

*Restoration and Protection
of the Natural Resources
of the Greenwood Lake Watershed
in New Jersey*



*Project Report #1
A Collaborative Effort by
Greenwood Lake Commission
and
Passaic River Coalition*

*Funded by a grant from the United States Environmental Protection Agency
2011*

Restoration and Protection of the Water Resources of the Greenwood Lake Watershed in New Jersey Project Report #1

Project Description

The purpose of this project is to develop plans to improve flows of clean water to downstream users of the waters from the Greenwood Lake Watershed in West Milford, New Jersey, and particularly where Belcher Creek enters the lake. The most critical issue that needs to be considered with respect to the water resources of the Greenwood Lake Watershed is whether or not there will be sufficient potable water supplies for the millions of people living in the region at affordable costs in the future. This project is expected to assist in achieving the following benefits:

- ◆ Improvement in flows of clean water from Greenwood Lake into the Wanaque Reservoir;
- ◆ Reduction in nutrient loadings in Greenwood Lake so that excessive primary productivity is reduced and water quality standards for nutrients are achieved;
- ◆ Restoration of recreational uses of Greenwood Lake and its watershed with their economic benefits.

Funded by a grant from the US Environmental Protection Agency, the Greenwood Lake Commission and the Passaic River Coalition have been working on this project since 2006. This Project Report #1 describes the recent status of the natural resources in the Greenwood Lake Watershed, and suggests plans for actions to take in the future to restore and protect them. Project Report #2 presents a “Greenwood Lake Dredging Plan”, which is summarized in Section VI of this report. Project Report #3 is the Commission’s forthcoming “Water Level Management Plan” for Greenwood Lake. The implementation of these plans is a hope and challenge for the future. For further information contact the Greenwood Lake Commission or the Passaic River Coalition.

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Restoration and Protection of the Natural Resources of the Greenwood Lake Watershed in New Jersey

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I. PLANNING FOR RESTORATION AND PROTECTION OF THE GREENWOOD LAKE WATERSHED IN NEW JERSEY

A. OVERVIEW OF PLANNING EFFORTS

Need for Restoration and Protection of the Greenwood Lake Watershed

Greenwood Lake, located in the New York/New Jersey Highlands, is nine miles long. The 27 square mile watershed is in the headwaters of the Passaic River Basin, a densely populated region of the United States (Figure I-1). Historically, Greenwood Lake provided its shoreline towns with exceptional recreational opportunities and economic benefits. Residents and tourists enjoyed swimming, boating, hiking, and the beautiful scenery centering on the lake. Marinas, restaurants and beaches bustled with sightseers, vacationers and local patrons. The pressures of extensive use, shoreline development, and conversion of summer cottages to year-round residences, however, have taken a toll on Greenwood Lake. The lake is choked with weeds and algae from excessive nutrients. Septic sewage treatment systems designed for seasonal use cannot perform successfully on a year-round basis. The decline in Greenwood Lake's water quality was paralleled by an economic decline, as the lake's recreation and scenic value deteriorated. Water from Greenwood Lake flows into the Monksville and Wanaque Reservoirs and other potable water sources in northeastern New Jersey. According to a recent US Forest Service study, "approximately 88 percent of the surface water withdrawn" from the New York/New Jersey Highlands "for public supply use is transferred out of the Highlands region to supply parts of ... 98 New Jersey municipalities."¹ In the Passaic River Basin about one-third of the available fresh water is used depletively, and most of this water comes from the Highlands. The most critical issue that needs to be considered with respect to the water resources of the Greenwood Lake watershed is whether or not there will be sufficient potable water supplies for the millions of people living in the region at affordable costs in the future. The goal for this project is to implement an action plan that improves the water quality and recreational uses of Greenwood Lake and that maintains flows of clean water to downstream users.

Planning Program

This report is part of a program intended to assist in the restoration and protection of the Greenwood Lake Watershed in New Jersey. The Greenwood Lake Commission is undertaking this program with funding from the US Environmental Protection Agency. This program is designed to plan actions to assist in achieving the following benefits:

- Improvement in flows of clean water from Greenwood Lake to the millions of downstream users in New Jersey;
- Reduction in nutrient loadings in Greenwood Lake and its watershed so that excessive primary productivity is reduced and aquatic habitats are improved;
- Restoration of recreational uses of Greenwood Lake and its watershed with their economic benefits.

¹ United States Department of Agriculture, Forest Service, Marcus G. Phelps & Martina C. Hoppe, Compilers., 2002. New York—New Jersey Highlands Regional Study: 2002 Update. NA-TP-02-03. Page 26.

I. PLANNING FOR RESTORATION AND PROTECTION

A three pronged approach was proposed for this program:

- Project 1 – Analysis of the Needs for Protection and Restoration
- Project 2 – Reduction in Deleterious Impacts of Excessive Nutrients on Water Quality
- Project 3 – Planning for the Dredging of Greenwood Lake

In 2006 work plans for these projects were described as follows.

Project 1 – Analysis of the Needs for Protection and Restoration:

Characterizations and assessments of the historic and current state of the watershed will be analyzed and compiled from existing studies, and presented in formats that are accessible and usable by the public. This element would include an emphasis on information about past and current water quality conditions that are contributing to the decline in recreational uses of the lake. This component would assess the availability of water supplies from the watershed, and changes in renewable water resources from the watershed. Such information could encourage the public to adapt to changing conditions so that the freshwater resources of the watershed are sustained for future generations. These analyses and studies will be conducted by staff of the Passaic River Coalition (PRC) with assistance and cooperation from the partner agencies, the Greenwood Lake Commission (GLC), Township of West Milford, Passaic County, the Highlands Council, and the New Jersey Department of Environmental Protection (NJDEP). Reports emanating from these studies will be disseminated to the public. ... A revised Greenwood Lake Restoration and Management Plan will be developed. Public meetings will be held to establish action plans for protecting the watershed and its water resources from further degradation.

Project 2 –Reduction in Deleterious Impacts of Excessive Nutrients on Water Quality:

Past studies have shown that Greenwood Lake has experienced excessive growth of aquatic plants, which has seriously affected fisheries, dissolved oxygen levels, and navigation due to loss of water depth and hazards in the water. This excessive primary productivity has been caused primarily by influxes of nutrients and sediments to the lake. Over half of these nutrient loadings are entering the lake from the Belcher Creek Watershed in New Jersey. Past studies, including the Greenwood Lake Phosphorus TMDL Program² and “319(h)” projects, provide invaluable information about some of the causes of excessive plant growth in Greenwood Lake. This project is designed to provide whatever additional studies may be needed to evaluate the impacts from sources that have not been adequately addressed to date, such as:

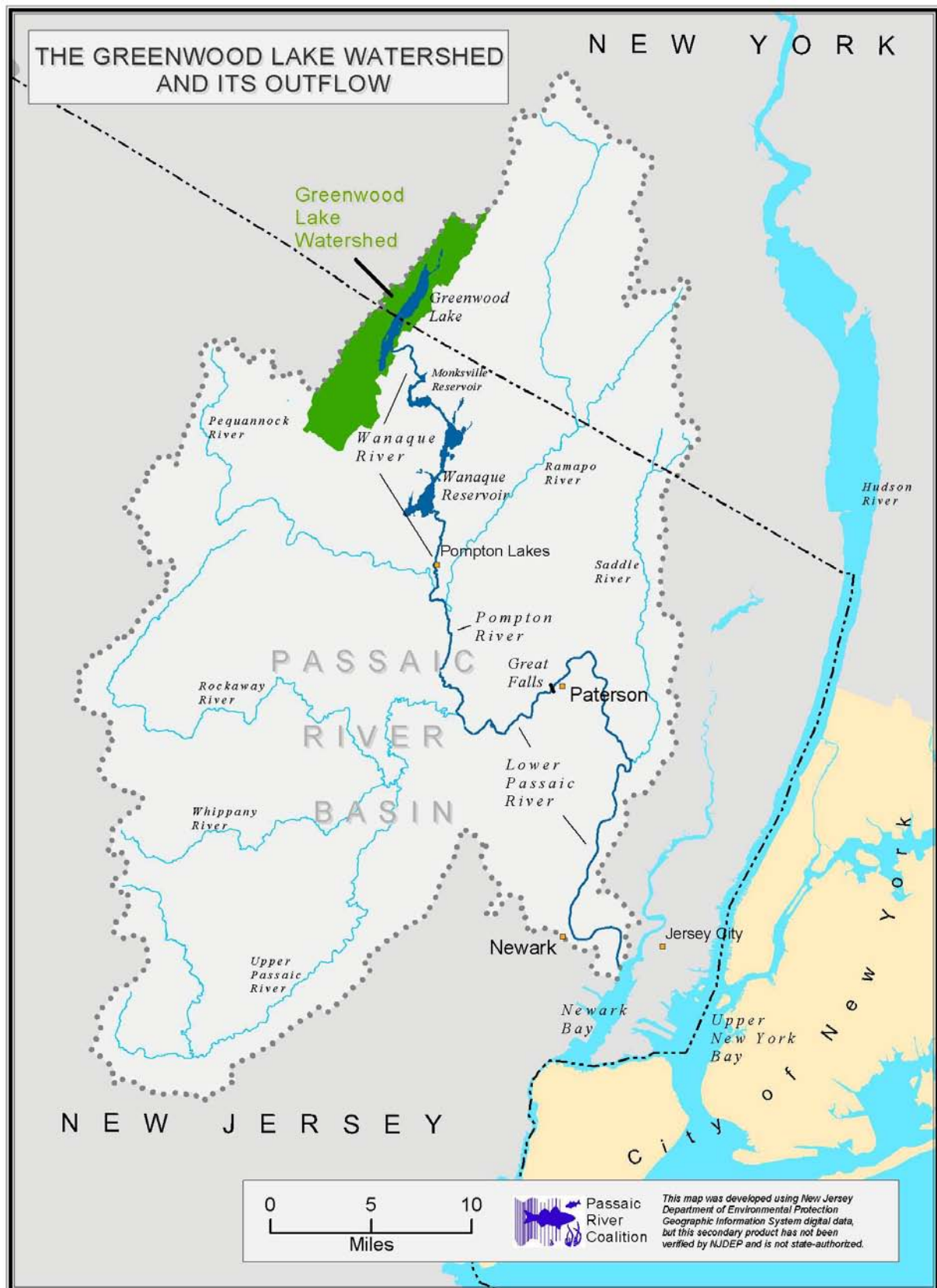
- Nitrogen Loadings
- Nutrient Loadings from Ground Water and Base Flow Influx
- Nutrient Loadings within Belcher Creek Watershed
- Impacts from Changes in Land Use and Water Use Patterns

This project will be carried out by PRC staff and other environmental experts. The Greenwood Lake Commission and its partners will be responsible for oversight, evaluation, and implementation of planning recommendations for this project. Public meetings will be held to inform the public about project findings and to solicit public opinion about actions to be taken.

² New Jersey Department of Environmental Protection. 2004. Total Maximum Daily Load for Phosphorus to Address Greenwood Lake in the Northeast Water Region. Approved by EPA, September 2004.

I. PLANNING FOR RESTORATION AND PROTECTION

Figure I-1 – The Greenwood Lake Watershed in the Passaic River Basin



I. PLANNING FOR RESTORATION AND PROTECTION

Project 3 – Planning for the Dredging of Greenwood Lake:

Since 1983 efforts have been underway to restore Greenwood Lake to its former status as a recreational resource for the metropolitan New York / New Jersey area. The implementation of in-lake cleanup tasks, including the removal of weeds and stumps and some dredging, has begun in limited locations. However, a major effort is needed to plan and carry out dredging of parts of Greenwood Lake in West Milford, particularly where Belcher Creek enters the lake. The Greenwood Lake Phosphorus TMDL Program estimates that 43% of the phosphorus enriching the lake comes from sediments already in the lake.³ Boating on the lake has been impeded by excessive sediment buildup and weed growth. Dredging parts of Greenwood Lake would reduce phosphorus loadings and algal growth, would improve habitats for fish, and would make the lake more usable for recreational purposes, thereby improving the economic viability of the watershed. The Greenwood Lake Commission, PRC and partners will work with a consultant to identify the appropriate means and funding to proceed with the activities needed to dredge sections of the lake where needed.

Past and Ongoing Study and Planning Efforts

This report attempts to summarize past and ongoing studies and planning efforts to restore and protect the water resources and other natural resources of the Greenwood Lake Watershed, especially that portion in New Jersey. The types of topics covered in each section of this report are outlined below.

I. Planning for Restoration and Protection of the Greenwood Lake Watershed in New Jersey:

Section I.B discusses past and current uses by people of the land and water in the watershed, and suggests reasons why planning for the future is important.

II. Natural Resources of the Greenwood Lake Watershed:

Section II provides a natural resources inventory of the Greenwood Lake Watershed in New Jersey, which includes some information from the New Jersey Department of Environmental Protection (NJDEP) and others regarding recent conditions. Section II.D includes discussion about water quantity and quality.

III. Uses of Natural Resources and their Impacts:

Section III provides an overview of past and ongoing studies of the uses of land and water in the watershed, and the conditions of these resources that have resulted. Section III.A describes studies related to water quality, section III.B discusses water quantity issues, and section III.C summarizes some of the studies related to land use impacts. In each section the studies are arranged in chronological order.

IV. Planning for Actions to Restore the Natural Resources of the Greenwood Lake Watershed:

Suggestions for actions that might be undertaken to protect and restore water quality and quantity within the Greenwood Lake Watershed in New Jersey so that the habitats for flora and fauna, including people, are enhanced are described in section IV.

³ New Jersey Department of Environmental Protection. 2004. Total Maximum Daily Load for Phosphorus to Address Greenwood Lake in the Northeast Water Region. Approved by EPA, September 2004.

I. PLANNING FOR RESTORATION AND PROTECTION

V. Ecological Investigation of Belcher Creek in the Greenwood Lake Watershed:

“Project 2”, which involved further investigation of the ecological conditions of the waters of the Belcher Creek watershed were carried out by Dr. Richard Pardi and Dr. Michael Sebetich of William Paterson University and others during 2009. Their findings are reported in section V.

VI. Greenwood Lake Dredging Plan:

“Project 3”, the development of a plan to dredge portions of the New Jersey end of Greenwood Lake, was carried out by consultants, HydroQual and associates, during 2010. Their recommendations are reported in a separate report entitled “Greenwood Lake Dredging Plan” and summarized in Section VI.

VII. High Priority Actions:

Members of the Greenwood Lake Commission have indicated that some of the actions mentioned in sections IV, V and VI should have a high priority. The ways to plan for taking such actions are described more fully in section VII.

B. USES OF THE GREENWOOD LAKE WATERSHED⁴

Historic Uses

The Greenwood Lake Watershed, depicted in Figure I-2, has experienced a long succession of ecological and historical transformations. In addition to changes in the ecosystem, population, and land use patterns of the area, the lake itself has undergone evolutions of size, shape, and name.

Known to Native Americans as “Quampium,” the area around the glacial lake was originally inhabited by the Munsee, a subtribe of the Lenni Lenape. In 1707, European settlers and fur traders purchased large tracts of land from the Munsee tribe, and renamed the lake “Long Pond.” As more settlers arrived and cleared their property for farmland, the forests and hunting grounds were drastically diminished. By 1750 the Munsees had all been forced out of the area. Farming communities expanded with the increasing settler population, and the early economy was primarily agricultural.

After the discovery of rich iron ore deposits in Sterling Forest, NY, a major foundry was established in 1754 and the mining and forging of iron occupied the valley. Gristmills, sawmills, and forges were constructed throughout the area, and a small dam on Greenwood Lake was constructed in 1765 to provide water power energy to these factories. Long Pond Ironworks, now a State Park, was founded in 1766 and operated continually until 1882. The iron industry of the colonial and revolutionary periods depended on the forests for charcoal production and led to extensive clear cutting of the trees around the Greenwood Lake Watershed.⁵ Emergent industry led to increased population levels in the area and significantly altered the landscape.

⁴ Alana Buonaguro and Natasha Loeffler were largely responsible for researching and writing this section.

⁵ Township of West Milford. 2003. Open Space Plan.

I. PLANNING FOR RESTORATION AND PROTECTION

After purchasing property at the head of Greenwood Lake in 1837, the Morris Canal and Banking Company constructed a dam on the southeastern shore, near the Wanaque River.⁶ The dam elevated the water level twelve feet and expanded the lake to its current dimensions, inundating portions of farmland, forest and the company's properties. The dam supplied water to the Morris and Essex Canal, an important route for Pennsylvania coal barges traveling to Newark Bay. The names "Long Pond" and "Greenwood Lake" were both used prior to the building of the dam, but after the striking enlargement of the water body, it was the latter name that gained common usage.

The expansion of the lake attracted tourists and marked the beginning of Greenwood Lake's resort era. By the mid-19th century, the lake had emerged as a popular summer vacation spot for residents of New York City and beyond. A grand hotel was operating on the north shore circa 1850 and after The Montclair and Greenwood Lake Railroad arrived in 1875, tourism and hotel development boomed. The Greenwood Lake Transportation Company operated steamboats along the lake, including the "Arlington," "Milford," and "Montclair," a double-decker built in 1876 that could hold 200-400 passengers. The steamboats met incoming trains at the station, located on the state line in Sterling Forest, and carried passengers to hotels, resorts, and summer cottages on both sides of Greenwood Lake.⁷

Historical changes in the Greenwood Lake Watershed had significant impacts on its ecosystems. In an 1887 New York Times article, a hunter laments that the last bear in the region had been killed more than 25 years before, and "the deer have disappeared, too." Historian Steven Gross explains that "the forests had been cut down to make charcoal for the iron industry, and any large game that had remained was hunted into non existence".⁸ After the substitution of coal for charcoal, the decline of the iron industry, and the abandonment of marginal farmland in the late 1800s, these species have returned to the Greenwood Lake Watershed. The aforementioned changes in land use allowed local vegetation a chance to return to more primeval conditions and the area to become densely forested again.⁹ In the absence of large industry or agriculture, the Greenwood Lake region depended heavily on tourism, a feature that has facilitated the preservation of natural resources in the watershed.

After World War II, the character of the Greenwood Lake Watershed changed dramatically. Tourism rates dropped and during the post-war period many of the seasonal dwellings and vacation homes were converted to permanent housing for year round residents.¹⁰ This transition incited rapid population growth, placing strain on the infrastructure and natural resources of surrounding towns. Presently the lake provides fishing, boating, and swimming recreation. Land based recreation includes camping, picnicking, and hiking the Appalachian Trail, and horse stables are located within and nearby the watershed.¹¹

⁶ Princeton Aqua Science. 1983. Phase 1: Diagnostic-Feasibility Study of Greenwood Lake, New Jersey and New York. Page 37.

⁷ Greenwood Lake Chamber of Commerce

⁸ Around the Lake 2007:6.

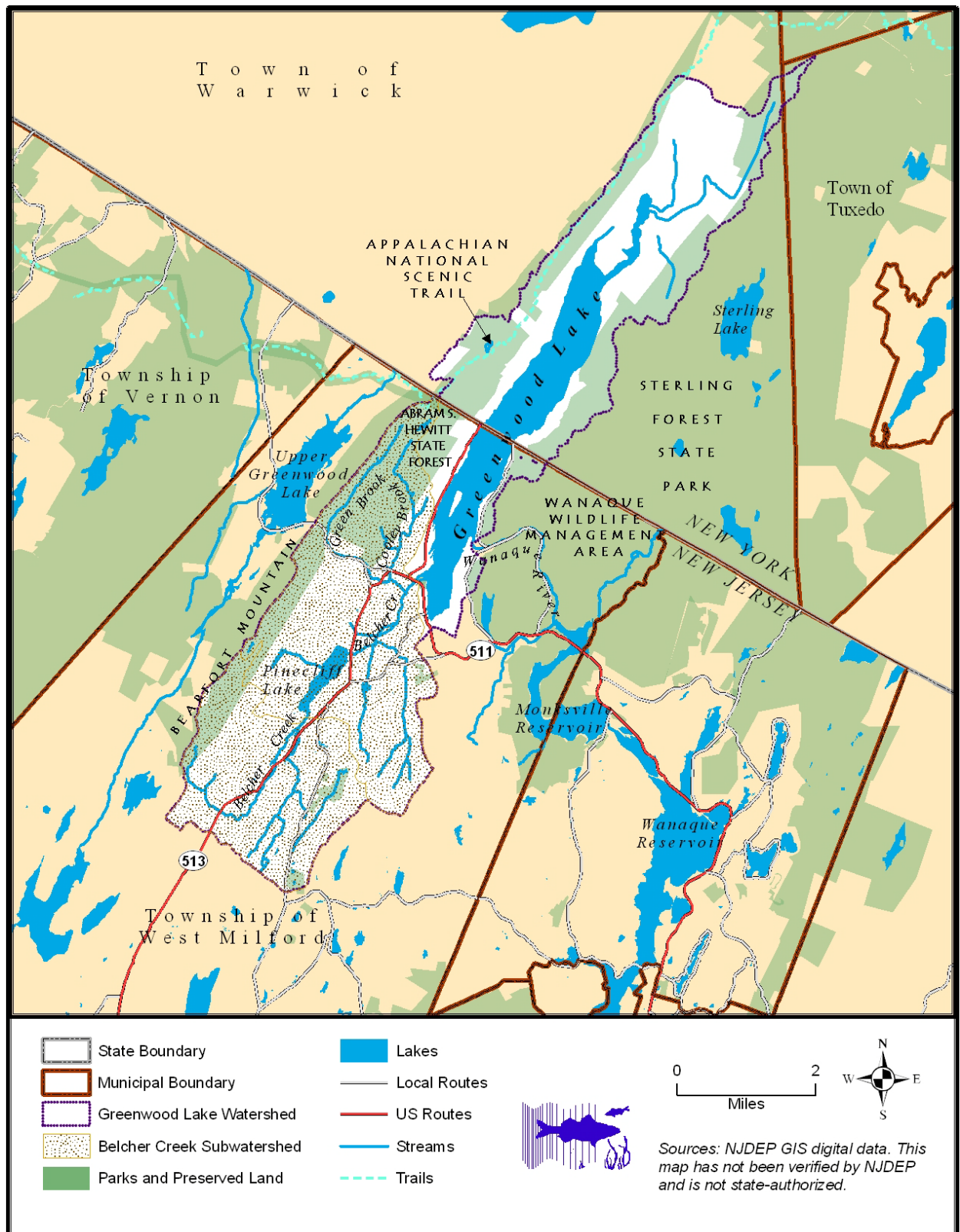
⁹ Township of West Milford. 2003. Open Space Plan.

¹⁰ New York Department of Environmental Conservation. 1989. Greenwood Lake: Clean Lakes Phase II Final Report.

¹¹ Princeton Aqua Science. 1983. Phase 1: Diagnostic-Feasibility Study of Greenwood Lake, New Jersey and New York. Page 38.

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Figure I-2 – The Greenwood Lake Watershed



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Current Land Uses

The Greenwood Lake watershed has been under extensive development pressure in recent years. At present, approximately one fifth of the watershed has been developed, the majority of which is at low to medium density. Future development must be carefully planned and concentrated in suitable areas, so as to minimize negative ecological impacts.

The watershed contains a variety of land use categories: Residential; Recreational; Industrial, Commercial and Transportation; Woods, Horticulture, Meadow and Marsh; and Other Urban or Built-up Land (Figure I-3). An overwhelming majority of the area of the watershed can be classified as Woods, Horticulture, Meadow and Marsh, which encompasses a total of 34,899 acres. The next largest category of land consists of 1,819 acres utilized for Residential purposes. Industrial, Commercial and Transportation land use comprises 392 acres, while 104 acres are employed for Recreational activities. Lastly, 129 acres may be characterized as Other Urban or Built-up Land. Also indicated on the map are Lakes and Streams, which comprise 1,083 acres of the watershed.

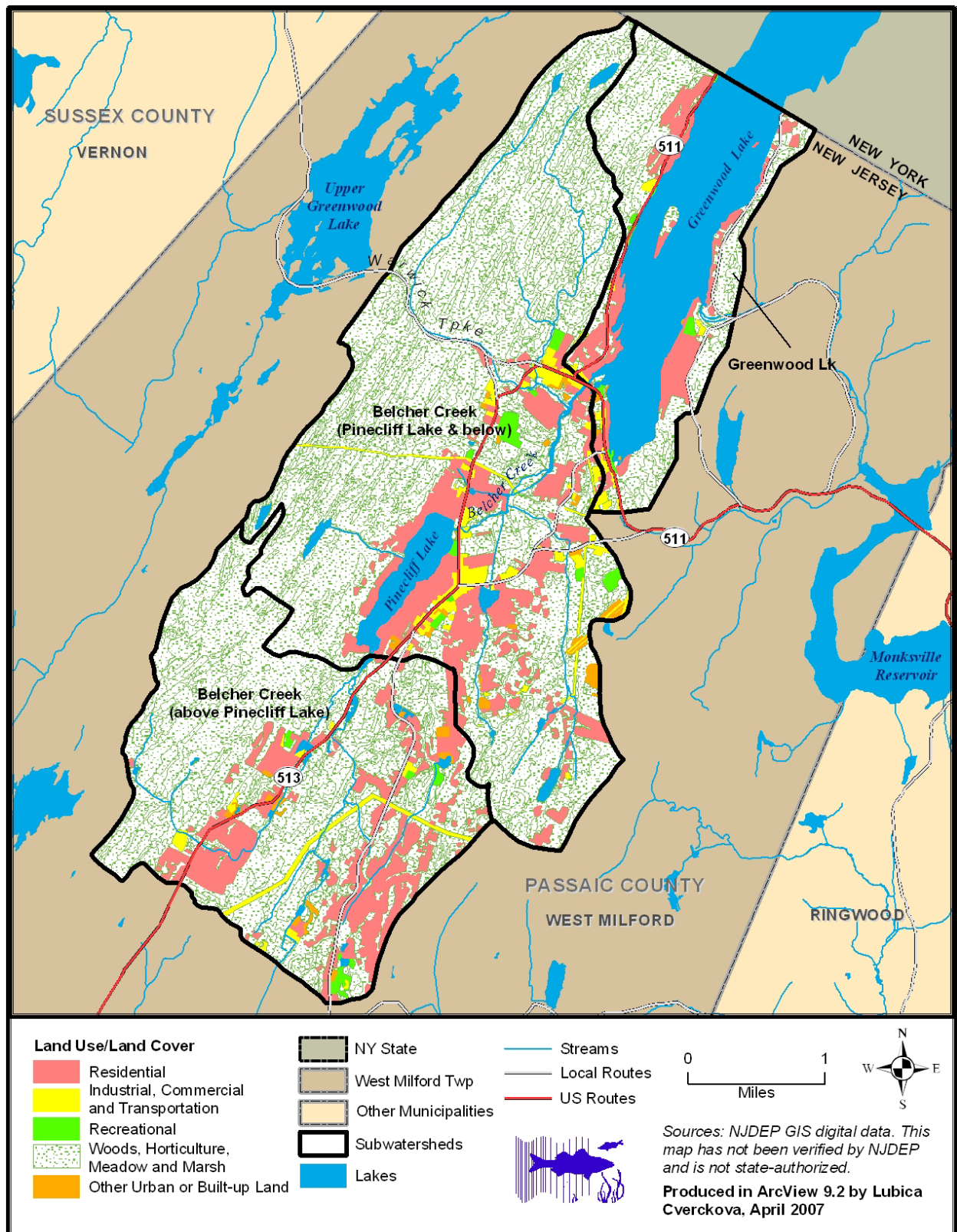
The shore of Greenwood Lake is predominantly Residential. There are a few Recreational sites along the lake shore, as well as some areas used for Industrial, Commercial and Transportation purposes. A very small amount of land near the southern end is classified as Other Urban or Built-Up Land. Storm's Island is Residential, while Pine Island is a mix of Residential and Woods. The amount of woodlands drastically increases as one travels farther from the banks of the lake.

In the Belcher Creek watershed (Pinecliff Lake & below), land use is mixed. To the west and to the north, the land is chiefly Woods, Horticulture, Meadow and Marsh. The area surrounding Pinecliff Lake is very dense Residential. There are large tracts of land for Industrial, Commercial and Transportation along major roadways, particularly where CR-511 and CR-513 converge. There is a significant amount of Other Urban or Built-up Land, as well as some large pieces of Recreational land. Residential land is generally not dispersed evenly, but concentrated into dense areas, largely in the form of private communities and developments.

The densest Residential areas are on the shores of Greenwood Lake and Pinecliff Lake. Lakefront property is desirable for a variety of reasons, such as boating access and a view of the water. However, the high density of homes so close to the shore increases water pollution and puts strain on the resources of the lakes and streams. These negative effects could be mediated if a larger vegetative buffer existed between residential homes and the banks of the lakes. This could be achieved through the actions of individual residents or, at the municipal level, through a major change in land use patterns.

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Figure I-3 – Land Uses in the Greenwood Lake Watershed in New Jersey

















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Zoning

The Greenwood Lake Watershed in New Jersey is located in the Township of West Milford in Passaic County. The municipal government of West Milford is responsible for land use zoning and regulation. The area surrounding Greenwood Lake is densely developed (Zoning Map, Figure I-4, and Table I-1). Most of the properties fall within the zoning designation of Lakeside Residential (LR). Zoning areas of Moderate Density Residential (R2) and Higher Density Residential (R1) also border the lake. A Lakeside Commercial (LC) zone is located along the southwestern end of the lake, and there is a small Community Commercial (CC) zone at the southern tip as well. A bit further from the lake is a Limited Manufacturing and Industrial area, followed by a Special Economic District, in which Greenwood Airport is located. Storm and Pine islands are designated under zone R2. Further from the lake are large zones of Very Low Density Residential (R4).

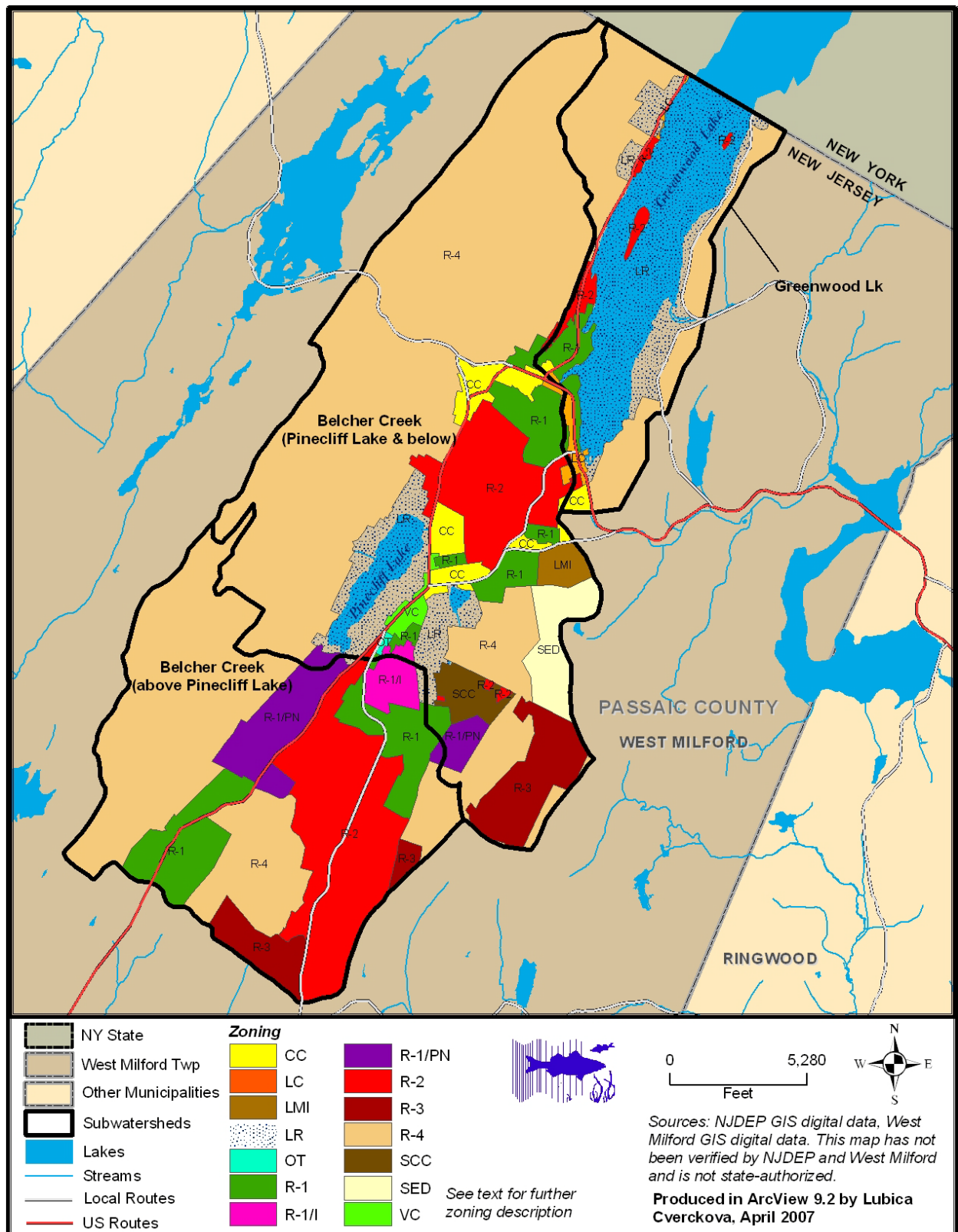
Belcher Creek runs through the zoning areas of Higher and Moderate Density Residential and Community Commercial (R1, R2, and CC). Pinecliff Lake is entirely Lakeside Residential, with a large zone of Very Low Density Residential to the west. To the east of Pinecliff Lake are a variety of zones, including Village Commercial (VC), Office Transition (OT) and Residential Inclusionary (R1/I). To the South is a large Multifamily Residential (R1/PN) zone and more residential areas of various densities (R1, R2, R3, R4).

Table I-1 -- Zoning Map Key

	LR	Lakeside Residential
	R1	Higher Density Residential
	R2	Moderate Density Residential
	R3	Low Density Residential
	R4	Very Low Density Residential
	R1/I	Residential Inclusionary
	R1/PN	Multifamily Residential
	LC	Lake Commercial
	CC	Community Commercial
	VC	Village Commercial
	OT	Office Transition
	SED	Special Economic District
	LMI	Limited Manufacturing and Industrial
	SCC	Senior Congregate Care

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Figure I-4 – Zoning



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Both Pinecliff Lake and Greenwood Lake are densely populated along their shores, which contributes to the potential eutrophication of both lakes. Belcher Creek is extremely susceptible to pollutants because it runs through commercial areas as well as dense residential areas. Commercial zones at the southern end of Greenwood Lake are also potential sources of contaminants. These zoning patterns have contributed to the pollution of the lake and may need to be reevaluated in the future.

Population

The population of West Milford has been steadily rising as the number of permanent residents has increased over the past century. West Milford was originally a resort area, with Greenwood Lake as its central attraction. When tourism declined following World War II, the Greenwood Lake watershed underwent a transition from seasonal housing to year round residences. The area experienced rapid growth in the 1950s and 60s and total numbers are still increasing, though expansion rates have slowed in recent years.

The total area of West Milford is 80.41 square miles (mi²) comprised of approximately 6.2% water (4.97 mi²) and 93.8% land (75.44 mi²). According to the United States Census Bureau, the Township of West Milford had a population of 28,181 residents in 2005. This number represents a marked increase from the 1990 and 2000 population figures of 25,430 and 26,410 people, respectively. The most extensive and recent demographic information comes from the 2000 census. At this time, there were 26,410 people residing in West Milford, with a population density of 350.1/mi². There were 9,909 housing units at an average density of 131.4/mi².¹²

Housing

In 2000, the average household size in West Milford was 2.84 occupants and the average family size was 3.23 people. Of the 9,909 housing units in West Milford at the time of the census, 9,190 (92.7%) were occupied, 719 (7.3%) were vacant, and 414 (4.2%) were utilized for seasonal, recreational, or occasional use. Of the 9,190 occupied housing units, 7,186 (78.2%) were family households and 2,004 (21.8%) were non-family households. 8,232 (89.6%) of the occupied housing units were occupied by the owners themselves while 958 (10.4%) were occupied by renters.

Structural descriptions of the 9,909 total housing units are as follows: 8,701 (87.8%) 1-unit, detached; 452 (4.6%) 1-unit, attached; 221 (2.2%) 2 units; 100 (1%) 3 or 4 units; 165 (1.7%) 5 to 9 units; 10 (0.1%) 10 to 19 units; 241 (2.4%) 20 or more units; 19 (0.2%) mobile homes; 0 (0%) boat, RV, van, etc. The following data illustrate when the structures were built: 1,215 (12.3%) from 1939 or earlier; 3,145 (31.7%) 1940-1959; 2,067 (20.9%) 1960-1969; 1,152 (11.6%) 1970-1979; 1,184 (11.9%) 1980-1989; 475 (4.8%) 1990-1994; 565 (5.7%) 1995-1998; 106 (1.1%) 1999-March 2000.¹³

Most of the homes in West Milford are concentrated around its lakes. According to the Township's website, "many of these homes, once summer resort bungalows, have over the years been enlarged and converted into year-round residences. And over the past twenty years, many

¹² United States Census Bureau, 2000.

¹³ United States Census Bureau, 2000.

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newer, larger homes on one- to four-acre lots, as well as two major condominium developments, have been built”.¹⁴

If not managed correctly, these recent developments can have adverse effects on the water quality of Greenwood Lake and its watershed. As the household sizes increase, so does the strain on septic systems, many of which are already inadequate. Additionally, larger roofs, driveways and garages exacerbate the problem by increasing the proportion of impervious surfaces for each lot, thus increasing the potential for runoff. In order to protect the lake from eutrophication, the Township of West Milford will need to implement and enforce stricter guidelines for septic systems and impervious surfaces on residential properties.

Industry

Although West Milford was once a major industrial force, that era ended with the expansion of Greenwood Lake and the conversion of the area into a tourist locale. Princeton Aqua Science stated in their 1983 Phase 1: Diagnostic-Feasibility Study of Greenwood Lake that “there are no industrial sites in the watershed”.¹⁵ Today, little industrial activity occurs within the Greenwood Lake Watershed. West Milford’s industries are restricted to the Limited Industrial zone, southeast of the lake (Figure I-5). The industries are located relatively close to Greenwood Lake, but they do not currently pose a threat to its water quality because they do not contribute to eutrophication to the same degree as residential and commercial sites. However, it is always important to monitor these sites as there is a potential for contamination from industrial chemicals and other forms of pollutants. Additionally, industrial sites often have high concentrations of impervious surfaces.

Agriculture

Although West Milford contains a significant amount of open space, only a fraction of the land is utilized for agricultural purposes. The small-scale commercial and family farms are scattered on plots of farmland throughout the township, not heavily concentrated in sizeable tracts. The absence of large-scale agribusiness is due to a variety of socio-economic factors, and also to the region’s unique geology and landscape. The amount of prime farmland is restricted by physical limitations such as steep slopes, shallow bedrock and poor soil quality. Of the existing prime agricultural land, some portions are put to uses other than farming, based on the needs of the community. The West Milford Open Space Plan does not include a section on agriculture, based on the rationale that “West Milford was never really a true agricultural community and there are no Class I soils in West Milford, only Class II and Class III”.¹⁶

The Phase 1: Diagnostic-Feasibility Study of Greenwood Lake indicated that agricultural activity was not a major contributor of nutrients into Greenwood Lake. This 1983 report by Princeton Aqua Science made the following assessment: As no agricultural land use occurs in the

¹⁴ <<http://www.westmilford.org>>

¹⁵ Princeton Aqua Science. 1983. Phase 1: Diagnostic-Feasibility Study of Greenwood Lake, New Jersey and New York. Page 26.

¹⁶ Township of West Milford. 2003. Open Space Plan. Page 45.

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watershed, loading coefficients for such applications were not employed in this study.¹⁷ Although agriculture may not have been a threat to the lake's water quality in the past, current tax data shows that many small farms are operating within the Greenwood Lake Watershed. While these farms are still not major contributors to eutrophication, it is crucial that they be monitored and that Best Management Practices are always employed.

The New Jersey Municipal Land Use Law states that, where applicable, a municipality's master plan should include a farmland preservation plan element. To this effect, the West Milford Planning Board has worked with Passaic County to formulate an Agriculture Development Board. The Township has plans to participate in the State Farmland Preservation Program for the purpose of identifying and preserving farmland assessed properties in West Milford.¹⁸ These preservation efforts will be beneficial to the town and potentially for Greenwood Lake, if they are integrated with sound environmental practices.

Commerce

West Milford's economy has historically been centered on Greenwood Lake and its environs. The lake has remained an attractive tourist spot for several decades and continues to bring revenue into the town.

During its resort era, Greenwood Lake was the site of many grandiose hotels and was frequented by tourists from New York City and farther. When tourism rates dropped after World War II, the town transitioned from a seasonal vacation spot to a permanent residential community. Consequently, overnight accommodations have become severely limited and the lake is reserved primarily for residents and day trippers.

Until the mid 1960s, the rural town had only a few small businesses and eateries. More businesses were attracted to West Milford after the first supermarket, a 20,000 square foot A&P, was built. In 1972, Warner Brothers constructed a wildlife theme park called [Jungle Habitat](#). Although the park brought tourist revenue, it also created complications and traffic problems. Residents denied Jungle Habitat's application for expansion in 1976 and the park closed shortly after.

In 1978, a 45,000 square foot [ShopRite](#) supermarket was built. Several fast food restaurants and a large movie theater soon followed. A&P eventually closed its original store and opened up a 60,000 square foot supermarket in the late 1990s. These changes enabled West Milford to support its growing population and helped to revitalize the area, reestablishing it as a tourist locale.

The main appeal of West Milford has always been its recreational opportunities. For decades, Greenwood Lake has drawn thousands of visitors annually.¹⁹ The marinas and stores located along the lake's shore bring in significant revenue for West Milford, as do the restaurants, pubs, and gift shops in town.

¹⁷ Princeton Aqua Science. 1983. Phase 1: Diagnostic-Feasibility Study of Greenwood Lake, New Jersey and New York. Page 95.

¹⁸ Township of West Milford. 2003. Open Space Plan. Page 16.

¹⁹ Township of West Milford. 2003. Open Space Plan. Page 35.

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According to a 1980 economic development plan, “the proximity of the lake to the New York-New Jersey metropolitan area, the historical usage of the lake, and the abundance of undeveloped land within the lake’s watershed make Greenwood Lake an ideal site for recreationally oriented commerce”.²⁰ The NYSDEC’s Clean Lake Phase II Final Report explains that “a variety of support services and businesses (motels, marinas, restaurants, etc.) derive much of their trade from people attracted to the area by the lake”.²¹

The Phase I: Diagnostic Feasibility Study notes that since “the focal point for existing and future commercial-recreational businesses is the lake, any decrease in lake quality will adversely affect the economy of the area. However, any further development of the area should proceed with caution in order to insure the preservation of the unique features of the lake and prevent further degradation of the lake”.²² The aforementioned reports clearly identify Greenwood Lake as the area’s paramount economic resource.

The potential for commercial recreation and the tourism industry of Greenwood Lake is far from realized. The lake’s economic and recreational potential is hindered by a number of issues, primarily ecological. Essentially, the condition of the lake can be linked to the quality of West Milford’s economy. If the lake is not protected, tourism rates will drop and the township may face difficult economic challenges. Because Greenwood Lake is a bi-state lake, many towns may suffer economic consequences if the lake’s quality is not maintained. A regional effort will be necessary to preserve the economic and ecological integrity of the Greenwood Lake Watershed.

Recreation

Greenwood Lake is highly valued as an ecological and recreational resource for both New Jersey and New York. Its accessibility and proximity continue to make it an attractive recreation center for residents of the NY-NJ metropolitan area. Greenwood Lake provides respite for residents of New York City and many New Jersey citizens who live in heavily urbanized environments, such as Paterson. Consequently, the protection of the lake is an issue that affects many more people than the residents of West Milford, New Jersey.

Greenwood Lake has been a recreational site for tourists since the mid 19th century. In the past 50 years, it has been mostly local residents who utilize the lake and its recreational potential. According to one survey from the 1980s, 37% of lake users lived outside of the immediate area. The average distance traveled was 21 miles, although some visitors did live as far as 100 miles from the area.²³ It was inferred that “the relatively small number of nonresident users may be due to the small number of public swimming beaches and public boat launches,” since the majority of swimming and marina facilities are either private, or charge a daily or seasonal users

²⁰ Princeton Aqua Science. 1983. Phase 1: Diagnostic-Feasibility Study of Greenwood Lake, New Jersey and New York. Pages 35-36.

²¹ New York State Department of Environmental Conservation. 1989. Greenwood Lake: Clean Lakes Phase II Final Report. Page 2.

²² Princeton Aqua Science. 1983. Phase 1: Diagnostic-Feasibility Study of Greenwood Lake, New Jersey and New York. Page 36.

²³ Princeton Aqua Science. 1983. Phase 1: Diagnostic-Feasibility Study of Greenwood Lake, New Jersey and New York. Page 39.

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fee”.²⁴ The questionnaire also illustrated that the most popular uses of the lake were boating, swimming, and water skiing, typically on the weekends between April and October.²⁵ During the winter, visitors enjoy ice fishing, skating and snowmobiling in the area.

Fishing is one of Greenwood Lake’s major attractions. The Township of West Milford contains “over 40 natural and man-made lakes, five reservoirs, many ponds, and nearly 100 miles of rivers and streams”.²⁶ The waters just below the dam are stocked with trout, and muskies have also been stocked in the lake. Some other fish that are commonly found in Greenwood Lake are Large and Small Mouth Bass, Catfish, Perch, Pickerel and Sunfish.

The lake’s numerous marinas make fishing and boating easily accessible (Figure IV-1, Points of Interest of Greenwood Lake). These include Greenwood Lake Marina, Happy Landing Marina, Sportsman’s Marina, Moosehead Marina, Greenwood Small Craft Marina, and South Shore Marina. The marinas provide various services to renters and members including docking space, launching ramps, boat sales and repair facilities, picnicking areas, restaurants and bars.

Public lakefront access is possible from West Milford boat launch areas on Turtle and Sophi Roads and State owned lands adjacent to Greenwood Lake Dam. Brown’s Point Park has no boat launch, but offers picnicking, fishing, a playground, and Frisbee golf.

Beyond Greenwood Lake, West Milford also offers extensive land-based recreational opportunities. The expansive forests surrounding Greenwood Lake attract campers, hikers, equestrians, and naturalists. Snowshoeing and cross country skiing are popular winter activities. Nearby forests include Abraham S. Hewitt State Forest, Norvin Green State Forest, Bearfort Mountain Natural Area, Long Pond Ironworks State Park and French Hill (Figure I-5). Adjacent to Norvin Green State Forest is the Weiss Ecology Center, which offers a variety of public programs and educational workshops.

Amidst West Milford’s thousands of acres of forests are hundreds of miles of trails, approximately 100 square miles of which are marked and maintained by the NY-NJ Trail Conference. Hikers can explore old iron mines and furnaces, pre-historic rock shelters and even a portion of the Appalachian Trail. Two other notable trails are The Hasenclever Trail and The Highlands National Millennium Legacy Trail.

The Hasenclever Trail connects the municipalities of West Milford and Ringwood at Long Pond Ironworks and is currently being extended to include more historic sites. The Highlands Trail is a bi-state foot trail intended to highlight the natural beauty of the New Jersey and New York Highlands Region. The trail extends over 150 miles from Storm King Mountain, NY, to Phillipsburg, NJ, connecting major scenic attractions in both states. Approximately 25 miles of the trail traverse through West Milford.

Plans are currently in place for a Proposed Bikeway that will provide a safe, recreational multi-use pathway for West Milford citizens and visitors. The township is also preparing plans to transform the former Jungle Habitat property into a central recreational complex.

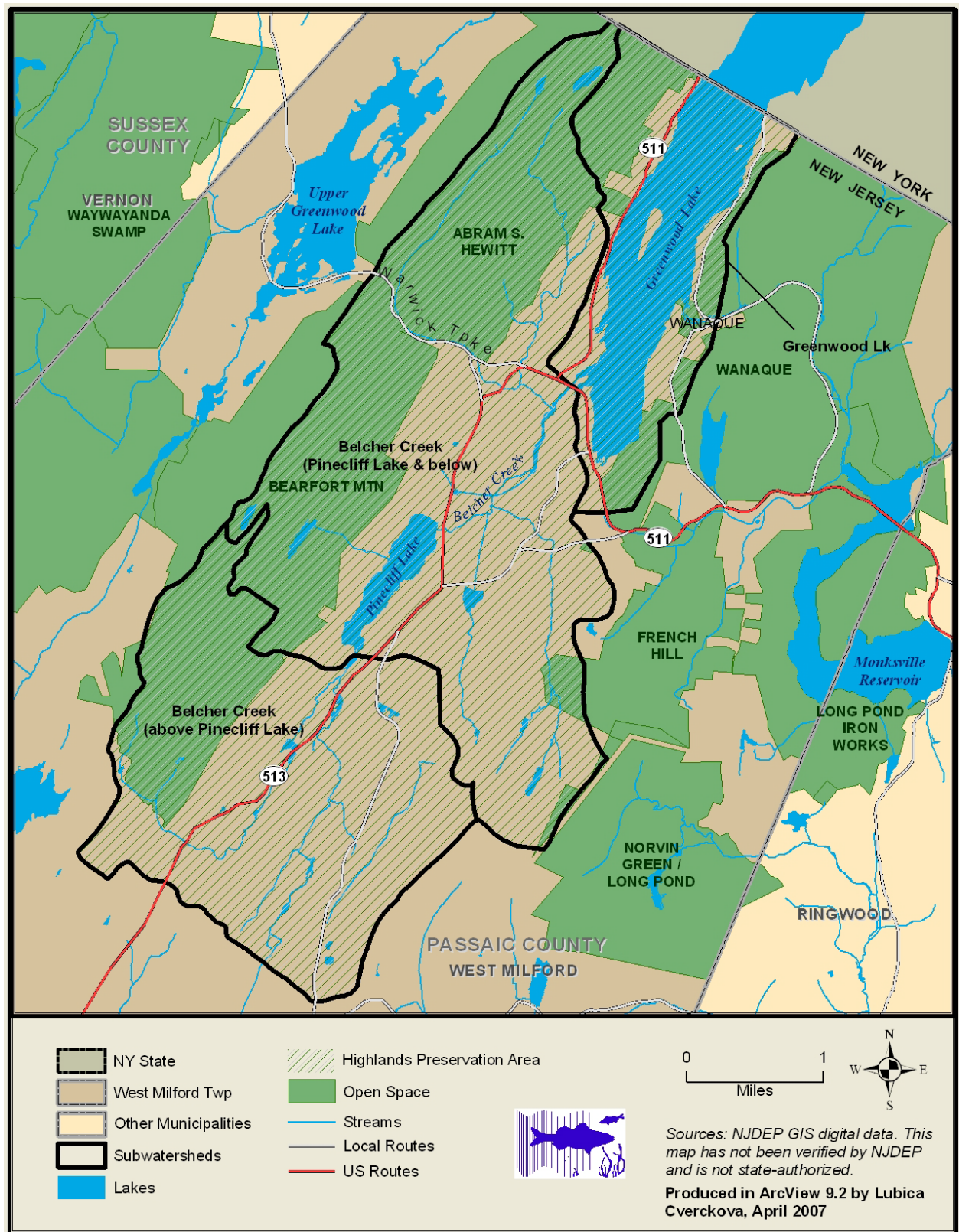
²⁴ Princeton Aqua Science. 1983. Phase 1: Diagnostic-Feasibility Study of Greenwood Lake, New Jersey and New York. Page 39.

²⁵ Princeton Aqua Science. 1983. Phase 1: Diagnostic-Feasibility Study of Greenwood Lake, New Jersey and New York. Page 39.

²⁶ Township of West Milford. 2003. Open Space Plan. Page 35.

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Figure I-5 – Major State “Open Space” Parklands



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West Milford has an abundance of recreational opportunities to offer its residents and visitors. In order to remain a recreational hot spot, it is critical for the township to limit development and maintain the amount of open space that makes West Milford so attractive. Specifically, Greenwood Lake and its watershed must be vigilantly protected, as it is such a critical recreational and economic resource. These efforts will benefit West Milford's economy, increase the well-being of its residents and guarantee the town many visitors for years to come.

Future Uses

The 2004 Highlands Water Protection and Planning Act severely limits the amount of development in this critical region. However, it is clear that without appropriate planning efforts, existing population levels are high enough to threaten the integrity of the lake and the surrounding ecosystems.

The consequences of land use and policy decisions are manifest in Greenwood Lake itself. As explained by the Greenwood Lake Watershed Management District, Inc., "the eutrophication of a lake is a natural aging process which, over a period of thousands of years, transforms it from a clear, clean water body to a marsh and eventually solid land." The contribution of human activity to eutrophication is a phenomenon referred to as "cultural eutrophication" and can speed up the natural extinction of the lake.²⁷ Greenwood Lake possesses a rich history that has been shaped by human activity in a myriad of ways. It is essential that efforts be done to preserve the lake so that it may be enjoyed by posterity. The Greenwood Lake Commission and the citizens of the watershed have the opportunity to improve the quality of lake so that it may be appreciated and protected for years to come.

²⁷ Princeton Aqua Science. 1983. Phase 1: Diagnostic-Feasibility Study of Greenwood Lake, New Jersey and New York.