the State and National Historic Registers. Other sites have been added on the basis of specific criteria although additional worthy sites may have been overlooked. Many of the inventoried sites are concentrated in the hamlet of Wallkill.

1. Introduction

Shawangunk has many significant historical structures dating from the mid-eighteenth century when the region was first settled. The town's heritage is dependent upon preservation of these sites, and, without the devoted attention of local citizens, many of them would have been lost long ago.

Two types of criteria are used to establish inclusion of historical sites in the historical open space category. First, those sites already officially listed on New York State and National Historic Registers are included. Historical sites currently not officially listed on historic registers are included based on one of the following criteria:

Standing, usable structures built prior to 1800, or

Churches built prior to 1850, or

Standing, usable structures built prior to 1900 which are a significant part of the cultural or economic life of a hamlet

2. List of Sites

The following is a list of sites officially listed on historic registers:

1. Andoom Barn, prehistoric site on River Road
2. Johannes Jansen House, (1712) 510 Decker Road
3. Thomas Jansen House, (1727) 145 Jansen Road
4. Pearl Street Schoolhouse, 238 Jansen Road
5. Schoolhouse #8, 2146 Bruynswick Road
6. Shawangunk Reformed Church (1753), parsonage (1751), and cemetery, 1166 Hoagerburgh Road
7. AH Terwilliger House, (1780) 1108 Hoagerburgh Road
8. Johannes Decker House, (1726 – 1787) 337 Red Mills Road
9. Vankeuren House, 1036 Benjamin Vankeuren Road
10. J.B. Crowell Brick Mould complex (buildings and dam), 242 and 244 Lippincott Road
11. Meredith House on Steen Road
12. Walstein Childs House (1763), Sand Hill Road on prison property
13. Andries Dubois House, 75 Wallkill Avenue
14. 56 Wallkill Avenue
15. 60 Wallkill Avenue
16. 76 Wallkill Avenue
17. Wallkill Library, 7 Bona Ventura Avenue
18. Borden Company dam and impoundments
19. Gerret Decker (1776 House), 2629 New Prospect Road

The following are sites not officially listed on historic registers but which satisfy one of the previously listed criteria.

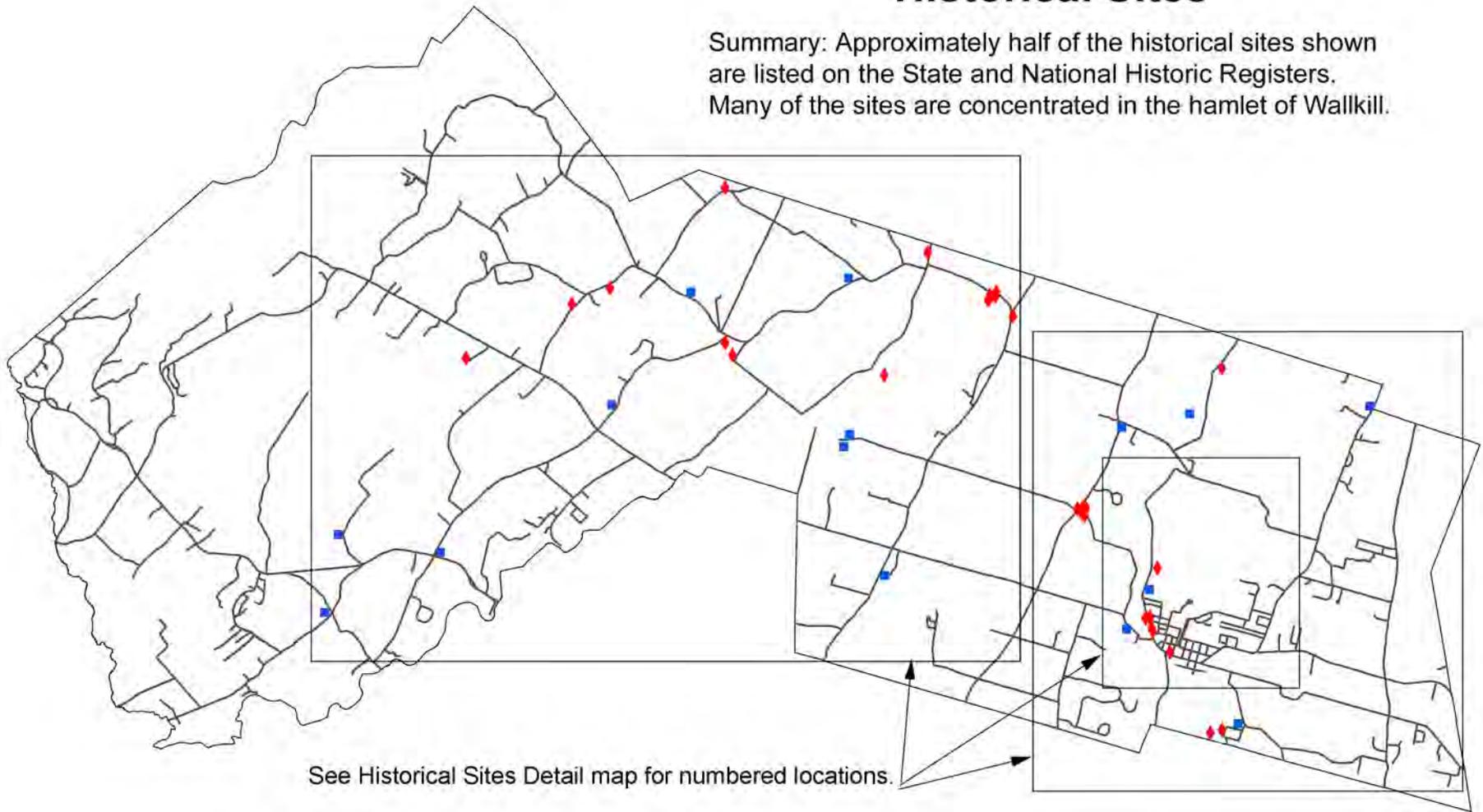
20. New Hurley Church (1835), Route 208 and New Hurley Road
21. Mullford House (1767), west side of Sand Hill Road
22. Isaac Terwilliger House (1732), east side of Hoagerburgh Road, south of Bruyn Turnpike
23. Rhinehart House, northwest side of New Prospect Road, southwest of Low Road
24. Jansen House (“The Gravel”), (18th century) northeast side of Awosting Road west of the hamlet of Dwaarkill
25. Unidentified house, partly stone, northwest side of New Prospect Road on the sharp curve northeast of Bruyn Turnpike
26. Van Keuran House, (18th century) west side of Sinsabaugh Road, north of Route 52
27. New Prospect Church (1815), New Prospect Road and Route 52
28. Cronin’s Tavern, (mid 19th century) formerly known as White’s Tavern, northwest side of Ulsterville Road
29. Justice Banks House (1772), River Road at north edge of the hamlet of Wallkill
30. George Graham House (1772), south side of Bruyn Turnpike just outside the hamlet of Wallkill
31. Mill House at Galeville, (believed to be 18th century) perhaps early 19th century,
west bank of the Wallkill River on Albany Post Road south of the Galeville Bridge
32. The “New Fort”, 1663 historical and 10,000 year old archeological site,
located on the west bank of the Shawangunk Kill at the north end of Old Fort Road
33. Terwilliger House (1766), north end of Old Fort Road
34. Cornelius Hasbrouck House (1771), the 18th century stone portion of the Victorian Borden House
on Hoyt Road on the Borden Farm
(Marc B. Fried assisted in establishing criteria and compiling the list of sites which are not officially listed on historic registers.)

3. Recommendations

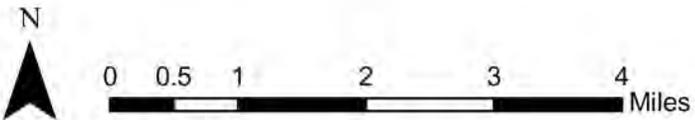
Many important structures in Shawangunk remain stable. These sites should be acknowledged before they deteriorate or are destroyed to make room for new construction. Preservation of valued historical sites should be incorporated into subdivision and other development plans and their integral character should be retained. Changes of historical use of structures should be compatible with the nature of the structure and should not eradicate its history. Additional historical sites which satisfy the criteria should be added to the list when appropriate.

Historical Sites

Summary: Approximately half of the historical sites shown are listed on the State and National Historic Registers. Many of the sites are concentrated in the hamlet of Wallkill.



- ◆ Sites - Listed On Registers
- Sites - Not Listed On Registers

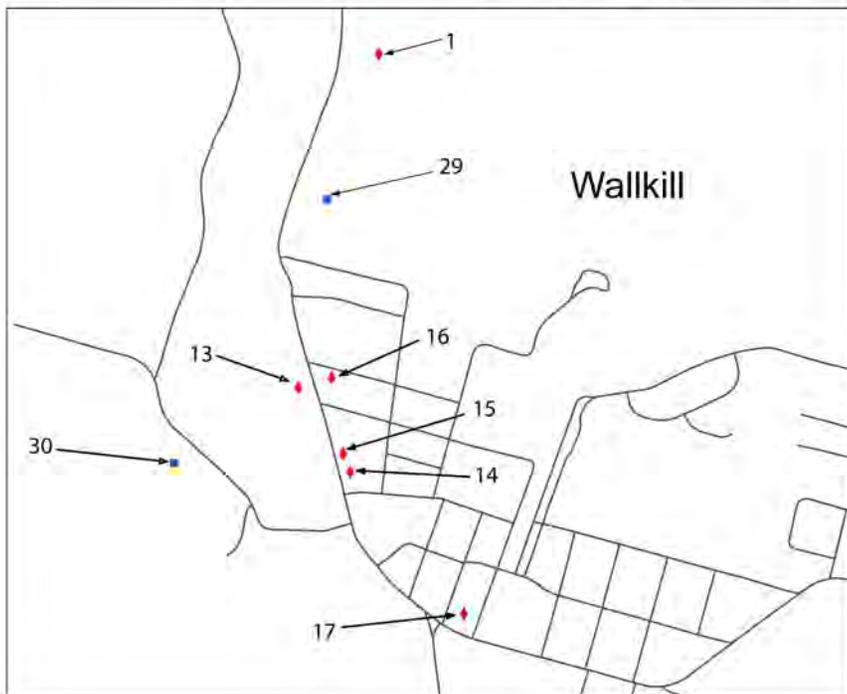
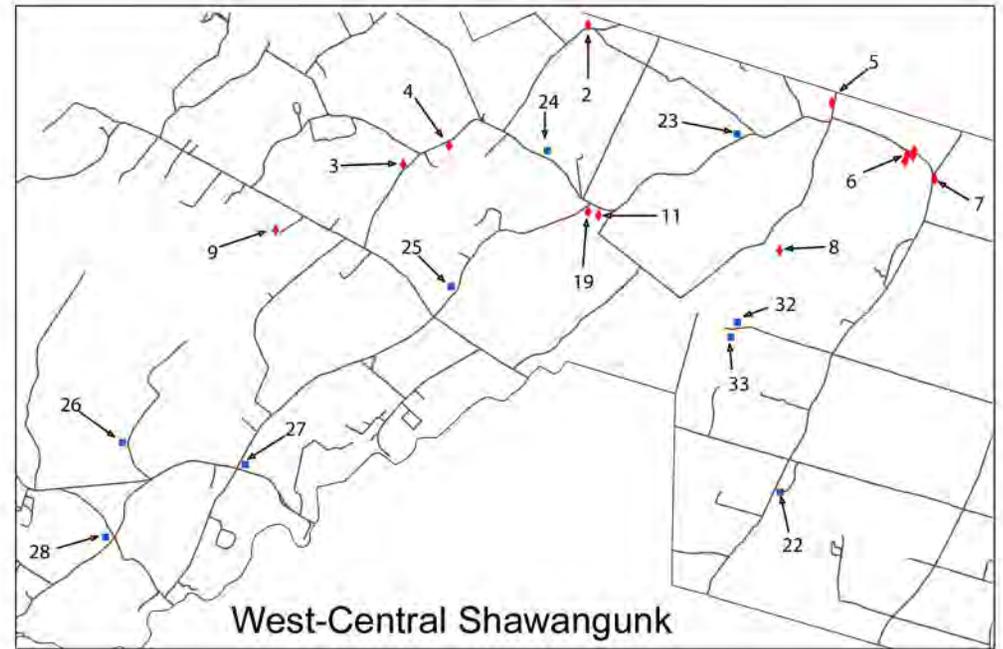
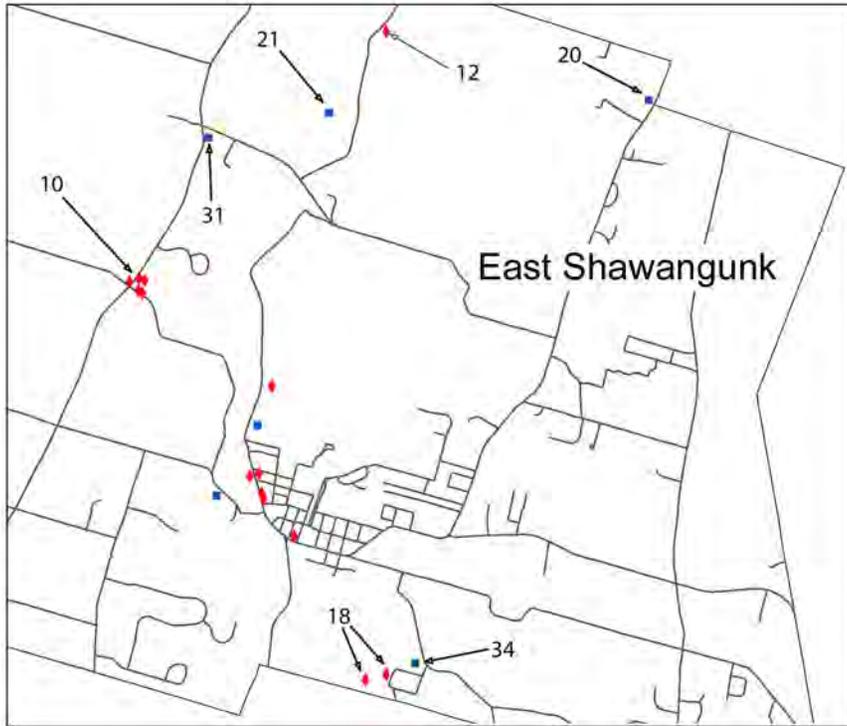


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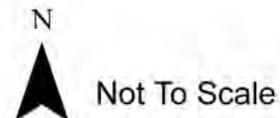
GIS Data Source: Ulster County Planning Department



Historical Sites Detail

Summary: Most of Shawangunk's historical sites are located along the roads.

- ◆ Sites - Listed On Registers
- Sites - Not Listed On Registers



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March 2004 GIS Data Source: Ulster County Planning Department

E. Recreation

E. Recreation

Summary

Shawangunk contains a variety of public-access recreational sites which include federal, state, and town properties along with school sports facilities, cemeteries, and a golf course. Access to private recreational open space such as hunting clubs is available on a membership basis.

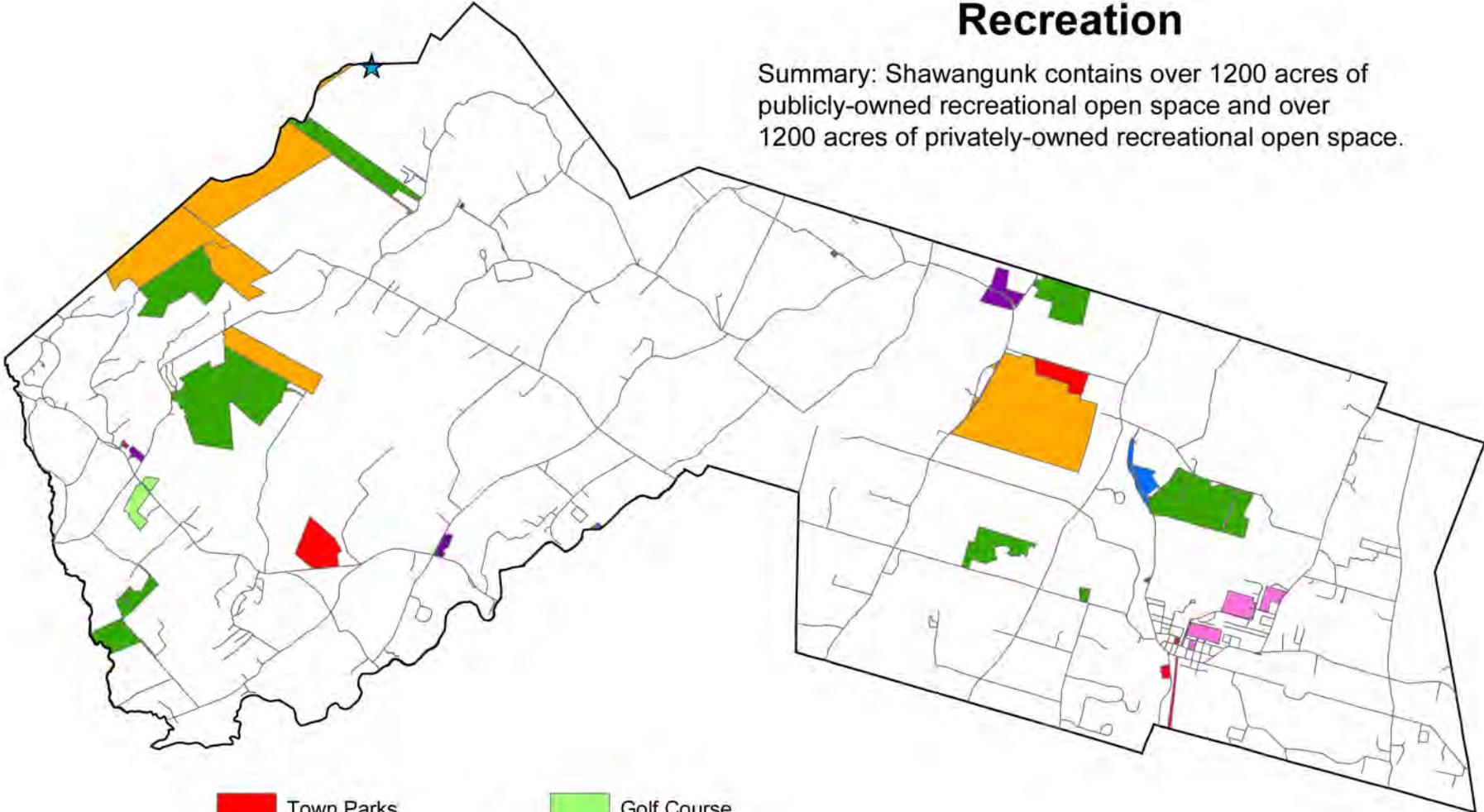
1. Introduction

Recreation areas are cultural or human-use open spaces. Outdoor recreation contributes to the quality of life. People need access to outdoor areas in order to hike, fish, hunt, watch birds, and play ball. Recreational activities in the town can range from passive strolling in cemeteries to active team sports at the local high school and everything in between. An increasing population requires more public access recreation open spaces. Currently the town has a number of recreation areas which provide a range of recreational environments.

Criteria used to establish recreational open space are based on the land uses of parcels. They are: town-owned parks; federal, state or private land with public access; school sports facilities; golf courses; town-owned river-access sites; rod and gun clubs; and cemeteries. Verkeerder Kill Falls, a significant natural area which is privately owned, is also included.

Recreation

Summary: Shawangunk contains over 1200 acres of publicly-owned recreational open space and over 1200 acres of privately-owned recreational open space.



- Town Parks
- Golf Course
- Town Owned River Access
- Rod & Gun Clubs
- School Sports
- Federal, State, Private with Public Access
- Cemeteries
- Verkeerder Kill Falls

<p>Open Space Inventory and Analysis Town of Shawangunk, New York</p>
<p>Conway School of Landscape Design Angela Sisson, Crystal Hitchings, & Joshua Clague</p>
<p>March 2004</p> <p>GIS Data Source: Ulster County Planning Department</p>

2. Town-owned parks

Neighborhood Parks

Research for the town's Parks and Recreation Plan determined that neighborhood parks should be a minimum of two acres and serve a one-mile radius. Garrison Park, a one-acre neighborhood park located in the hamlet of Wallkill, contains a playground and a basketball court. Popp Park is a five-acre neighborhood park located in the hamlet of Wallkill. The park offers a pavilion and barbecue pit and is the only park with Wallkill River access. The Walker Valley Schoolhouse Park is a two-acre neighborhood park which contains a civic building and contains the Dorothy and Greg Greer Memorial Park, which contains a basketball court.

Town Parks

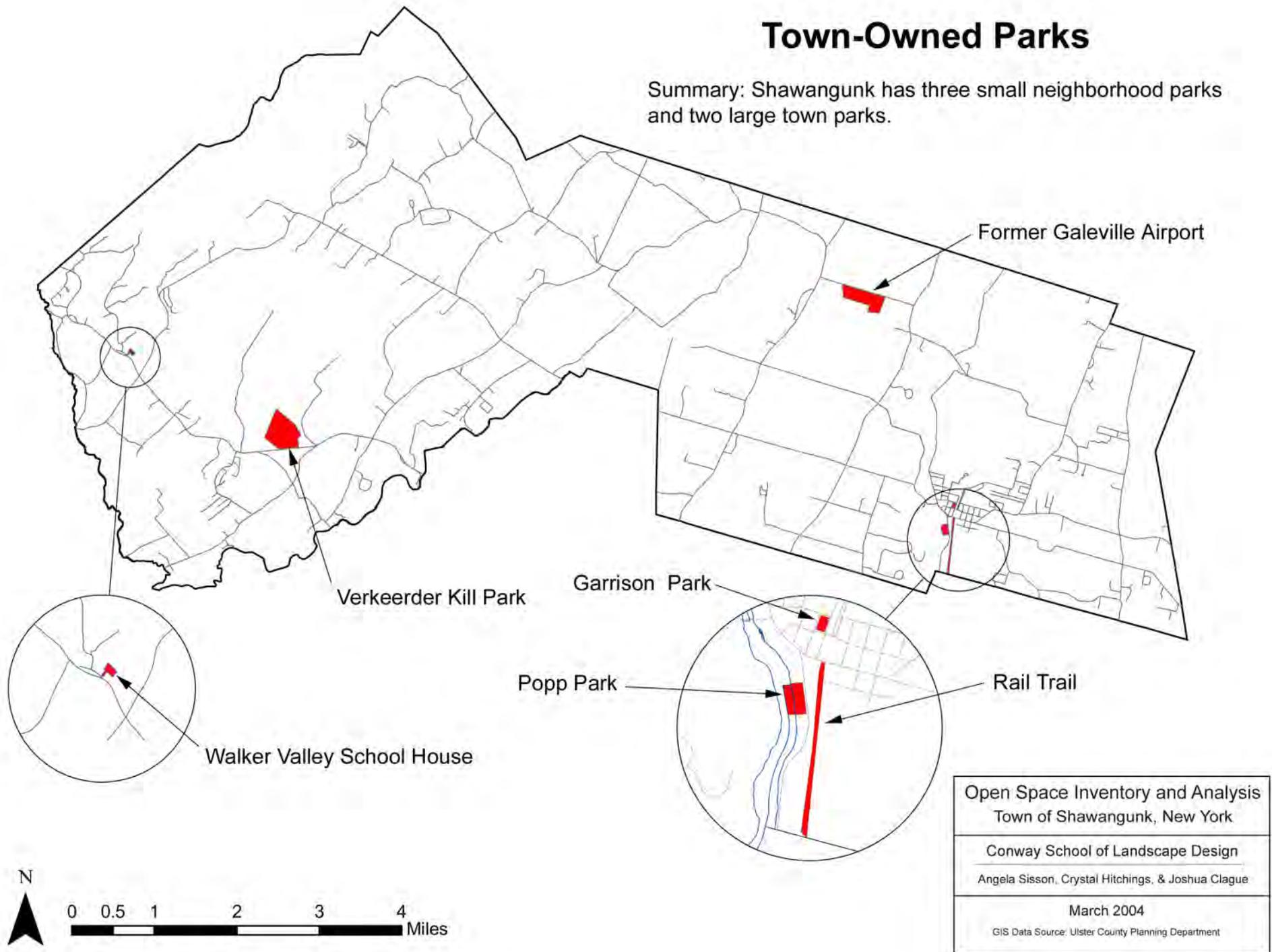
Research for the town's Parks and Recreation Plan determined that town parks should be a minimum of ten acres and serve a minimum three-mile radius. A fifty-five acre town park is located at the former Galeville Airport along the northern border of the Shawangunk Grasslands National Wildlife Refuge, three miles northwest of the hamlet of Wallkill. A parking area is available but the park is not otherwise developed. Verkeerder Kill Park, a town park, consists of eighty-three acres located on Route 52 one mile northwest of New Prospect Road. The park offers a pavilion with winter skating, restrooms, a nature trail, a fishing area, and the only soccer field in town outside of school facilities. A softball field is scheduled for installation.

The Rail-Trail

A section of old rail bed within the town, beginning at the hamlet of Wallkill and running south to the Orange County line, is a multiple-use rail-trail. This rail-trail is connected to an Orange County section of rail trail which runs uninterrupted from the Orange County line south to village of Walden.

Town-Owned Parks

Summary: Shawangunk has three small neighborhood parks and two large town parks.



3. Federal, State, and Private Property with Public Access

Federal Property with Public Access

The Shawangunk Grasslands National Wildlife Refuge, a 570-acre wildlife refuge, is located four miles from the hamlet of Wallkill on Hoagerburgh Road. Formerly the Galeville Airport, the Shawangunk Grasslands National Wildlife Refuge was established in 1999 to protect the habitat of grassland-dependent migratory birds. The refuge currently harbors six declining migratory songbird species. During summer months more than 150 species of birds have been observed, many of them nesting in the vast meadows. The refuge offers bird watching, hiking, and nature study opportunities.

State Properties with Public Access

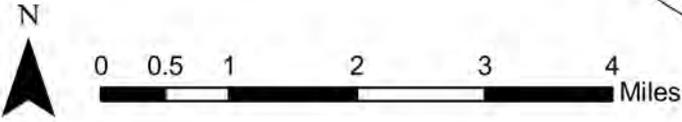
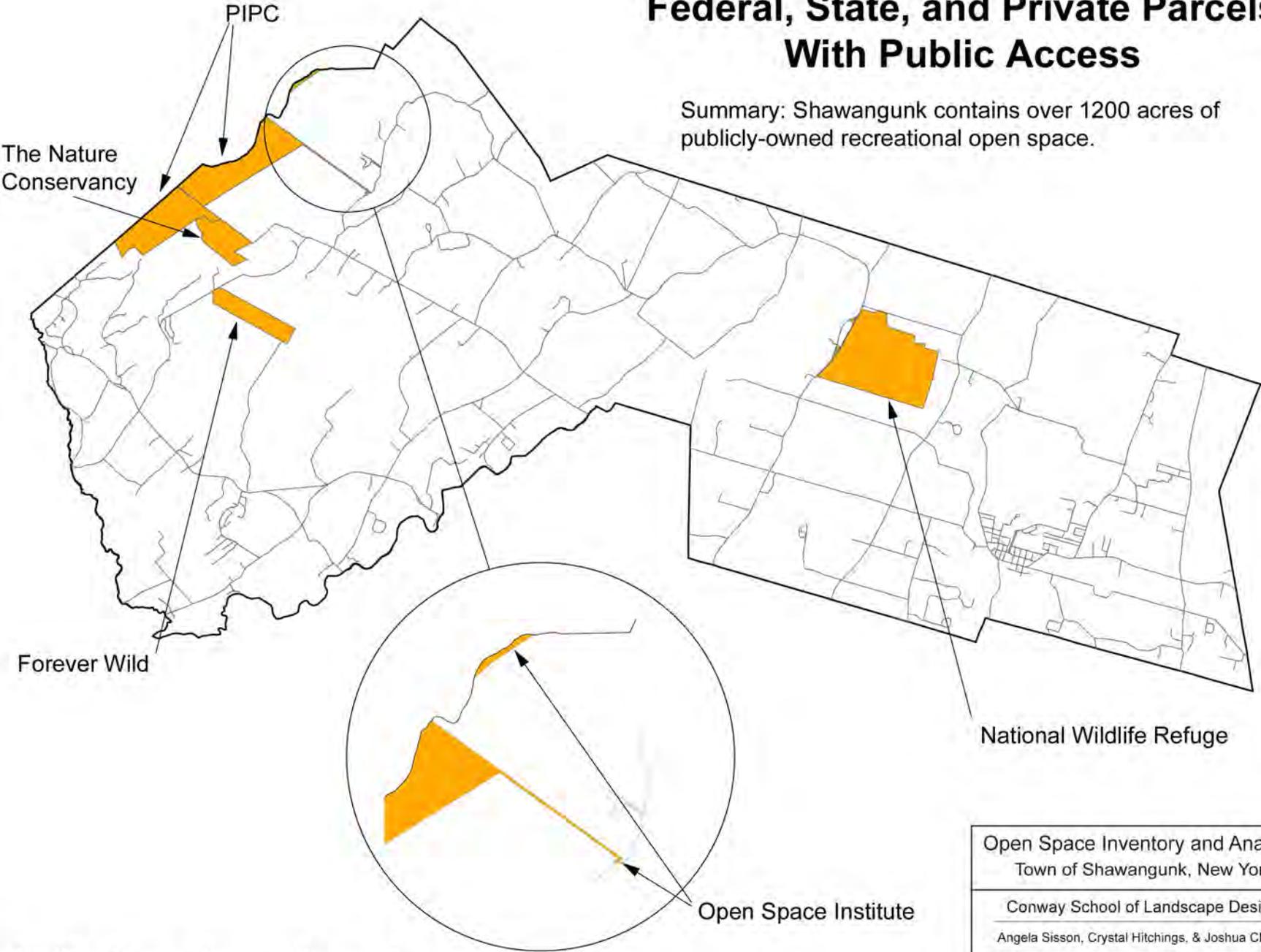
State properties with public access are available for hiking and fishing. Hunting is allowed with a permit. The Palisades Interstate Park Commission property is made up of two large parcels of 300 and 242 acres. The property is located on the Shawangunk Ridge along the northwest border of the town next to Sam's Point Preserve, which offers additional recreational opportunities, and is accessible from Upper Mountain Road. A 125-acre Forever Wild parcel near the Palisades Interstate Park property is accessible from Oregon Trail and Quannacut Road. This land has been permanently protected under the state's constitution.

Private Properties with Public Access

Private properties with public access are available for hiking and fishing. Hunting is allowed with a permit. Two Open Space Institute parcels are accessible to the public. One is a nine-acre parcel along the northwest border of town next to Sam's Point Preserve, and the other is a one-half acre parcel located on Upper Mountain Road and borders the Palisades Interstate Park property. The Nature Conservancy's 117 acres on the Shawangunk Ridge is located next to the Palisades Interstate Park property.

Federal, State, and Private Parcels With Public Access

Summary: Shawangunk contains over 1200 acres of publicly-owned recreational open space.



Open Space Inventory and Analysis Town of Shawangunk, New York
Conway School of Landscape Design Angela Sisson, Crystal Hitchings, & Joshua Clague
March 2004
GIS Data Source: Ulster County Planning Department

4. School Sports Facilities

School facilities provide outdoor and indoor recreation such as sports fields and basketball courts. The Wallkill School District's sports fields and facilities are accessible to residents of east Shawangunk. The Pine Bush School District, with facilities just outside the town, is accessible to residents of west Shawangunk.

5. Golf Courses

A nine-hole, forty-one-acre golf course is located in Walker Valley on Route 52. Although the business closed recently, the facilities and the infrastructure are in place and the golf course was operational for a number of years. The potential exists for a re-opening and a continuation of golfing at the same facility.

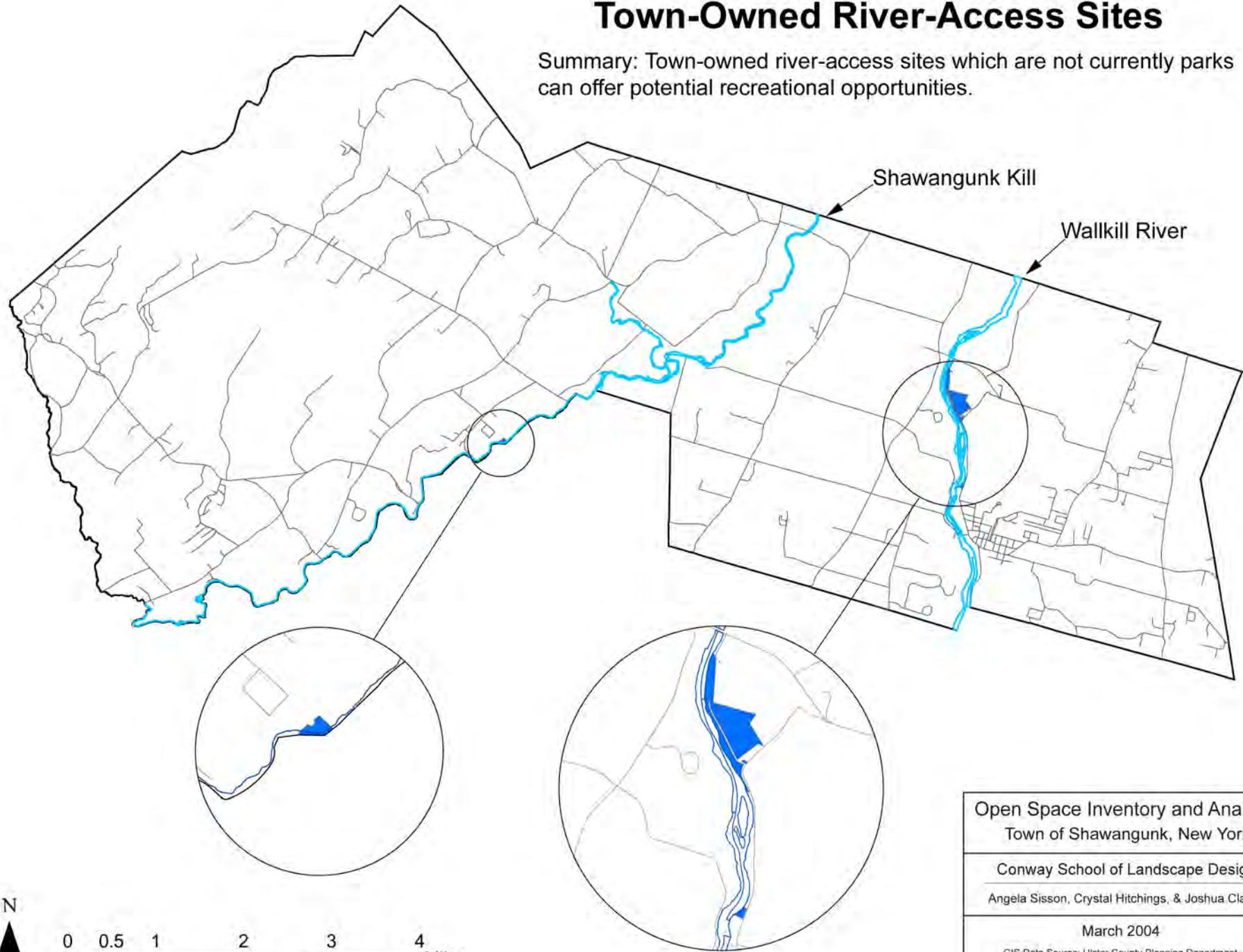
6. Town-Owned River-Access Sites

Even though town-owned river access sites are not parks (Wallkill River sites shown on the map are actually landfills) they are included in the recreation open space category. The Wallkill River and the Shawangunk Kill both provide boating and fishing opportunities. The Shawangunk Kill offers a more rustic and natural boating experience. The river corridor, protected under the New York State Wild, Scenic, and Recreational Rivers Act, has retained its natural character, allowing kayakers and canoers to enjoy unspoiled rural landscapes while traveling on the river. Access to these two rivers is important to the town's recreation and public river access is very limited. The town has only one park on the Wallkill River—Popp Park in the hamlet of Wallkill.

A Shawangunk Kill river-access site located at the end of Riverside Road is a town-owned two-acre parcel protected under Forever Wild guidelines and cannot be developed with park facilities or structures. This parcel will, however, provide adequate river access for boating and fishing. An additional Shawangunk Kill river-access site is located just outside of town at the west end of Wallkill Avenue in the Town of Crawford.

Town-Owned River-Access Sites

Summary: Town-owned river-access sites which are not currently parks can offer potential recreational opportunities.



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March 2004 GIS Data Source: Ulster County Planning Department

7. Rod and Gun Clubs

In addition to public-access recreation, private recreational opportunities also exist. Numerous hunting and fishing clubs, available for membership, own over 1100 acres in Shawangunk.

8. Verkeerder Kill Falls

Verkeerder Kill Falls is located on private property just south of the Shawangunk-Wawarsing town line as shown on the Recreation map. The height of the falls is approximately eighty-five-feet. An overlook to the falls is accessible from a Sam's Point Preserve hiking trail.

9. Cemeteries

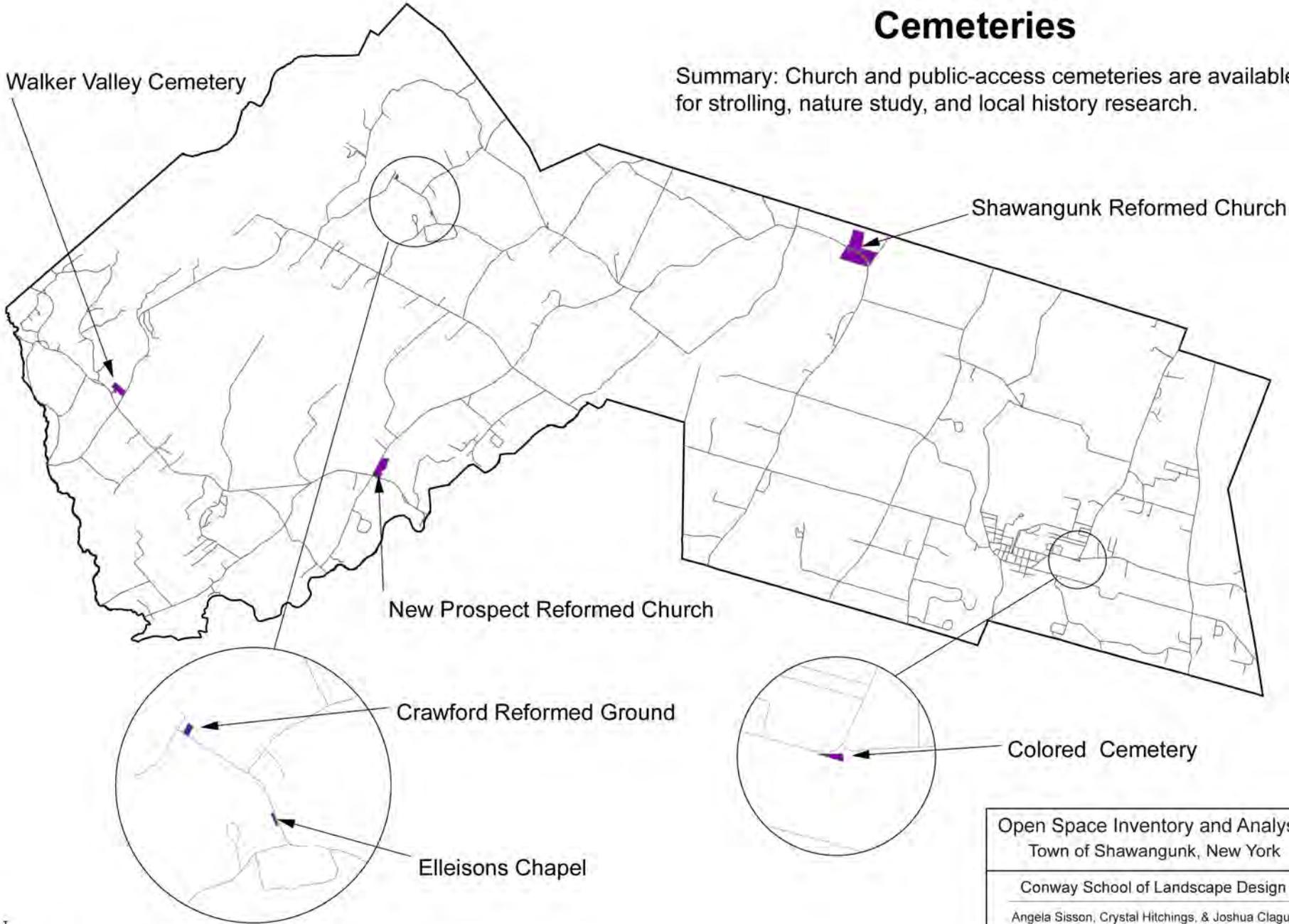
Cemeteries have a long tradition as parks. Shawangunk's rural cemeteries offer a quiet respite from daily activities. Recreational activities include walking, nature study, and jogging. A complete list of cemeteries is included here. The mapped cemeteries, which are church or public-access, are shown in bold. While some of the cemeteries on the list have public-access and are appropriate for passive recreation, the list also includes a number of small cemeteries on private property without public access.

Cemeteries in the Town of Shawangunk (cemeteries in bold are shown on map)

1. Borden Ground – near Borden Mansion
 2. Bevier Ground – Wallkill Prison
 3. Buchanan Ground – M.Claussen Farm near Dwaarkill, North Winds Farm
 4. **Colored Cemetery**
 5. **Crawford Reformed Ground** –former site of Crawford Reformed Church
 6. Dubois Ground – 1 mile north of Wallkill on hill near river, Sunnyside Farm
 7. Hasbrouck Ground – near Borden Mansion
 8. Huey Ground – 1 mile east of Ulsterville near house of Walter Seal (Tavino’s)
 9. Graham Ground – on hill west of Seth Lippencott House
 10. Kain Ground – located in Victor McCord Farm
 11. Lefevre Ground – Wallkill Prison
 12. Masten Ground – 1 mile west of New Hurley Church
 13. Mulford Ground – Sand Hill, 1-1/2 miles north of Wallkill
 14. **New Prospect Reformed Church** – old and new
 15. Ostrander Ground – short distance from Dubois Ground
 16. Relyea Ground – ¼ mile north of Ulsterville on Newton Dixon Farm
 17. Rosa-Roosa Ground – at edge of field west of Wallkill and left after crossing bridge
 18. **Shawangunk Reformed Church** – Bruynswick Cemetery
 19. Titus Ground – Borden Home Farm in pasture originally Titus Farm
 20. Walker Ground – adjoining Walker Valley Cemetery
 21. **Walker Valley Cemetery**
 22. Venkeuren Slave Cemetery –behind Benjamin Vankeuren housing development
 23. Church of the Highlands (**Elleisons Chapel**) Mountain Road
 24. Watchtower Cemetery – Red Mills Road
 25. Russian Orthodox Cemetery – Jansen Road
 26. Abigail Brom(?) – Wallkill Prison
 27. Prisoners Ground – Wallkill Prison
- List of cemeteries supplied by Antoinette Gagan.

Cemeteries

Summary: Church and public-access cemeteries are available for strolling, nature study, and local history research.



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Recommendations

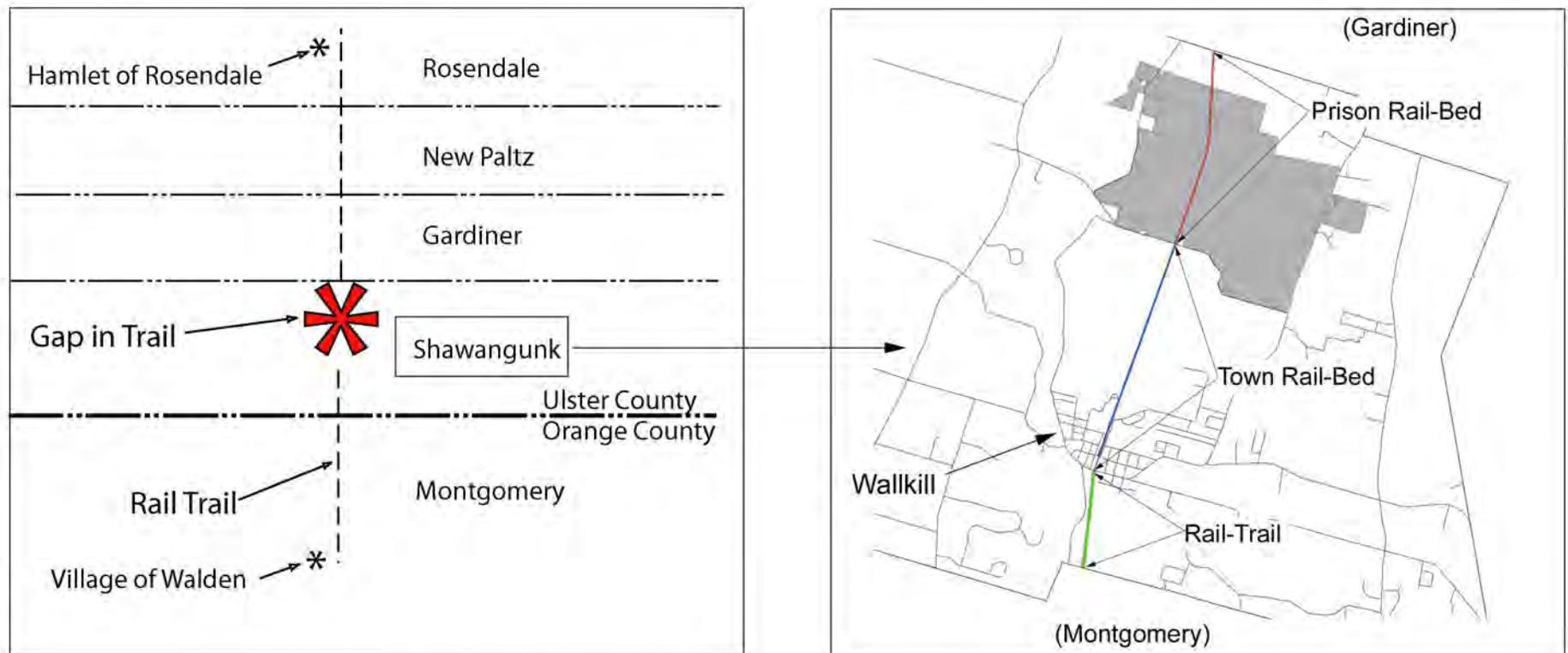
The section of the abandoned rail bed in town beginning at the hamlet of Wallkill and running north to the prison is owned by the town and could be developed into a rail-trail. The section of abandoned rail bed which runs through the prison to the Shawangunk-Gardiner town line is owned by the prison and cannot be developed into a rail-trail. Another section of rail-trail outside of town begins at the hamlet of Rosendale and runs south uninterrupted to the Shawangunk-Gardiner town line. The only gap in the rail-trail running from the hamlet of Rosendale to the village of Walden is in Shawangunk.

A rail-trail bypass around the prison could mend the gap. The trail would be continuous from the hamlet of Rosendale to the village of Walden providing hiking and biking to residents and bringing tourists through the center of Wallkill to encourage economic opportunities. (See rail-trail map on next page)

Town-owned river-access sites, which are currently landfills, can be developed into dual-purpose parks, serving as both neighborhood parks and boating and fishing access sites.

Connections can be created between recreation areas to extend recreational activities such as hiking and biking.

Small parking facilities at a few locations on the Shawangunk Ridge in town could allow hiking or biking access to less traveled recreational areas. Residents would not have to rely on parking facilities at the three large preserves outside of town which largely serve tourists.



The only gap in the rail-trail between the hamlet of Rosendale and the Village of Walden occurs in Shawangunk.

F. Water Quality

F. Water Quality

Summary

Currently, Shawangunk’s water supply is still clean. Many headwater sources of Shawangunk’s streams, wetlands, and ponds are within the town’s political boundaries, making preservation of the water supply possible at a municipal level.

1. Introduction

Water quality is an issue for many residents in Shawangunk. Water supplies are limited, and droughts in past years have depleted some private wells. An increase in the number of new residential developments puts more demands on the drinking water and the increase in new septic systems raises the risk of ground water contamination.

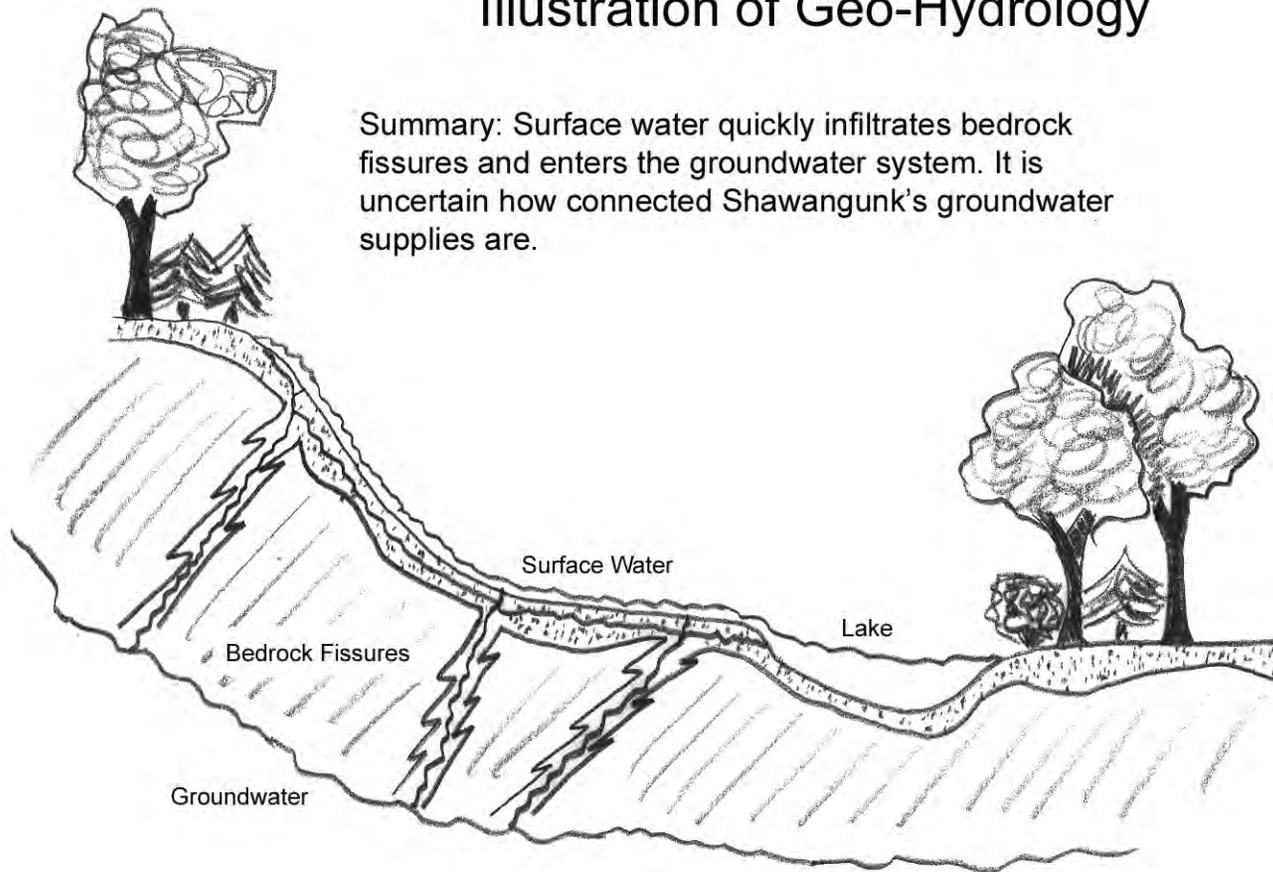
This water quality inventory discusses relevant geological features and surface hydrology, and highlights those water features which significantly affect the overall quality of water in Shawangunk. These features include Class A and B rivers and streams and their Class C headwaters; floodplains; Class 1, 2, and 3 wetlands; and wetlands in association with Class A and B rivers and streams and their Class C headwaters. These features and areas in town most critical to maintaining good water quality are included in the water quality layer.

2. Geo-hydrology

The Shawangunk Ridge bedrock is an extremely hard conglomerate of quartz pebbles and sand grains cemented by quartz, resulting in a lack of inter-granular porosity; it is this lack of porosity that holds water at the surface. However, vertical joint systems and fault planes provide fissures through which rain and snow quickly infiltrate the bedrock and enter the groundwater system. Rain storms might cause the subsurface water table to rise rapidly, but the water table drops rapidly as groundwater dissipates into bedrock fissures. In the lower elevations of the Ridge, and in the river valley, the bedrock is predominantly shale. This shale is also riddled with bedrock fissures. Glacial limestone deposits have eroded over time, allowing surface water access to these fissures, through which the water reaches the groundwater aquifer system. Where soils are shallow, surface water isn’t adequately filtered before it reaches bedrock aquifers. It is uncertain just how interconnected Shawangunk’s groundwater drinking supplies are.

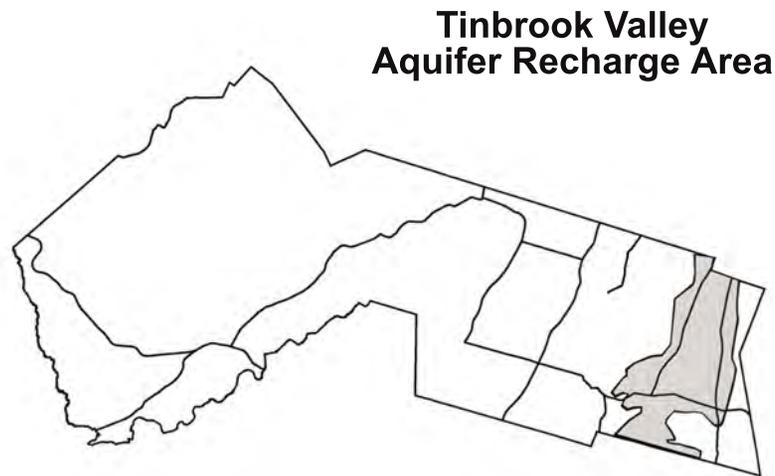
Illustration of Geo-Hydrology

Summary: Surface water quickly infiltrates bedrock fissures and enters the groundwater system. It is uncertain how connected Shawangunk's groundwater supplies are.



3. Aquifers

A significant unconsolidated sand and gravel aquifer system supplies the Shawangunk Kill Valley, including the town of Shawangunk. The v-shaped valley cut by a pre-glacial Shawangunk Kill contains irregular deposits of sand and gravel from outwash and moraine deposits. Most of these occur above the water table, but some thicker deposits exist in deep parts of the bedrock valley and so form highly permeable aquifers. The Shawangunk Kill Valley Aquifer was estimated by the USGS in 1972 to yield three million gallons of water per day. A smaller aquifer, the Tinbrook Valley Aquifer, supplies water to the central hamlet of Wallkill. The Tinbrook Valley Aquifer Recharge Area is protected by a Critical Environmental Area boundary, within which proposed development or land use changes must be assessed for their environmental impact on water quality. Many small bedrock aquifers exist in Shawangunk, but their recharge areas are not officially identified. Most of the town's residents use water from private wells which are dependent on these unprotected bedrock aquifer recharge areas.



In the greater Shawangunk aquifer recharge area, the thin soil cover provides little material for filtering septic leach fields. A steeply sloping water table and bedrock fractures may quickly conduct septic contamination into bedrock aquifers. Two Superfund sites are known to have significantly contaminated local groundwater systems. In 1996, a thousand-gallon septic tank belonging to the Mohonk Road Industrial Plant was determined to be the source of volatile organic compounds. The groundwater pollution plume extended over a distance of about one mile. The tank was removed in September 1997. The Ellenville Scrap Iron and Metal site was the source of contaminants released into the Beer Kill and still poses a potential threat to the local aquifer system.

4. Surface Hydrology

The Shawangunk Ridge, which makes up the western boundary of the town, is the original source region for much of the town's surface and ground water, aquifers, and wells. Numerous streams, mostly first and second order streams, web the town, especially the western ridge portion. Many of these streams flow directly into a wetland, pond, lake, river, or other streams. Because many of these streams originate within the town boundaries, their water quality is the direct responsibility of Shawangunk residents. Water bodies within the western half of the town drain into the Shawangunk Kill, while water bodies within the eastern half drain into the Wallkill River. Because the Shawangunk Kill flows directly into the Wallkill River, the entire town is essentially within the Wallkill River watershed, and because the Wallkill River is the largest tributary to the Hudson River, the town of Shawangunk is also part of the larger Hudson River Watershed. The Hudson River flows directly into the Atlantic Ocean. What happens to the water even in these small streams, ponds, or wetlands can affect the water in a much greater region.

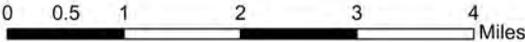
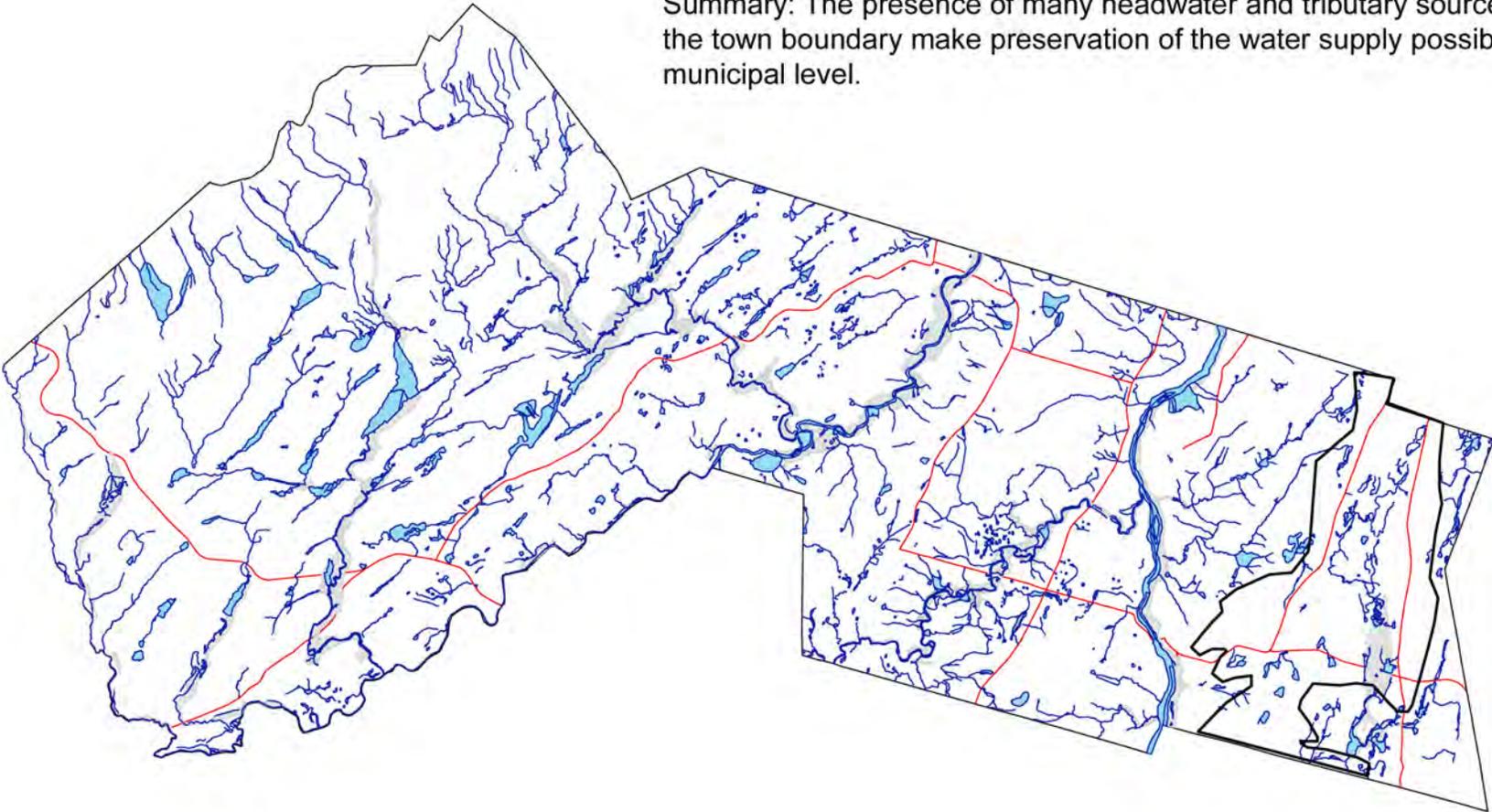
The New York State Department of Environmental Conservation (NYS DEC) rates streams and rivers by class according to quality of the water. Streams in Shawangunk range from Class A to Class C. A Class A rating means that water quality is suitable for drinking, culinary, and all other purposes. A Class B rating means that water quality is suitable for primary and secondary recreation, fish habitat, and fish reproduction. A Class C rating means that water quality is suitable for fish habitat and fish reproduction.

It is important to note that many of the Class C streams feed Class A or Class B streams. Water quality within these Class C streams therefore directly affects water quality within Class A and Class B streams. If only some rivers or streams can be protected, it may be most important to consider Class A and Class B streams first. However, in order to fully protect these streams and rivers, the water which feeds them can't be polluted. Therefore, all Class C headwater streams are of equal importance to water quality protection.

Criteria for inclusion in the water quality layer includes: A or B Class streams and rivers; C rated streams that are direct tributaries of A or B class streams or rivers; and wetlands, floodplains, and open water directly in association with A and B rivers and streams and their Class C tributaries. Three varying degrees of protected vegetated buffer zones immediately surrounding all of these features are also included.

Surface Hydrology

Summary: The presence of many headwater and tributary sources within the town boundary make preservation of the water supply possible at a municipal level.



-  ponds
-  rivers and streams
-  flood plain
-  Tinbrook Aquifer
-  state & county roads

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Conway School of Landscape Design Angela Sisson, Crystal Hitchings, & Joshua Clague
March 2004
GIS Data Source: Ulster County Planning Department

5. Rivers and Streams

The Wallkill River

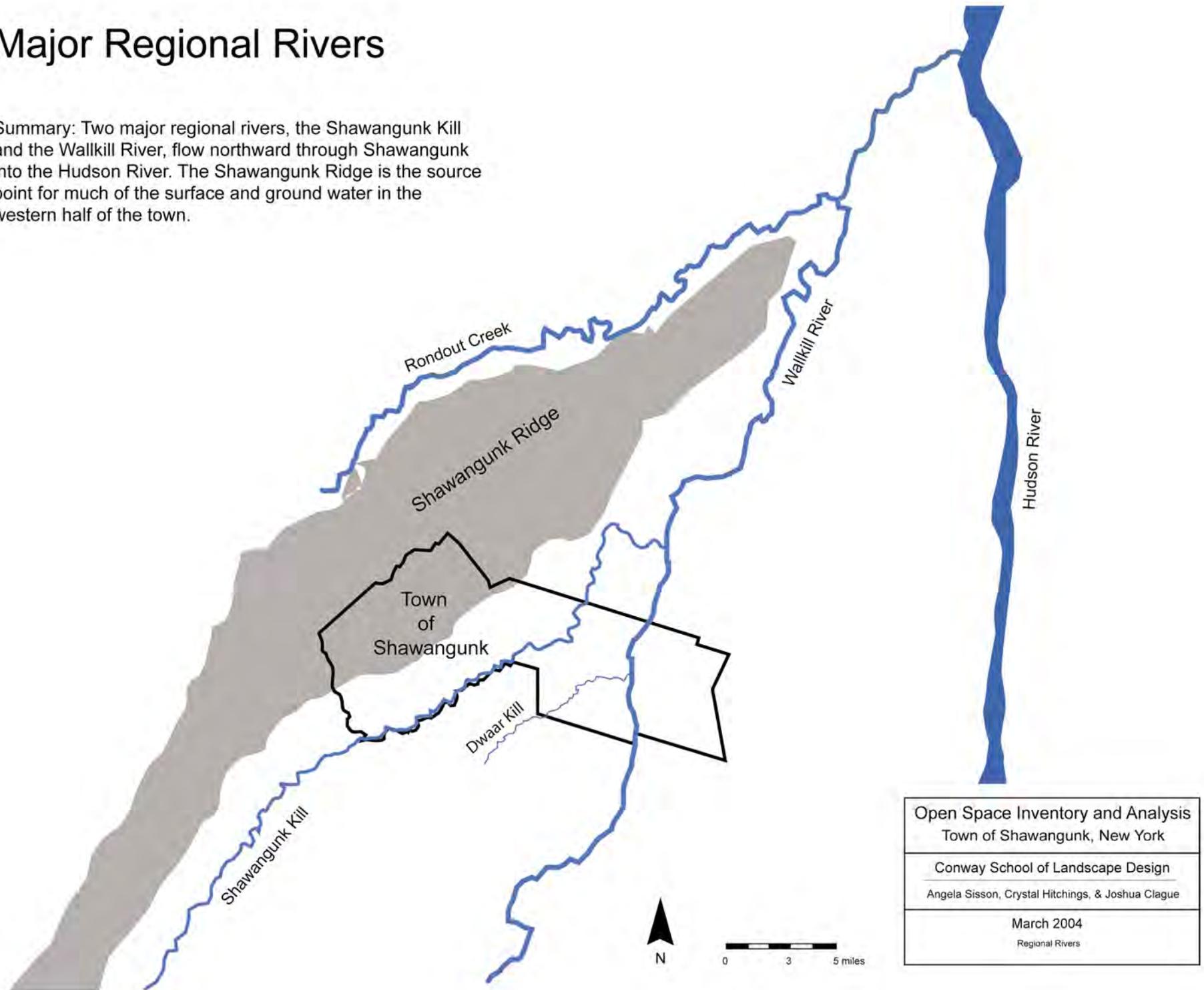
Principal tributaries to the Wallkill River within the town of Shawangunk are the Shawangunk Kill and the Dwarrrkill. The Wallkill's total catchment area in New York is 548 miles. The watershed of the Wallkill River contains intense agricultural lands, urban areas, landfills, and industrial areas, and because the Wallkill is the largest tributary to the Hudson River, it collects water and pollutants from a large area. In Orange County, southwest and upstream from Shawangunk, the Wallkill River runs directly through the region's most valuable agricultural soils, an area referred to as the "Black Earth District." Because of the intensity of agricultural activity close to the river's edge, nutrient levels and water turbidity are generally high.

A biological assessment of the Wallkill River done in 1994 by the NYS Department of Environmental Conservation revealed that the Wallkill River scored "relatively high" to "high" in phosphate-phosphorus, nitrogen and nitrates, sulfates, chlorides, dissolved oxygen, and suspended solids. The Wallkill may be particularly susceptible to pollution because the region's bedrock-derived soils are extremely soluble and allow contaminated surface runoff to directly enter the river. Because the Wallkill runs over porous shale, limestone, and dolostone bedrock, pollution in the river is likely to seep through the bedrock and pollute the groundwater.

This NYS DEC assessment determined that both near and in the town of Shawangunk the water quality may have been impacted enough to limit fish reproduction. The Wallkill River supports a large number of fish species, documented by the NYS DEC at twenty-two species, including some rare fish species. A notable fish species, the eastern mudminnow, is at its northernmost range in southern New York. According to a Hudsonia report, animals at the extremes of their ranges often exhibit great genetic variability and are more vulnerable to natural or human-caused stress (Kiviat, Stevens, Schmidt, and Barbour; 1994).

Major Regional Rivers

Summary: Two major regional rivers, the Shawangunk Kill and the Wallkill River, flow northward through Shawangunk into the Hudson River. The Shawangunk Ridge is the source point for much of the surface and ground water in the western half of the town.



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Conway School of Landscape Design Angela Sisson, Crystal Hitchings, & Joshua Clague
March 2004 Regional Rivers

The Shawangunk Kill

Numerous first order tributary streams flow east off the Shawangunk Ridge into the Shawangunk Kill, which then runs into the Wallkill River. In total, the Shawangunk Kill drains 150 square miles. The Shawangunk Kill's water is relatively unpolluted. Its low nutrient levels and cool water support a regionally rare biological community with high diversities of fish and freshwater clams and mussels, including the rare swollen wedge mussel. Thirty-one species of fish have been documented in this river, including several rare species: the comely shiner, sand shiner logperch, redbreasted sunfish, and margined madtom. The wood turtle and the bog turtle have both been known to live in the riparian habitat and wetlands of the Shawangunk Kill corridor.

An eleven-mile stretch of the Shawangunk Kill is designated by New York State as a Recreational River under the Wild, Scenic, and Recreational Rivers System act. This designation extends from the Orange and Ulster County line where Bruyn Turnpike meets the Shawangunk Kill northeast to the confluence of the Shawangunk Kill and the Wallkill River in the Town of Gardiner. A recreational designation protects the river and its corridor to the extent that no dams or other obstructions may be built within the river, and that all developments or activities within the designated corridor must be in accordance with the purpose of the act and the recreational designation. The protected corridor's width fluctuates to the east and west, according to a careful process of delineation by the NYS DEC. No new point source pollution is allowed on the river, and existing point and non-point sources are required by the DEC to be reduced. All proposals for land changes or developments within the corridor boundaries must be approved by the NYS DEC.

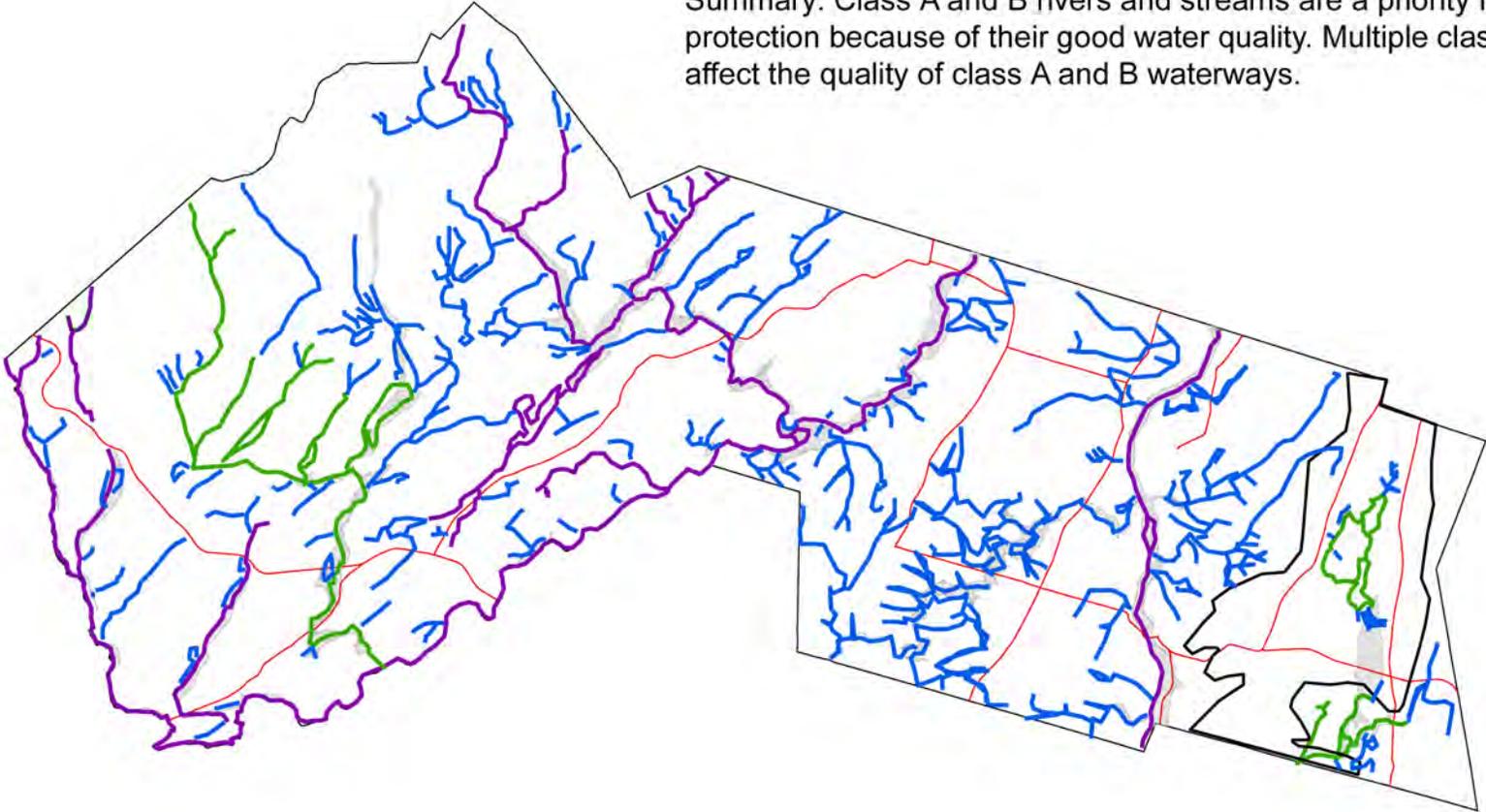


6. Priority Rivers and Streams

Both the Shawangunk Kill and the Wallkill River are Class B waters, along with several major tributaries west of the Shawangunk Kill. West of the Shawangunk Kill, the southern section of the Verkeerder Kill and several tributaries are Class A streams. The only other Class A streams listed on the NYS DEC's stream and river classification maps are two small stream systems in the east of town, one in the north-central part of the Tinbrook Valley Aquifer Recharge Area and one just to the south of the aquifer, touching the southeastern boundary of town.

Priority Rivers and Streams

Summary: Class A and B rivers and streams are a priority for continued protection because of their good water quality. Multiple class C streams affect the quality of class A and B waterways.



- class A streams and rivers
- class B streams and rivers
- class C headwater stream networks
- floodplain
- Tinbrook Valley Aquifer
- state & county roads

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Conway School of Landscape Design Angela Sisson, Crystal Hitchings, & Joshua Clague
March 2004 GIS Data Source: Ulster County Planning Department

7. Wetlands

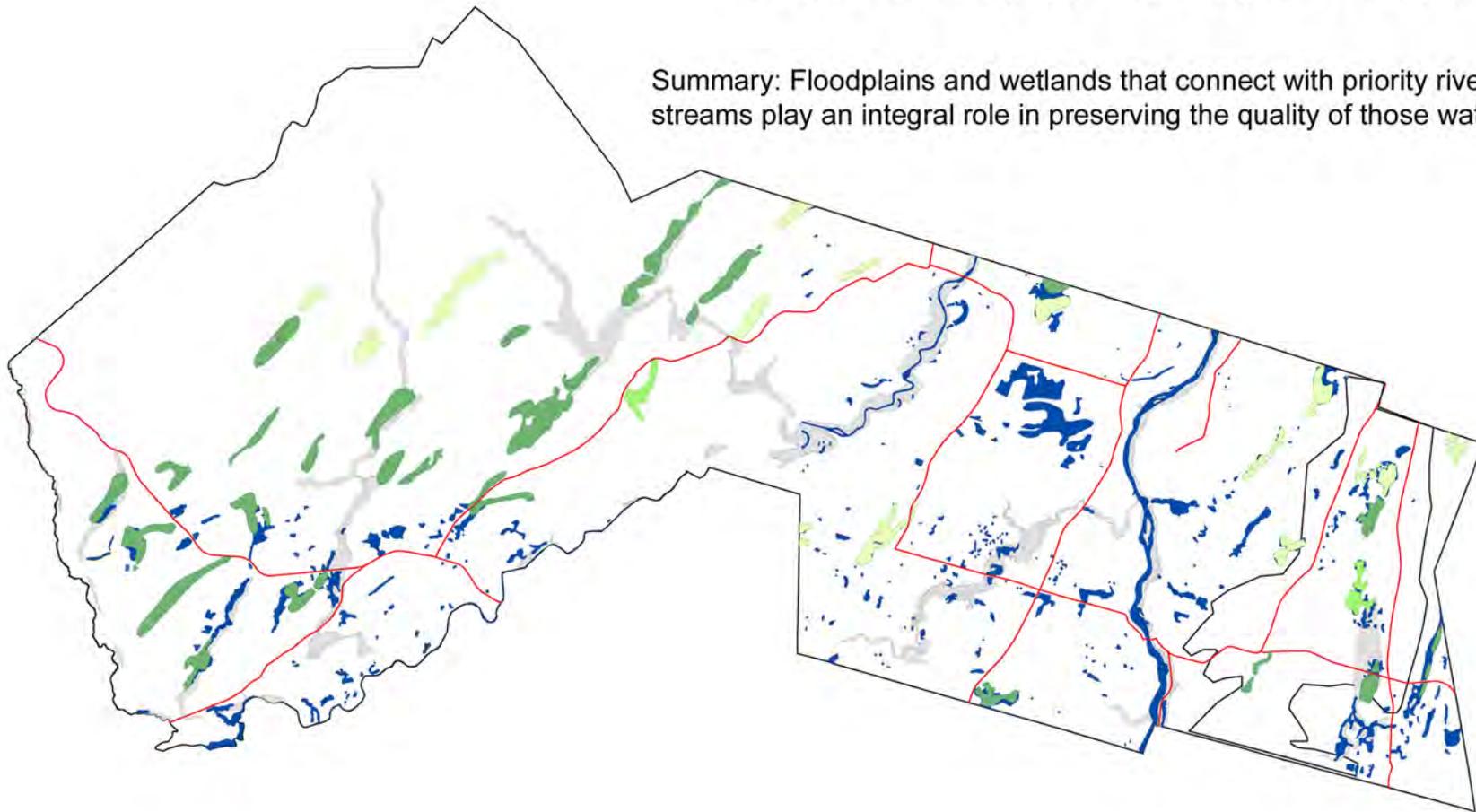
Most of the lakes, ponds, streams, and rivers in Shawangunk are directly associated with a wetland. Wetlands serve many functions in the preservation of water quality. Wetlands slow stormwater runoff and temporarily store the water, protecting downstream areas from flooding. They serve as chemical and biological oxidation basins that cleanse the storm and floodwater as it flows through them. Wetlands collect sedimentation, silt, and organic matter from the water, keeping them from polluting or clogging downstream water bodies. They cleanse water before it enters other water bodies, protecting the quality of the larger water system. Open water associated with wetlands often provides recreational and educational opportunities dependent upon these cleansing wetland functions. Depending on local hydrological conditions, wetlands also contribute directly to the recharging of underground aquifers.

Wetlands under the jurisdiction of the NYS DEC are rated according to their ecosystem benefits, or values. This rating also takes into account the current condition of a wetland. A Class One wetland provides the most benefit while a Class Four wetland provides the least benefit. Only one Class Four wetland occurs in Shawangunk. The majority of state designated wetlands in Shawangunk are Class Two and Class Three wetlands, with several large Class One wetlands. Therefore, NYS wetlands within Shawangunk contribute valuable ecosystem functions, or values. NYS wetlands are at least 12.4 acres in size and are protected by a 100-foot buffer zone. Any disturbance within the wetland or buffer zone requires a permit from the NYS DEC.

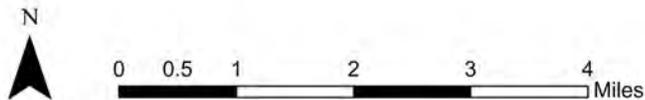
Many wetlands smaller than the state minimum of 12.4 acres are federal wetlands regulated by the United States Army Corp of Engineers. Federal wetlands are classified according to type rather value. All wetlands—federal, state, and otherwise—are important to the maintenance of Shawangunk’s water quality. Their proximity to other water bodies makes them vital to the collection and filtration of storm and flood water, and, especially when associated with priority rivers and streams, an integral part of the water quality protection system. Wetlands included in the final Water Quality Layer are Class One, Two, and Three NYS wetlands and all federal wetlands within 500 feet of a priority river or stream.

Wetlands and Floodplains in Association with Priority Rivers and Streams

Summary: Floodplains and wetlands that connect with priority rivers and streams play an integral role in preserving the quality of those waterways.



-  NYS class 1 wetlands
-  NYS class 2 wetlands
-  NYS class 3 wetlands
-  federal wetlands
-  floodplain
-  Tinbrook Valley Aquifer
-  state & county roads



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March 2004 GIS Data Source: Ulster County Planning Department

8. Floodplains

Like wetlands, floodplains accommodate excessive storm and floodwaters. Downstream flows are lessened when excess waters are allowed to spread out, minimizing erosion and siltation of waterways. Siltation causes turbidity, or the suspension of solids in streams and rivers, which blocks light to water plants, reduces oxygen, clogs fish gills and covers food supplies, and generally degrades water quality for fish and invertebrate habitat. Both the Wallkill River and the Shawangunk Kill and their tributaries have significant floodplains. All floodplains are included on the water quality layer.

9. Recommendations

Careful development planning and land management practices can ensure high water quality for present and future generations of Shawangunk residents.

Riparian Buffer Zones

Nearly every pond, lake, wetland, stream and river in Shawangunk affects another water resource. Because the surface water system is so interconnected, protection of one water body is just as important as is protection of any other water body. The simplest and most effective method of protecting the quality of water in any open water body or wetland is through the preservation or establishment of a vegetated riparian buffer. Many streams and rivers in Shawangunk have inadequate or non-existent vegetated riparian buffer zones, especially within residential and agricultural areas where vegetated buffers would serve the most water quality protection benefits.

Vegetated riparian buffers are areas of native shrubs, trees, and herbaceous plants along the banks of rivers, lakes, ponds, wetlands, and streams that provide a transition between water and human activities. Riparian buffers are complex ecosystems that provide crucial biological services to riparian and wetland communities. Vegetated riparian buffers filter and retain sediments; immobilize, store, and transform nutrient and chemical pollutants from surrounding uplands; stabilize banks and shorelines; reduce erosion; modify water temperatures; and provide water storage and recharge of subsurface aquifers.

The vertical structure and rough surfaces of vegetation and organic litter slows surface water flow, causing sediments in the water to be deposited onto the ground before reaching the water body. Vegetated riparian buffer zones have been found to reduce sediment loads in surface runoff by 90 percent.

Excessive sediments can clog fish gills, bury their food, smother their eggs, and reduce light infiltration to aquatic plants. Excessive sediments can cause water bodies to diminish in size over time, reducing their flood-carrying capacity and increasing their water temperatures. An increase in water temperature can lead to algal blooms and eutrophication of the habitat, or depletion of oxygen, a state detrimental to the health of many water-dependent flora and fauna.

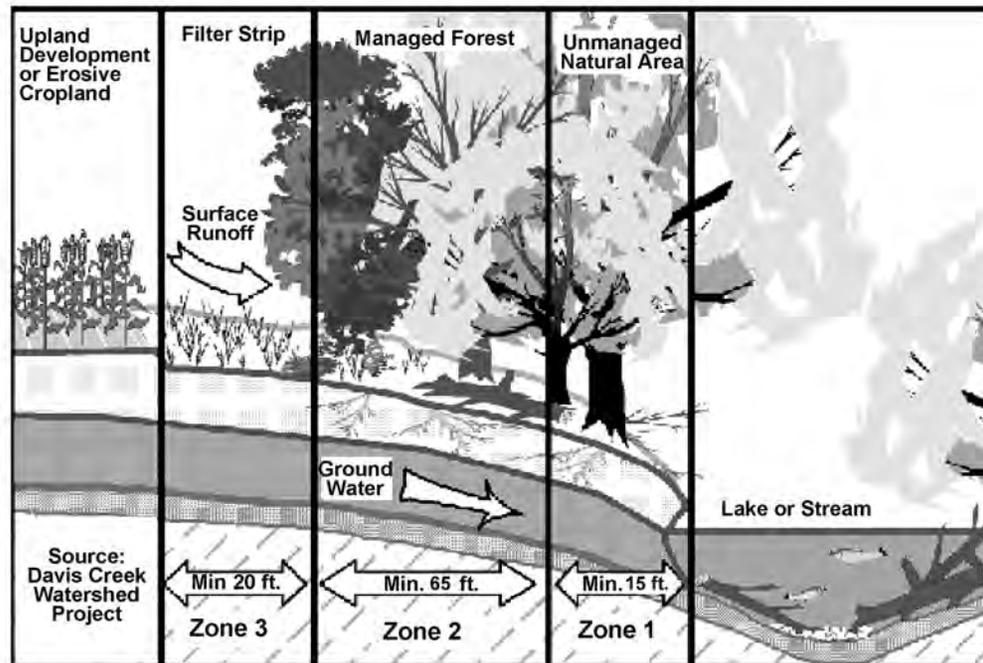
Nitrates and phosphates are fertilizer nutrients occurring in agricultural run-off and can also cause eutrophication of water bodies. Vegetated buffer zones absorb these nutrients, as well as some pesticide and herbicide pollutants, before they reach the water body. Wider vegetated buffer strips are more efficient at removing nutrients. Forested buffers reduce nitrogen loading by 40-100 percent while grass buffers reduce nitrogen loading by only 10-60 percent.

Flood damage is reduced by the presence of vegetated buffer zones because the vegetation slows down the velocity of flood waters and also soaks up excess water through extensive root systems. Because vegetation slows surface water flow, the water is allowed to soak into the ground and recharge groundwater supplies, extending the base flow into the drier summer season. A vegetated riparian buffer zone also allows for natural meanders in the shoreline of a water body, which contributes again to the water-holding, flood-reducing capacities of a water body.

Buffering entire watersheds is recommended, rather than just focusing on larger streams, lakes, and rivers. It is the smaller first and second order headwater streams that most directly influence the water quality of larger water bodies. Forested riparian buffer zones are only effective with the simultaneous implementation of upslope land management practices. Even outside of the riparian buffer zone, development and disturbance should be carefully managed to minimize disturbance to water quality. Water quality can be affected by activities which happen far inland of the actual water body. Floodplains should be incorporated into the forested riparian buffer zone setbacks.

Appropriate riparian buffer strip widths will vary according to site-specific topographical, hydrological, and geological conditions. No uniform answer exists that will adequately protect all riparian areas alike. The key is to create contiguous riparian corridors with no breaks through which concentrated and unfiltered surface water flows may enter. Many studies, including the NYS DEC Proposal to Establish Final River Corridor Boundaries (1993) give numbers which can be used to determine an appropriate vegetated buffer width.

The United States Department of Agriculture's Forest Service and the USDA's Natural Resource Conservation Service suggest that a riparian buffer should consist of three management zones and three height levels. The first management zone, adjacent to the water body, should consist of native, water-tolerant trees and shrubs to provide shade, insect habitat, soil stability, and large woody debris for in-stream habitat. No disturbance whatsoever should be allowed within Zone One. Zone Two is just inland of Zone One and contains native trees and shrubs and other vegetation to filter runoff, and provide uptake of nutrients and pollutants. Within Zone Two, selective tree harvesting is permitted if it is in keeping with the original intent of the riparian buffer zone. Zone Three consists of native grasses and perennials to spread and filter the sediments, nutrients, and pesticides often found in surface water runoff from urban or agricultural areas. Within Zone Three, haying and rotational grazing is permitted. Each of the first two zones should consist of multiple levels of vegetation: a tree canopy, a shrub layer, and a groundcover layer.



Summary: Vegetated buffer zones filter surface and ground water before the water enters lakes and streams.

The USDA recommends a combined minimum of seventy-five-feet for these three zones, with expansion where frequent flooding occurs, where very shallow or erodible soils are present, and on steep slopes (Welsch, 1991, referenced in Schultz, Isenhart, and Colletti). According to the Davis Creek Watershed Project, for maximum sediment and nutrient removal, flood control capacity, erosion control and bank or shore stabilization, the buffer should be one hundred-feet wide. Zone One should be a minimum of fifteen-feet wide, Zone Two a minimum of sixty-five-feet, and Zone Three a minimum of twenty-feet. Where existing conditions allow, wider buffer zones are more desirable for maximum water quality protection benefits.

Low Impact Development/Best Management Practices

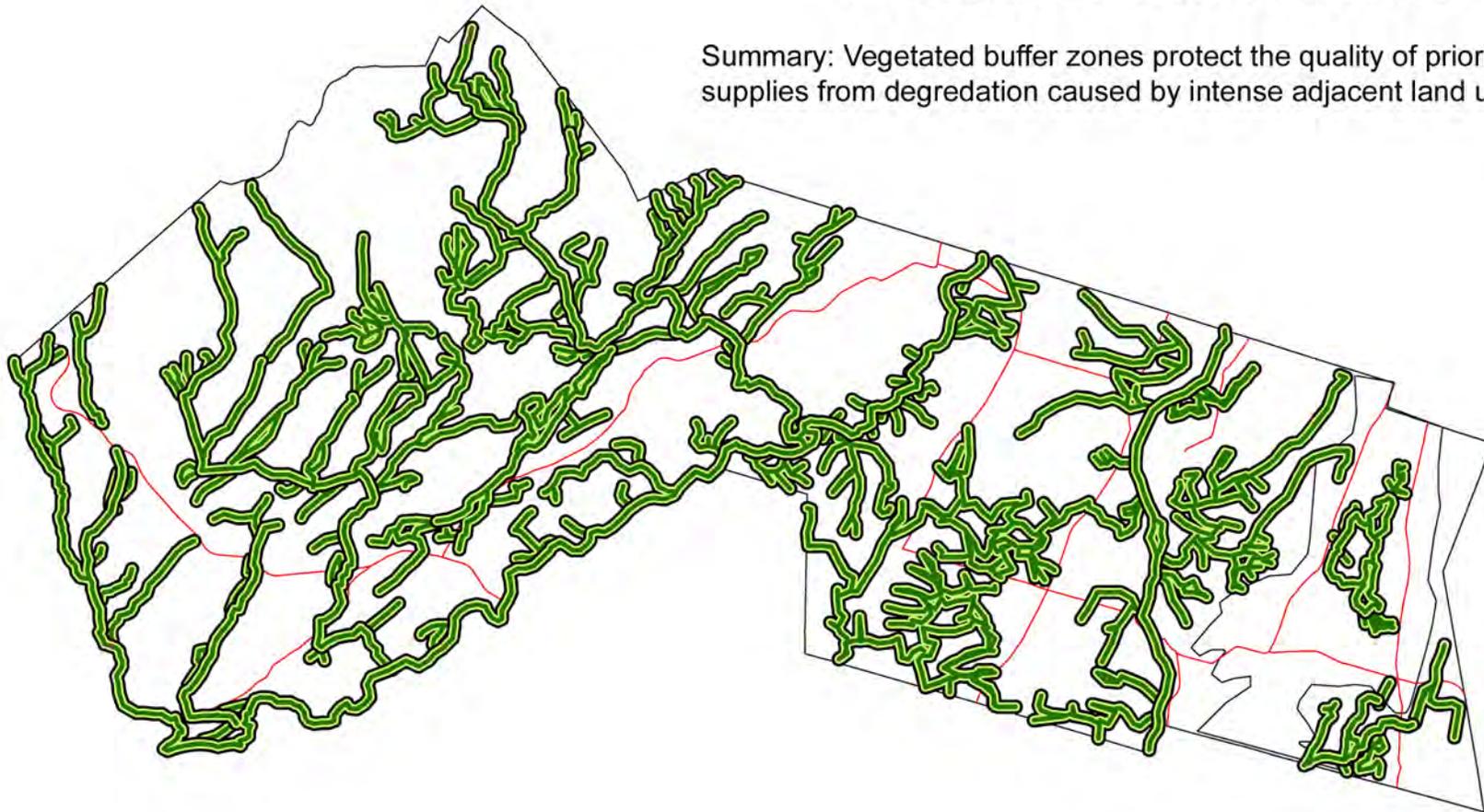
Development within three hundred feet of the bank of any body of water should be analyzed for possible negative environmental effects. If development is permitted, it should follow a low-impact, conservation-oriented design approach. Low Impact Development (LID) is a flexible, site-specific approach to development that combines natural resource conservation, hydrologically functional design, and pollution prevention measures to reduce the effects of development on the pre-existing quality of land, water, and air. LID designs replicate natural watershed hydrology and maintain pre-development water quality and run-off conditions. LID Best Management Practices (BMP's) often incorporate one or more of the following techniques: bio-retention areas; dry wells; cisterns; pollution filter-strips and buffers of (native) vegetation; stormwater ponds and wetlands; and infiltration and sand filters.

The goals of LID design are to preserve open space; minimize land disturbance; protect natural systems and processes; incorporate natural site elements into the design; and to decentralize and minimize storm water at its source. LID designs reduce wetland impacts; reduce downstream erosion; improve groundwater recharge; and reduce development effects on upland habitats.

LID mitigation standards and design approaches, along with other links, can be found by contacting the Low Impact Development Center at www.lowimpactdevelopment.org/.

Priority Rivers and Streams with Protective Buffer Zones

Summary: Vegetated buffer zones protect the quality of priority water supplies from degradation caused by intense adjacent land uses.



Degrees of Riparian Buffer Zone Protection

-  100 foot vegetated buffer zone
-  200 foot light forestry/agriculture buffer
-  300 foot low-impact development buffer
-  Tinbrook Valley Aquifer
-  state & county roads

Open Space Inventory and Analysis
Town of Shawangunk, New York

Conway School of Landscape Design
Angela Sisson, Crystal Hitchings, & Joshua Clague

March 2004

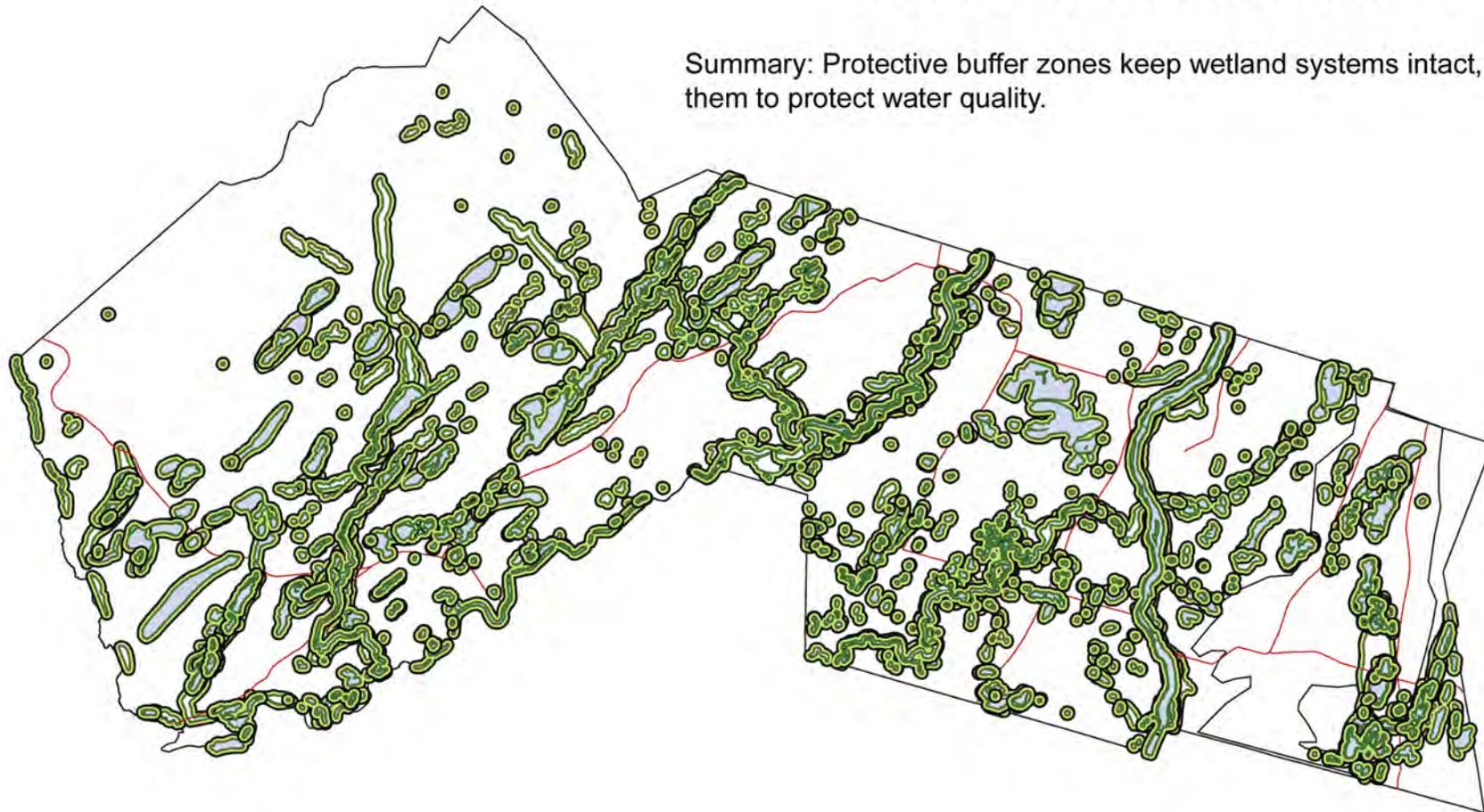
GIS Data Source: Ulster County Planning Department



0 0.5 1 2 3 4 Miles

Wetlands and Floodplains with Protective Buffer Zones

Summary: Protective buffer zones keep wetland systems intact, allowing them to protect water quality.



- 100 foot vegetated buffer zone
- 200 foot light forestry and agriculture zone
- 300 foot low impact development zone
- wetlands
- Tinbrook Valley Aquifer
- state & county roads

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Town of Shawangunk, New York

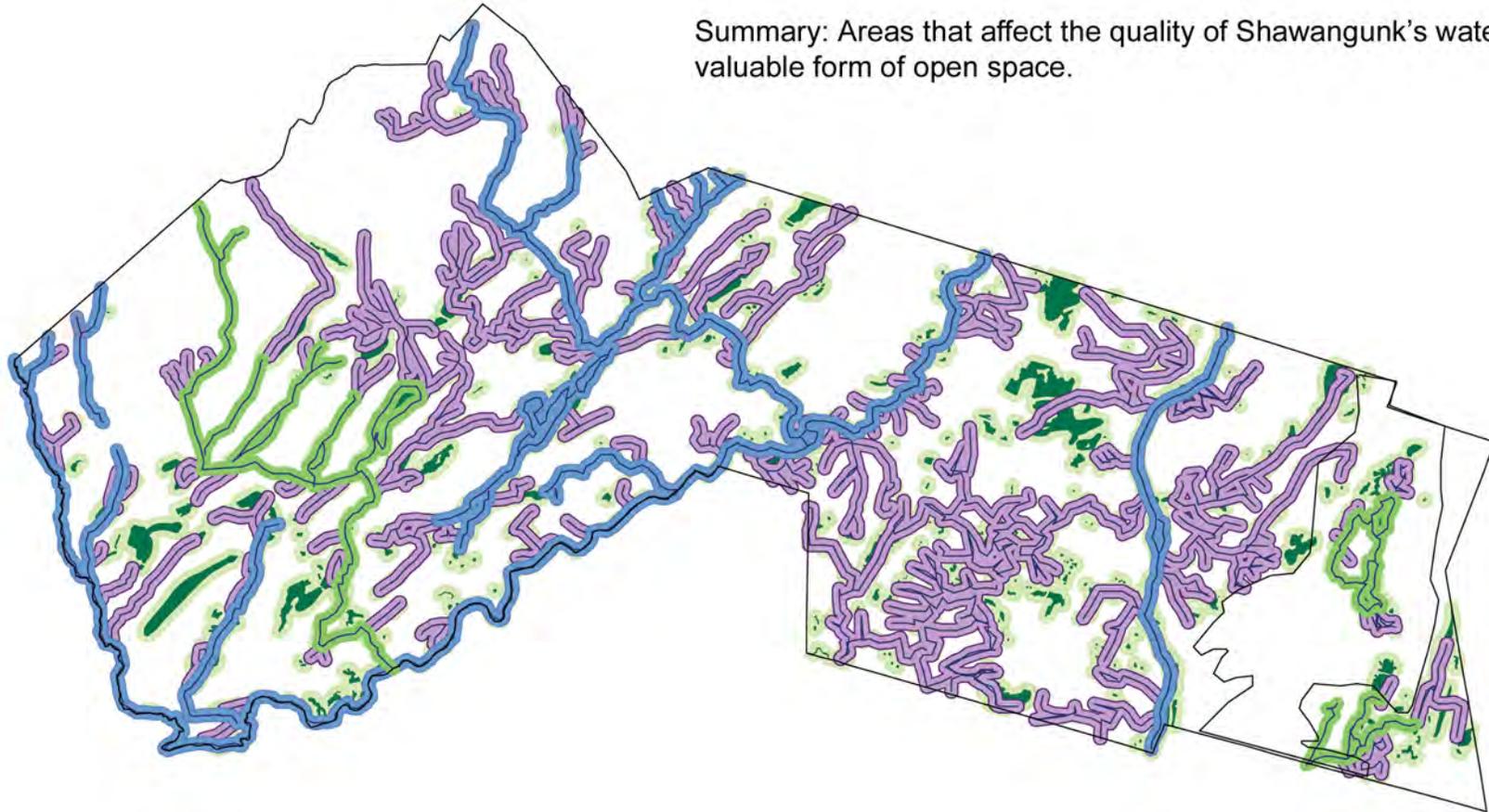
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GIS Data Source: Ulster County Planning Department

Areas Affecting Water Quality

Summary: Areas that affect the quality of Shawangunk's water are a valuable form of open space.



-  Class A streams and rivers with riparian buffer zone
-  Class B streams and rivers with riparian buffer zone
-  Class C headwater streams with riparian buffer zone
-  wetlands in association with priority rivers and streams
-  wetland buffer zone
-  Tinbrook Valley Aquifer



0 0.5 1 2 3 4 Miles

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G. Wildlife Habitat

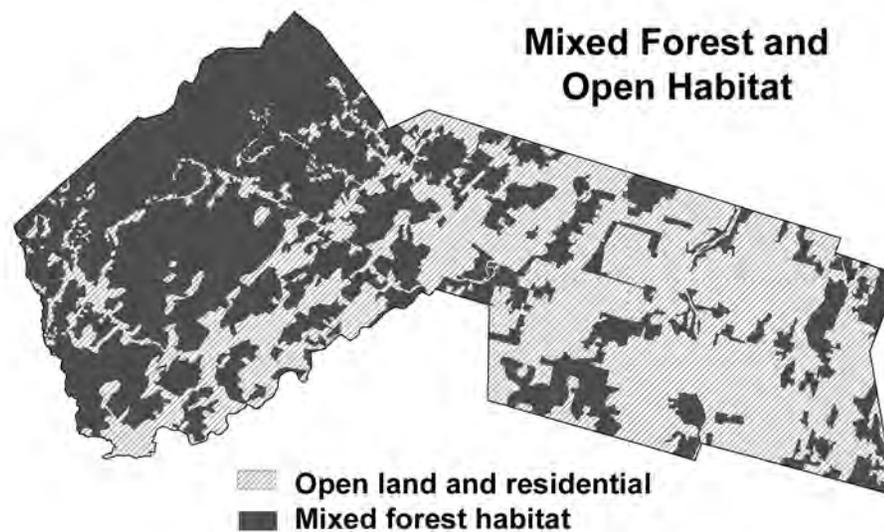
G. Wildlife Habitat

Summary

The town of Shawangunk boasts many diverse and important habitats that support both abundant and rare plant and animal species. Although all wildlife habitat and species are worthy of being protected, not all can be. Priorities must be established as to which habitat types or which species will receive protection. The priority areas of this inventory are habitats that are unusual, that support sensitive or rare species, and are hard to recover once lost, including vernal pools; wetlands in association with open water; wetland clusters; floodplains; contiguous riparian travel corridor; and unfragmented forests in excess of 150 acres. These habitats are included in the wildlife habitat layer.

1. Introduction

Two distinct geographical areas occur within the town of Shawangunk. The western section of town encompasses the unfragmented hardwood forests and rocky slopes of the Shawangunk Ridge and foothills. The central and eastern parts of town within the Wallkill Valley are predominantly flat, open agricultural and residential areas. Within both of these areas, diverse habitat types accommodate a wide variety of wildlife, including many regionally and locally rare species.



2. The Shawangunk Ridge

The Shawangunk Ridge, part of the northern section of the Shawangunk Mountains, runs through the western edge of town. The ridge is considered the most ecologically and aesthetically significant portion of the entire range, and 25,000 acres are in public and private preserves. Low soft-rock terrain and high quartz conglomerates create a dramatic diversity of landforms from rock plateaus to steep white quartz cliffs. A distinctive hard conglomerate and sandstone bedrock, sometimes extending up to six miles wide, forms a base for the area's biological communities. The ridge is characterized by its unique geological features, acidic, nutrient-poor soils, pockets of nutrient-rich soils in rock cracks and ravines, and varying degrees of exposure. The mosaic of slope, elevation, aspect, moisture, and micro-climate leads to a great diversity of habitat types, many of which are common in the Shawangunk Mountains but are rare in the Hudson Valley or northeastern United States. These diverse habitats include cool, clear, nutrient poor lakes, streams, and waterfalls; acidic, boggy wetlands; cliff-and-talus formations; slabrock; ravines; ice caves; pitch pine barrens and dwarf pitch pine plains; virgin forests; and a hawk migration route. A large list of endangered, threatened, special concern, and regionally rare plants and animals are associated with the habitat types found on the Shawangunk Ridge. A very small sample of this list includes the Indiana bat, the golden and the bald eagle, the peregrine falcon, the imperial moth, the ichneumon wasp, the orange bumblebee; and mountain spleenwort, trifold rush, and broom crowberry. Most of the ridge area vegetation within the town boundary of Shawangunk is mixed hardwood forest, including beech-maple mesic forest, hemlock-northern hardwood forest, chestnut-oak forest, and Appalachian hickory forest.

The section of the Shawangunk Ridge within the town of Shawangunk is protected to some extent by an overlay district, called the Shawangunk Ridge Critical Environmental Area.

3. The Wallkill Valley

The Wallkill River formed the Wallkill Valley, which stretches from New Jersey northeast into New York. The central and eastern portions of the town of Shawangunk lie within the Wallkill Valley. Evidence of the area's value as a post-glacial wildlife habitat corridor is found in the diversity of fossilized remains and it continues to be an important corridor for many plant and animal species today, including black bears, bobcats, and migrating hawks. Species from boreal, coastal, and prairie regions converge in the Wallkill region. Calcareous wetlands exist in areas where ridge meets valley, supporting many rare and endangered plant species. Left over from glacial bogs, rich organic soils, known as "black dirt," contribute to the agricultural richness of the Wallkill region. In the town of Shawangunk excellent agricultural soil exists in isolated pockets.

Shawangunk is cut into thirds by the Shawangunk Kill and the Wallkill River. A variety of avian, reptilian, mammalian, and botanical species depend on these rivers for their survival and dispersal. The Shawangunk Kill is a shallow river with a predominance of slack water and a riverbed substrate varying from bedrock to sand and gravel to clay-mud. Several large islands jut up from the river, whose width varies from two hundred to thirty feet wide. The Wallkill River is generally deeper and wider than the Shawangunk Kill with a predominantly sandy bottom. Habitats in both rivers include rocky riffles, undercut banks, and fallen snags.

A variety of habitats in the town of Shawangunk, from fields, streams, hedgerows, thickets, wetlands, marshes, and barns, support a healthy and diverse avian population, including several rare or threatened species. Abandoned agricultural land, with its brushy young growth of twigs and buds several feet off the ground, provides important forage, breeding, and nesting habitat for many mammal and bird species. The Shawangunk Grasslands National Wildlife Refuge boasts several habitat types including wetlands, hardwood forest, shrub, and grasslands. The mission of the Grasslands is to restore and expand habitat to support six species of declining migratory birds that currently or historically occupy the refuge: the northern harrier, the short-eared owl, the upland sandpiper, the grasshopper sparrow, the savannah sparrow, and the bobolink. Other species commonly spotted at the Grasslands include the horned lark, the Henslow's sparrow and vesper sparrow, and the eastern meadowlark.

Ulster County, like many areas of the northeast, was almost completely deforested for pasture and agriculture in the late nineteenth century. By the 1970's, nearly all of Ulster County was once again forest and brush land with an increasing number and variety of wildlife. (The pileated woodpecker, for instance, returned with the forest.) Two imported organisms, the chestnut blight and the gypsy moth, greatly affected the composition of Shawangunk's forests as they returned. The American chestnut, which had been a common forest species, was obliterated after the chestnut blight arrived in the 1920's, leaving a major gap in the wildlife food supply. The gypsy moth temporarily overwhelmed the oak forest at about this same time. The use of DDT on agricultural pests extirpated the peregrine falcon. Increasingly acidic rain began to affect water quality in lakes and streams, and was suspected to interfere in the development of trout and salamander eggs, and to reduce productivity of soils and forests.

The present forest overstory consists of red and white oak, sugar maple, and hickory with pockets of white ash, hemlock, and white pine. On average, the forest is thirty to seventy years old. The forests on the eastern side of town are typically islands interspersed between crop and pasture lands. Although small, these forest-island and open and overgrowing field mosaics provide valuable eco-tone habitat for edge-dwelling species such as voles, shrews, moles, and mice, and provide food sources for predators like red and gray fox, raccoons, owls, and raptors. Abandoned pasture land is growing up with pioneer species such as eastern red cedar, black locust, red maple, broomsedge, goldenrod, Queen Anne's lace, poison ivy, Virginia creeper, chokecherry, elderberry, and sumac. Open meadows are used by the American woodcock, a declining species, for courtship displays, and overgrowing pastures and woodland adjacent to meadows supports the nesting and foraging needs of the woodcock.

The wetter areas in Shawangunk support forests that include hickory, pin oak, slippery elm, ash, ironwood, red maple, and quaking aspen. Along the rivers grow American sycamore and basswood. River otter, muskrat, and mink reside in the rivers and their tributaries. Marshy areas contain cattail, skunk cabbage, reed grass, sedges, ferns, reptiles, and amphibians, with raccoons, muskrats, and beavers residing in the heavily wooded marsh edges.

4. Sensitive Habitat

Wildlife habitat is a crucial resource to protect with an open space designation. Enough wildlife habitat should be protected to fulfill the needs of local animal populations as well as migrating populations. People appreciate and often crave direct and daily interaction with nature, but some degrees of interaction can harm the very nature people seek. Many wildlife species are adversely affected when their habitats are fragmented, encroached upon, or otherwise degraded. Some plant and animal species and some habitat types are more sensitive to disturbance than others. Plant and animal species sensitive to disturbance can disappear, sometimes completely, from highly developed areas as their habitats become more and more fragmented.

All land supports wildlife to some extent. The priorities established for this inventory focus on the protection of habitat types rather than of specific plant or animal species. Priorities for wildlife habitat protection are based on the criteria that the habitats are sensitive to disturbance, that they support sensitive, rare, or habitat-specific species, or that they are difficult to re-establish once lost. Habitat types identified using these criteria include vernal pools, wetlands (especially wetlands in association with open water bodies and wetland clusters), floodplains, river and stream habitats, contiguous riparian travel corridors, and large unfragmented forests. These habitat types occur in both the Shawangunk Ridge area and the Wallkill Valley.

5. Wetlands

An incredible diversity of wildlife species use wetland habitats, either occasionally or solely, including bear, fisher, bobcat, hare, otter, beaver, songbirds and waterfowl, reptiles, and amphibians. Many plants are wetland obligate species, meaning they are especially adapted to survive only in wet areas. These wetland plants capture and utilize nitrogen and phosphates from groundwater runoff and break down organic debris into nutrient rich soils. Wetlands are high in nutrients, add greatly to the biotic output of a habitat area, and contribute energy to the larger food web. Wetlands provide habitat to numerous microbes, insects, and small amphibians, support rare plant and animal species, and support plants and animals dependent on wetland habitats.

There are a number of state-designated Class One and Class Two wetlands in Shawangunk. The lower the class designation, the more the wetland contributes to biological processes such as water quality protection. Class One and Two wetlands often support rare plant and animal species. A Class One wetland occurs within the Tinbrook Valley Aquifer Recharge area, and one occurs near the center of town, just west of the Shawangunk Kill. Class Two wetlands mostly occur to the west of the Shawangunk Kill, while Class Three wetlands spread across the northern section of town.

Federal wetlands are listed according to type. Six major types, each with many subtypes, exist in Shawangunk. The six major types are palustrine emergent, palustrine forested, palustrine scrub/shrub, palustrine unconsolidated bottom, and riverine upper perennial and unknown perennial. Smaller federal wetlands are spread fairly evenly across the town. A clump of larger federal wetlands occurs to the northwest of the Wallkill River.

6. Wetlands Associated With Open Water

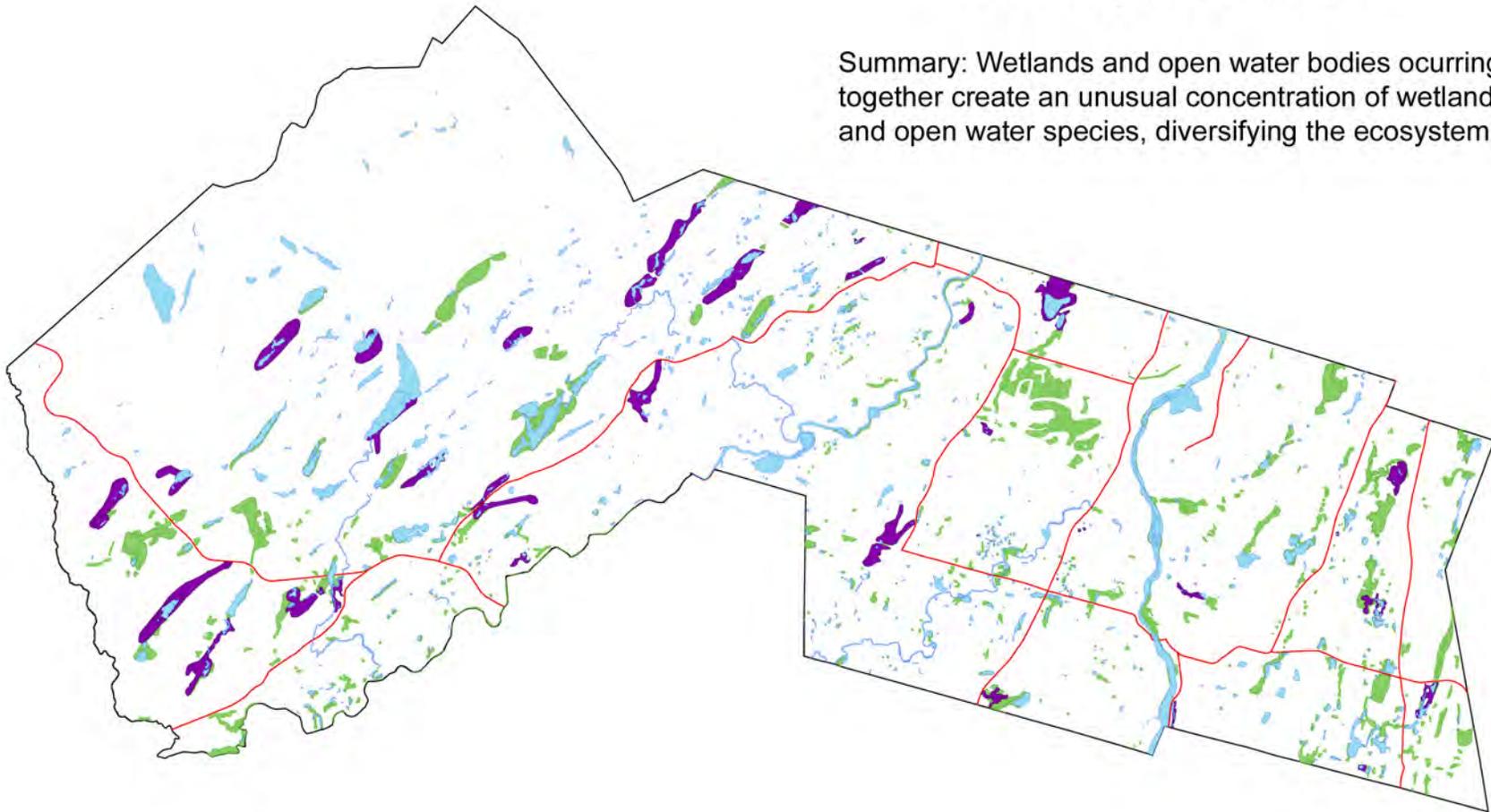
Wetlands and open water bodies are well represented in Shawangunk. Separately, wetlands and open water bodies provide excellent habitat for many species of plants and animals; when these two habitats are close together, wetland and open water species occur in a more unusual proximity, adding to the diversity of the ecosystem. Such habitats have many special values; some wildlife and fish usually found in open water must spend part of their lifecycle in wetlands for reproduction, food, and cover, and the wetlands are also vital in providing natural nutrients to open water ecosystems. Wetlands associated with open water bodies occur frequently in Shawangunk.

7. Wetland Clusters

Wetland clusters are also unusual habitat types because their proximity intensifies local concentrations of wetland habitat and wetland species. Several large wetland clusters occur in Shawangunk to the east, west, and center of town. Many smaller clusters appear on the outskirts of the larger clusters, most often in association with stream systems.

Wetlands in Association with Open Water

Summary: Wetlands and open water bodies occurring together create an unusual concentration of wetland and open water species, diversifying the ecosystem.



0 0.5 1 2 3 4 Miles

-  open water
-  wetlands
-  wetlands in association with open water
-  state & county roads

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Town of Shawangunk, New York

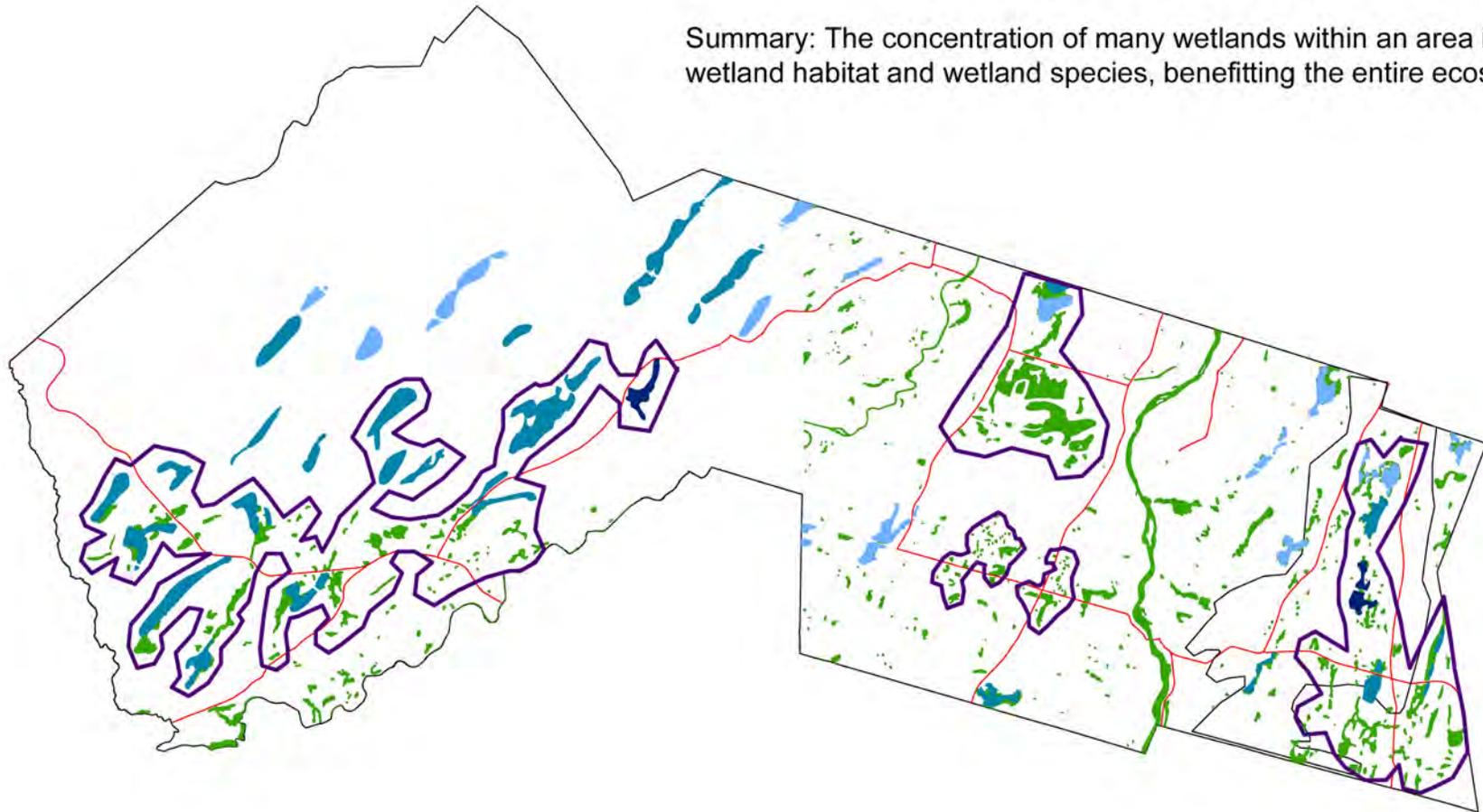
Conway School of Landscape Design
Angela Sisson, Crystal Hitchings, & Joshua Clague

March 2004

GIS Data Source: Ulster County Planning Department

Wetland Clusters

Summary: The concentration of many wetlands within an area intensifies wetland habitat and wetland species, benefitting the entire ecosystem.



- outline of wetland clusters
- NYS class 1
- NYS class 2
- NYS class 3
- nationally designated wetland
- Tinbrook Valley Aquifer
- state & county roads



0 0.5 1 2 3 4 Miles

Open Space Inventory and Analysis
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8. Vernal Pools

Vernal pools support species such as spotted salamanders, wood frogs, and fairy shrimp, which can successfully reproduce nowhere else. Fish predation in larger ponds severely limits the survival of eggs and young of vernal pool species. Fish cannot survive in vernal pools because of their tendency to have low water (or completely dry up during summer months) and low oxygen levels. After emerging from the pools, wood frogs and salamanders spend their adult lives in the surrounding forest, returning to the pools to breed, meaning that adjacent, intact forested areas are an integral part of the success of vernal pool habitats. Spotted salamanders travel an average of 450 feet from the pool, while wood frogs can migrate 1600 feet. Vernal pools support wetland plants that would not normally occur in an upland forest, and provide a feeding and resting place for many small mammals, birds, reptiles, and amphibians. According to B.S. Windmiller of Tufts University, vernal pools contribute significant amounts of food (insects and amphibians) to an environment, affecting the ecology of surrounding forests up to a quarter of a mile from the pool.

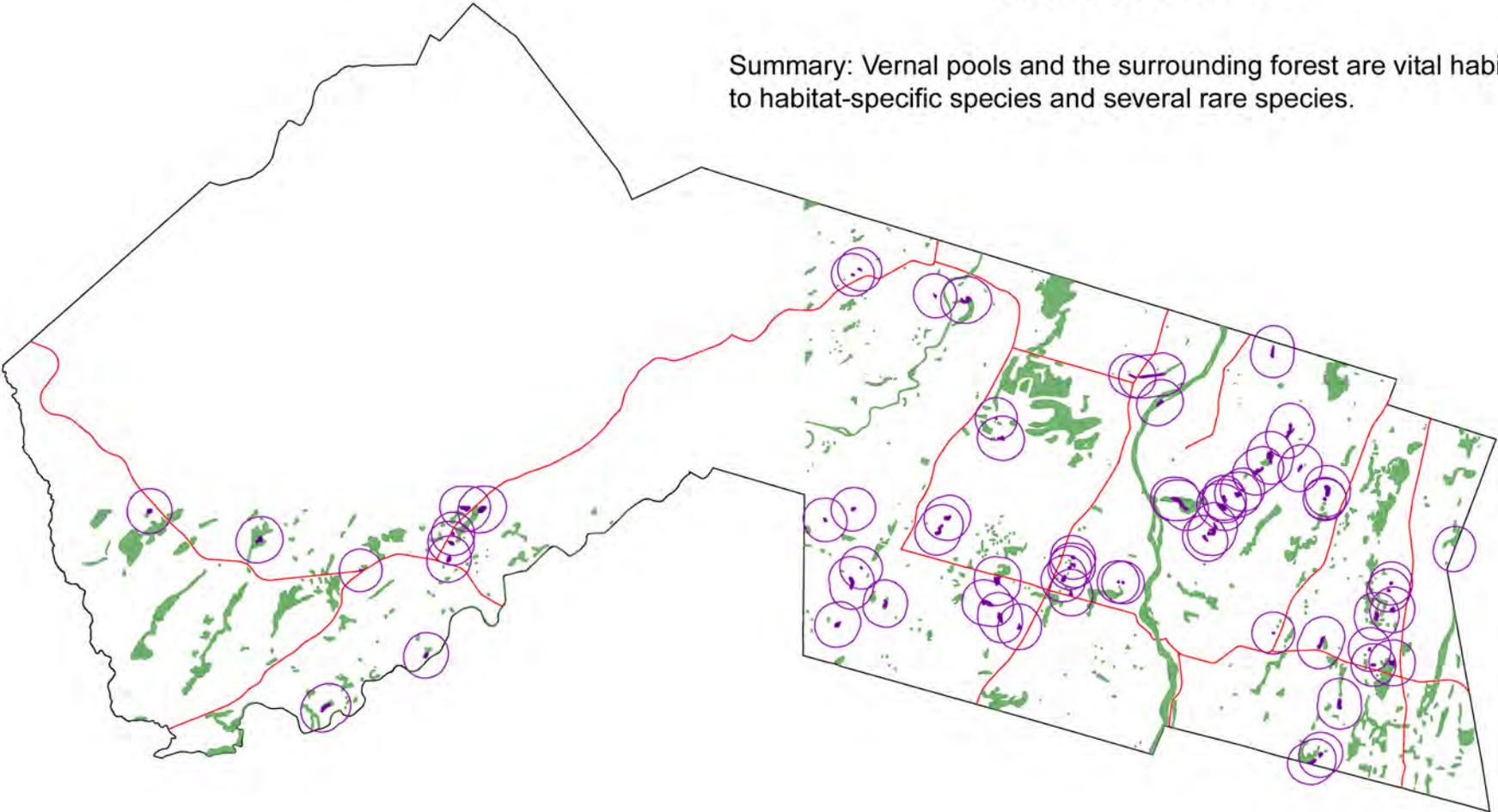
Although vernal pools may be artificially created, the intact forest necessary to the adult lifecycle of vernal pool amphibians is hard to recreate. Even small degrees of fragmentation of forest habitats can make the distances between vernal pools too great for the adults to travel, degrading local populations. Many vernal pool amphibians breed in the same pools in which they hatched and show little tendency to relocate to other pools. According to a study done by the Wildlife Conservation Society, a disturbance of even 25% of the upland forest habitat can be enough to seriously affect the viability of a vernal pool population.

Because of their dependence on one habitat type and their sensitivity to habitat disturbance, many vernal pool indicator species are in danger. The blue-spotted salamander, Jefferson salamander, marbled salamander, and spadefoot toad are on the Special Concern list in New York and many other states. Featherfoil, a vernal pool plant, is threatened. The tiger salamander is endangered in New York State.

Because smaller wetlands are more likely to occasionally dry up, and therefore to not support fish, smaller wetlands have a higher potential for being vernal pools. The NYS DEC regulates wetlands 12.4 acres or larger, leaving most of the smaller wetlands to federal jurisdiction. Federal wetlands potentially providing vernal pool habitat in Shawangunk were identified for this study using the National Wetlands Inventory. According to wetland scientist Bill Latrell of Valley Environmental Associates (Greenfield, MA), palustrine emergent wetlands are more likely than other wetlands to be vernal pools. Palustrine refers to the marshy nature of the wetland, while emergent means that vegetation is growing up out of the water. In combination, these characteristics indicate that a wetland is shallow, again implying the potential for the wetland to occasionally dry out and not support fish. Several large clusters of potential vernal pools exist in Shawangunk, one within the Tinbrook Valley Aquifer, one just to the northwest of the Aquifer, one to the southwest of the Wallkill River, and one to the southwest of the Shawangunk Kill. Along with potential vernal pools, core upland forest habitats of salamanders and wood frogs are included on the vernal pool map.

Vernal Pools

Summary: Vernal pools and the surrounding forest are vital habitat to habitat-specific species and several rare species.



-  1000 foot Vernal Pool Habitat Buffer
-  potential vernal pools
-  nationally designated wetlands
-  state & county roads

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Conway School of Landscape Design Angela Sisson, Crystal Hitchings, & Joshua Clague
March 2004 GIS Data Source: Ulster County Planning Department

9. Rivers, Streams, and Floodplains

Rivers and Streams

Rivers and their tributary streams are vital to habitat-specific species such as fish, turtles and many invertebrates, and water quality plays a large part in the survival of these creatures. Water is very difficult to clean up once polluted, especially when pollution comes from many sources along the river or from undetectable non-point inland sources. Clean-up efforts can take many years and be expensive and labor intensive. If rivers and streams are clean, all efforts should be made to keep them clean.

Low nutrient levels and cool water in the Shawangunk Kill support a regionally rare biological community with high diversities of fish and freshwater clams and mussels, including the rare swollen wedge mussel. Studies done by Hudsonia and the NYS DEC document thirty-one species of fish in the Shawangunk Kill and twenty-two species of fish in the Wallkill River, including several rare species, the sand shiner logperch, redbreasted sunfish, and the margined madtom (Kiviat, Stevens, Schmidt, and Barbour, 1994; Pierce, 1978; NYS DEC, 1981).

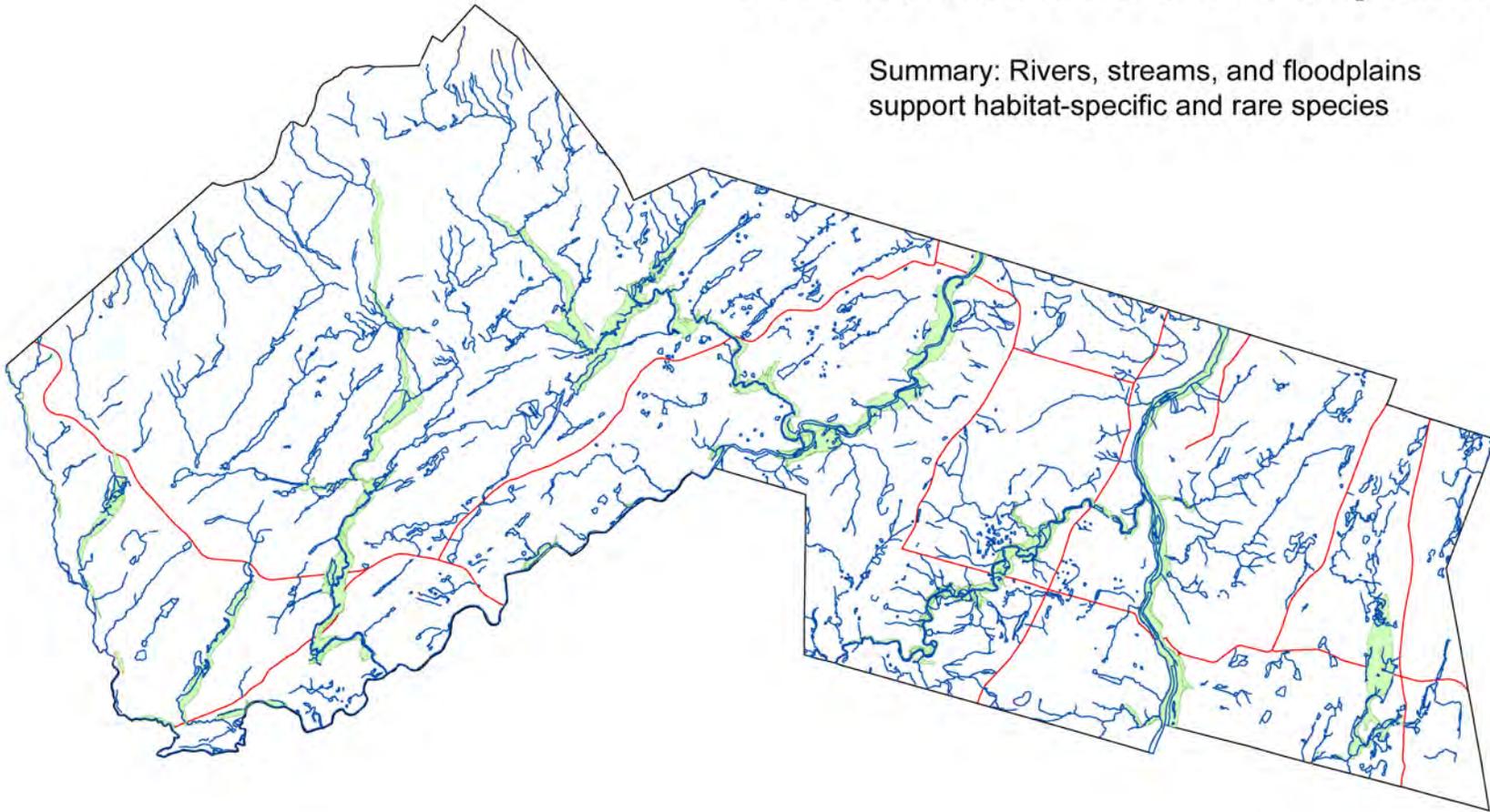
Floodplains

The floodplains of rivers are critical habitats to many rare plant species and some rare animal species. Floodplains also provide important flood-management functions to downstream habitats of both wildlife and humans.

Several rare plants are documented by Hudsonia and the NYS DEC to exist in the floodplains and riparian zones of these rivers and their tributaries, some of which occur because of the region's calcareous soils. These rare plants include statewide rare species (cattail sedge, Davis' sedge, red-rooted flatsedge, violet bush clover, river birch, small-flowered agrimony, small white aster, watermeal, and winged monkeyflower) and regionally-rare plants (Asa Gray's sedge, Torrey's rush, clammy cuphea, green dragon, ground-cherries, ninebark, swamp loosestrife, tumbleweed, water-hemp, and squarrose sedge). The rare wood turtle and the endangered bog turtle have both been known to live in the riparian habitat and wetlands of the Shawangunk Kill corridor.

Rivers, Streams & Floodplains

Summary: Rivers, streams, and floodplains support habitat-specific and rare species



0 0.5 1 2 3 4 Miles

- rivers and streams
- floodplain
- state & county roads

Open Space Inventory and Analysis
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10. Contiguous Riparian Travel Corridors

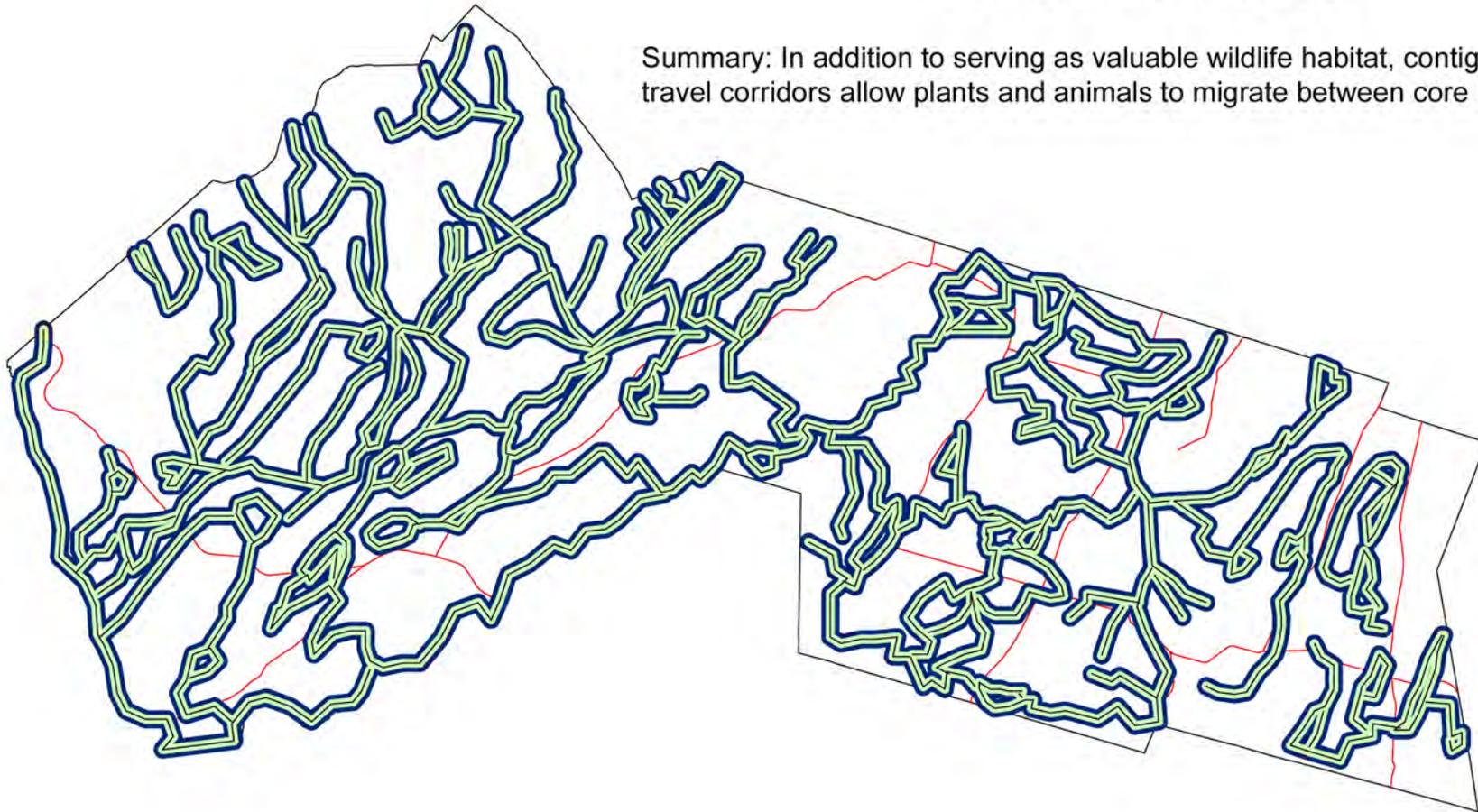
An important consideration for any viable wildlife habitat is connection between core habitat areas. Wildlife species must be able to migrate through the landscape, and most species need contiguous travel corridors that are unobstructed by development and other disruptive land uses. Rivers and streams provide a naturally contiguous connection as the swaths of vegetation along them provide the upland habitat necessary to allow plants and animals to move through the landscape. A minimum vegetated corridor of one hundred to three hundred feet is suggested to accommodate large mammals and some bird species (Croonquist and Brooks, 1991, cited in Klapproth, 2000), while six hundred feet is recommended where heron rookeries or bald eagles are present (United States Department of Agriculture Natural Resource Conservation Service, 1996, cited in Klapproth, 2000). The amount of forested riparian travel corridor actually needed depends on the particular species being provided for. The wider a forested corridor is, the more plant and animal species will be able to use the corridor.

Many of the streams, wetlands, ponds, lakes, and rivers in Shawangunk are highly connected, offering several riparian corridor migration routes. But many of the water bodies, especially the streams and rivers, are left with extremely narrow vegetated buffers against open agricultural fields. These narrow strips of vegetation hinder the migration of plants and animals that require protective cover, shade, or undisturbed soil, or a larger range. Existing vegetated travel corridors are not contiguous because they are broken by development or agricultural openings, a barrier that is too great for many species to traverse.

Contiguous travel corridors are vital to the dispersal and continued viability of many species, and once fragmented by development, are nearly impossible to replace at an adequate width. Riparian travel corridors could serve double functions by protecting river and floodplain habitats at the same time as providing contiguous corridors for wildlife habitat and dispersal.

Contiguous Riparian Travel Corridors

Summary: In addition to serving as valuable wildlife habitat, contiguous riparian travel corridors allow plants and animals to migrate between core habitats.



0 0.5 1 2 3 4 Miles

- contiguous travel corridor along rivers and streams
- 250 foot buffer
- 500 foot buffer
- state & county roads

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GIS Data Source: Ulster County Planning Department

11. Unfragmented Forests

Intact forests unfragmented by roads and development are rare. These unfragmented forests are vital to the local survival of large and far-ranging mammals such as bobcats and bears, and are also vital to many plant and bird species. Larger, unfragmented forests provide interior forest habitat. This interior habitat is crucial to the survival of interior plant and animal species sensitive to disturbance, predation and competition, such as the American marten, fisher, scarlet tanager, oven bird, and the red-eyed vireo, whereas edge habitats support more adaptable species such as fox, rabbits, robins, and hawks.

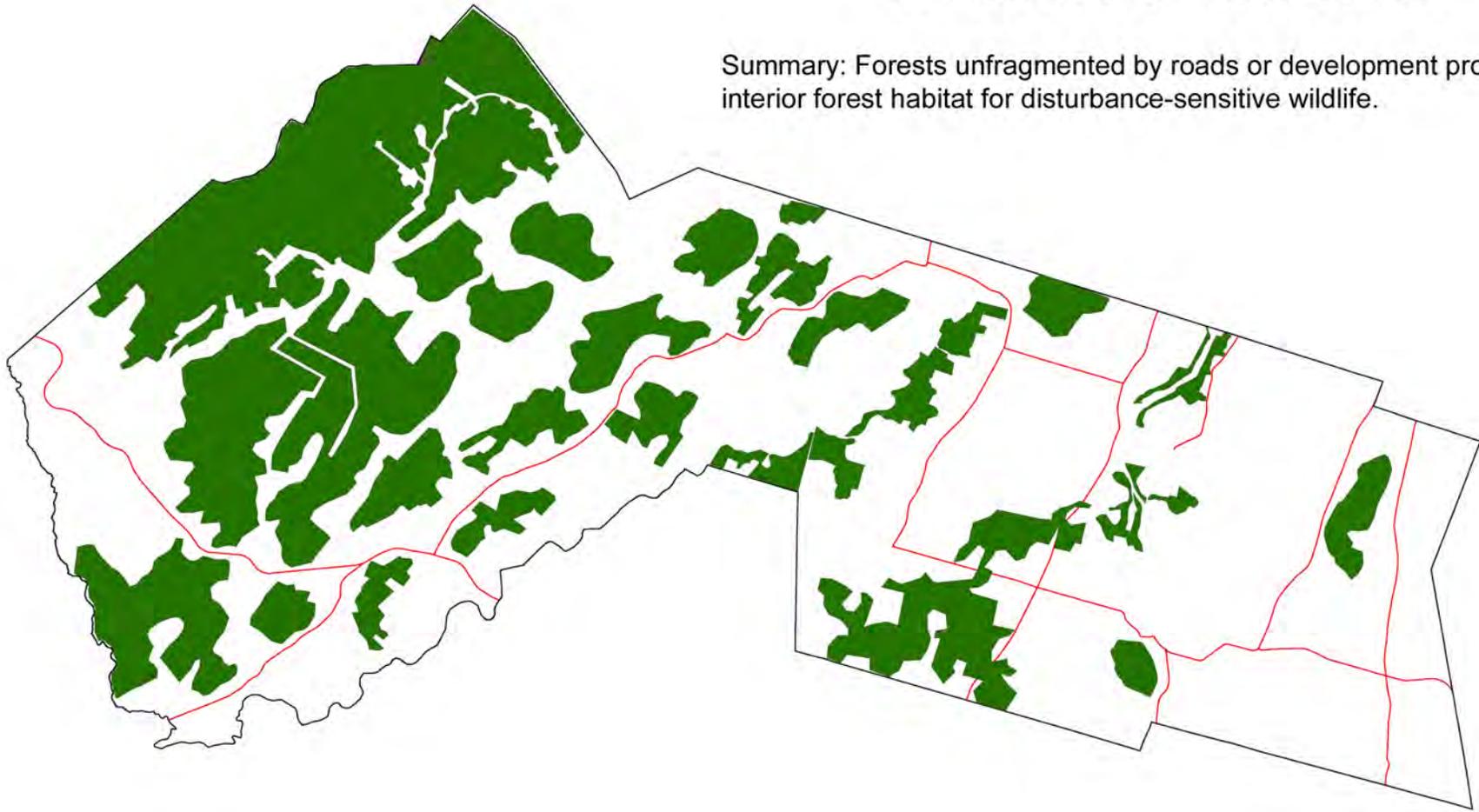
Very little core forested habitat remains in Shawangunk, especially in the eastern half of town. Most of the forest has been fragmented by agriculture into small islands of forest and wetlands surrounded by a sea of agricultural fields. There is little or no connection between these forest islands, and, especially in the eastern half of town; these isolated forest areas are not large enough to sustain a high diversity of wildlife species.

A large area of unfragmented forest remains in the northwestern section of Shawangunk. Many smaller areas of unfragmented forest exist toward the middle and east of town, including a thin strip along the Shawangunk Kill and a patch on the Wallkill River. Two small forests less than 150 acres along Shawangunk's north-central boundary are part of larger forested areas in the town of Gardiner.

Large areas of unfragmented forest provide habitat to far-ranging and disturbance-sensitive plant and animal species, including some rare and uncommon species. Once altered by roads or development, such forests are impossible to replace. Within developed and agricultural areas, patches of intact forest provide vital core habitat areas that are otherwise absent for a great distance over the landscape. Especially in conjunction with meadows and old-field habitats, and with connective vegetated corridors, forest islands can help wildlife species to persist in the landscape despite high development and habitat fragmentation.

Unfragmented Forest Habitat in Excess of 150 Acres

Summary: Forests unfragmented by roads or development provide vital interior forest habitat for disturbance-sensitive wildlife.



0 0.5 1 2 3 4 Miles

 unfragmented mixed forest habitat
 state & county roads

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GIS Data Source: Ulster County Planning Department

12. Recommendations

Careful land-use planning and best management practices can find a middle ground between habitat preservation and habitat destruction. Education and low-impact recreation can usually be incorporated into wildlife habitat preservation areas. Rather than preventing a human population from inhabiting a landscape rich with forests, wetlands, vernal pools, and riparian corridors such as the one just described, planned development incorporating hamlets and clusters of dwellings into a matrix of wetlands and woodlands and farmlands will provide the scenic and recreational amenities that humans crave.

Wetlands

Wetlands are vital to habitat specific species and to migrating open-water dependent species, are important habitat extensions to forest species, and are also important in overall eco-system functions. Because wetlands are difficult to replicate artificially, existing wetlands should be protected. Wetland clusters and wetlands in association with open water are especially important to consider. Individually, state designated Class One and Class Two wetlands are the most valuable, but Class Three wetlands should not be discounted without field testing. The reason for the class designations is not given for each wetland, making their individual importance unknown without further investigation. Federal wetlands should receive equal consideration to state wetlands; their small size and large number often makes them unique and vital additions to an eco-system. State and federal laws offer some protection, but more protection should be considered by the town to protect their vital wildlife habitat resources.

The recommendations of this inventory suggest that all wetlands be given three 100-foot buffer zones within which different degrees of protective measures would be implemented. Immediately around the wetland, no development or disturbance should occur within the first 100-foot buffer zone, and natural vegetation should be allowed to return or persist. Within the second 100-foot zone, selective forestry and chemical-free agriculture could be allowed and careful consideration should be given to all development and land use change proposals. Within the third 100-foot zone, intense development and intense land-use change proposals should be carefully evaluated. No point-source pollution should be allowed within these areas.

Vernal Pools

Vernal pool species depend on intact surrounding forest for a successful life-cycle completion. Existing vernal pools should be field-identified. The areas around these pools should be protected from fragmentation and natural vegetation should be allowed to return or persist. Recommendations in a study done by the Wildlife Conservation Society suggest a protective buffer of 750 feet around all viable vernal pools. The Audubon Society of New Hampshire suggests 1,000 feet. Wherever possible, and where wood frogs are present, a greater undisturbed forest buffer creates potential for a healthier vernal pool habitat. The pool depression itself should be completely undisturbed. The first 100 feet immediately surrounding the pool should be protected completely from all disturbance and pollution, with a natural and intact forest canopy. Critical terrestrial habitat for nesting, foraging, hibernating, and dispersing extends outward from the pool for at least 750 feet. This area should be maintained as minimally disturbed forest habitat with an intact understory. Selective timber harvesting is allowable within this critical terrestrial habitat zone, but minimal forest floor disturbance is required, and no roads or large clearings should be created.

Rivers, Streams, and Floodplains

Recommendations for the protection of river, tributary stream, and flood plain habitats suggest varying degrees of protective vegetated buffer zones. Forested riparian buffer zones create much needed terrestrial habitat for wildlife, including plants, birds, reptiles and amphibians, and small and large mammals. Forested buffers provide corridors for migration of plants and animals from one habitat core to another.

Within the first one hundred feet of the stream bank, no disturbance or development should occur and vegetation should be allowed to mature into forest. Vegetation protects the banks from erosion, and therefore the water from siltation and degradation of fish habitat. Organic debris from forested buffers contributes to the food chain within a water system, supporting microorganisms and fish alike. The forest canopy controls water temperatures, which must remain cool to support most aquatic plants and animals. Downed woody debris creates small dams, which create pools of water that are integral to the fish habitat of a stream or river. Low overhanging branches also create dark, cool, camouflaged areas for fish to inhabit. Riffles caused by downed woody debris caught in stream and river systems oxygenate the water, also directly benefiting fish and aquatic plants. Turtles, snakes, and frogs often use caught woody debris for basking perches.

Within the second 100-foot protective zone, selective forestry and non-chemical use agriculture are allowable, with careful consideration of their effects on the river. Within the third 100-foot protective zone, development and land use changes should be carefully evaluated for their effect on water quality and therefore fish/invertebrate habitat. No point-source pollution should be allowed within any of these protection zones. Within floodplains, and especially where rare plants and animals are documented or are likely to exist, natural vegetation should be allowed to return or persist, with only minimal forestry allowed.

Contiguous Riparian Travel Corridors

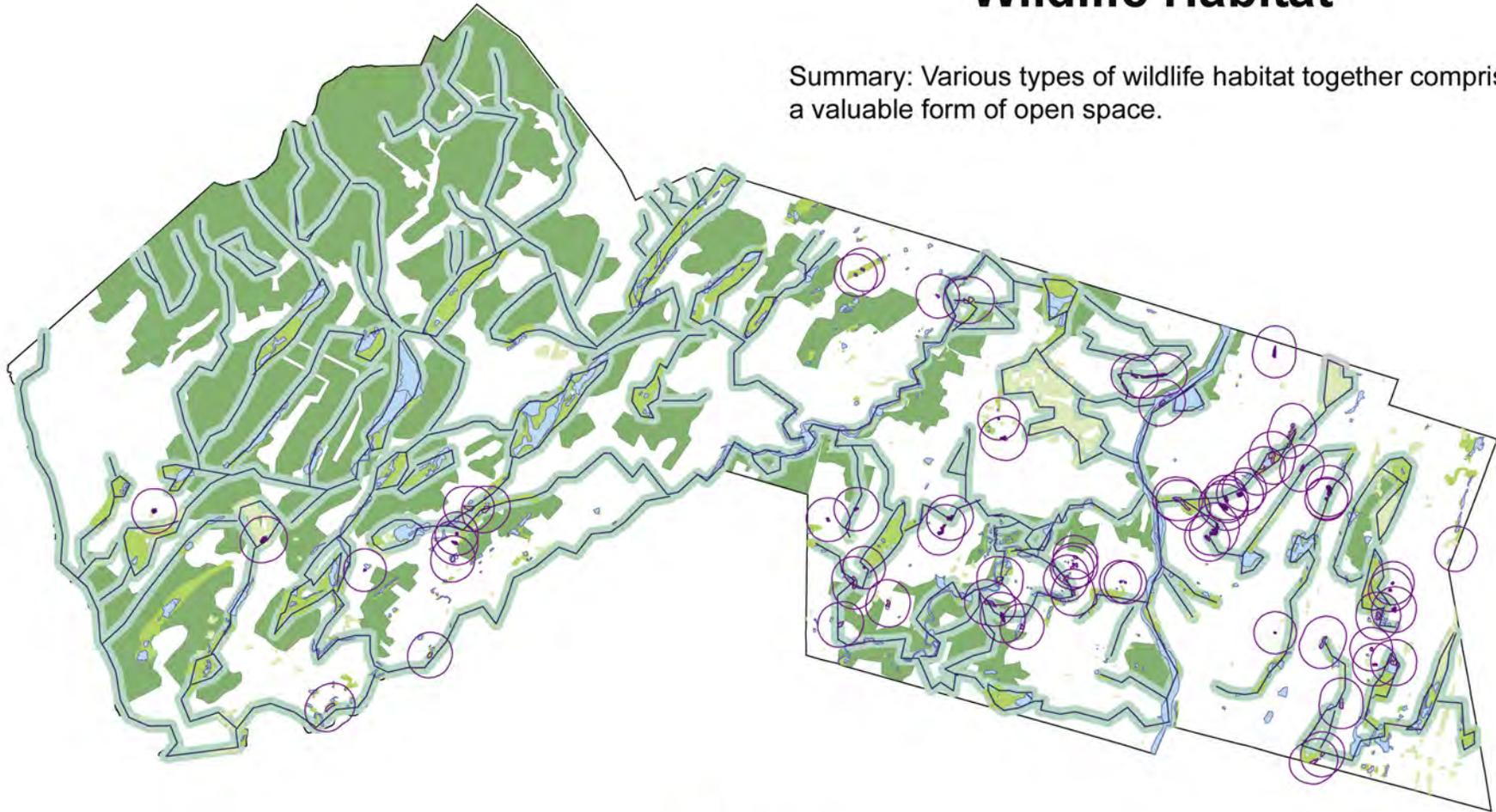
Riparian travel corridors should be protected. Wider corridors will accommodate and therefore benefit more species. Some studies suggest 500 to 600 foot widths for optimal wildlife use. Widths implemented will depend on the types of species that might use the corridors. In areas where large or extremely sensitive species roam, or to connect core wilderness areas, 600 feet of vegetated travel corridors are advisable. In areas where less sensitive and smaller species and birds will mainly use the corridors, 100 to 300 feet of vegetated corridors will suffice. Within these less sensitive travel areas, selective forestry and light residential development can be compatible with the protective cover and dispersal habitat requirements of wildlife.

Unfragmented Forests

Protection recommendations suggest preserving as many large intact forests as possible, especially those potential wilderness areas in excess of 500 acres and large forested islands within agricultural and residential areas. Core wilderness areas should be large enough to support the life cycles of sensitive and far-ranging species such as bear and bobcat, and, if that is not possible, should be connected by corridors to other core wilderness areas. Connective corridors and supporting habitats such as wetlands, meadows, old fields, and open water should always be incorporated into the protection plan for unfragmented areas. On a limited basis, selective and carefully managed forestry could be compatible with and sometimes beneficial to unfragmented wilderness and forest-island habitat.

Wildlife Habitat

Summary: Various types of wildlife habitat together comprise a valuable form of open space.



- vernal pools
- 1000 foot Vernal Pool Habitat Buffer
- wetlands in association with open water
- open water
- wetland clusters
- contiguous riparian travel corridor
- buffer of riparian travel corridor
- unfragmented forest



0 0.5 1 2 3 4 Miles

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Town of Shawangunk, New York

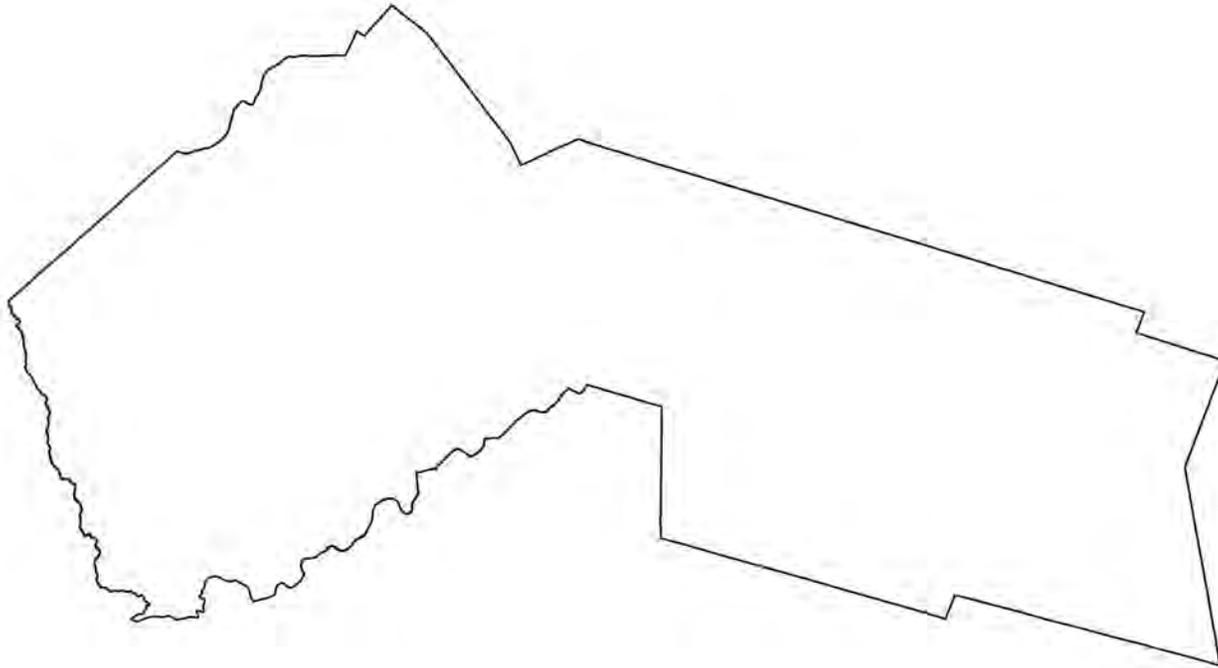
Conway School of Landscape Design

Angela Sisson, Crystal Hitchings, & Joshua Clague

March 2004

GIS Data Source: Ulster County Planning Department

Section 4: Using the Planning Tool



Section 4: Using the Planning Tool

1. The Layering Process

Identifying and analyzing existing open space is a necessary step in the process of guiding development within Shawangunk. Each category of the analysis section – agriculture, scenic roads, historical sites, recreation land, water quality, and wildlife habitat–provides valuable planning information. This section of the report focuses on how combining information from each analysis will assist planners in prioritizing the protection of open space.

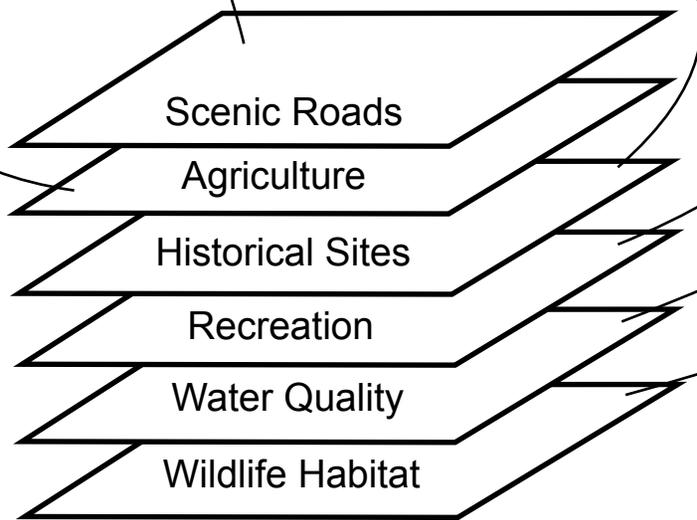
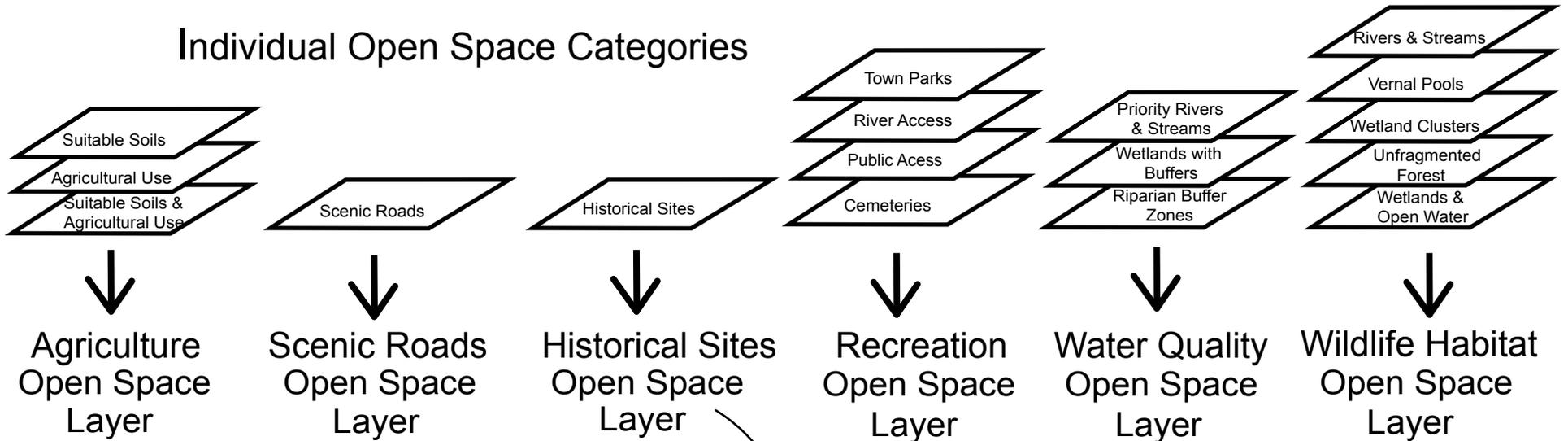
Within each open space category, analysis of several components is required. For instance, within the wildlife habitat category, vernal pools, travel corridors, wetland clusters, open water, and unfragmented forests were each analyzed for habitat value. The results of each analysis were mapped, and the map patterns combined to create a layer. The final map or layer from the analysis of each open space category is used in the initial planning process. The color was removed from each map and replaced by an identical shade of gray. In the following pages layer maps representing the six open space categories are shown in gray. The inset on each layer map shows the final or composite map from each category prior to color and road removal.

These gray layers become the planning tool. When two or more layers are combined, the shades of gray darken where they overlap. The white areas show where no open space categories are present. The darkest areas show the presence of the most open space categories, highlighting areas of priority for open space conservation. When all six layers are used simultaneously, the resulting composite will offer a comprehensive picture of open space in the town.

After reviewing the open space composite, each individual gray layer can be analyzed, with its components, for a more in-depth understanding of the specific categories that make up the composite. Reference to the analysis and recommendations section of this report will help planners determine how open space preservation of the different categories could be approached. With careful planning, open space preservation and new development can co-exist.

Diagram of Open Space Layering Process

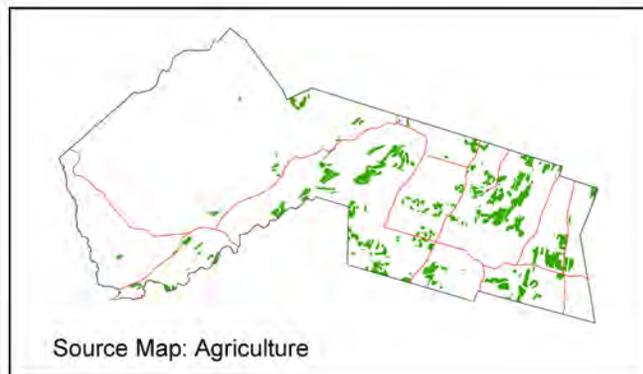
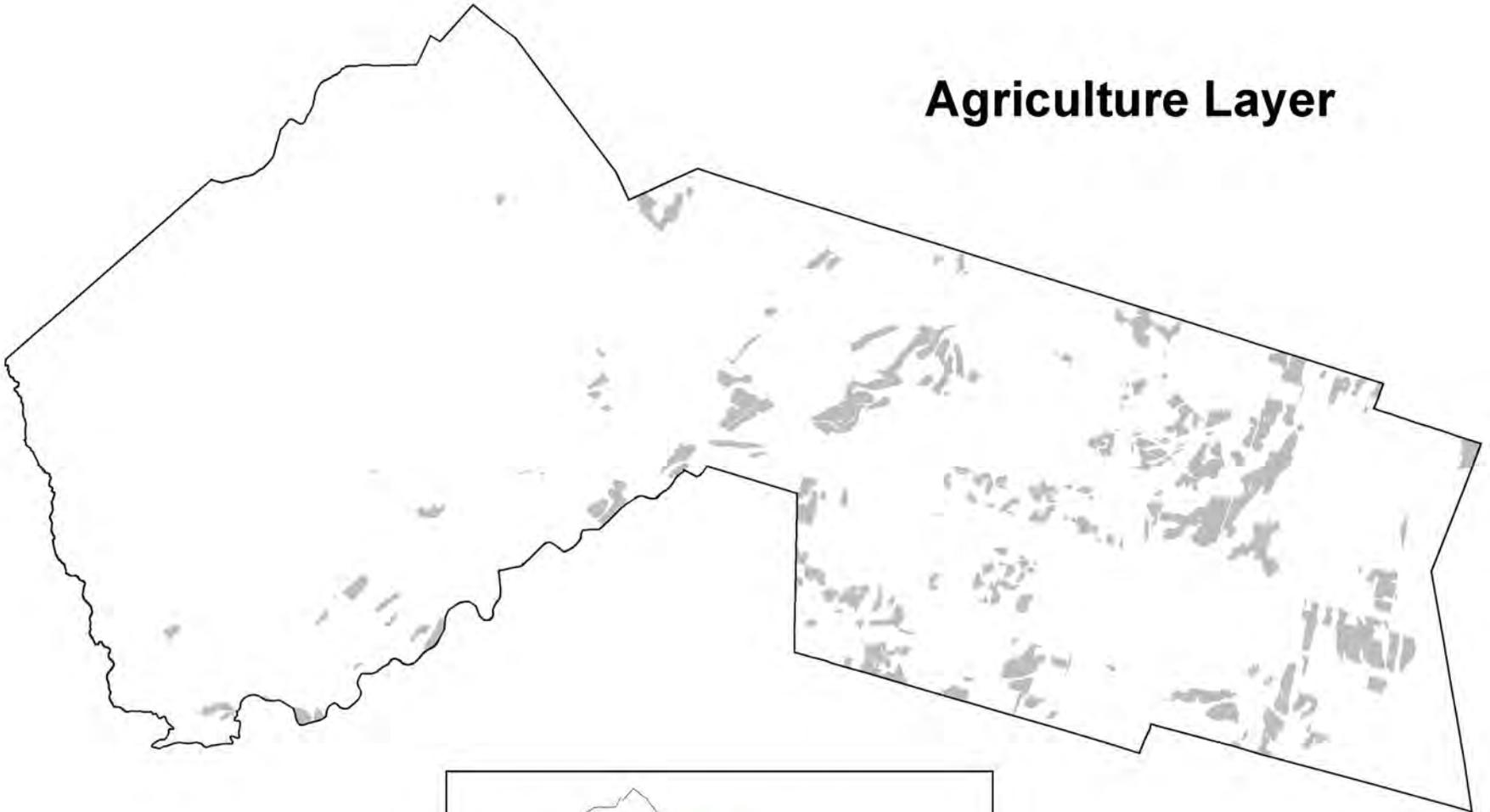
Individual Open Space Categories



Composite of Open Space Layers

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Conway School of Landscape Design Angela Sisson, Crystal Hitchings, & Joshua Clague
March 2004 Layering Diagram

Agriculture Layer



0 0.5 1 2 3 4 Miles

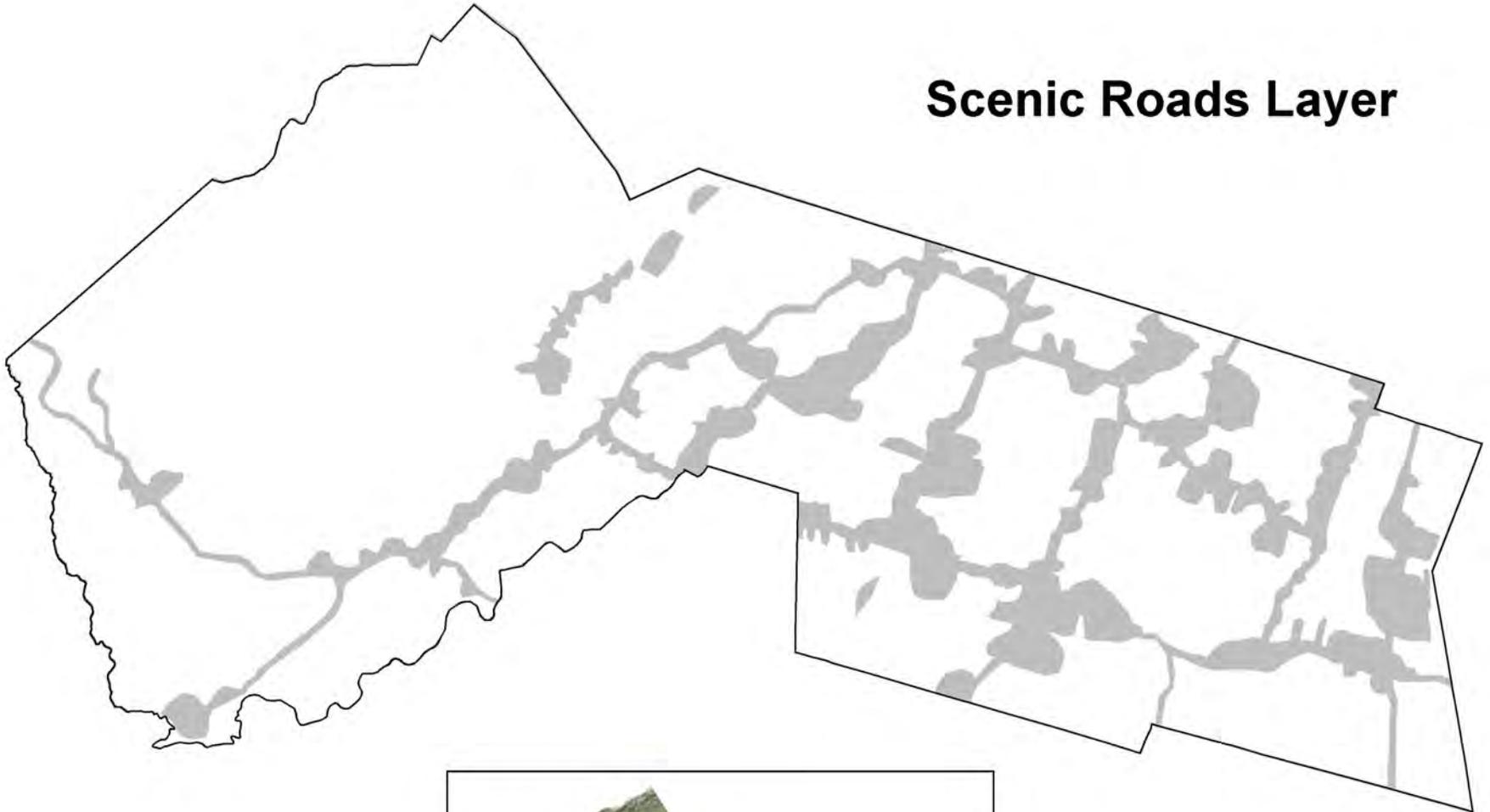
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GIS Data Source: Ulster County Planning Department
Additional Source: USDA Soil Survey-Ulster County, New York

Scenic Roads Layer



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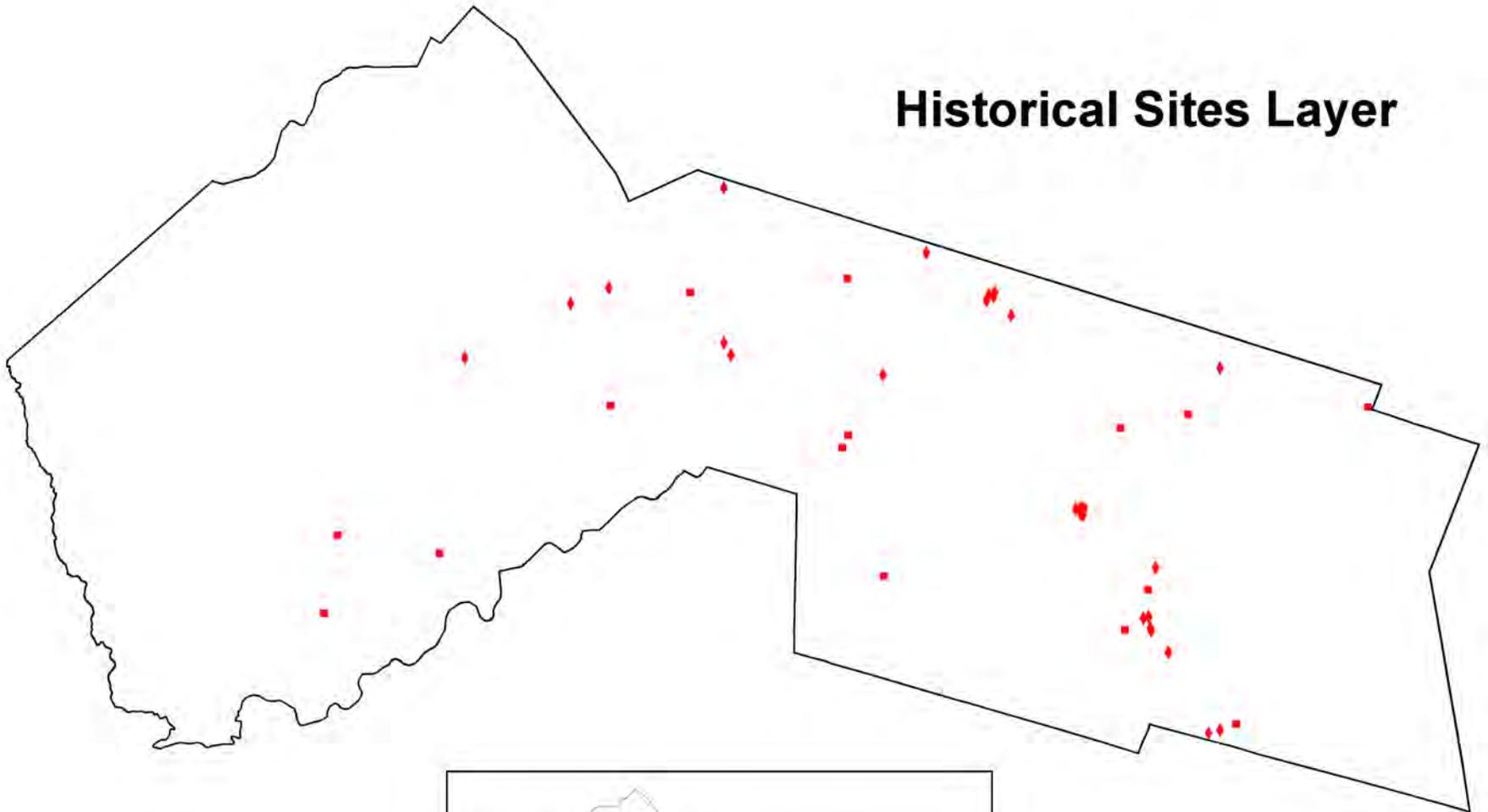
March 2004

GIS Data Source: Ulster County Planning Department
Additional Source: United States Geological Survey



0 0.5 1 2 3 4 Miles

Historical Sites Layer



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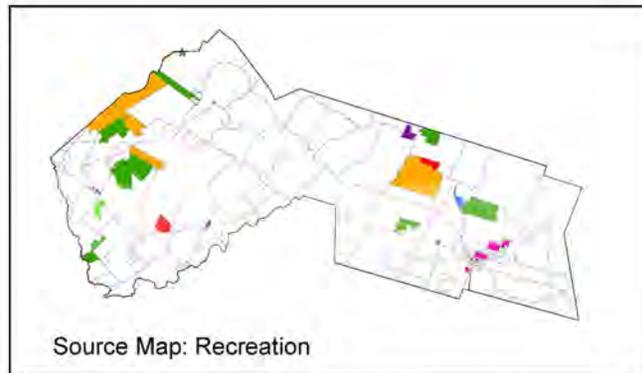
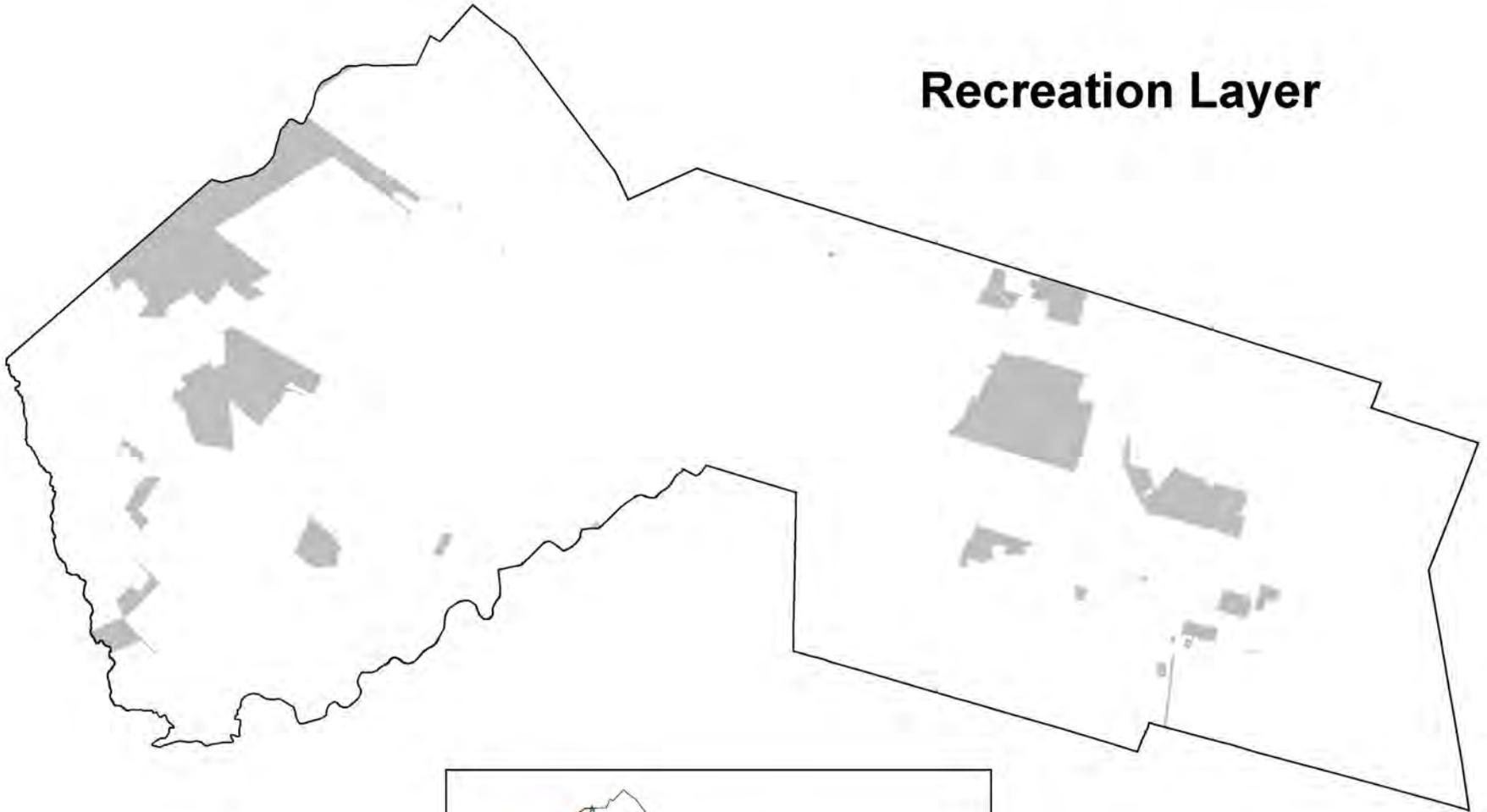
March 2004

GIS Data Source: Ulster County Planning Department



0 0.5 1 2 3 4 Miles

Recreation Layer



0 0.5 1 2 3 4 Miles

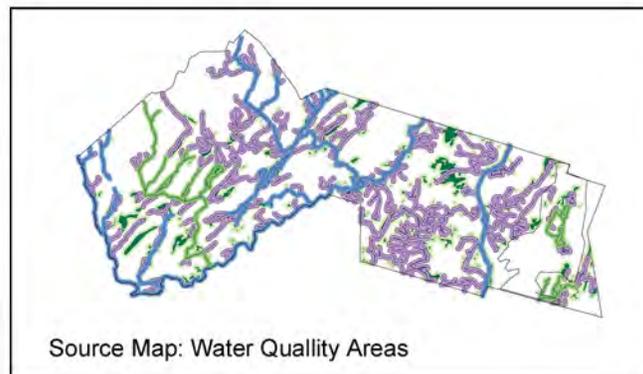
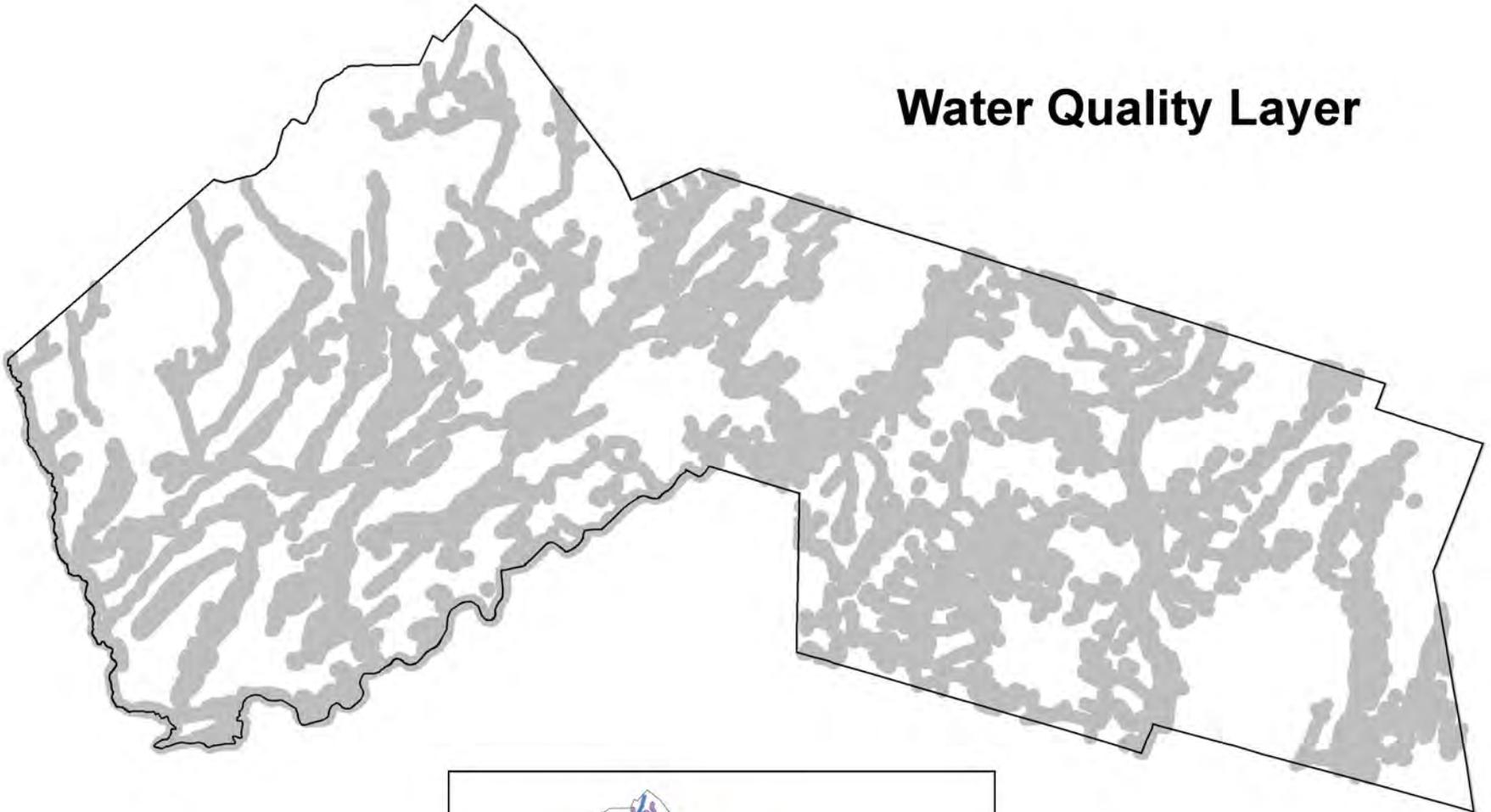
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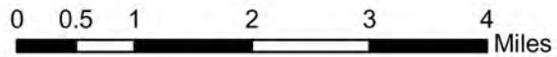
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GIS Data Source: Ulster County Planning Department

Water Quality Layer



Source Map: Water Quality Areas



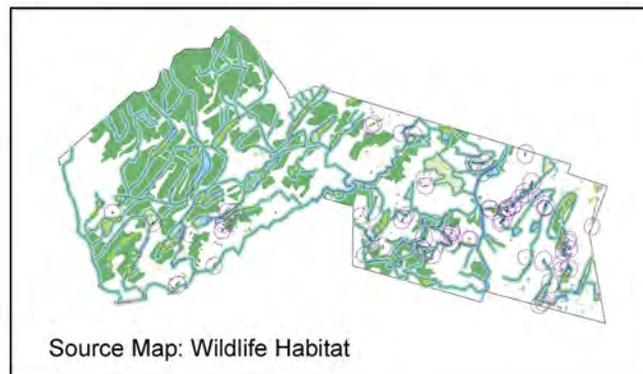
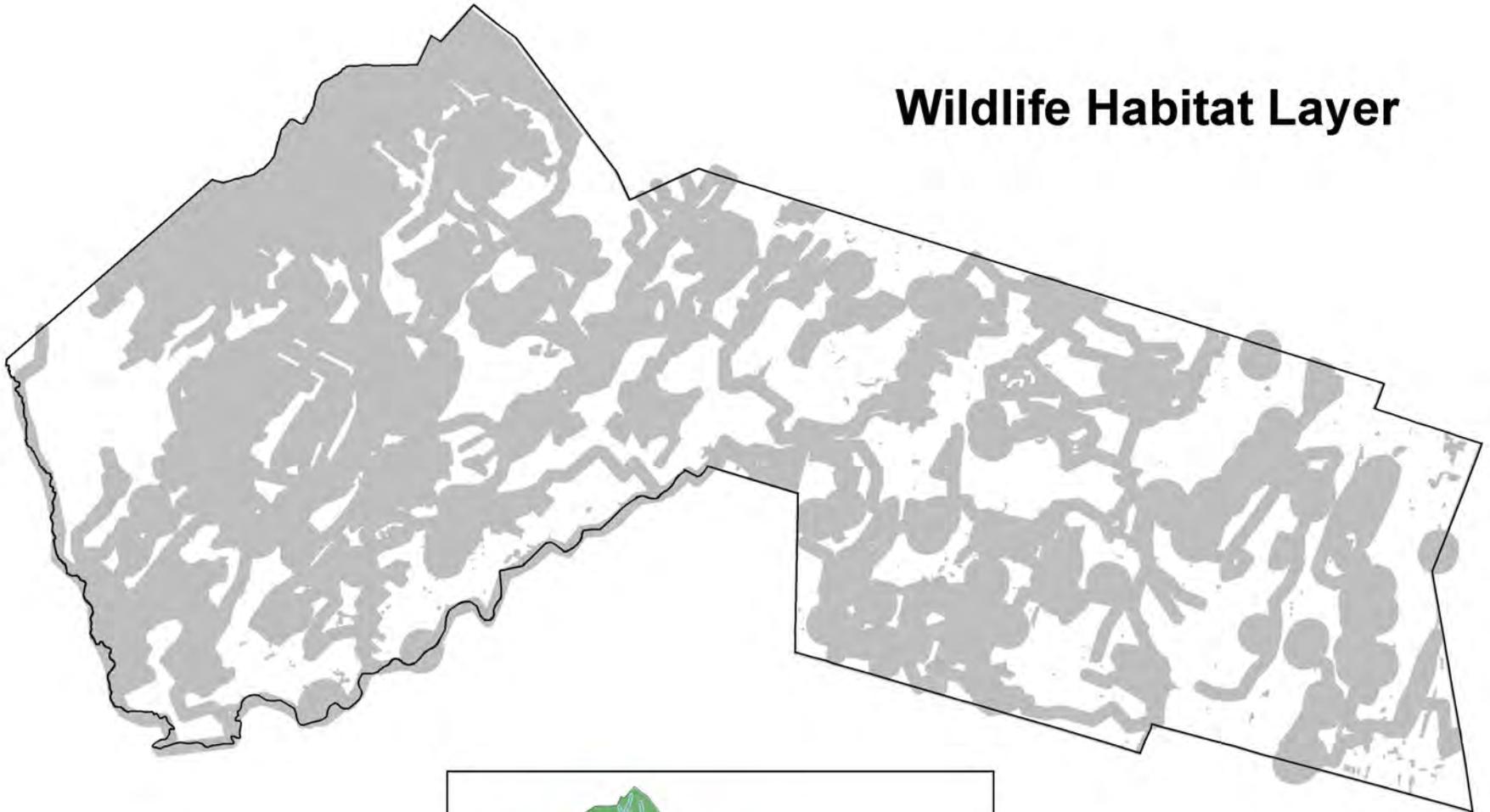
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Wildlife Habitat Layer

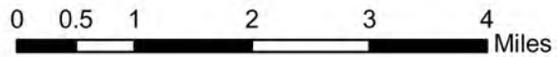


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Town of Shawangunk, New York

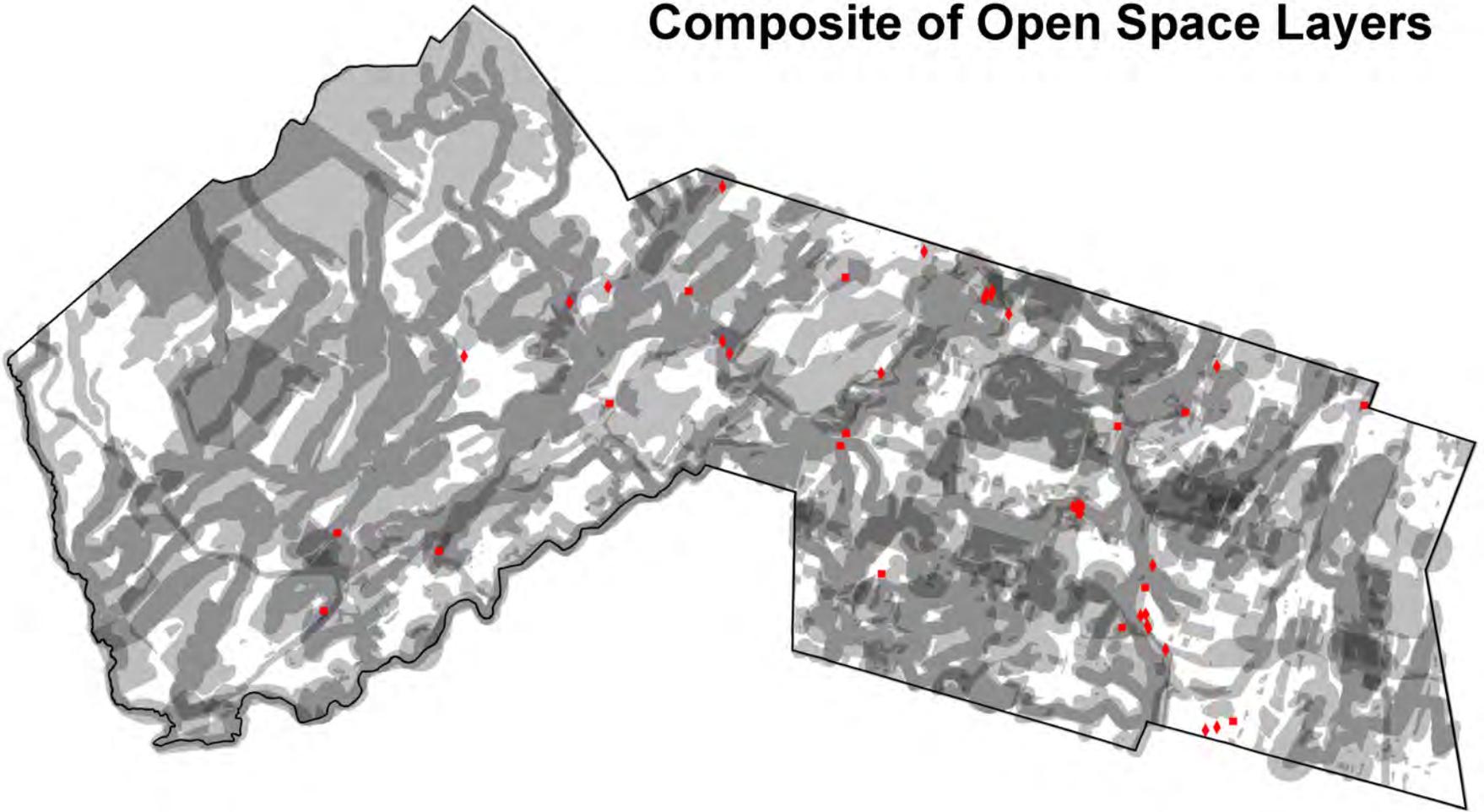
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Composite of Open Space Layers



0 0.5 1 2 3 4 Miles

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March 2004

GIS Data Source: Ulster County Planning Department
Additional Source: USDA Soil Survey - Ulster County, New York

The next two parts of this section illustrate two examples of how this tool can be used by the town. These are not the only ways this overlay process can be helpful, but they demonstrate two effective ways to approach preservation of open space in the long-term. The first example shows how the maps work to guide development on a particular parcel in a manner that preserves the open space already existing on that parcel. The second example shows how to analyze different areas to determine which lands would be the most desirable for open space acquisition or other municipal level protection methods.

2. First Example: Open Space Protection Within a Development

This process begins with a parcel of land that is slated for development (figure 1). A development plan identifies the portion of that parcel where the development will occur (figure 2). By overlaying the composite of open space layers with a map of property parcels, it is possible to see how the proposed development avoids and/or coincides with sensitive open space categories on the land (figure 3). A closer look shows portions of that parcel that contain many categories of open space, as well as portions of that property that have few to none.

Checking each of the gray layers within the parcel and each of the applicable components within that layer will reveal more specific information about the type and sensitivity of open space that may be jeopardy. The planning board is now able to consider a range of actions from recommending revisions to the plan (figure 4) to purchasing development rights on portions of that parcel with high open space value.

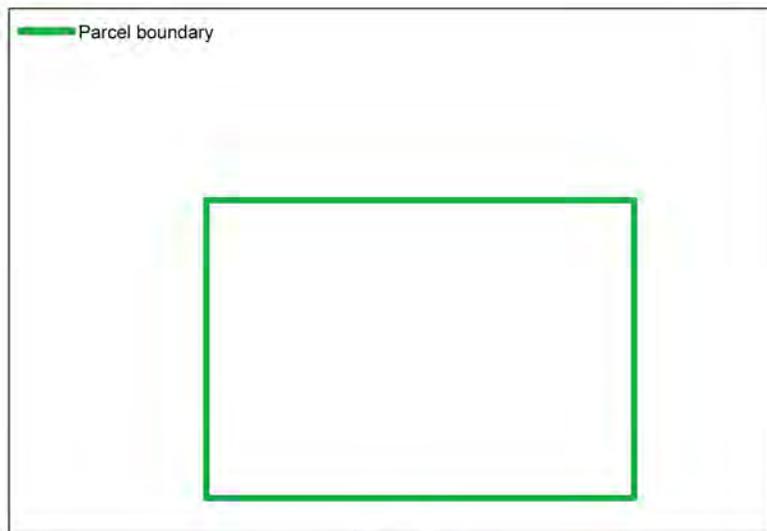


figure 1
hypothetical parcel slated for development

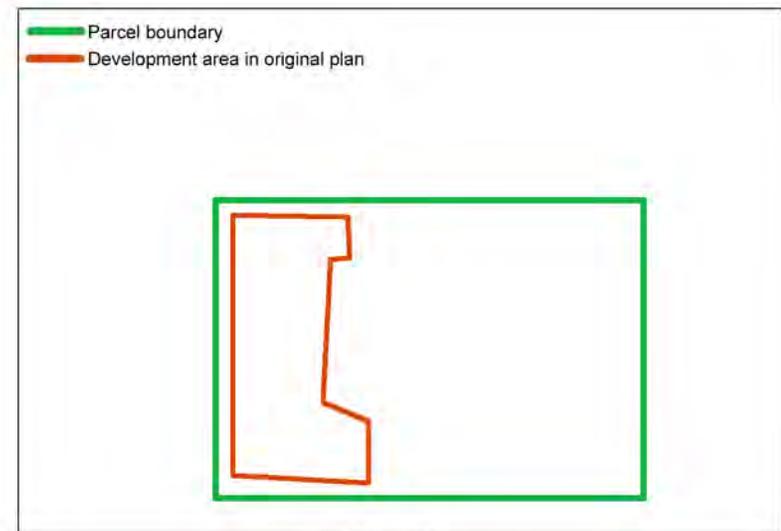


figure 2
highlighting area to be developed

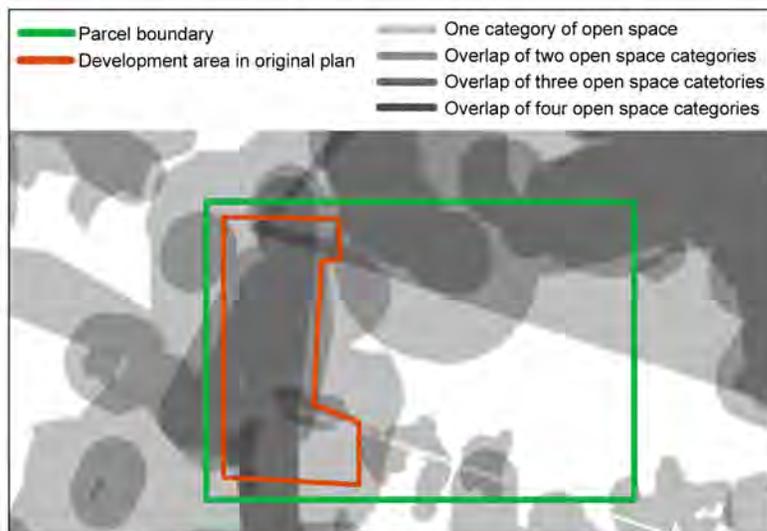


figure 3
comparing open space on the site to development plan

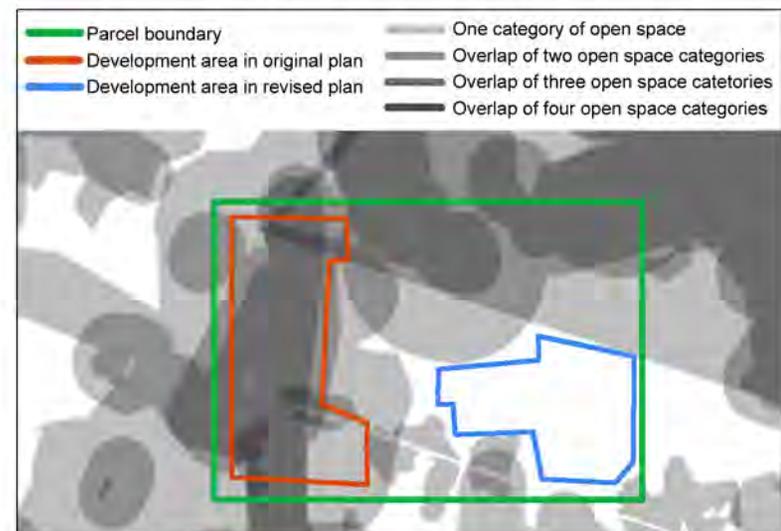


figure 4
suggestions for alternative development plan

3. Second Example: Municipal Preservation of Open Space

This layering tool can also be used in deciding which lands should be preserved as public open space. Parcels containing the darkest shades of gray contain the most categories of open space. Depending on the town's concerns, these darker areas may be the most important to preserve.

For instance, if the town wanted to create new recreation corridors (such as trails) that connect existing recreational parcels within Shawangunk, they could begin by using the recreation layer to analyze the proximity between those existing recreation parcels (see figure 5). Recreational use and natural processes can often coexist in the same place. Looking at the composite of open space layers helps to identify areas of Shawangunk where recreational opportunities exist in conjunction with the presence of natural resource open space areas, in this case wildlife habitat (figure 6) and areas important to water quality (figure 7).

By combining the recreation, water quality, and wildlife habitat layers, a clear picture emerges of an opportunity to connect two recreation parcels. This opportunity is created by the presence of an existing riparian wildlife travel corridor that connects existing unfragmented forest habitat. This corridor is also a high priority water quality protection area (figure 8). By identifying this section as a recreational corridor, this land can also be preserved as valuable wildlife habitat and an area of importance to water quality protection.

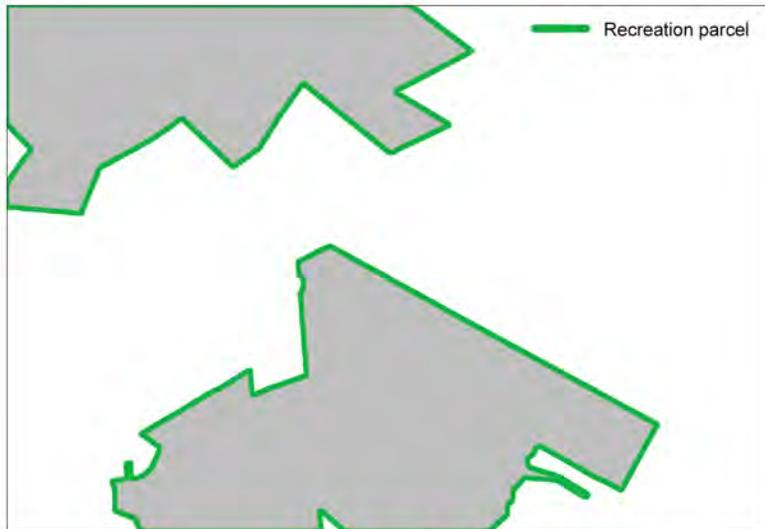


figure 5
section of recreation open space layer



figure 6
section of wildlife habitat open space layer

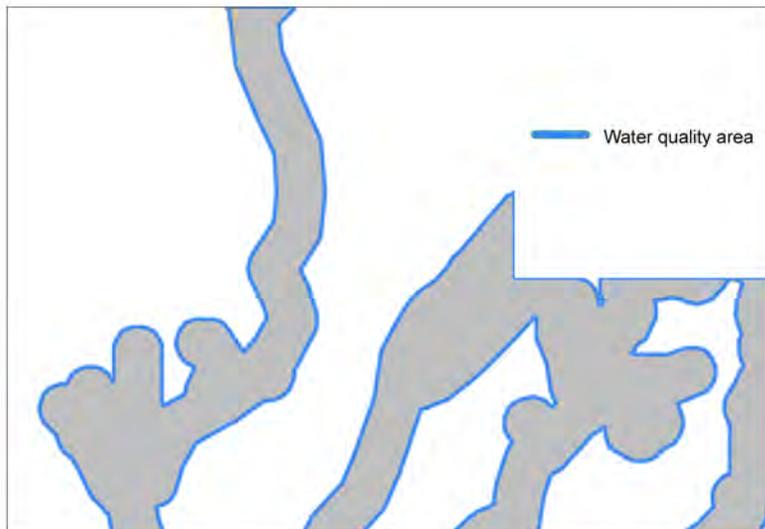


figure 7
section of water quality open space layer



figure 8
highlights potential connection of recreation open space
based upon existing wildlife and water quality corridors

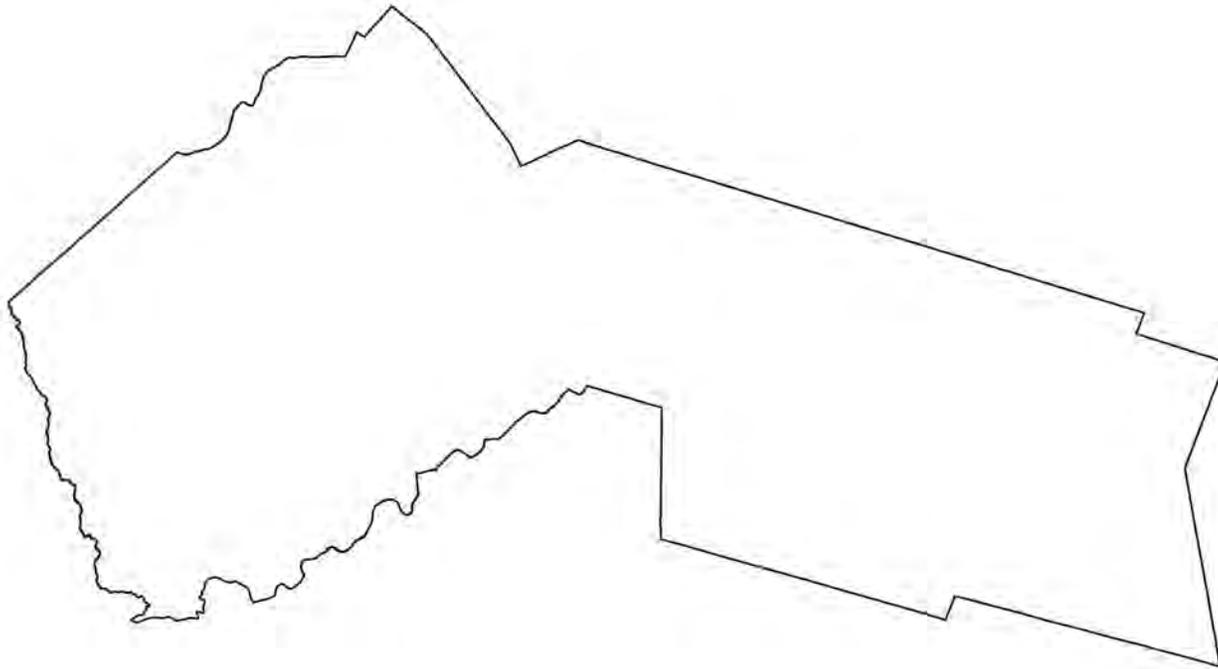
4. Planning for Preservation

This layering process can be a tool for identifying the open space areas most important to preserve, whether as a single category or in combination with other categories. The town must then decide which preservation methods are most effective within each category or for a specific site. In order to implement protection of open spaces, further study of preservation options is necessary. These options include but are not limited to zoning overlays; subdivision regulations; conservation-design standards; best management practices, stormwater management, and low impact design methods; open space acquisitions; agricultural and other land management incentives, including conservation easements; transfer of development rights; purchase of development rights; recreation land dedications; and Critical Environmental Area designations.

The recommendations suggested at the end of each open space category can largely be combined to protect most of these special open space resources, meaning that in many cases the protective measures applied to one open space area would inadvertently serve to protect another open space area. For instance, riparian buffer zones protect water quality, provide wildlife habitat, and create recreational areas. Farmland preservation protects agriculture while retaining scenic views. Scenic view overlay districts protect not only the view but also historical structures. Creating more recreational open space preserves wildlife habitat.

The most basic open space protection method is to approach all development with the conservation of natural and cultural resources as a priority. Any new development in the Town of Shawangunk will to some degree affect the future character of the town. Careful development and build-out-capacity planning done now will help ensure that the town does not become so developed that its historical, natural, and agricultural heritage becomes unrecognizable. With careful land-use planning and land management, it is entirely possible that development and preservation can co-exist.

Section 5: References



Section 5: References

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