

# ENVIRONMENTAL RESOURCE INVENTORY

**Borough of Mountain Lakes  
Morris County, New Jersey**

## TABLE OF CONTENTS

A Conservation Battle for Mountain Lakes and the Tourne Park  
The Plan: Build a Storage Reservoir on Part of Mountain Lakes  
Community Reaction

### **APPENDIX**

**112**

Borough Conservation Ordinances  
Historical Lake water quality data  
Flora References  
Natural Heritage Program Status Code  
Fauna References

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## ENVIRONMENTAL RESOURCE INVENTORY INTRODUCTION

Since its inception as one of New Jersey's first planned communities in the early 1900's, Mountain Lakes has been well known for the many natural environmental features which contribute to an exceptional quality of life. The recreational lakes, an abundance of trees, and large tracts of undeveloped areas all contribute to a feeling of natural beauty and serenity which continues to enhance the lifestyle of Borough residents.

Over the years, the Borough has resisted the ever-present pressures to develop open spaces and subdivide large lots in the interest of maintaining those environmental characteristics which make Mountain Lakes a truly unique community. It is clear that the environmental and economic future of the Borough depends in large measure on the intelligent management of future growth and the continued preservation of our natural resources.

One of several tools required to properly manage municipal land use is an inventory of natural resources which identifies selected environmental characteristics and serves as the bench mark against which the future success (or failure) of conservation programs can be measured. For many years, interested residents have contributed to a growing body of information describing the natural resources which characterize the environment of the Borough. This accumulated knowledge plus substantial research form the basis for this Environmental Resource Inventory (ERI).

A comprehensive Master Plan has been prepared which will become the basis for the future management of our community's growth and the preservation of our natural resources. This ERI will enable more specific objectives to be developed and implemented, thus increasing the effectiveness of the master planning process. In addition, the ERI will assist the Building Sub-Code Official and Planning Board in their reviews of future building applications. This will help to assure consistency with the master plan objectives in general and the conservation of our natural resources in particular.

Since residents of the Borough are continually accumulated data on our natural resources, it seems appropriate to structure this report in a modular form with free-standing sections. In this way, information on any topic can be added or modified as appropriate, while entire new sections may be added as information becomes available.

Our objective in preparing the ERI has been to identify the general area where a certain characteristic is most likely to be found or exhibited based on the best available data. Therefore, conclusions specific to any particular site should not be drawn without physical verification of the characteristic at the site in question.

A natural resources inventory, if used properly, can result in harmonious blending of human desires and natural processes. This was stated most effectively in 1973 by the Environmental Commission's original chairman. We share his hope.

### A Green Legacy

*Our capacity to alter the world of nature is truly awesome. Population pressures and the requirements of commercial expansion and urban growth are constantly at work enlarging the man-made portion of our environment and diminishing the natural.*

*Currently the man-made portion of the environment in the metropolitan New York-New Jersey region is replacing the natural at the rate of 2,000 acres per week. The best estimates of the regional land use planning agencies tell us that we will have to build as much between now and the turn of the century as we have built during the past 200 years of our history. Some of this will be rebuilding on the site of past development, but much of it will involve the development of what is now open space.*

*If we are to maintain a healthy human relationship to the land and preserve the necessary open space to make this relationship possible, it is plain that we must act now -- when there is still open space to work with. We must insist that our developers be more conservation-minded, and we must broaden the role of resource planning in the management of our municipal estate.*

*Mountain Lakes has from the very first been hospitable to humankind. Its glory has always been the spaciousness and solitude provided by its green spaces -- even before we were aware of the resulting environmental benefits such spaces provide a community. But this green legacy will remain green only if we act to keep it so.*

*While almost everyone will agree to the general principle that open space should be preserved rather than needlessly destroyed, the translation of this sentiment into official action is another matter. Sound ecological and economical arguments must replace emotions and sentiment as the basis for land use decisions. In the final analysis there are basically three open space benefits:*

- The first is the establishment of outdoor recreational opportunity.*
- The second is for the maintenance of attractive community design, a pleasant landscape, and the environment amenity this supplies.*
- The third is for the maintenance of natural processes or, in a modern phraseology, ecosystem balance.*

*Each of these three basic approaches to open spaces have inherent ecological, social and economic benefits, and fortunately in many cases all these functions can be served by one piece of land (more accurately by one well planned system of open spaces).*

*Where do these three functions come together? Fortunately the answer to that question does not require elaborate inventories by scientists, technicians or sociologists. In most cases, empirical reasoning and a careful look at the landscape is enough.*

*The recreationists say that "water is the focal point". Water and related land provide the greatest range of recreational opportunities. They also speak of trails, woodland paths, and large unbroken and isolated areas of open space for hiking and camping. The designer is concerned with either separating or unifying communities via predominant natural land forms, such as water courses, also ridge lines for visual amenity and large tracts of land to serve as buffers or "green belts". The naturalist also finds wildlife in and associated with water. He is also concerned with the action of water on vegetation and soil; thus steep slopes require natural cover. Finally, he knows that some of the large tracts are necessary because an ecosystem, i.e., that integrated plant/animal community that makes up a self-sufficient biological inter-*



*relationship, cannot exist with any integrity without preserving certain critical areas undisturbed by land uses or activities which tend to disrupt the ecological balance.*

*Recently, the acres per thousand approach has been replaced by an ecological one in which natural processes are the basis on which open space decisions are made, as well as general planning decisions reflecting prohibition against certain types of land uses. If natural processes are maintained in relative equilibrium, all kinds of benefits accrue. The most dynamic and thus major determinant of natural processes is, again, water. If the water system is kept in equilibrium, then the chances are that all natural processes will be in basic equilibrium. Thus, land-use limitations as well as sites for open space can be selected on the single basis of maintaining the integrity of the water regimen. When this is done, the defense of government policy need not rest exclusively on arguments such as natural beauty or as the provision of "X" amount of recreational space for "Y" amount of people. The defense can rest upon work actually performed by water in process: marshes and wetlands as reservoirs for flood water, aquifers as self-perpetuating water storage systems, unbuilt-upon flood plains to avoid economic and physical catastrophes, and protected surface water for use and recreation.*

*By placing restrictions on the use of water-related land, open space can be infused into development as amenity, and recreational sites provided. Therefore, the absolute amount of land that a municipality should preserve as open space is calculated by the water system, not by acres per thousand.*

By Vernon "Dave" Dame  
Environmental Commission Chairman 1973

## MORRIS COUNTY PUBLIC RESOURCES INTERACTIVE MAPPING APPLICATION

To assist the user in visualizing the location and geographic extent of the various natural resources, Borough land use, and geographic features discussed throughout this ERI, the Borough entered into an agreement with the Morris County Planning Department to host the Borough's geographic information system (GIS). By mapping all these features in a GIS format in lieu of "hard copy" mapping typical of ERI reports, the user can create a "real time" snapshot of each of these. By periodically updating the GIS layers of each feature and coordinating ERI text, this ERI report will become a living document.

The Morris County Planning Department has created an interactive database for use by the public known as the Morris County Public Resources Interactive Mapping Application (MCPRIMA). Throughout this ERI, the user will see hyperlinks to the MCPRIMA which will show various data layers already turned on relating to the ERI topic being discussed. Once in the MCPRIMA, the user will be able to modify the "created" map and create an image to export and or print. Detailed directions for use of the MCPRIMA are located within the MCPRIMA under the help function. By pressing the hyperlinks throughout this ERI, the user will be seamlessly transferred to the MCPRIMA. Within the MCPRIMA, the user will see another hyperlink that will seamless send the user back to the Borough's website and this ERI.

Following is a hyperlink to the MCPRIMA main page which will show an "aerial" base map of the Borough.

[https://morrisgis.co.morris.nj.us/MCPRIMA\\_4x-war/MountainLakes?startUpTheme=public\\_login&publicThemeName=Mtn%20Lakes%20test%202](https://morrisgis.co.morris.nj.us/MCPRIMA_4x-war/MountainLakes?startUpTheme=public_login&publicThemeName=Mtn%20Lakes%20test%202)

The user will have the ability to turn on or off the following data layers:

- Topography
- Lake Bathometry
- Steep Slopes
- Soil Type
- Lakes and Streams
- Groundwater Recharge
- Depth to Bedrock
- Wetlands
- Depth to Water
- Prime Aquifer Map
- Groundwater Recharge
- HUC-14 Sub Watersheds
- Wellhead Protection Areas
- Tax Parcels
- Zoning
- Municipal Properties
- Preserved Land
- Historic Sites
- Transportation Facilities
- Hiking Trails
- NJDEP Known Contaminated Sites

The MCPRIMA utilizes computer generated data layers. As such, the maps/reports created can be used for visual representations only. The maps are not dependable at the site level, so they cannot be used in support of any land use/zoning application or evaluation submitted to the Borough. Any land use interpretation made from the MCPRIMA must be confirmed by the source map information that can be obtained from the Borough municipal office.

The Municipal Land Use Law (MLUL), the legal basis for municipal planning in New Jersey, requires that every municipal zoning ordinance must be based on a Master Plan. In compliance with the MLUL, this plan provides the basis for the Borough's zone plan and development regulations. In addition, it seeks to coordinate the Borough's land use policies and to provide a clear description of the Borough, its goals and the policies that should be adopted to implement these goals.

The first comprehensive Master Plan for the Borough was adopted in 1963 and was based upon the state law predating the MLUL. A new Master Plan was adopted in 1979 prepared by the Master Plan Committee of the Planning Board with the professional assistance of Tore Hultgren, P.P. In 1986; a Housing Element amendment to the 1979 plan was prepared in conformance with an amendment to the MLUL. In 1994, as part of a required periodic re-examination, the need for a substantial revision and updating of the Master Plan became apparent.

The first priority for the Master Plan and Housing Committees was the preparation of the key mandatory elements of a new Master Plan. These elements were prepared with the professional assistance of Kimball & Kimball and William Harrison. A new Borough Master Plan consisting of the following sections was adopted on September 28, 1995:

- Community Characteristics
- Statement of Objectives, Principles, Assumptions, and Policies
- Land Use Plan
- Housing Element and Fair Share Plan

Subsequently, non-mandatory elements of the Master Plan (listed below) were prepared by the Master Plan Committee together with amendments to the previously adopted Land Use Plan and Housing Plan (prepared by the Housing Study Committee). These elements and amendments were adopted on October 24, 1996:

- Circulation Plan
- Conservation Plan
- Community Facilities and Utilities Plan
- Recreation Plan
- Recycling Plan
- Historic Preservation Plan
- Relationship to Other Plans
- Summary of Major Findings and Recommendations

Although firmly rooted in the 1979 plan, the 1996 Master Plan reflected the major changes since that time and attempted to anticipate future needs of the Borough.

The Municipal Land Use Law (MLUL) requires every municipality in New Jersey to re-examine its Master Plan and development regulations at least once every ten (10) years (N.J.S.A. 40:55D-89) in order to keep municipal planning efforts current. On October 24, 2002 the Planning Board of the Borough of Mountain Lakes adopted a re-examination report of its current comprehensive 1996 Master Plan on October 24, 2002 and again on September 25, 2008. A copy of the Borough's October 24, 1996 Master Plan, October 24, 2002 Re-examination Report and September 25, 2008 Re-examination Report can be found on the Planning Board Page of the Borough's website.

Please proceed to the MCPRIMA to map the zoning classifications and tax parcels within the Borough.

[https://morrisgis.co.morris.nj.us/MCPRIMA\\_4x-war/MountainLakes?  
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## **REGIONAL RELATIONSHIPS**

### **New Jersey Highlands**

In the New Jersey Highlands Water Protection and Planning Act (Highlands Act), the Legislature designated specific boundaries within the New Jersey Highland Region as the Preservation Area and the Planning Area. . As a legislative enactment, these boundaries are not subject to modification through the municipal Conformance Process with the Highlands Regional Master Plan (RMP).

The fundamental distinction between the Preservation and Planning Areas is that municipal and county conformance with the Highlands RMP is required in the Preservation Area and is voluntary in the Planning Area. The Preservation Area consists of nearly 415,000 acres of the Highlands Region 859,358 acres, and is located in 52 municipalities within the seven Highlands Counties. The lands within the Preservation Area were subject to the immediately effective standards in the Highlands Act and are governed by rules and regulations subsequently adopted by the NJDEP.

The Borough is located in its entirety within the Highlands Planning Area. The Planning Area consists of nearly 445,000 acres and is located in 83 municipalities. The Borough has currently chosen to follow its own Master Plan (last revised in 1996) and not to conform to the conditions of the Highlands RMP.

### **Whippany River Watershed**

The Whippany River watershed is an area of 69.3 square miles in Morris County NJ that encompasses all the land, streams and lakes that drain into the Whippany River. The majority of Mountain Lakes drains to Troy Brook, a tributary of the Whippany River, and is located within the Whippany River watershed.

The Whippany River Watershed Action Committee (WRWAC) is a 501(c)(3) nonprofit organization involving municipal governments located within the watershed and the Morris County Board of Chosen Freeholders. As stewards of the Whippany River watershed, the WRWAC's purpose is to preserve, protect, and maintain the land and water resources of the watershed. The Action Committee accomplishes its mission through broad-based community action, implementation of projects, on-going assessment and promotion of resource conservation.

The Borough of Mountain Lakes has been an active member of the WRWAC since it was organized in 1999. The partnership between the Borough and the Action Committee has benefited water quality both within Mountain Lakes and in the broader region. Located at the headwaters of Troy Brook, Mountain Lakes' environmental management practices directly affect the water flow, water quality, and drinking water supplies in downstream areas, including the Troy Brook, the Whippany River, and the Passaic River watersheds.

The Borough and Action Committee have served as valuable resources and partners to the mutual benefit of each other. Mountain Lakes and WRWAC have collaborated on local and regional issues involving surface water resources, ground water resources, stormwater management, habitat development and restoration, lake water quality, runoff contaminant control, environmental stewardship, and environmental education

Mountain Lakes partnered with WRWAC, neighboring municipalities, and Rutgers University in developing the Troy Brook Regional Stormwater Management Plan (RSMP), the first of its kind in New Jersey. Projects identified in the stormwater management plan can be considered, developed and implemented with funding from water quality grants from New Jersey.

The Troy Brook RSMP, the overall Whippany River Watershed Management Plan, and the Mountain Lakes Stormwater Management Plan are the primary documents guiding management of local watershed resources within Mountain Lakes.

Please proceed to the Mountain Lakes Stormwater Management Plan for more details.

<http://www.ecode360.com/8632062?highlight=stormwater%2Cplans>

## CLIMATE

Mountain Lakes does not have a weather monitoring station of its own. The Jersey City Water Commission takes daily weather observations at its reservoir in Boonton. This station, being in close proximity to and of approximately the same elevation as Mountain Lakes, serves as a good basis for describing our local climate.

It should be noted that climate is based on the averages of weather readings gathered over an extended period of time. This methodology smooths out fluctuations and should in no way be considered as a prediction or forecast of future climates.

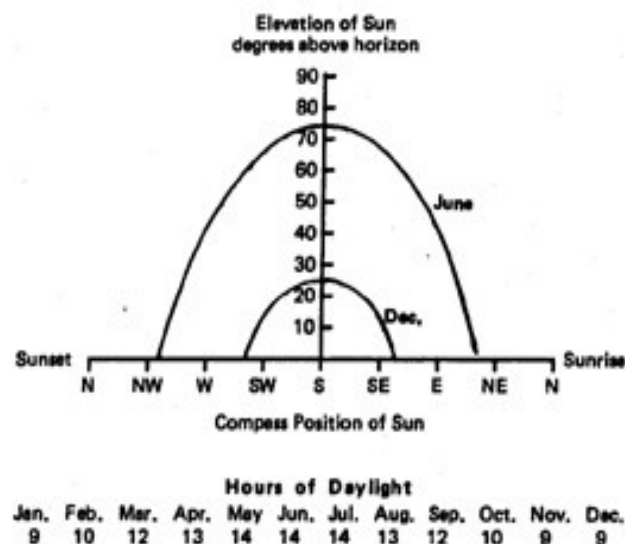
Mountain Lakes lies in the humid continental climate zone. This zone is noted for its changeable weather, because it is in the conflict zone between warm, humid air masses from the south and cooler, drier air masses from the north.

Winds in Mountain Lakes can blow from any direction; however, in winter, cold northwest winds predominate, and summer winds are most often hot and humid out of the southwest.

The amount of insolation (incoming solar radiation) received in a given day reflects the angle at which the sun's rays are striking the earth (the more nearly this approaches 90°, the greater the intensity) and the number of hours during which the sun is shining.

The declination of the sun during June and December is shown in Figure 1.

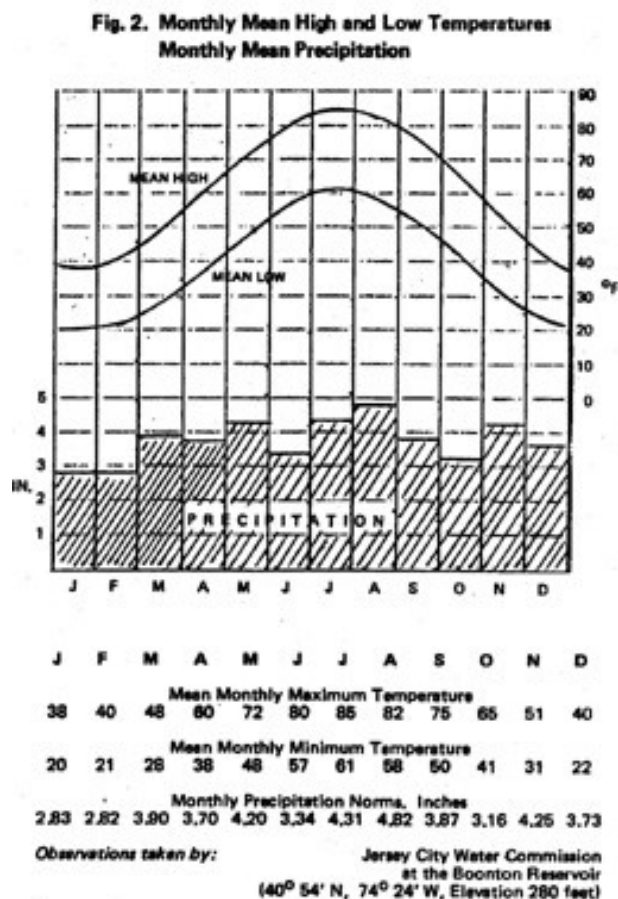
Fig. 1. Declination of the Sun in Mountain Lakes





Local cloud cover and haze caused by pollution tend to diminish the amount of sunshine received. Normally, in Mountain Lakes, the sunshine is slightly over one-half the possible amount, with the greatest number of sunny days occurring in October and the least in February. The average summer temperatures, for the hottest months of July and August, are in the low 70°F's. The average winter temperatures for the coldest months of January and February are in the high 20°F's as shown in Figure 2. These, however, are monthly averages and do not show the great variation that sometimes occurs. The record high temperature of 104°F was recorded in the summer of 1953, and the record low of -20°F occurred in the winter of 1934.

## Monthly Mean Temperatures and Precipitation



The last killing frost in the spring generally occurs between May 5th and 10th and the first killing frost in the fall generally occurs between October 5th and 10th.

Precipitation is generally well distributed throughout the year but with a slight increase during the summer months due to local thunderstorms, of which the area receives between 25 and 30 per year. The precipitation averages about 45 inches a year with the monthly distribution shown in Figure 2.

Even in the wintertime more of the precipitation falls as rain than as snow. Figures on the exact amount of snow that falls are difficult to obtain because they are affected markedly by variations in local conditions, such as elevation. The Army Corps of Engineers reports that the average

annual snowfall over the Passaic River Basin is about 34 inches with a water equivalent of about 4 inches. Snow falls of more than 10 inches in a single storm occur occasionally.

In the 21<sup>st</sup> century, according to C. Rosenweig and W.D. Solecki, global climate models indicate that the New York metropolitan area will experience warmer year round temperatures, hotter heat waves in the summer, more severe storms, and increased drought and flooding.

## **GEOLOGY**

### **Topography and Steep Slopes**

The underlying rock types, geologic structures, geologic history, and the climate of the region have all contributed to the formation of the landscape we have in Mountain Lakes today. The topography and degree of slope have important implications for all land use decisions. Because of the geologic history of the area, much of the land is moderately to steeply sloped. This results in conditions that make development of these areas undesirable from a practical as well as an environmental point of view.

Steep slopes and heavy rains can result in runoff conditions which cause soil erosion and subsequent siltation of the lakes if not properly controlled. Leaving large tracts and critical parcels undeveloped provides the necessary natural growth which serves to control soil erosion. Indiscriminate development and disregard of critical areas has, in the past, actually created runoff and soil erosion problems where none existed before. Proposals for the future development of steeply sloped areas should be carefully reviewed for their potential impact on the environment.

Please proceed to the MCPRIMA to map the topography within the Borough.

[https://morrisgis.co.morris.nj.us/MCPRIMA\\_4x-war/MountainLakes?startUpTheme=public\\_login&publicThemeName=Mtn%20Lakes%20test%202](https://morrisgis.co.morris.nj.us/MCPRIMA_4x-war/MountainLakes?startUpTheme=public_login&publicThemeName=Mtn%20Lakes%20test%202)

### **Bedrock Geology**

New Jersey contains a wide variety of physical features produced by complex geological processes that have been going on for millions of years. These processes have produced a series of landforms that generally trend from the northeast to the southwest. These landform features reflect the underlying rock type, geologic structure, and geological history and are termed physiographic regions. In New Jersey we have the Ridge and Valley, Highland, Piedmont, and Inner and Outer Coastal Plains (Fig. 3). Mountain Lakes is located on the boundary between the Highlands and Piedmont Regions and includes part of each.



Figure 3. New Jersey Landforms

## Highlands

The geologic history of this area begins in the Precambrian Era (Fig. 4, Geologic Time Scale) and continues through the Quaternary period, a time span of over 600 million years. The oldest rocks in the region are found in the Highlands. These rocks record a long history of repeated deposition of sediments followed by folding, faulting, and intrusion of molten rock. These mountain-building processes resulted over time in slowly changing the igneous and sedimentary rocks into metamorphic ones. The most common of these metamorphic rocks are several types of gneiss, distinguished by their alternate bands of light and dark-colored minerals.

Besides forming the Highlands, the Precambrian rocks also form the “basement” on which the younger sediments of the Piedmont were subsequently deposited.

**Figure 4. Geologic Time Scale**

| Geologic Time Scale |               |                       |
|---------------------|---------------|-----------------------|
| Era                 | Period        | Millions of Years Ago |
| Cenozoic            | Quaternary    | 1.5                   |
|                     | Tertiary      | 65                    |
| Mesozoic            | Cretaceous    | 136                   |
|                     | Jurassic      | 193                   |
|                     | Triassic      | 225                   |
| Permian             | Pennsylvanian | 280                   |
|                     | Mississippian | 310                   |
| Paleozoic           | Devonian      | 345                   |
|                     | Silurian      | 395                   |
|                     | Ordovician    | 435                   |
|                     | Cambrian      | 500                   |
| Precambrian         |               | 570                   |

## Piedmont

The Piedmont consists of Triassic-Jurassic age sedimentary shales, sandstones, and conglomerates interspersed by lava flows. These rocks sit directly upon Precambrian rocks with those of Paleozoic age (a time span of about 350 million years) missing. Geologic history indicates that widespread earth movement occurred in the latter part of the Triassic, resulting in the elevation of the Highlands relative to the areas further east. Subsequently, sediments from the Highlands washed down onto this lower region. Sedimentation was periodically interrupted by volcanic activity when thick layers (350 to 750 feet) of lava flowed across the surface. Evidence seems to indicate that when these fissure eruptions took place the sediments were nearly horizontal but were later tilted toward the west. The most common sedimentary rock of the Piedmont is the Brunswick Shale. In Mountain Lakes, however, it is mantled with a large amount of glacial drift.

## The Ramapo Fault

The Ramapo Fault terminates the Highlands on the east and represents the boundary between this region and the Piedmont as can be seen in the sketch. The Ramapo Fault is a fracture in the earth that runs about 80 miles from Peekskill, New York, southwest through Mahwah and Oakland in Bergen County, Pompton Lakes in Passaic County, and across Morris County in this vicinity. The fault terminates in the Peapack-Gladstone area of Somerset County. Through Mountain Lakes the fault approximates the path currently followed by Conrail (Erie Lackawanna Railroad), but it is difficult to determine its exact location since it has no visible surface trace.

The Ramapo Fault has not produced a major earthquake in historic times; however, scientists from Lamont Doherty Geologic Observatory who monitor it constantly have recorded some two dozen small tremors (1.5 to 3.0 on the Richter Scale) in the past five years. They do not rule out the possibility of major movement along the fault at any time.

## **Pleistocene Glaciation**

During the Pleistocene Epoch of the Quaternary there were long periods when large parts of North America were covered by glacial ice. There were even longer periods called interglacials when the climate was at least as mild as it is today. Only three of the four major North American ice advances are evident in New Jersey. The last glacier, termed the Wisconsin, retreated from this area about 15,000 years ago, leaving behind a greatly modified landscape.

The maximum thickness of the ice sheet in New Jersey has never been determined, but rough estimates place it at between 1500 and 2500 feet. Its general direction of movement was from north to south, carrying with it a great deal of material scoured from the land. This rock debris, termed glacial drift, ranged in size from clay and silt up to huge boulders.

When the ice started to melt back as fast as it was advancing, the front of the ice became stationary for a time. At this point the sediments and rock was released from the melting ice and dumped in a pile at the front of the ice. Thus it formed what is called a terminal moraine. The Wisconsin terminal moraine in New Jersey consists of a low irregular ridge of glacial material averaging a mile wide and ranging in height from 25 to 300 feet. This curving ridge marks the southern extent of glaciation in the state. Across Morris County the moraine extends roughly from Chatham to Hackettstown. This may explain the 363 feet of unconsolidated deposits that were encountered before reaching bedrock when Rte. 46 Well No. 5 was drilled.

The pre-glacial drainage was completely disrupted by the glaciers; and when the ice began to melt, new drainage patterns were formed. This process was delayed somewhat by the formation of a huge melt water lake called Glacial Lake Passaic. This lake extended from the Watchung Mountains on the east to the Highlands on the west and at its maximum size was about 30 miles long and up to 240 feet deep. The Piedmont portion of Mountain Lakes was covered by this lake.

Please proceed to the MCPRIMA to map the bedrock within the Borough.

[https://morrisgis.co.morris.nj.us/MCPRIMA\\_4x-war/MountainLakes?  
startUpTheme=public\\_login&publicThemeName=Mtn%20Lakes%20test%202](https://morrisgis.co.morris.nj.us/MCPRIMA_4x-war/MountainLakes?startUpTheme=public_login&publicThemeName=Mtn%20Lakes%20test%202)

## **NRCS Soils**

The total complex of weathered rock particles, organic material, air and water that lies on a specific site between the vegetative cover and parent material is called soil. A soil is a cumulative result of regional geology and long-term climatic factors. A soil is specific to its location. It may, for historical reasons, occur in close proximity to several other kinds of soil. The roots of living plants and natural mulch supplied by leaves and dead plants help keep soil in place. They offset natural processes of erosion which cause rock and soil particles to be broken down and transported from one location to another. (Current examples in Mountain Lakes

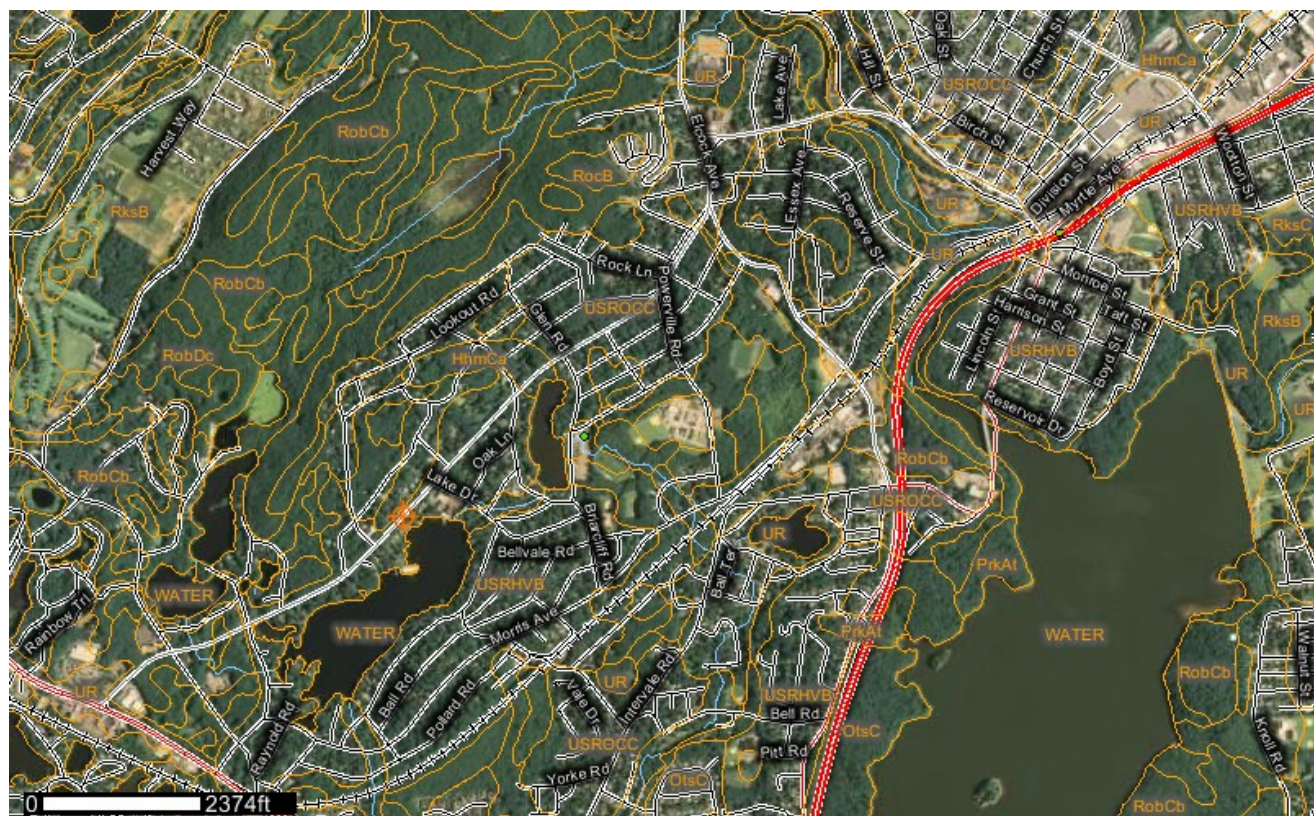
where erosion has taken place following the removal of vegetation can be seen on the hill behind the football home bleachers, Island Beach boat launch and behind Birchwood Beach).

Factors controlling erosion and transportation are: the physical characteristics of the soil itself, slope of the land, amount and intensity of precipitation, infiltration rate, surface runoff, land use, extent and type of vegetative cover, and the capacity of the runoff waters to carry sediment. At higher velocities flowing water can carry a greater load of sediment; and when water velocity drops, the load settles to the bottom. This occurs, for example, when a stream's gradient decreases as river water flows into a standing body of water, such as a lake, a reservoir or when a river reaches the ocean. Soil materials lost to erosion in one location are eventually deposited as sediment elsewhere and may contribute to the formation of a new soil in that location. The process of rock breakdown, transportation, and subsequent deposition of soil materials at a lower elevation in the landscape is continuous and is offset by long-term geological mountain building activity. Removal of vegetation and the disturbance of soil, such as occurs in the process of building construction, make the total natural system more unstable and accelerates the rate of natural redistribution. Therefore, the location of soil materials cannot be viewed as fixed.

The geologic history of Mountain Lakes has provided it with varied sources of material from which soils have formed. Because the physical properties of the rocks differ, the physical properties of the soils formed also differ. The U. S. Department of Agriculture's Soil Conservation Service (SCS) has developed one standard system used for analysis of the physical characteristics of soils. For each soil, various physical properties are described, such as depth to bedrock, drainage characteristics and texture. The SCS analyzed these data to develop interpretations for certain engineering uses for each soil, such as the construction of light buildings with cellars, suitability for receipt of septic effluent, development of recreational areas, and construction of roads and parking lots. The interpretations are stated in terms of the degree to which the physical properties of the soil present limitations for the specified use. Limitations are classified as "slight", "moderate", or "severe". "Severe" is defined by the SCS to be those "...resulting from the effects of steep slopes, high water tables, stream flooding, unfavorable soil texture, acidity, large numbers of stones, rocks and so forth. The Morris County Planning Board has further designated the following physical properties (which are categorized by the SCS as "severe") as critically significant in this area: Greater than 15 percent slope, less than 6 feet depth to bedrock, and less than 2 feet to seasonal water table.

The location of the principal kinds of soil in Mountain Lakes are illustrated in the following NRCS Soil Survey:





### Soil Survey Key

| Code   | Type of Soil                         | % Slope |
|--------|--------------------------------------|---------|
| RksB   | Riverhead gravelly sandy loam        | 3-8     |
| RksC   | Riverhead gravelly sandy loam        | 8-15    |
| RobCb  | Rockaway sandy loam; Very stony      | 8-15    |
| UR     | Urban land                           |         |
| RobDc  | Rockaway sandy loam; extremely stony | 15-25   |
| RocB   | Rockaway gravelly sandy loam         | 3-8     |
| PrkAt  | Preakness sandy loam                 | 3-8     |
| OtsC   | Otisville gravelly loamy sand        | 3-15    |
| USRHVB | Urban land; Riverhead complex        | 3-8     |
| USROCC | Urban land; Rockaway complex         | 3-15    |
| HhmCa  | Hibernia loam; stony                 | 3-15    |

### Soil Series Descriptions

The following taken from "A Soil Survey of Passaic County, NJ" was created by the USDA Soil Conservation Service in cooperation with the NJ Agricultural Experiment Station and Cook College at Rutgers, December 1975.

- **Riverhead Series:** Consists of deep, well-drained moderately coarse textured soils. These gently sloping to extremely sloping soils are located in valleys adjacent to the rough stony Highlands. They formed in glacial outwash material derived mainly from

granitic gneiss and lesser amounts of conglomerate, sandstone and shale. Permeability is moderately rapid in the surface layer and subsoil and rapid in the substratum. Available water capacity is moderate. This soil is a good source of sand and gravel. Rapid permeability in the substratum is a pollution hazard where the soils are used for onsite septic effluent disposal systems. These soils have slight to moderate limitations for most uses in community development.

- Rockaway Series: Consists of gently sloping to very steep soils that have a fragipan in the lower part of the subsoil. These soils are dominantly moderately well drained but in places are well drained. They are on side slopes in the rough, stony and rocky Highlands. The soils formed in glacial till derived mainly from granitic gneiss and from lesser amounts of conglomerate, sandstone and shale. Permeability is moderate above and moderately rapid below the fragipan. It is slow in the fragipan. Available water capacity is moderate. In excessively wet areas, water above the fragipan moves laterally. A seasonal perched water table is at a depth of 1 ½ to 2 ½ feet for short periods. The slowly permeable fragipan and perched water table limit the use of these soils for onsite septic filter fields. Slips are a concern on road banks and on other slopes where the soil has been scalped and boulders on the surface are concerns where construction and landscaping are performed. These soils are surrounded by rough and rocky areas that make accessibility for developments costly or economically prohibitive.
- Urban Land: Consists of areas that have been developed for residential, commercial or industrial use. During development, these areas were leveled or cut and filled to such an extent that 40-80% of the original soil has been altered.
- Preakness series: Consists of deep, nearly level, poorly drained, loamy soils that have a water table to the surface later in winter and early in spring. In most places these soils are subject to annual flooding. They are in low positions on the landscape and receive much runoff from the surrounding higher areas. The soils formed in glacial outwash derived mainly from granitic gneiss and lesser amounts of conglomerate, basalt, sandstone and shale. Permeability is moderate in the surface layer, moderately rapid in the subsoil, and rapid in the substratum. Available water capacity is moderate.
- Otisville Series: Consists of excessively drained soils that have a sandy and gravelly subsoil and substratum. These gently sloping to steep soils are on sides of valleys. They formed in glacial outwash derived mainly from granitic gneiss and lesser amounts of conglomerate, sandstone and shale. Permeability is moderately rapid in the surface layer and upper part of the subsoil, and rapid in the lower part of the subsoil in the substratum. The rapid permeability of the substratum is a potential hazard if the soil is used for onsite septic filter fields. Available water capacity is low. These soils are a source of gravel and sand. Limitations for use in community, recreation and industrial development range from slight to severe depending on the use and the slope.
- Hibernia Series: Consists of extremely stony, somewhat poorly drained soils that have a fragipan in the lower part of the subsoil. These gently sloping to strongly sloping soils occupy areas of the rough, stony and rocky Highlands. These soils formed in glacial till derived mainly from granitic gneiss and lesser amounts of conglomerate, sandstone, and shale. Permeability is moderate to moderately rapid above the fragipan and slow in the fragipan. Water is perched over the fragipan from late in winter until early in spring. Depth to the seasonally high water table is ½ to 1 ½ feet. The dense, firm, slowly



permeable fragipan and the seasonal perched water cause severe limitations for onsite septic filter fields. Available water capacity is moderate. Boulders and stone content cause severe limitations for development.

Please proceed to the MCPRIMA to map the soils within the Borough.

[https://morrisgis.co.morris.nj.us/MCPRIMA\\_4x-war/MountainLakes?  
startUpTheme=public\\_login&publicThemeName=Mtn%20Lakes%20test%202](https://morrisgis.co.morris.nj.us/MCPRIMA_4x-war/MountainLakes?startUpTheme=public_login&publicThemeName=Mtn%20Lakes%20test%202)

## **HYDROGEOLOGY**

## **Groundwater and Wells**

The major source of water in Mountain Lakes is an aquifer of considerable depth (about 200' - 300') running along Route 46 east of the Boulevard and nearly parallel to Pocono Road west of the Boulevard. Near the western boundary of the Borough the channel forks, one fork running west toward St. Francis Health Resort, Denville, and the other running north through the Rockaway River Country Club and up the Rockaway Valley. Current engineering studies indicate that it is highly probable that future municipal water supply will draw from this aquifer. Extensive material on the delineation of this and other relevant regional aquifers can be found in the Geraghty and Miller (1978) and Geonics (1979) studies.

Virtually all the Borough water supplies come from this aquifer, from a wellfield in the Rockaway Valley and from a well on the south side of Route 46 east of the Boulevard. Residential water is stored in two tanks with a capacity of 1.5MM gallons and the Borough pumps roughly 750K gallons a day. The NJDEP has established annual and monthly groundwater usage allotments to protect regional water resources. In 2005 and 2006 the Borough exceeded its state-mandated water allocation for two months causing a state-mandated 5 year new connection stop.

Well locations are important to an ERI because they identify points where surface pollutants may reach the groundwater more easily. Known contaminated sites on Rte 46 which could impact groundwater are B&V Tailoring and Cleaning and the Hess Station. In fact, Well #5 was detected to have low but measurable levels of PCE in 1991-1997 with 0.4-0.9 parts per billion detected. Beginning in 1997 PCE was found to be in excess of NJ State limits ranging from 1.2 -1.5 ppb. An air stripper was subsequently installed on this well in 2000 and the water quality now consistently meets all State requirements.

In an area such as Mountain Lakes where groundwater is the primary source of supply, maintaining the wells and groundwater quality is critical. At this time, the Borough has no well-head protection ordinances to ensure the future viability of its sole water supply. Work in this direction is made difficult by the fact that to a large extent, the aquifer and its recharge area are located on private land (both developed and undeveloped) with a good percentage of it falling outside Borough boundaries. This mandates a regional approach which is considerably more difficult to achieve.

The information provided in the Water Table Map and Table 1 is a fairly complete inventory of wells in the Borough. Further investigation at specific sites may reveal additional wells not included here. This information indicates the level of groundwater pollution risks and alerts those involved in planning and site plan review to the problem. Such an understanding of the general difficulty in preventing groundwater pollution is important.

Early settlers prior to 1910 depended upon individual private wells. These wells appear as G, H, I, K, M and O. Buildings after 1910 were tied into a privately-owned water supply system. This was later taken over and improved by the Borough. Well C dates from this period and is now inactive. Wells E and F, the other inactive Borough wells, were drilled for test purposes and never used for production. The currently active Borough wells are A, B and D and two additional wells located on the Rockaway River in Denville at the Rockaway River Country Club. The remaining wells are privately owned and drilled at various times from the 1920's through the 1950's.

**Table 1. Wells in Mountain Lakes**

| Wells in Mountain Lakes |       |          |      |       |          |           |                     |          |
|-------------------------|-------|----------|------|-------|----------|-----------|---------------------|----------|
| Symbol                  | Block | Location | Lot  | Depth | Diameter | Formation | Status              |          |
| A                       |       |          | 4    | 22A   | 334'     | 20"       | Terminal Moraine    | Active   |
| B                       |       |          | 53   | 10    | 440'     | 8"        | Precambrian Granite | Active   |
| C                       |       |          | 53   |       |          |           | Precambrian Granite | Inactive |
| D                       |       |          | 29   |       | 135'     | 6"        |                     | Active   |
| E                       |       |          | 127  | 1     | 204'     | 6"        | Stratified Drift    | Inactive |
| F                       |       |          | 6    | 5     | 250'     | 6"        | Stratified Drift    | Inactive |
| G                       |       |          | 130  | 1A    |          |           |                     |          |
| H                       |       |          | 129C | 12    |          |           |                     |          |
| I                       |       |          | 129C | 14    |          |           |                     |          |
| J                       |       |          | 118  | 43    | 320'     |           | Stratified Drift    |          |
| K                       |       |          | 118  | 1     |          |           |                     |          |
| L                       |       |          | 89   | 1     |          |           |                     |          |
| M                       |       |          | 113  | 1     |          |           |                     |          |
| N                       |       |          | 23   | 35    |          |           |                     |          |
| O                       |       |          | 19   | 2     |          |           |                     |          |

Please proceed to the MCPRIMA to map groundwater characteristics and wells within the Borough.

[https://morrisgis.co.morris.nj.us/MCPRIMA\\_4x-war/MountainLakes?startUpTheme=public\\_login&publicThemeName=Mtn%20Lakes%20test%202](https://morrisgis.co.morris.nj.us/MCPRIMA_4x-war/MountainLakes?startUpTheme=public_login&publicThemeName=Mtn%20Lakes%20test%202)

### **Surface Water: Lakes**

A unique resource of the Borough of Mountain Lakes is the chain of man-made lakes within its borders. The bottoms of the lakes are fine sediments and organic material. Before construction of the dams, the lake areas consisted of swamps and woodland. The water source is from springs and surface drainage of land within the Borough. This geographical arrangement makes it possible for Mountain Lakes to provide more control of the surface water quality than is possible in most communities. Conversely, the responsibility for pollution falls squarely upon the residents. The total area of all of the nine lakes in the chain is approximately 162 acres.

The lakes provide recreation in all seasons. There are public swimming areas on two lakes, Birchwood and Mountain, and swimming from private docks and beaches is popular on all of the lakes. All of the sandy beaches in the Borough, both public and private, have been artificially created by bringing sand from other sources. Fishing is good with such species as bass, perch, pickerel, crappie, sunfish and catfish to be found in most of the lakes. Each spring a Trout Derby is held on Birchwood Lake for the children of the community. Those trout that are not caught, survive and continue to be caught throughout the summer. Trout will live in the lakes but will not breed, apparently because the summer water temperatures are too high. Sailboat races are

held during the summer on Mountain Lake where some international class sailors have been developed. Canoeing is also very popular. During the winter there is skating on all lakes.

The lakes provide a haven and a home for many wild creatures. At one time muskrats became so numerous that a professional trapper was employed who took 124 muskrats from Birchwood and Crystal Lakes in just a few weeks. Since then they have again become well established. Several species of turtles are visible on logs and rocks around the shore during a warm summer day. In addition large snapping turtles can be seen occasionally in the upper lakes, especially in the spring when they leave the water to lay eggs. There are also some non-poisonous water snakes in the upper lakes. Water fowl including Canada geese and several varieties of ducks stop on the lakes. Periodically a pair of swans nest on a few of the lakes.

The Lakes Management Committee has monitored and maintained the health of the lakes. As part of their duties, the Committee has engaged the services of a lakes management consultant, Allied Biological, Inc. from Hackettstown NJ. The Allied Program consists of weekly surveys of all lakes, biweekly unicellular phytoplankton sampling from June-August, herbicide and algaecide applications to control nuisance macrophytes and algae, and a water quality monitoring program (phytoplankton and water chemistry analysis).

The control of nuisance species and algae is necessary to preserve native flora and fauna populations and to maintain high lake water quality for all to enjoy. Left uncontrolled, non-native invasives, like Eurasian watermilfoil, curly-leaf pondweed, water chestnut and purple loosestrife, develop into dense weed masses that literally suffocate the lake and fauna that depend upon it. Similarly, excessive algae growth can develop into unsightly "blooms" with noxious odors and can dramatically lower the water clarity and oxygen needed for a healthy ecosystem. Of particular concern, blue-green, or unicellular, algae are capable of producing toxins that cause skin irritation, allergic reactions, GI symptoms and respiratory problems. This blue green algae and nuisance blooms have occurred in our lakes, namely Wildwood, Olive, Shadow and Grunden's. Algae thrives in nutrient-rich (phosphorus and nitrogen) waters caused by external sources like lawn fertilizers, stormwater runoff and wildlife droppings. Even if external sources can be controlled, however, a significant amount of phosphorus can be released naturally from lake sediment found on the bottom of oxygen-challenged water bodies.

There are two ways to deal with lake management problems such as these: "quick fix" and long-term management. Under the direction of the Lakes Management Committee, Mountain Lakes is making efforts on both fronts. As a short-term solution, The committee employ Allied Biological to apply herbicides, algaecides and use hydro raking to kill unwanted algae and invasives. This process treats the biological symptoms of a lake's problems but does not address the underlying causes. Long-term management entails a coordinated effort of community groups, individuals, landowners and government. Examples of long-term management efforts are Borough ordinances prohibiting the use of phosphorus-containing fertilizers and new efforts promoting the use of riparian buffers at the lakes' edge. The leading example of the latter is the Centennial Cove Project in which invasive bushes were removed and replaced with a 360 foot garden buffer containing native species.

A brief description of each lake follows detailing its historical name, individual characteristics and current remediation efforts. This information was taken from the 2009 and 2010 Year End Lakes Management Reports prepared for the Borough by Allied Biological. Of note, the water quality measures reported and subsequent treatment program are highly related to variables beyond our control like levels of precipitation and ambient temperature. The summer of 2010

was one of the hottest and driest on record which dramatically increased water temperature and subsequent algae blooms.

### Birchwood Lake (Third Lake)

Surrounded entirely by Borough-owned woodlands, this 14 acre lake has the best water quality because of its many springs. It also tends to be the coldest with surface water temperatures 1-2 C colder than the other lakes. The lake is very shallow in the upper portion with an average depth of only 3 to 4 feet. In the lower portion, where areas are designated for public swimming, the deepest areas are 12 to 15 feet. Recreationally, several platforms and floats are located for use in the extensive swimming and diving programs promoted here.

Birchwood is located at the beginning of the chain and gets little surface run-off because of the absorptive quality of the woodland soil. Hence, Birchwood features the highest plant diversity, the lowest alkalinity and pH (6.5), as well as the lowest phosphorus levels at .02 mg/L. Phosphorus is a chemical compound derived from phosphorus and oxygen and is generally the limiting factor in aquatic plant growth. Phosphorus exists naturally in low levels, however, man-made phosphorus from fertilizers and septic systems enter freshwater during rain storms or as a result of bank erosion. A total phosphorus level greater than .03 mg/L can promote excessive aquatic plant growth and decomposition in the form of algal blooms or nuisance plant growth.

Given all the positive lake quality measures listed above, a particularly perplexing problem has been a low level of dissolved oxygen. Dissolved oxygen is the measurement of the amount of oxygen freely available to aquatic biota. Factors affecting it include temperature (warm water holds less oxygen), atmospheric pressure (low pressure decreases solubility), mineral content of the water, water mixing (wind, flow or thermal upwelling) and an over abundance of organic matter such as dead algae. Excessive dead materials cause rapid aerobic bacteria growth which, in turn, consumes a great deal of oxygen. To support diverse aquatic biota, 5-6 mg/L of dissolved oxygen is minimally required. At Birchwood early season water oxygen is at minimal levels of 5.09 (2010) and it declines by late June to as low as 1.66 mg/L. Since 2007, this low oxygen level has prevented algae treatments with products like Alum. Efforts to improve water oxygenation include the installation of an aerator in the swimming lanes and another opposite the beach.

Another area of concern has been siltation at the lower end caused by the construction of the public beach facilities and the replenishing of sand at the beach. An effort has been made to control sedimentation by constructing lakeside walls of wooden ties and of concrete.

| Birchwood Lake |                 |               |                               |           |                 |               |                      |
|----------------|-----------------|---------------|-------------------------------|-----------|-----------------|---------------|----------------------|
| 2009           |                 |               |                               | 2010      |                 |               |                      |
| Date           | Product Applied | Treated Acres | Target Species                | Date      | Product Applied | Treated Acres | Target Species       |
| 4/27/2009      | Renovate OTF    | 2             | Water lillies                 | 6/3/2010  | Reward          | 0.25          | Ribbon-leaf Pondweed |
| 6/19/2009      | AquaPro         | 0.132         | Water lillies; Water hyacinth | 6/17/2010 | AquaPro         | 0.33          | Water lillies        |
|                |                 |               |                               | 7/28/2010 | Reward          | 0.002         | Ribbon-leaf Pondweed |
|                |                 |               |                               |           | AquaPro         | 0.133         | Water lillies        |

### **Crystal Lake (Second Lake)**

The second in the chain and the deepest, Crystal Lake is partially surrounded by Borough woodlands. As a result of its water purity, this lake and its adjacent lake were used for many years as sources of high quality ice for commercial and home use. It was during this era that these lakes were named First, Second and Third by the Fox Lakes Ice Company. Crystal has an area of 20 acres. The depth in the upper portion above the island is 4 to 8 feet. Between the island and the outflow dam the depth varies from 12 to 18 feet. Its depth, attractive natural surroundings and the variety of fish species has made this lake a favorite with fishermen in both summer and winter.

Although the lake once boasted pristine water quality, development in the 1970's on both the east and west side of the lake, required more roads with storm drains leading to the lake. This development has resulted in an increase in sedimentation and a decline in water clarity, however, 2010 levels were quite good with an estimated 8 foot visibility in June. Dissolved oxygen levels are excellent (6.8 mg/L to 8.6 mg/L) and phosphorus, while higher than historically (.02 mg/L to .03 mg/L), remains at acceptable levels. Although problematic blue-green algae have been found in this lake as recently as 2008, the problem has not re-occurred.

# C r y s t a l L a k e

### **Sunset Lake (First Lake)**

The third lake in the chain, about one third of the total shoreline of Sunset Lake remains woodland along the northern and western shores. The area is 15 1/2 acres with an average depth of 6 to 8 feet. Public access was provided in 1974 with an access road off of Pocono Rd. Dissolved oxygen levels at Sunset are good (6.5 mg/L to 7.0 mg/L), but turbidity is increasing and phosphorus levels were again high in late summer (.04 mg/L). Turbidity is the measurement of lack of water clarity caused by suspended solids. The leading sources of turbidity include soil erosion, urban runoff, flooding, dredging and algae blooms. Sunset's 2010 turbidity ranged from 2.5 NTU to 4.6 – second only to Shadow (5-44 NTU) and Olive (6-7 NTU) lakes. Sunset's turbidity is showing a 3-year upward trend and if it continues to rise, it may negatively impact aquatic biota, especially fish.

# S u n s e t L a k e

## **Olive Pond and Shadow Lake**

Next in the chain are the two connected lakes Shadow and Olive with a combined area of 3 1/2 acres. These ponds are surrounded almost entirely with private residential properties and roadways. The average depths of these lakes are only 4 to 8 feet so the surface drainage from surrounding properties has resulted in excessive nutrients and sedimentation resulting in algae growths. Recent dissolved oxygen measurements for Olive Lake have shown a range of 1.8 mg/L (dangerously low; 4.0 mg/L or lower can cause a fish kill if it persists) to 9.85 mg/L. Although the latter looks ideal, due to the high water temperature, it was most likely caused by high phytoplankton counts resulting in a high level of photosynthesis. Total phosphorus levels ranging from .06 mg/L to .11 are, together with connecting Shadow Lake, the highest in the Borough. Additionally, relatively high turbidity of 1.6 NTU to 6.0 NTU can be expected to have detrimental effects on aquatic biota. Blue-green algae continues to be an issue with levels detected from July onwards; in recent years, algae treatments cannot be administered in late season because oxygen levels are too low to support it.

# Olive Pond

Similar to Olive Pond, Shadow Lake exhibits wide swings in dissolved oxygen levels (4.8 mg/L to 12.8) tied to excessive algae and water temperatures, and season-long elevated levels of phosphorus (.08 mg/L to .16). In 2010 the new aeration system was operated continuously but given the extreme weather it was difficult to judge its effectiveness. Of particular note, turbidity levels spiked to 44 NTU in July and although they declined to 5.2 in August, the cause of these extreme variables could not be determined. In response to the persistent high nutrient concentrations observed in this Lake, Allied Biological began fecal coliform sampling in the middle of the season and conducted sewer dye testing with 7 out of the 18 homes that border the lake. The fecal data indicated very variable results and it was determined that a more comprehensive sampling study would be needed to determine the source of the observed bacteria although a residential source appears likely. Lastly, the appearance of significant densities of blue-green algae, especially documented toxin-producers, is a cause for continued concern at Shadow Lake.

# Shadow Lake

## Mountain Lake

By far the largest lake with 79 acres, Mountain Lake has an average depth of about 6 to 8 feet in the area north of Island Beach and Midvale Dock. The balance of the lake has an average depth of 8 to 10 feet--slightly more near the dam. Normally the outlet at the dam is kept closed to force all available water to flow through Mountain Lake and on through the canal to Wildwood Lake. When necessary, a system of valves control the system outflow for water level management, treatment of the lakes, and safety.

This lake provides the facility for sailboat racing and is a dramatic setting for the Fourth of July fireworks celebration. Island Beach, the public swimming area, is particularly attractive for smaller children because of the extensive area of shallow water and its pleasant beach. It is also very convenient because of its central location.

Dissolved oxygen levels at Mountain Lake are suitable although can be slightly low in early summer (4.9 mg/L to 7.4 mg/L). Phosphorus levels are higher than desirable (ranging from .05 mg/L to .07 mg/L), resulting in moderate to high algae densities in late season. There are also certain areas where sedimentation has caused some filling of shore-line areas.

# Mountain L

## Cove (Propagation Pool)



The Cove has a surface area of one acre and given its central location on Morris Avenue, is a popular place for ice-skating in the winter. In 2011 it was the site of a comprehensive landscape/hardscape re-design in honor of the Borough's 100 year anniversary. Run by volunteers, the "Centennial Legacy Project" removed existing invasive species and created a riparian buffer of natural plant species between the street and the lake. The Project recently won the 2011 ANJEC Environmental Achievement Award and the volunteers had an opportunity to share their work with Environmental Commissions throughout the state.

In terms of water quality, the Cove's low dissolved oxygen levels ranging from 3 mg/L to 5 mg/L are a continual cause for concern. The addition of an aerator may improve ecological conditions. Phosphorus levels are elevated at .04 mg/L to .06 which is not surprising considering the high phosphorus measurements upstream at Olive and Shadow Lake.

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# The Cove

## **Grunden's Pond (Reservoir Lake)**

Located across the Boulevard, Grunden's Pond measures 2 1/2 acres. Dissolved oxygen levels (5.9 mg/L to 9.3) are considered adequate and although an aerator was thought to be necessary in this location, recent data indicates that it may not be needed. Phosphorus levels varied throughout the season but were overall too high, ranging from .03 mg/L to a high of .06 mg/L. Field biologists also noted turbid conditions despite low rainfall and decreased observations of carp and koi. Additional testing parameters were added to Allied's Program in 2009 with tests undertaken to understand ammonia, carbon dioxide, iron and calcium levels. It has been determined that ammonia levels are undetectable indicating that the nitrogen cycle is in balance. Carbon dioxide has been found at elevated levels which could be suppressing dissolved oxygen. Iron is a micro-nutrient released into water bodies naturally via rock weathering or from human sources such as acid rain. When it is present at high levels, it can contribute to blue-green algae formation. At Grunden's Pond, iron levels increased throughout the 2010 season from .26 mg/L to a high of .91 mg/L in August (Secondary Drinking Water Regulations limit iron at .3 mg/L). This build up could be a result of low rain conditions that failed to flush the iron out of the Pond and did not seem to contribute to excessive algae.

# G r u n d e n ' s P o n d

## **Wildwood Lake**

This is the final lake in the chain. It is slightly over 26 acres in area and has an average depth of 3 to 4 feet in the end nearest the Boulevard and of 6 to 8 feet for the balance of the lake. It is slightly deeper near the dam. There are two small streams which flow into the lake on the north end near the Boulevard. They come from springs located up the hill in the vicinity of Laurel Hill Road. The lake is surrounded mostly by private property with some small Borough-owned sections. Dissolved oxygen levels are good at 5.2 mg/L to 7.9, however, phosphorus levels are high measuring .17 mg/L in July of 2010. Algae blooms have been a re-occurring problem at this lake although the need for algaecides has been decreasing since 2008.

# W i l d w o o d

## **Dixon's Pond**

This is a privately-owned pond of less than an acre at Valley Road.

## **Arrowhead Lake, Great Bay and the Bay of Deep Waters**

In 1925 the Arthur D. Crane Co. purchased 100 acres, including a small lake called Protectory Pond, from the Sisters of the Sorrowful Mother of St. Francis Health Resort. Combining this land purchase with two smaller ones, the Crane Co. began development of a lake community which would lie within the borders of both Mountain Lakes and Denville.

In the fall of 1925 a dam was constructed and Protectory Pond was flooded using its own natural springs. This newly formed body of water was called Arrowhead Lake. Aided by their natural springs, two small swamps were later transformed into two additional lakes named the Bay of Deep Waters and Great Bay. These three bodies of water cover approximately 34 acres and lie, on average, 525 feet above sea level.

Arthur Crane's plan was to build a summer community of privately owned houses. Many of these second homes were owned by people who spent most of the year living in Brooklyn and Jersey City. After the stock market crash of 1929, some of these people found it impossible to continue maintaining two residences. Soon the beautiful lakes and pleasant surroundings encouraged more and more people to make Lake Arrowhead their year round home.

## **Streams**

A network of streams through the Borough which provides an efficient drainage system eventually entering Troy Brook and the Whippany River Basin. Since the streams, with one exception, have small watersheds within the Borough, there are few flooding problems. In addition to their utility as drains, the streams add interesting and attractive features to the many properties through which they pass. The Borough government is aware of the environmental advantages of streams and is striving to maintain them by means of conservation easements, physical maintenance and refusal to sell any borough-owned properties containing wetlands of any sort. Most of the larger Borough-owned properties with wetlands have been dedicated as parkland.

Water temperature variation can significantly alter stream ecology and result in the loss of organisms important to natural processes of cleansing and purification. Thus, it is of overriding importance to preserve the natural tree cover along our streams.

## **Vernal Pools**

According to the NJ Department of Environmental Protection (NJDEP) and Wikipedia, vernal pools are temporary pools of water that are without fish. This lack of fish enables the development of natal amphibian and insect species. Most pools are dry at least part of the year and fill in with the winter rains or snow melt. They are typically at their peak depth in the spring, hence the name "vernal".

Vernal pools are confined wetland depressions, either natural or man-made, that hold water for at least two consecutive months out of the year and are devoid of breeding fish populations. Here in New Jersey, rural portions of the Highlands, Piedmont, and Coastal Plain landscapes are home to the majority of our vernal pools. These unique ecosystems provide habitat to many species of amphibians, insects, reptiles, plants, and other wildlife.

Vernal pools come in an array of forms: isolated depressions within upland forests, seasonally flooded meadows, floodplain swamps, abandoned gravel pits or quarries, and even derelict swimming pools. However, no matter what the structure or genesis of the pool is, all vernal pools either dry out completely or draw down to very shallow levels unsuitable for sustaining fish. Fish are highly predatory on amphibian eggs and larvae. Over the course of evolution, several species

of salamanders and frogs exploited these fish-less water bodies. Today, these species exhibit "hard-wired" instincts and behaviors that are geared exclusively towards fish-free vernal habitats.

Amphibians that are dependent upon vernal pools are known as "obligate vernal pool breeders." In New Jersey there are seven species - two frogs and five salamanders - that fit this category. Another 14 of New Jersey's amphibians also use vernal pools for breeding, but unlike the 'obligate' species, these species can successfully reproduce in habitats that contain fish. These species are known as "facultative vernal pool breeders."

### **Obligate and Facultative Vernal Pool Breeding Amphibians:**

#### **Obligate Vernal Pool Breeding Amphibians:**

Eastern tiger salamander (*Ambystoma t. tigrinum*) **Endangered**  
Marbled salamander (*A. opacum*) **Special Concern**  
Spotted salamander (*A. maculatum*)  
Jefferson salamander (*A. jeffersonianum*) **Special Concern**  
Blue-spotted salamander (*A. laterale*) **Endangered**  
Wood frog (*Rana sylvatica*)  
Eastern spadefoot toad (*Scaphiopus holbrookii*)

#### **Facultative Vernal Pool Breeding Amphibians:**

Green frog (*Rana clamitans melanota*)  
Bullfrog (*R. catesbiana*)  
Pickerel frog (*R. palustris*)  
Southern leopard frog (*R. utricularia*)  
Carpenter frog (*R. virgatipes*) **Special Concern**  
Northern cricket frog (*Acris crepitans*)  
Northern spring peeper (*Psuedacris crucifer*)  
New Jersey chorus frog (*P. triseriata kalmii*)  
Upland chorus frog (*P. triseriata ferarium*)  
Northern gray treefrog (*Hyla versicolor*)  
Southern gray treefrog (*H. chrysocelis*) **Endangered**  
Pine Barrens treefrog (*H. andersonii*) **Threatened**  
Four-toed salamander (*Hemidactylium scutatum*)  
Long-tailed salamander (*Eurycea l. longicauda*) **Threatened**  
American toad (*Bufo americanus*)  
Fowler's Toad (*B. fowleri*) **Special Concern**

In addition to amphibians, there are several reptiles that inhabit vernal pools on a seasonal basis, primarily to eat the eggs and larvae of amphibians:

Wood turtle (*Glyptemys insculpta*) **Threatened**  
Spotted turtle (*Clemmys guttata*) **Special Concern**

Mud turtle (*Kinosternon subrubrum*)  
Eastern painted turtle (*Chrysemys picta picta*)  
Common snapping turtle (*Chelydra serpentina serpentina*)

Given the importance of these pools in preserving diversity, the 2001 NJ [Endangered and Nongame Species Program](#)'s established its Vernal Pool Project, which is a dedicated effort to map and survey vernal pools throughout the state. Vernal pools that provide documented habitat for certain amphibian and reptiles species (= certified) will be afforded regulatory protection through the new rule. Mountain Lakes has 9 vernal ponds that have been mapped under this project. Maps pinpointing their location can be found at <http://www.dbcrssa.rutgers.edu/ims/vernal/viewer.htm>.

Locally, members of the Woodlands Commission and naturalist Rick Radis have identified upwards of 20 individual pools: at least five vernal pools are found in the Yorke Road woodlands; six are in Wilcox Park; two in Frederick Park; three in Tower Hill; a large complex is present immediately to the west of St. Catherine's Church on Pocono Road; two are in woodlands in the vicinity of the municipal building; and others are scattered in small wooded tracts throughout the town.

The vernal ponds in the Yorke Road woodlands are home to the endangered blue-spotted salamander.



Other rare mole salamanders such as spotted, Jefferson's and marbled; wood frogs; spring peepers and other tree frog species exist in these pools as well (see Fauna section of this report).

Please proceed to the MCPRIMA to map the lakes, streams, and wetlands within the Borough.

[https://morrisgis.co.morris.nj.us/MCPRIMA\\_4x-war/MountainLakes?startUpTheme=public\\_login&publicThemeName=Mtn%20Lakes%20test%202](https://morrisgis.co.morris.nj.us/MCPRIMA_4x-war/MountainLakes?startUpTheme=public_login&publicThemeName=Mtn%20Lakes%20test%202)

## **LAND USE - CONSERVATION**

### **Background**

It takes a keen understanding of the Arts and Crafts movement in the United States to appreciate the central role nature has taken in the community of Mountain Lakes. In the late nineteenth and early twentieth centuries, the Arts and Crafts school of thought inspired a movement towards simple living that incorporated a reverence for the soothing effects of nature and its ability to heal both spiritually and physically.

Mountain Lakes' developer, Herbert Hapgood, incorporated many of those values into both the landscape and the homes of the community. Hapgood's homes were meant to reflect harmony with nature by using the natural materials in the surrounding area. Chestnut trees became wainscoting, rubblestone was used for foundations, and the plentiful boulders were transformed into landscaping walls. The homes had upstairs sleeping porches designed to take advantage of the naturally cool nights. Large windows let the sun shine in. While the substantial homes lured many new residents to Mountain Lakes, the early promotional material advertised the community as "The Home of Nature Lovers". It listed features such as its mountains, hills, valleys, strings of lakes, eight miles of shoreline, pure air, and cool temperature in the summer and shelter in the winter. Through its adherence to the original founding values, the steadfast diligence of its citizens, and good planning, Mountain Lakes could still advertise the same community today as it did a century ago.

### **Borough Conservation History**

When developer, Herbert J. Hapgood, surveyed the area that became Mountain Lakes, the Fox Hill Ice Company had already purchased and dammed Birchwood, Crystal and Sunset Lakes. As Hapgood planned his community, he created Mountain and Wildwood Lakes as the centerpiece of recreation with homes and streets flowing around both. Early residents enjoyed a rich recreational life of swimming, boating, fishing and sailing.

Mountain Lakes became its own municipality in 1924 and the newly incorporated government bought both lakes on behalf of the citizens to be used for public recreation. The Depression forced the remaining construction companies into bankruptcy and was accompanied by a wave of abandoned homes in what became known as "Mortgage Lakes". In the 1930's, Mayor Halsey Frederick began the first land acquisitions by buying these properties and then reselling them to put them back on the tax rolls. This practice continued until the end of World War II when the Borough began to hang on to that land.

In 1952, Mayor Wilcox acquired 250 acres from the Fox Hill Ice Company bringing Birchwood, Sunset and Crystal Lakes into public ownership. Some property was sold for residential development of the shoreline. Following the early construction of the Lake Drive School, additional land was sold to the Board of Education by the Council for a token amount when the need arose. In addition, Borough property was leased to the Board to permit construction of a practice field behind Briarcliff School. The result of these acquisitions and leases has been a random pattern of publicly owned property consisting of large natural areas, scattered building lots, and odd-sized and odd-shaped parcels. In 1956 the Borough acquired additional deeds to various properties throughout the community, but the sentiment of the community began to change resulting in a policy to sell no more Borough-owned property than was acquired. That

policy would eventually morph into an official resolution whereby Council prohibited any further sale of Borough property in 1972. This policy was reaffirmed by Council in 1979 and has been passed by resolution every year since.

Mountain Lakes began to establish the parks that would become so central to its persona in earnest in 1964. In that year, 165 acres were set aside for parks and recreation followed by an additional 152 acres in 1974. More park lands were added in 1985, 1996 (26 acres) and again in 2002. The ordinance authorizing the 1996 acquisition states that the purchase is for "public purposes, including aquifer and watershed protection, wetlands and open space preservation, recreational and other municipal purposes." The result of these acquisitions is that Mountain Lakes now represents a leafy oasis between busy Route 46 and Interstate highway 287. Good land use policy, coupled with opportunity, created a valuable "Green Belt" buffer between the residential area of the Borough and the highways, protecting residents from noise and air pollution as well as fulfilling the original purpose of protecting the aquifer.

### **A Conservation Battle for Mountain Lakes and the Tourne Park**

The following was taken from the Borough website: [www.mtnlakes.org/History](http://www.mtnlakes.org/History).

In the late 1960's the quality of the Rockaway River below the Jersey City Reservoir began to deteriorate badly. In those days, responsibility for management of that section of the river belonged to Jersey City. Unfortunately they appeared to have little interest in the river and during the summer drew so much water out to keep their reservoir high that the flow slowed to a trickle.

What made matters worse, because of the lack of a modern sewer system, the "trickle" was often brown and disgusting! The odor in Lake Hiawatha was frequently repugnant and it was often said apocryphally that it caused the paint to peel from the doors.

Complaints to Jersey City were to no avail and recourse was sought in the courts. After several years of litigation, the courts found for the plaintiffs and responsibility for management of the river was removed from Jersey City and given to a new entity, the *Rockaway Valley Regional Sewer Authority (RVRSA)*. The RVRSA became responsible for the entire 130 sq. mi. of the Rockaway River watershed.

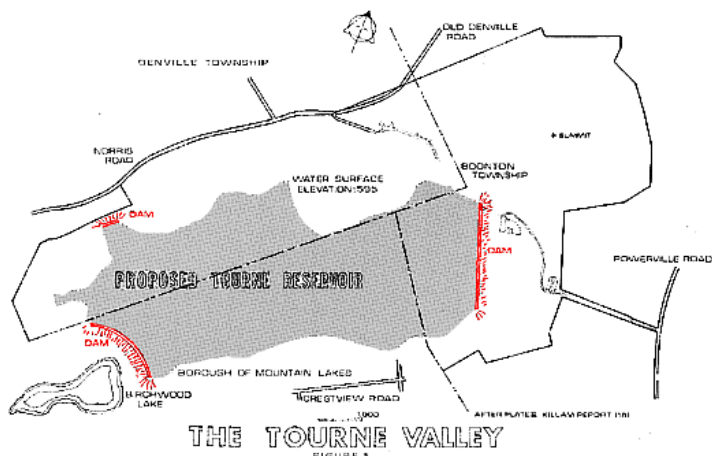
### **The Plan: Build a Storage Reservoir on Part of Mountain Lakes**

The RVRSA immediately began working on a plan to build a large new modern sewage treatment plant below the Jersey City Reservoir. A gravity interceptor running from Wharton and serving all of Rockaway Valley would collect sewage to be treated at the single proposed plant.

The plan proposed a pumped storage reservoir upriver from the Jersey City Reservoir. Such a storage reservoir could be filled in the rainy season and pumped back out into the Rockaway River during the summer when the flow was low and the downstream cities needed water. The river flow in the lower Rockaway could be augmented and more easily managed.

The Tourne was chosen as the location of this reservoir. It was low-lying, could easily be dammed and was deemed to be of low value.

This idea was not exactly new. Something like it had been in Morris County Master Plan Water Supply Element for several years. The RVRSA decided to resurrect and expand this idea for their purposes. They engaged the services of Killam Associates, a local civil engineering firm, to do a planning study and develop a concrete proposal.



The plan involved two huge dams and one smaller one. A 60-foot dam was to be built near the tip of Birchwood Lake, the second, a still larger 70-foot main dam would be built at the base of Tourne Mountain (past the ball fields and picnic area, past the bridge over Rigby's Brook, to the hillside below Rock Lane in Boonton Township). Finally, a smaller dam would be located north of Arden Road near Old Boonton Road. The entire area from just below Crestview Road to Old Boonton Road in Denville would be an 80-foot deep lake totaling 190 acres. The reservoir area included parts of Mountain Lakes, Denville, and Boonton Township.

What was even more interesting was the plan for filling the reservoir and drawing it down. Killam proposed that a large aqueduct be constructed from the Jersey City Reservoir to the Tourne reservoir. The Tourne reservoir would have been 350 feet higher than that in Jersey City so during the draw-down periods, gravity could be used to move the water through the aqueduct. To fill the Tourne reservoir, however, giant pumps would be installed near the sewerage treatment plant to pump literally billions of gallons of water 2½ miles and 350 feet up through the aqueduct.

## Community Reaction

The RVRSA did not really try to hide the plan but did not attempt to publicize it widely either. A low-key hearing was scheduled in Boonton on September 25, 1973. Luckily, an alert Mountain Lakes resident, Josie Uhrig, noticed the newspaper announcement and raised the alarm.

A number of people in the community were appalled. A committee was formed consisting of residents of the three affected towns and others. Calling themselves the *Save Our Tourne Valley Coalition*, the committee went to work to study the proposal, analyze its weaknesses, and prepare counter arguments. The Committee prepared a comprehensive report pointing out numerous major flaws in the RVRSA's plan. The primary flaws were:

- **High Cost:** The RVRSA counted only the costs of improvements. There would also have been the costs of land acquisition, payroll, and operations costs. The power for



pumping alone would have been one million watts, roughly equal to the power required to run a town the size of Mountain Lakes! If all costs were included, it would make the price of water over \$1000/million-gals, a factor of 3 higher than the market cost at that time.

- Flow Augmentation Objections: Increasing the flow on the lower Rockaway was not needed under any set of reasonable assumptions and was clearly prohibited by several New Jersey statutes.
- Water Recycling Objections: If the objective was to recycle treated sewage water, the proposed configuration was badly flawed. The treatment plant should have been located higher upstream where gravity would allow the flow into the Jersey City Reservoir with zero pumping cost.

The primary reasons the Tourne should be saved:

- Tourne Park is Needed for Open Space in Morris County: At the time, the County Master Plan called for 12 acres of parkland for each 1000 residents. Region 2, the most populous area of the County, had less than one-half that. Costs of land were rapidly escalating and available land for parkland was vanishing. It made no sense to remove such a huge block of land that would be very costly to replace.
- Once it's Gone, it Cannot be Replaced: The Tourne Valley is not just any land. It is so rich in terms of its history, its surroundings, its flora and fauna, that it would not be possible to replace at any cost.
- Environmental Impact: The plan would replace a typical terrestrial community with an aquatic habitat. No recreational use could be made of it, however, because its level would fluctuate. The peak drawn down season would correspond with the peak summer recreational needs. Beyond that, many environmental questions remained unanswered such as the affect on the water table, impact on the lakes in Mountain Lakes, threats to neighboring communities caused by possible fissures in surrounding mountains, and risks of dam failure.

The Citizen Committee issued its report in January 1974 and sent a large number of copies to legislators, journalists, and decision makers throughout the state and federal government. Then teams fanned out to conduct briefings with the state DEP, key legislators in Trenton, and the EPA in Washington. By the end of April, the RVRSA had abandoned the Tourne reservoir plan.

### **What are the Lessons from this Conservation Battle?**

Despite the long-range planning of state, county, and municipalities, the Tourne Valley was threatened. The threat did not come from developers - it came from another government agency that wished to use the land for its own purposes.

The case of the Tourne Valley was thus one of the people versus the people. A natural area of parkland was desired by two government agencies. Had the people set aside parkland so it would be available for public destruction? The precedent would have been far-reaching. No municipal official would ever again be willing to purchase open space if it could snapped up later by official bodies looking for cheap sites.

Luckily, a small group of dedicated people rose up to confront the government. They persevered and won. We have them to thank that the Tourne is available to us today. But in a larger sense, we owe them thanks for showing us once again that individuals *can* make a difference.

### **The First Conservation Easements**

In 1985 the Borough began putting conservation easements on environmentally sensitive public park lots. In 2004, the Borough amended the ordinance to add more public land to those lots previously set aside. Other easements have been placed on some private property to protect natural features. These easements allow the Borough to protect stream corridors and flood prone areas without the cost of outright purchase at today's high costs. A list of environmental easements can be found in the appendix of the same name.

### **The First Conservation Zones**

The Borough's first conservation zone was created in 1988 when the governing body realized that while the municipality owned substantial tracts of land, the park land actually remained in residential zoning. The principal land use permitted in the conservation zone ordinance was "conservation of natural environment, and recreational activities such as footpaths or playing fields which do not destroy the natural topography and which are consistent with conservation purposes."

In 2002 Council further amended this Conservation ordinance to split conservation land into two different uses. The overall purpose remained to protect "potential groundwater resources, erosion-prone soils, ecologically important wetlands and woodlands which provide environmental and aesthetic benefits." However, the new amendment refined the uses into "strict preservation" or "active recreation" zones. A C-1 zone permits "recreational uses that involve limited disturbance to the natural environment" including passive recreational activities such as hiking, jogging, fishing, cross-country skiing, etc. A C-2 zone permits more active recreation such as playgrounds, tennis courts, athletic fields and other "active" recreational activities. Since the activity allowed in C-2 involves additional noise and disturbance of topography, this zone also requires a 100' vegetative buffer from the edge of disturbance to contiguous residential properties.

While more than one-third of the landmass of the Borough is in open space, there are substantial larger tracts of woodlands which fall into the passive category (C-1). These include the Richard M. Wilcox Park (154 acres around Birchwood Lake), sections of Halsey A. Frederick Park (64 acres) along Morris Avenue between Powerville and Fanny Roads, the land behind Midvale Park, the Thorleif Fliflet Bird Sanctuary on Lake Drive, the land between the end of Maple Way and the railroad tracks, and the land bordered by Overlook Road, Tower Hill Road and the Boulevard. This latter plot contains the Tower Hill Sled Run.

Smaller lots dedicated to specific activities include: The Frank B. Kaufmann Park on the site of the old Borough Hall at the Boulevard and Briarcliff Road, Memorial Park on Lake Drive, the Esplanade off Morris Avenue overlooking the railroad station, Briarcliff Park on Wildwood Lake at the intersection of Briarcliff Road and the Canal, and the previously mentioned Bird Sanctuary on Lake Drive.

In addition to the woodland parks mentioned, there are a number of unnamed “vestpocket” parks in the Borough. These small lots serve to provide breaks between developed areas affording residents on either side a visual privacy screen of shade trees and natural vegetation.

### **Critical Areas for Preservation**

The most critical areas in Mountain Lakes for species diversity, population sizes, critical habitat, and migration habitat for birds, are the largest wooded tracts. These include Frederick and Wilcox Parks, Tower Hill, and the Yorke Road woodlands. Also important, and not as protected or secure, are the vernal pond complexes present near St. Catherine’s Church on Pocono Road; the vernal ponds in woods near the municipal building; and vernal ponds in scattered small woodlots in several areas of the town. Vernal ponds are a habitat that has only recently come into consideration in preservation efforts, and they are not widely familiar to the general public. An effort should be made to map all vernal ponds in the Borough, and to consider their importance in future planning decisions.

### **Efforts at Neighborhood Conservation**

One characteristic that makes Mountain Lakes unique is the degree to which its 4200 some residents know one another. The town has always been very social and there are numerous opportunities to make friends such as school sporting activities, joining one of the many volunteer run organizations, joining the Borough’s Country Club, to simply spending time at one of the public beaches. Early on, residents wanted to ensure that neighbors did not retreat behind high fences. Ordinances exist restricting fencing on individual property and this has contributed to fostering a welcoming and neighborly feel within the Borough. In 2011, there are 22 distinct neighborhoods as designated by the Centennial Committee. Neighborhood boundaries were created and as part of the year-long Centennial celebration, neighbors were encouraged to choose a mascot and compete in various “Neighborhood Challenges”. Each neighborhood was also encouraged to have a picnic reminiscent of the famous photo of the clambake at the Luellen’s.

Another attempt to preserve gracious neighborhoods was the passing of two ordinances that restricted the size of new development or home renovations. During the 1980’s, residents became concerned as Mountain Lakes witnessed the construction of “McMansions” squeezed onto lots. Trees were removed, houses grew ever larger and the open and spacious feel of neighborhoods was increasingly threatened. The Council passed a Floor Area Ratio limitation that ensured houses were properly sized for their lots and a second ordinance to increase minimum required set backs from neighboring property. Residents who wish to develop in violation of these ordinances must go before the Zoning Board for a variance. Today, the average residential density per acre is 1.8 dwellings.



## Active Recreation Areas

Given that so much of the Borough is held in public lands, Mountain Lakes tends to attract people who value recreation and athletics. The schools are a sports powerhouse excelling in football, lacrosse and swimming, however, the Borough prides itself on supporting a diversity of sports and outdoor activities. A snapshot of recreational bodies, courtesy of the Mountain Lakes Master Plan, follows:

### Mountain Lakes Recreational Areas

| Facility  | Function  |
|---|---|
| <b>Water</b>  |   |
| Island Beach  | Swimming, boating, picnics, playground, sailing, concession stand, concerts                                 |
| Midvale Boat Dock   | Boating, fishing  |
| Birchwood Beach   | Recreational and competitive swimming and diving, fishing, volleyball, hiking, picnics and concession stand |
| The Cove  | Boating, ice skating  |
| <b>Improved Fields</b>                                      |   |
| Jan Wilson Memorial Basketball Court                        | Basketball  |
| Alden L. Haswell Memorial Field                             | Lacrosse, soccer, youth sports  |
| Al Scerbo & Charlie Pitcher Fields                          | Baseball  |
| Doublier Memorial Tennis Courts                             | Tennis  |
| Halsey Frederick Park Basketball Court at Lake Drive School | Lacrosse, soccer, field hockey  |
| William N. Taft Memorial Field                              | Basketball  |
|   | Playground, soccer, youth sports  |
| <b>Parks</b>  |   |
| The Tourne Park   | Hiking, sledding, x-country skiing  |
| Halsey Frederick Park                                       | Hiking, x-country skiing  |
| Richard M. Wilcox Park                                      | Hiking, x-country skiing  |
| Frank Kaufman Memorial Park                                 | Borough festivities   |
| <b>Private Facilities</b>                                   |   |
| Mountain Lakes Club   | Tennis, swimming, boating, bowling  |
| Park Lakes Tennis   | Tennis, paddle tennis   |
| Mountain Lakes Raquet Club                                  | Indoor tennis   |
| Lakeland Hills Family YMCA                                  | Swimming, basketball, fitness classes/equipment, playground, picnic, indoor youth leagues                   |

A highlight of the Borough's outdoors experience is surely Morris County's Tourne Park. Stretching 220 acres across Mountain Lakes, Boonton Township and Denville, the Tourne is

home to 24 hiking trails that range from 300 feet to 3500 feet in length. The Tourne's name is derived from Dutch for "lookout" or "mountain" and on a clear day, one can see the skyline of New York from its summit (897 feet). According to Wikipedia, much of the land for this park was inherited and acquired by Clarence Addington DeCamp in the late 1850's. Using hand tools and levels, DeCamp built two roads leading to the top of the Tourne and he actively invited friends and family to hike the area he loved so well. In 1958, Morris County acquired the initial 219 acres from Logan Steels and Dr Lewis Hull. The park was officially opened in 1960. One of the best loved trails is the "Wildflower Trail" which was planted by the Garden Clubs of Mountain Lakes and Rockaway Valley in 1962. The trail features over 250 native plants.

Links to trail maps in Mountain Lakes:

[Richard M. Wilcox & Tourne Parks, high resolution  
http://www.mtnlakes.org/Environment/MLtrails.gif](http://www.mtnlakes.org/Environment/MLtrails.gif)

[Mountain Lakes Eastern Trails \(0.42 MB\)  
http://www.mtnlakes.org/Environment/MLtrailsE.gif](http://www.mtnlakes.org/Environment/MLtrailsE.gif)

[Emilie K. Hammond Wildflower Trail in Tourne Park  
http://www.mtnlakes.org/Environment/TMp-Wildflower.htm](http://www.mtnlakes.org/Environment/TMp-Wildflower.htm)

Another highlight is the Boulevard itself. Once the site of the Trolley that connected Mountain Lakes with Boonton, the Borough's main road now features a wide path that is used extensively for biking, walking and running. The length of this street is graced by mature trees and beautiful views of Island Beach.

Please proceed to the MCPRIMA to map land use within the Borough.

[https://morrisgis.co.morris.nj.us/MCPRIMA\\_4x-war/MountainLakes?  
startUpTheme=public\\_login&publicThemeName=Mtn%20Lakes%20test%202](https://morrisgis.co.morris.nj.us/MCPRIMA_4x-war/MountainLakes?startUpTheme=public_login&publicThemeName=Mtn%20Lakes%20test%202)

## **FUTURE DEVELOPMENT & COMMUNITY FACILITIES**

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Mountain Lakes has for many years been an essentially fully developed community. Development in recent years has been largely limited to redevelopment of existing properties and infill development on relatively small parcels of land in otherwise developed areas. One notable exception is the development of the Park Place (Fanny Road) property where the potable water is being provided by Boonton and all other services will be provided by Mountain Lakes. Other potential development sites include two lots of approximately 8 acres, one being in the Willow Rd area and the second being the King of Kings property. Both sites are potential development sites that would require an expansion of municipal services. The trend in redevelopment rather than new development is expected to continue in coming years because of the limited availability of vacant developable land. As such, no major extensions of public utilities in Mountain Lakes are projected. Due to the limited potential for new development, the focus of this element is to provide a general description of the facilities and utilities that currently exist in the Borough and to make recommendations for maintenance and improvements.

## Community Facilities

The following are the major public facilities in Mountain Lakes:

1. **Public Schools:** The Borough has a long tradition of commitment to public education and this commitment is reflected in its statewide rankings: 9<sup>th</sup> ranked NJ public school in 2010 per the magazine, NJ Monthly. Approximately 70% of local taxes are committed to school support. A high level of commitment to public education has been a cornerstone of Mountain Lakes' attractiveness to families and should be continued. School facilities plans are submitted to the County Superintendent annually to outline the District's plans for renovations and maintenance. The Borough Board of Education regularly evaluates future facility needs. Any proposals need to be carefully evaluated by the entire community.

### Existing School Facilities

(Source: Mountain Lakes Board of Education)

| SCHOOL / LOCATION<br>(Site Acreage)                         | YEAR BUILT /<br>EXPANDED    | SIZE                   | FUNCTION   |
|---|-----------------------------|------------------------|--|
| Lake Drive School, Lake Drive and the Boulevard (2.4 acres) | 1914 expanded<br>1920       | 175 student capacity   | Regional facility for the hearing impaired, more than 90 sending Districts |
| Wildwood Elementary School, Glen Road (14.1 acres)          | 1953 expanded<br>1965, 1999 | 590 student capacity * | Grades K through 5   |
| Briarcliff Middle School, Briarcliff Road (12.7 acres)      | 1936 expanded<br>1999       | 381 student capacity*  | Grades 6 through 8   |
| Mountain Lakes High School, Powerville Road (41.1 acres)    | 1958 expanded<br>1972, 2005 | 715 student capacity * | Grades 9 through 12  |

\* Based on Board of Education Long Range Facilities Plan for 2005-2010.

**Recent School Improvements:** In 2003, two new playing fields were completed on land in the Halsey A. Frederick Memorial Park. In 2005 the High School received an overall

facelift plus the addition of a new media center, band room, classrooms, training center and a second gym. The addition of a new hallway greatly improved the traffic flow of the building.

In 2007, the football field shared by all the schools was resurfaced with artificial turf. In 2010, significant work was done on the high school and Wildwood roofs including the addition of solar panels.

| SCHOOL ENROLLMENT                           | 1969-70 | 1979-80 | 1989-90 | 1999-00 | 2009-2010 |
|---|---------|---------|---------|---------|-----------|
| (Source: Mountain Lakes Board of Education) |         |         |         |         |           |
| Mt. Lakes Students                          | 1,793   | 1,224   | 856     | 1,180   | 1,209     |
| Non-resident Students                       | 16      | 12      | 41      | 33      | 12        |
| Hearing impaired                            | -       | 51      | 136     | 224     | 164       |
| Boonton Twp HS Students                     | -       | -       | -       | 189     | 270       |
| TOTAL                                       | 1,809   | 1,287   | 1,033   | 1,626   | 1,655     |

2. Public Library: The Mountain Lakes Free Public Library is located at Elm Road adjacent to the Post Office. The Library has over 40,000 books and over 3,000 audio/visual items. A major renovation was made in 1996 for better utilization of the existing space. In 2002 the Children's Room was expanded. A large meeting room is in the lower floor of the building, specifically dedicated to and heavily used by community organizations. This room was renovated in 2006 to make it handicap accessible and a bathroom was added. A Borough archives room was also added. Through their library cards Mountain Lakes residents also have access to the M.A.I.N. (Morris Automated Information Network) system.
3. Borough Hall: The Borough Hall houses the Borough Administration, School District Administration, Police and Volunteer Fire Departments, Council Chambers and meeting rooms. In 1996, an individual stair elevator was installed in compliance with the Americans with Disabilities Act. The Court services were moved to Denville, as of May 2010. In 2008 the Borough established a Facilities Committee to study the problem of space issues within the existing building. The Committee determined that the building did not provide the space that the building user groups required; particularly space for the Police Department. Architectural plans were developed for the creation of a new Borough Hall. The Borough Council decided not to proceed with the expansion due to overall cost, the state of the economy, and the possibility of establishing shared services with the neighboring communities.
4. Fire Department: The Mountain Lakes Volunteer Fire Department is housed within the Borough Hall. Facilities available to the Fire Department consist of three bays which house two pumpers and one rescue vehicle. The Borough replaced the rescue vehicle in 2008 and a pumper in 2010. Mutual aid arrangements with neighboring towns provide additional and back up resources on a voluntary, reciprocal and "as available" basis. The



Fire Hall has a small meeting room/kitchen facility which serves primarily for the Fire Dept's office and meeting space, but doubles as the Police Department's lunch room and holding/interview room, amongst other uses. The facility does not have a decontamination area for hazardous materials which the Fire Department considers to be a risk. The Borough's practice of periodically replacing aging fire trucks, upgrading water delivery for fire-fighting, and upgrading communications systems should continue. Although additional future development is projected to be modest, the regulatory and compliance environment affecting the Fire Department is expected become more stringent. In addition, it has become more difficult to attract volunteers in recent years. The Borough will need to monitor these trends and respond accordingly to avoid diminution of fire protection service.

5. Department of Police: The 13 person Mountain Lakes police force is housed in the lower level of Borough Hall with the Fire Department. The force is a regular presence on Borough streets, directing traffic for community events as well as the daily traffic congestion around the elementary school. In an effort to share services, in 2008 the Borough switched to a County dispatch system to handle 911 emergency, fire and police calls.
6. Department of Public Works: The Department of Public Works headquarters is located in the same block as the Borough Hall, with access from Pocono Road. The facilities include the Borough Garage and storage area as well as an office for the director, a meeting room and personnel rooms. The twelve bays in the garage are used to capacity by the Department's vehicles of various sizes and types. Vehicles and other equipment are replaced in accordance with a schedule reflected in the Capital Improvement Program. Most of the normal Borough maintenance (streets, parks, lakes, dams, buildings and grounds) and some construction of new facilities are done by the Department of Public Works (DPW). Other responsibilities include the public water, sanitary sewerage and storm drainage systems, and the Recycling Center (behind the Borough Garage). The Department's buildings and equipment are generally adequate for the purposes and no major expansions are expected.
7. Dams: The federal and state governments have required inspections and upgrading, repair and /or replacement of all earthen dams. All major Borough dams, with the exception of Sunset Lake have been substantially rebuilt. Active monitoring and maintenance of the dams in the Borough is being done.

## UTILITIES

### History of Sewers in Mountain Lakes

Mountain Lakes from its earliest days depended on septic tanks and cesspools for its sewage disposal. The large lots were good for this purpose, however, as the Borough developed and more houses were built, this became a problem. Would polluted effluent drain into the lakes? I

Starting in the 1960s, resident study committees were formed, each concentrating on the problem of drainage into the lakes. The third committee was appointed in 1972. It strongly recommended that the Borough install sewers in homes that bordered the lakes. Sewers would have been ideal everywhere but cost was a significant issue. Luckily, in 1975 with the passage of the Clean Water Act, the federal government offered sewerage funds to communities that were ready to apply. This grant allowed the Borough to sewer the entire community for the cost of the original partial project.

In 1977 a two-year construction project began to sewer all houses built before the 1975. The construction firm chosen was Lisbon Contractors. As they began work, a volunteer group of six to eight citizens met every Friday evening from 6:05 p.m. (when the train got in) to 7:50 p.m. They walked the lines that had just been laid as well as the areas designated for next week's work. Their observations were welcomed by the contractors and most were adopted. Lisbon's engineer-in-charge said they did their best work -- probably since they knew someone was watching them -- and also because they got praise wherever it was warranted.

The final construction cost of this project was the contract price of \$6,294,569.50 -- making history, as there was not one penny of cost overrun. After grants from both the federal Clean Water Act and from the State of New Jersey, and with interest earned on bond sale proceeds, the final cost to taxpayers was \$4.2 million dollars.

This is an example whereby a small group of committed and cooperative volunteers worked together to improve the outcome for the Borough.

The utilities in or serving Mountain Lakes include:

| FUNCTION                               | AGENCY                              |
|--|-------------------------------------|
| Electricity                            | Jersey Central Power and Light Co   |
| Natural Gas                            | New Jersey Natural Gas Company      |
| Telephone / Internet/ TV<br>(landline) | Verizon, Cablevision                |
| Potable water                          | Mountain Lakes Water Utility        |
| Sanitary sewage collection             | Mountain Lakes Sewer Utility        |
| Sanitary sewage treatment              | Parsippany-Troy Hills Sewer Utility |
| Solid wastes collection/disposal       | Borough of Mountain Lakes *         |
| Recycling                              | Borough of Mountain Lakes *         |
| Storm drainage                         | Borough of Mountain Lakes           |

\*Municipal contract with private scavenger for residential and public building pick-up, individual private contracts for businesses.

1. Energy, Telephone and Cable TV: Electricity, telephone and cable TV utilities are furnished primarily through overhead lines. These services are available throughout the Borough. Natural gas is available in most sections of the Borough. Heating oil is truck-delivered to individual homes by a number of purveyors.
2. Public Potable Water: For the most part, all homes and non-residential units in the Borough are served by public water provided by the municipal system (53 homes in the Lake Arrowhead area are served by Denville.) The number of customers is about 1,520 (4Q, 2010), including 84 commercial customers. There are no major industrial water consumers in the community.
3. Water Supply: There are four working wells serving the community. The major one designated Well #5 is located near the Boulevard, south of Route 46, and provides for most of the needs. In 2000 an air stripper was added to Well #5 in order to eliminate trace contamination. Another well located at Tower Hill Road and two wells in Denville assist meeting firm capacity requirements. With the three other wells recently upgraded, the Borough has 100% back-up capacity. The treated water meets all governmentally mandated quality requirements and the Environmental Commission reviews the monthly quality read-outs for all the wells. The long term impact on groundwater quality and quantity from development in our region is a major concern, especially because the aquifer, upon which the Borough depends for its water, crosses municipal boundaries into areas of rapid development. The Borough exceeded water allocation in 2005 and 2006 and has operated under a State-mandated 5 year new connection stop ever since. Another attempt to limit water usage has been the passing of an alternate day landscaping water ordinance in 2007, and a more diligent attempt to track down and fix leaks in the distribution system.
4. Distribution System: The water is stored in two tanks with a combined capacity of 1,500,000 gallons, located on Lookout Road opposite Summit Avenue. The Borough pumps between 700,000 (off-season) and 1,000,000 (peak summer season) gallons of water per day. The distribution system does not show any major weaknesses in serving the Borough's existing development. Pressure is adequate except for some spots in the vicinity of the storage tank. There are two small streets still serviced by 2 inch water mains, however, the existing capacity has been deemed adequate due to the small number of homes. Water leakage, (defined as unaccounted for unbilled water usage) was 27 percent in 2008, however, an aggressive focus on this issue lowered it to 14% by 2010. Not all of the leaks are within the control of the Borough since many occur in old service lines between the curb box and the meter to the house and are the customer's responsibility.
5. Sanitary Sewer System: The Borough's sanitary sewerage system was installed in 1977-78. Residential and commercial development since then has been integrated into the system. The one residential street (Arden Road) not included in 1977-78 was added in 1996; it is the only residential street using a pumping station in the otherwise all-gravity collection system. The only other pumping station (private) is on Morris Avenue by the Park Place property. The Parsippany-Troy Hills Sewer Utility provides secondary and tertiary treatment of the collected wastes, under a contract based on a maximum

flow of 520,000 gallons per day generated by the residences. Another 120,000 gallons per day has been allocated for non-residential customers. This capacity should be adequate for present and future development.

6. Storm Drainage: The storm drainage system in the community has been mapped. Most of the drainage water infiltrates the ground or ends up in the lakes. Flooding does not constitute a major problem in Mountain Lakes as it is a headwater area. Excessive rain storms will flood a number of basements. Run off problems have been identified in several areas and are being addressed with installation of additional catch basins and lateral connections. Ten detention or retention areas have been built in the Borough as part of residential and commercial developments. As a headwater area, the community should continue to take responsibility to provide zero increase in surface-water run off in connection with major developments for the benefit of the downstream communities. In addition, the Borough's Surface Water Management regulations should provide for mitigation of pollution in storm water of such developments. The Borough also follows New Jersey Surface Water Management regulations, aggressively maintaining catch basins and lateral connections, replacing when necessary.

## **CONTAMINATED SITES**

### **Contaminated Sites History**

Love Canal in Western NY is memorialized in environmental history as the seminal example of what happens when there is no or limited regulation governing the disposal of toxic wastes on property or the subsequent reuse of property where such wastes were dumped. In the late 1800's, Mr. William Love envisioned a canal connecting the upper section of the Niagara River to the lower section of the Niagara River. Early on, Mr. Love ran out of money and abandoned the project leaving behind a canal that was 1 mile long, 15 feet wide, and up to 69 feet deep. In the 1920's, the City of Niagara Falls began disposing waste in the canal. In the 1940's, Hooker Chemical bought the property and began to dump chemical wastes into the canal. In the early 1950's, and in response to post-war suburban expansion, Hooker Chemical sold the property to the City of Niagara Falls, which developed the property with a school and neighborhoods. In the 1970's, a health emergency was declared due to the apparent health effects being experienced by the residents. Notably, a survey conducted by the Love Canal Homeowners Association found that 56 percent of the children born from 1974 to 1978 experienced a birth defect.

In response to this environmental disaster, the Comprehensive Environmental Response Compensation and Liability Act, 42 USC 9601 et seq. ("CERCLA" or "Superfund") was enacted by Congress in 1980. A function of CERCLA is to create a super fund by charging the polluting companies to fund the investigation and clean-up of the most contaminated sites.

### **Contaminated Sites State History**

The Industrial Revolution brought major changes to Europe and North America during the 18th to the 19th centuries and New Jersey was not immune. In 1791 Alexander Hamilton proposed the development of a planned industrial town at the Passaic Falls, which eventually would become Paterson, New Jersey. By the early 1800s, Paterson was the cradle of the Industrial Revolution in New Jersey and had become the country's largest silk manufacturing center. In 1835 Samuel Colt began manufacturing firearms in Paterson, and by 1850, Paterson was producing locomotives. Elsewhere in New Jersey, industry was establishing a firm foothold -- Newark had breweries, hat factories, and paper plants; Trenton, iron and paper; Jersey City, steel and soap; and Middlesex, clays and ceramics. The late 1800s saw the birth of the electrical industry, the growth of oil refineries on Bayonne's shores, and emerging chemical, drug, paint, and telephone manufacturing centers. As a result of these industrial activities, it was common for chemical wastes to be routinely dumped or landfilled on the property without regard to the environmental consequences.

New Jersey's industrial legacy has resulted in more than 20,000 contaminated sites (NJDEP). New Jersey also has the unenviable distinction of being home to more Superfund sites than any other state. Superfund sites are generally high priority contaminated properties that the federal government is investigating and remediating through the USEPA. Less contaminated sites, called brownfields, do not involve the Federal Government.

### **NJ Regulatory Response**

New Jersey has been at the forefront of environmental law and enacted water pollution control laws as early as the late 1700's. Through several legislative iterations, the New Jersey Department of Environmental Protection ("NJDEP") as it exists today was created in 1970 to protect the air, water, land, and natural and historic resources of the State. The NJDEP's mission is advanced through an effective and balanced implementation and enforcement of environmental laws to protect these resources and the health and safety of New Jersey's residents. The regulatory framework to address contaminated sites in New Jersey stems from the following notable statutes:

Spill Act -- New Jersey enacted the Spill Compensation and Control Act, NJSA 58:10-23.11 et seq. ("Spill Act") 4 years prior to CERCLA and establishes a comprehensive framework for the prevention and remediation of hazardous substance contamination. A key tenet of the Spill Act is the liability provision which imposes joint and several liability for the clean-up costs regardless of fault and with limited defenses.

ISRA -- On January 1, 1984, the Environmental Cleanup Responsibility Act, NJSA 13:1K-6 et seq. (subsequently renamed the Industrial Site Recovery Act ("ISRA")) became effective. ISRA imposes a statutory obligation to investigate and remediate property prior to transferring property in certain real estate and business transactions.

SRRA -- On May 7, 2009, Governor Corzine signed into law the Site Remediation Reform Act, NJSA 58:10C-1 et seq. which introduced sweeping changes to the administration of site cleanups in New Jersey. Among other important changes to existing environmental laws, the Act introduced a licensed site remediation professional ("LSRP") program modeled under a program that has been operating in Massachusetts for a number of years. One of the key objectives of SRRA is to streamline the regulatory closure process for the more than 20,000 known contaminated sites across New Jersey by allowing LSRPs, instead of the NJDEP, to oversee site cleanups.

## **Contaminated Sites in Mountain Lakes**

Mountain Lakes, for all its bucolic splendor, is home to approximately 187 contaminated sites (based on NJDEP's Dataminer database -- <http://www.nj.gov/dep/opra/online.html>). While a majority of these contaminated sites are the result of leaks and spills from residential heating oil tanks, a number of contaminated sites are the result of commercial or industrial activities, notably:

Petroleum and Gasoline Station Facilities. The activities at the following properties have resulted in contamination primarily from leaking fuel storage tanks which has caused petroleum constituents above regulatory standards in soil and groundwater. These properties continue to exhibit detectable levels of contamination and require additional investigation and/or remediation:

- Amerada Hess Service Station, 62 Route 46 (NJDEP PI ID 8796)
- Citgo / Gulf Service Station, 326 Route 46 (NJDEP PI ID 26487)
- Dixon Brothers Oil, 100 Pocono Road (NJDEP PI ID 8821)

**B & V Cleaners (Dry Cleaning Facility)**, 82 Route 46 (NJDEP PI ID 127072) – the activities at this property have resulted in contamination from dry cleaning activities resulting in chlorinated solvent constituents above regulatory standards in soil and groundwater. Notably, in 1991, tetrachloroethylene (PCE), a chemical used in dry cleaning facilities, was detected at a concentration above the drinking water standard in Mountain Lake's Well #5 located adjacent to B & V Cleaners. In recognition of the need to maintain water quality and deliver safe water to its residents, Mountain Lakes undertook the planning, funding and design of an air stripping facility at the contaminated well to eliminate the PCE contaminant from the water supply. This air stripper has been in operation since 2000 and has a capacity to treat approximately 1,000,000 gallons of water per day.

**Contaminated Site Cleanup Success Story:** The former Standard Railway Fusee Corp. facility, located at the corner of Morris Avenue and Fanny Road (NJDEP PI ID 31817), represents a success story in local remediation and redevelopment. Formerly designated as a contaminated "brownfield" site, remediation efforts were completed in 2006 and this property is now a luxury condominium/townhome development known as Park Place at Mountain Lakes.

**How do I learn more?** Additional information about contaminated sites in Mountain Lakes and throughout New Jersey can be obtained by calling NJDEP at 1-866-DEP-KNOW or by filing an Open Public Records Act ("OPRA") request for information at <http://www.state.nj.us/dep/opra>. Additional information also may be available at <http://www.epa.gov/epahome/commsearch.htm>.

Please proceed to the MCPRIMA to map NJDEP known contaminated sites (KCSL) within the Borough.

[https://morrisgis.co.morris.nj.us/MCPRIMA\\_4x-war/MountainLakes?startUpTheme=public\\_login&publicThemeName=Mtn%20Lakes%20test%202](https://morrisgis.co.morris.nj.us/MCPRIMA_4x-war/MountainLakes?startUpTheme=public_login&publicThemeName=Mtn%20Lakes%20test%202)

## **HISTORICAL AND CULTURAL RESOURCES**

### **History**

The area that would become Mountain Lakes was originally home to the Lenni Lenape Indians, who dominated the region from about 5,000 B.C. to the last part of the 17th Century. From 1664, as the Indians began to move westward, until 1910, the year that the development of Mountain Lakes began, land titles and boundaries were shifted through disputed ownerships and deeds of dubious legality.

In the late 17th Century, the area was known as Old Forges. By 1700 it was part of Whippanong, then the Hanover area, and by 1759 it had become part of the Great Boonton Tract. The area began to attract settlers in the 18th Century, as Old Boonetown, now Boonton, became a center for iron works and gristmills. Workers, traders, and farmers, primarily of English and Dutch origin, established their families and built homes, some of which are still standing. In 1798 a small portion of now Mountain Lakes was part of Boonton Township, and the rest was included in Hanover Township, an arrangement that would last until the incorporation of Mountain Lakes Borough. Historically, the land was cleared and farmed extensively by the early settlers. It began to return to woodlands after the Civil War, when coal largely supplanted wood and charcoal for domestic and commercial purposes, and area forests began to regenerate.

During the time of ice boxes in 1893, the Fox Hill Ice Company built Crystal Lake along with a 100 foot barn-like ice house to allow the workers to slide the ice blocks inside. A few years later, Sunset Lake was built with an ice house along present day North Pocono Road. The Company also built a railroad spur to provide access to the lakes at what is now West Shore Road. The ice was harvested every winter and shipped to New York City.

In 1908, surveyor Lewis Van Duyne of Boonton approached Herbert J. Hapgood with the idea for development of the then virgin area located on the eastern face of the highlands overlooking the Passaic River Valley. Van Duyne had become familiar with the area while surveying for the future Jersey City Reservoir. That year, Van Duyne and Hapgood began to purchase the land that would become Mountain Lakes. At a purchase price of \$15/acre, the land consisted of swampy meadows and woodlots which were losing their value with the increasing popularity of coal. Van Duyne and Hapgood, however, saw value in the development of the area based upon its natural beauty and its proximity to the Lackawanna Railroad. Hapgood, together with his landscape engineer, Arthur T. Holton, had a vision. He wanted to build homes in a popular, marketable mode. So he set out to build a gracious planned community to provide future homeowners with comfortable family-oriented homes.

Work on Mountain Lakes Residential Park began in the winter of 1908-09 with the commencement of clearing and the construction of the basic elements that would set its character as a residential park community: the roads and dams. Man-made lakes were created (Mountain and Wildwood) which formed the focus for the design of the community around which roads and residential lots were laid out. Home construction began in 1910 and the first residents arrived in 1911. The beginning of trolley service in 1910 was a significant asset not only for the new residents but for the workmen clearing the site and building the homes. The trolley was a



single track connecting Denville to Boonton and ran along what is the present day Boulevard, stopping at all major intersections.

As the first houses were built, residents ventured out from New York to escape the city heat. The first family, the Lawrence W. Luellens, moved into 46 Dartmouth Road on March 11, 1911. By the end of June, some fifty families had taken up residence. After the railroad station was completed in November of 1912, commuters were ready to take advantage of a direct train line to New York. By the end of 1912, two hundred Hapgood homes were sold and occupied. In 1914 commerce came to Mountain Lakes with the opening of a grocery store on Midvale road by Joseph Yaccarino. This establishment was soon followed by a drugstore, a luncheonette, a taxi service, a dry cleaning and tailor shop and the town library. Half the stores were later destroyed by fire. 1914 also saw the opening of the private Mountain Lakes Club as well as the local post office and the cornerstone of the Community Church.

Nearly 500 homes were constructed between 1911 and 1923 when Hapgood's operation declared bankruptcy due to declining sales and a bad business deal concerning Route 46. Hapgood fled to South America and the remains of his company were re-established under the new Belhall Company. The company was only able to build a small number of houses of Tudor, Norman, English cottage and Colonial style until it too went bankrupt during the Depression. Two decisions by the Borough at this time gave the town the ability to maintain a natural and serene environment. The Borough purchased 250 acres of woodlands around Birchwood and Crystal Lakes and gained titles to the remaining undeveloped lots in 1938. With an area of just 2.9 square miles, 9 lakes and many acres of woodlands, the rustic character of Mountain Lakes was established.

Trolley service ended in 1928 when the Borough became an automobile-oriented community. Roads were paved and area highways improved and the trolley track was replaced by a broad sidewalk along the Boulevard. A souvenir of that time is the unique row of trees that were planted along the former trolley line in the early 1930's. The idea and financial support were provided by a school board member and Bell Labs engineer known as Mr. "A". Five different species were planted in a repeating sequence by a volunteer workforce. The cost of the trees was 15 cents each.

The last major development came after World War II when the Fox Development Company erected some 67 smaller homes on a large, relatively flat tract of land between the railroad and Intervale Road. Known as the "Village," these homes filled an important demand for housing for returning veterans and their young families.

### **Historic Significance of Borough Architecture**

The period in which Herbert Hapgood designed was one of eclectic architectural styles, but his work shows a consistent debt to Craftsman architecture, tempered by a Colonial Revival influence. Craftsman architecture was one of several related styles that developed out of the English Arts and Crafts movement of the 19th century. Like the English movement, Craftsman architecture emphasized a simple approach to design, with an honest expression of the materials used. This truth and simplicity was a reaction against what was called the "excesses" of Victorian design. Or, as Gustav Stickley, the American proponent of the movement, stated in his monthly journal, "beauty does not imply elaboration or ornament."

Hapgood took many features of Gustav Stickley's Craftsman architecture and philosophy and adapted them to his own designs. His houses were solid and boxy in appearance. They were large yet non-ostentatious homes with variations of colonial or neo-classical detail. All showed a clear relationship to the natural environment and promoted outdoor living. They were made to fit into the landscape, located on natural rather than graded terrain. Narrow roads were curved to fit the contours of the land. The houses were designed to appeal to upper middle-class people who wanted to raise their families in a wholesome country environment filled with recreational opportunities and neighbors who would share their values.

An early advertisement features three distinct types of houses which were built on lots near the banks of Wildwood and Mountain Lakes. Hapgood named them the Manor House, the Semi-Bungalow and the Swiss Chalet. These styles were actually adaptations of the Foursquare House common in American towns in the early part of the twentieth century. In an article entitled, "The American Foursquare," in *The Old House Journal* (February 1982), the architectural historian, Renee Kahn, defines the Foursquare as a two story house with "a square boxlike shape, and a low hipped roof with broad overhanging eaves. The exterior is unadorned, relying for impact on its shape and proportion. There is usually a porch extending the full width of the front elevation. Most often, there is a dormer in the roof facing front; sometimes there will also be dormers on the two side planes of the roof. Occasionally there will be a bay window or other architectural feature that breaks up the absolute flatness of the sides."



The choice of materials used in the Lakers reflected both local availability and the fashion of the times. The fieldstone of the chimneys, walls and foundations was deposited regionally by the Wisconsin glacier ten thousand years ago. Chestnut paneling, ceiling cross beams and oak flooring were cut from trees at local sawmills using the timber cleared from the construction sites. The Craftsman attitude towards natural materials is apparent in Hapgood's use of stucco, boulderstone exteriors with exposed wood details, and interiors characterized by sturdy oak floors, exposed beams and trim, chestnut paneling, and large brick and stone fireplaces. Built-ins and inglenooks are typical -- comfortable, simple conveniences. These houses have a sense of volume to them and sit snugly into the landscape. The abundance of surrounding

porches contributes to the emphasis on the horizontal, which keeps these houses so solidly anchored to the earth. Around 1910, builders began to show increased interest in stucco. Renee Kahn states, "Although its initial cost was slightly more than wood, it required little or no maintenance, and could be tinted delicate pastel colors when wet ... A soft beige/brown appears to have originally been the most popular color."

As is generally the case in planned communities, most of the trees and plants were removed for ease of construction. Trees and bushes which have sprung up since reflect the natural, informal landscaping that was prevalent at the time. The mountain laurel and rhododendron, for example, are specifically adaptive to the acid soil. Other decorative outdoor structures consisted of garden trellises, pergolas, gazebos, boathouses and tennis courts designed to enhance the enjoyment of the outdoors.

### **National Register of Historic Places Designation**

In 2005, the majority of the Borough became an historic district listed on the State and National Register of Historic Places. The National Register of Historic Places is the Nations' official list of cultural resources worthy of preservation. To qualify for listing, properties must be significant in American history, architecture, archeology, engineering, or culture.

Mountain Lakes qualified as an historic district under the primary criteria of significance of community planning and development as a planned residential park suburb. The secondary criteria are significance in architecture, for the concentration of Craftsman style homes. Unlike other old communities that have lost their cohesive look and feel, the planned residential park suburb that is Mountain Lakes has been maintained. New houses have been built, many in the Laker style, the narrow, meandering streets are still flanked by houses set well back from the road, and the abundance of stonework is still clear. As of 2010, out of an original 482, there are 451 remaining Hapgood houses and 57 Belhall homes out of approximately 60 originally built.

This designation is a source of immense pride for the Borough, but there are also additional benefits. Historic district status serves to protect the Borough from some kinds of intrusive development and building owners may qualify for some grants especially if they are a non-profit or an owner of a business.

The nomination to become an historic district was prepared by the Borough's Historic Preservation Committee (HPC) at the request of the Borough Council. The preparation took from 2001 to 2005, and involved approximately five dozen volunteers. The community volunteers and HPC committee members spent countless hours documenting the Borough in words, photographs, maps and slides, and in researching the town's history. A copy of the full nomination can be found at the library and at Borough Hall.

### **Historic Properties**

The Historic District contains 1,182 buildings, 43 sites, and 406 structures. Its boundaries encompass the original area Hapgood envisioned as his planned suburb: roughly bounded by Pocono Road to the west, the border between Denville and Mountain Lakes in the Tourne to the North, Rock Lane and Powerville Road to the east, and the railroad right of way to the south. The total area is 1,397 acres. The district is bisected by the Boulevard and contains all of the lakes in the Borough.

Sites of significant historical interest, as determined by the Landmarks Preservation Committee, are:

- Grimes Farm and House (1733). House and outbuildings stood on this site until 1979 when the house was moved to 4 Craven Road. This wood frame house was originally a one-room dwelling. An addition contains a concealed closet believed to have been used as a hiding place for fleeing slaves and a link in the "Underground Railway". The Grimes house was listed on the State Register in 1976 and the National Register in 1977. Rame-Hart\*. This structure was formerly part of the Grimes homestead. It has been converted for industrial use.
- Righter House (1732). Now the oldest house in town, it was once a popular tavern and inn on the road between Parsippany and Rockaway. The house is said to be haunted by the ghost of Sarah Ann who died at the foot of the stairs on her way to church.
- Oglesby House\* (1778). A wooden Dutch farmhouse, it was built in two sections by Elizabeth & John Stagg. Four generations of Romines have inhabited the house.
- McNeill House\* (1803). Originally built as a saltbox in the old town of Boonton, it was moved to this site in 1900 just before the construction and flooding of the Jersey City Reservoir.
- Pendleton-Latzer House\*. An early 1800's clapboard structure with several structural additions, it is now used for offices.
- Walker House\* (1813). The original section of this house was built by Jasper Romine. This home has undergone several alterations and renovations.
- Lebo House\* (1833). This elegant colonial home was designed by an architect and built by E.H. Ball. Mr. Ball ran a prosperous livestock farm.
- Shulte House\* (1875). Originally built as a clapboard structure for the Ball family in the late 1700's, the main portion of the house is a Victorian addition constructed in 1875.
- Brackin House\* (1905). This frame house was built by W.H. Grimes & Sons of Parsippany. It has been owned by the Brackin family since 1918.
- Ferris House\* (1911). This was the first house built here by the developer, Herbert Hapgood. It was occupied by the family of L. Luellen, originator of the Lily Paper Cup.
- Mountain Lakes Railroad Station (1912). The first train stopped here in November 1912. For many years the railroad was the principal means of commuting for most of the Borough's wage earners. The structure now houses a popular restaurant known as "The Station," and is listed on the Morris County Inventory of Historical sites.
- Community Church (1914). First known as the Mountain Lakes Church, the cornerstone was laid in 1914 and the church was the first public building built. Previously, church services were held in the garage of the Luellen's at 46 Dartmouth. The church bell originally doubled as the fire bell.

- Lake Drive School (1914). This was the first official public school. Previously, elementary students attended classes at The School of Individualized Learning located at a home on 8 Larchdell Way, or temporarily at a store on Midvale Road. Originally a four-room building of fieldstone, it housed Grades K – 9 and high school students attended school in Morristown or Boonton. An addition was built in 1921.
- Mountain Lakes Club (1914). Built for the then princely sum of \$35K, this private club was the center for many early community activities. On the lower floor was a men's smoking room, billard and pool room, bowling alleys and lockers. On the upper floors were a large assembly room, a reception room and a women's shower. A fire started in the kitchen on New Years' Eve of 1928 and the Club burned to the ground. It was re-built in 1931 and is still used as a private club today.
- Site of the Romaine Graveyard. This area is an old family graveyard, once a part of the Romaine Farm.

*\*Name of owner at time of publication.*

Please proceed to the MCPRIMA to map the historic sites within the Borough.

[https://morrisgis.co.morris.nj.us/MCPRIMA\\_4x-war/MountainLakes?startUpTheme=public\\_login&publicThemeName=Mtn%20Lakes%20test%202](https://morrisgis.co.morris.nj.us/MCPRIMA_4x-war/MountainLakes?startUpTheme=public_login&publicThemeName=Mtn%20Lakes%20test%202)

### **Mountain Lakes Historical Walking Tour**

<http://www.mtnlakes.org/History/Hiswalkingtour.htm>

## FLORA

"A community grows great when men plant trees whose shade they know they shall never sit in." - *Ancient proverb*

"...that the scanty forest derelicts of our day shall have given place to stately shade trees umbrageous and beautiful." - *Original Mountain Lakes 1912 cornerstone greeting*

### Importance of Shade Trees in Mountain Lakes

As these quotes testify, the value of a full canopy of shade trees is immeasurable and the foresight of those who plant and care for them is admirable. Given that Mountain Lakes was a development constructed within a few years timeframe, practically all the trees were removed. The new residents recognized the need for new trees and in 1915 started the Committee on Tree Planting and Landscape of the Mountain Lakes Association. The Borough had large shade trees planted along all the roads. The Committee evolved into the present day Shade Tree Commission (STC) and it has been their job to watch over the shade tree canopy ever since. Their goal is to maintain the shade tree canopy entrusted to them by previous generations. Due to their efforts, Mountain Lakes has obtained Approved Status under the NJ Shade Tree and Community Forestry Assistance Act as well as has been designated a "Tree City USA" by the Arbor Day Foundation.

The trees that the STC oversees are those located on Borough right of ways (ROW), which is a corridor of between 2 to 15 feet on either side of the road, depending on the road, as well as those in residential setbacks. Protective ordinances have been passed that forbid residents from pruning or removing any trees within these areas without a written permit. Trees in ROWs must also be protected via a submitted plan during residential construction. Throughout the years, the STC has removed dangerous trees, cared for, and planted new trees within the right of ways. In 2009, for example, the Borough obtained a \$25K grant to plant 50 new shade trees along the Boulevard and in other public areas. The grant from the NJ Community Stewardship Incentive Program (CSIP) required municipality matching in funds or in-kind services. The match was delivered in the form of countless volunteer hours on the part of the Commission who oversaw the planting and maintenance. As a result of these efforts, the Borough had essentially "maxed out" the number of shade trees that could be planted on public property (2011's Hurricane Irene and the following Nor'easter on October 29, 2011 may have changed this situation with numerous big trees (and power lines) lost in excessive weather conditions).

Given this reality, the STC has changed their focus to educating residents about the value of planting shade trees, versus ornamental, on their property. According to the STC's website, a single healthy shade tree converts 26 pounds of CO<sub>2</sub> into oxygen every year. Plus, having large trees on one's property can result in a 25% reduction in winter and 50% reduction in summer home energy bills due to their insulating and shading properties. Under current ordinances, residents are permitted to remove as many as 3 trees on their property within a 12 month period. In the past, residents of Mountain Lakes prided themselves on keeping their lawns and landscaping on the "natural" side. Beginning in the 1980's, however, with the arrival of the big houses came the arrival of more artificial and highly manicured lawns and landscaping. Many of these changes brought ornamental invasives and non-native plants.

These gardens now require more of water and maintenance because of the synthetic pesticides and fertilizers used.

### **Education Efforts Around Shade Trees and Native Plants**

Two recent efforts to educate residents about the value of shade trees and native plants are those undertaken as part of the Borough's Centennial celebration (1911 – 2011). The first was the restoration of the Mountain Lake Cove area between the water and Morris Avenue. Key components of the project were to replace nuisance and invasive species (including a 360-foot invasive Japanese barberry hedge located along the shore) with a native-plant buffer, to reduce erosion and to provide a riparian buffer to protect the lake from road pollutants. The project also provided educational opportunities for the community to learn how to properly maintain and enhance lakeside properties by landscaping with native plants.

The award-winning, environmentally-friendly design is an indigenous garden that will not require chemical maintenance, will restore biodiversity, and conserve water resources.

Pure species native plants used in the Cove design included:

- Arrowwood (*Viburnum dentatum*)
  - New Jersey Tea (*Geonothus americanus*)
  - Blue Dogbane (*Amsonia tabernaemontana*)
  - Ninebark (*Physocarpus orbiculatus*)
  - Broomsedge (*Andropogon virginicus*)
  - Red Chokeberry (*Aronia arbutifolia*)
  - Sweet Pepperbush (*Clethra alnifolia*)
  - H.G. Virginia Sweetspire (*Itea virginica* Henry's Garnet)
  - Sweetfern (*Comptonia peregrine*)
  - Hardhack (*Spirea tomentosum*)
  - Switchgrass (*Panicum virgatum*)
  - Inkberry (*Ilex glabra*)
  - Wreath Goldenrod (*Solidago caesia*)
  - Burgundy Lowbush Blueberry (*Vaccinium angustifolium*)

Secondly, the Mountain Lakes Shade Tree Commission is promoted a "100 Trees for 100 Years" initiative, incenting residents to plant new shade trees on their property. With the goal of achieving 100 new trees, the STC is allowing residents access to wholesale tree pricing and awarding a commemorative certificate with each tree planted. Tree species that fall under this program include: Northern Spruce, Red Maple, Red Oak, Juneberry, Sugar Maple, Linden, Redbud, Pin Oak and Elm. This effort will preserve for future generations the tree canopy that is so much a defining quality of Mountain Lakes.

### **Geology's Relationship to Flora & Fauna**

This Flora section is largely excerpted from a report commissioned by the Environmental Commission in 1994 entitled: "SURVEY OF NATURAL COMMUNITIES PRESENT IN THE BOROUGH OF MOUNTAIN LAKES", compiled by Richard P. Radis.

As noted earlier, Mountain Lakes is part of the Highlands Region with its ancient gneissic rocks, ridges, and rugged glacial terrain. The Borough sits atop the Terminal Moraine, the area where the ice reached its southern limit in the Wisconsin Glaciation, less than 20,000 years ago. Evidence of this most recent glaciation can be seen in the boulder fields, rock striations, recessional moraines, and large glacial erratics found in the town. Plant species which occur here, and to a lesser extent animal species, are reflective of the glacial history and glacial soils of the area.

The fact that much of the undeveloped Borough property is wooded provides the benefits of shade, air purification by the trees and a natural cooling effect. When the trees are in leaf, they also provide the added benefit of a sound buffer which significantly reduces the traffic noise from the nearby interstate highways. Borough owned lots also provide a natural habitat for the preservation of other natural resources such as wild birds, insects and animal populations as well as many species of trees and plant life.

Habitats present in the Borough include suburban (roads and roadsides, mowed lawns and landscaped areas, athletic fields, commercial sites, paved areas); lacustrine (lake); palustrine (streamside); red maple swamp; marsh (rare); scrub-shrub (rare); mixed deciduous uplands; forested wetland; forested ecotones; and flooded woods and developing marsh caused by beavers. There are a number of small microhabitats present, such as boggy spots with sphagnum moss, ravine, seepage areas and seepage slopes, and intermittent streams. A few amphibian species are of potential occurrence in some of wetland habitats. Other vertebrate wildlife present in the town is reflective of the larger habitats, and is representative of the Highlands region as a whole.

Dominant species found in each community are discussed below, and a list of all species encountered during the Radis survey is contained in Appendix 2.

### **Inventory Sampling Methods**

Sampling visits, varying in duration from one to several hours, were conducted during July, August, September, and October of 1994, and covered most of the lacustrine (lake), wetland, and upland tracts present in the Borough. Plant species were recorded when encountered, though no attempt was made to conduct a complete inventory of vascular plants present, as such a study is time-intensive and requires an entire growing season. Roadsides, roadside shade tree plantings, or landscaped areas were not surveyed. A total of twenty-three hours was spent in the field.

Community classifications used in this study have been adapted from three publications: A Preliminary Natural Community Classification for New Jersey (Breden 1989); Plant Communities of New Jersey (Robichaud and Anderson 1994); and Natural Community Inventory of Picatinny Arsenal, New Jersey (Windisch 1993).

Habitat types are not always sharply distinct; because of variations in soil type, topography, historical land use patterns, and other factors, they sometimes grade into one another and share characteristics. Such transition zones are noted in the report. For reasons of clarity, the



technical names of plants do not appear in the body of the text except to distinguish species which share similar common names. For example, "wintergreen" in this area can be one of two species, *Gaultheria procumbens* or *Chimaphila maculata*, while "blueberry" and "huckleberry" are often used interchangeably even though they constitute two distinct heath genera, *Vaccinium* and *Gaylussacia*. A "sedge" can be any of several hundred species which occur in the state.

A list of citations giving both common and technical names appears in Appendix 2. Nomenclature in general follows that adopted in Manual of Vascular Plants of Northeastern United States and Adjacent Canada (Gleason and Cronquist 1991), and keys contained in this text were used in several identification problems. Some common names have been adopted from Special Plants of New Jersey (Snyder 1992).

## **Vegetation Inventory of Natural Communities**

### **1) Lacustrine System**

- a) Open Water Lake Zone: This habitat occurs at depths of over six feet and is generally devoid of vascular plants, though free-floating species such as lesser duckweed, star duckweed, and dotted *Wolfia* were seen in Birchwood and Mountain lakes. As lake depths lessen, this zone grades into the below.

# Lacustr

- b) Submergent Lake Zone: Generally found at depths between three and six feet and containing usually-submerged aquatic plants such as common bladderwort, humped bladderwort, a number of pondweed species, naiad, fanwort, and low and slender water milfoils. Again, this zone intergrades with the next as water depth lessens and emergent vegetation begins to appear. This zone was noted to be present in Birchwood and Mountain Lakes.

# Lacustr

- c) Emergent Lake Zone: Found at depths ranging from approximately three feet to the lake shore. Dominated by emergent species such as common cattail, spatterdock, common arrowhead, arrow arum, bulrush species, floating heart, rush species, fragrant water lily, bur-reed, pickerel weed. This habitat also contains some of the species which occur in the submergent and open water zones. Present, in varying degrees, at all the Borough's lakes.

# Lacustrine -

## 2) **Palustrine System**

### a) Open Canopy:

- i) Inland Noncalcareous Pond Shore: This habitat is generally present only along the undeveloped shores of Birchwood, Crystal, and Sunset lakes, where it appears seasonally in periods of low water in late summer. Plants which occur in this habitat are adapted to cycles of inundation and exposure.

- ii) Species found here include Engelmann's and spiny-spored quillworts, water smartweed, and Pennsylvania smartweed, as well as beached emergents and submergents such as fragrant water lily, spatterdock, water shield, and pondweeds. Though not rare, the quillworts, which are relatives of the ferns, are often difficult to find unless exposed by low water.

# Palustrine O

- iii) Northern New Jersey Shrub Swamp: Represents an uncommon community in the Borough, and is restricted to small areas in Wilcox and Frederick parks. This type, termed shrub/scrub wetlands by some authorities (Tiner 1985), is often associated with streams. Dominant shrubs include highbush blueberry and sweet pepperbush, with smaller numbers of winterberry, red and black chokeberry, smooth alder, red osier dogwood, arrowwood, and swamp rose. Small red maples and sour gums are also present, along with herbaceous plants such as cinnamon fern, royal fern, sensitive fern, marsh fern, meadow rue, bugleweed, tussock sedge and peat moss species. Shrub swamp is a habitat that often grades into the red maple swamp community (see below), and may be simply a successional stage.

# Palustrine C

b) Forrested:

- i) Inland Red Maple Swamp: Fairly common in the Borough, present in Wilcox and Frederick parks, and in private and conservation easement lands near Route 46. This swamp occurs along streams, areas with poor drainage, and along the undeveloped edges of Birchwood, Crystal, and Sunset lakes. The predominant tree is red maple, with smaller numbers of sour gum, swamp ash, and swamp white oak. The predominant shrub species in this community are highbush blueberry and sweet pepperbush, with markedly lower numbers of plants such as spicebush, buttonbush, and arrowwood. Common ground cover includes royal, cinnamon, sensitive and marsh ferns, skunk cabbage, jack-in-the-pulpit, tussock sedge, and peat moss species.

# Palestrine Fo

- ii) **Inland Acidic Seepage Slope:** A small area of this unusual and rare community type was found in mixed oak forest on a hillside in Wilcox Park. Most wetlands occur in level terrain along watercourses, in poorly drained areas, or in sites where the water table is near the surface. Seepage slopes may be created by the presence of a shallow fragipan in the soil which forces water to flow along or just beneath the surface (Breden 1989). A seepage slope forms a microhabitat markedly different from surrounding uplands. Skunk cabbage, peat moss species, and cinnamon fern are the predominant plants at this site. Small numbers of club-spur orchid, matricary grape fern, triangle grape fern, and least grape fern were also found here, growing along the edges of the seep. Although triangle and least grape ferns do not appear on any state threatened or endangered list, they are considered uncommon or rare by some authorities (Montgomery and Fairbrothers 1992).

# Palestrine Forr

### 3) Terrestrial System

- a) Dry-Mesic Inland Mixed Oak Forest: This is the most common community type present in Mountain Lakes, found in tracts ranging from small woodlots to the large expanses present in Wilcox and Frederick parks. Oak species--white, red, scarlet, chestnut, and black--comprise the majority of tree species, though American beech, tulip tree, sugar and red maples, American ash, eastern hemlock, flowering dogwood, cherry, and birches can be found in lesser numbers. This community was once called the oak/chestnut forest, and, judging from



the number of resprouts present, particularly in Wilcox Park, American chestnut must have once been quite common here. Although the species was destroyed as a viable forest tree in the early decades of this century by a fungus blight, the still-vital rootstocks continue to send up shoots, which grow into shrubs or small trees until they are girdled and killed back by the blight, which is still active. One tree seen in Wilcox Park was approximately forty feet in height, with a trunk diameter of nine inches, and was mature enough to produce nuts--a rare event. It is unusual for a chestnut to reach this height, breadth or maturity, though the tree's bark showed blight damage which will soon destroy it. Unfortunately, a similar--but more permanent--fate appears to be likely for the eastern hemlocks in the area, due to hemlock decline and the woolly adelgid, an insect pest. Eastern hemlock may be eliminated as a major forest tree by the end of the decade over large areas in New Jersey, New York, and Connecticut (Benzinger 1994). Almost all the hemlocks seen during the survey showed damage, and many were dead or dying. At present, there appears to be no practical method to control the problem in forested tracts, though individual ornamentals can often be saved by spraying. Blueberry species, black huckleberry, blackberry species, sassafras, witch hazel, mountain laurel, and spicebush are the predominant shrub species in this habitat. A wide variety of herbaceous species are also present, the most common of which include aster and goldenrod species, marginal and fancy woodferns, Canada mayflower, sedges (*Carex* species), garlic mustard, and a variety of clubmosses; a surprising number of orchid species were found here. In certain areas this community grades into the next.

# Terrestrial - Dry-

# Black Oak

- b) Mixed Hardwoods Mesic Forest: This community is largely restricted to the parkland located between the Conrail tracks and Intervale Road. Although the species composition is similar to that of mixed oak forest, no one tree species or genus predominates, and there is a wider diversity. Common trees present include tulip tree, red and sugar maples, oaks, black cherry, yellow birch, American beech, shagbark hickory, American ash, basswood, shadbush, American hornbeam, black birch, and American elm. Shrub and herbaceous species are largely similar to those present in the mixed oak forest, though the tracts examined appeared to contain more "weedy" plants, such as garlic mustard, poison ivy, Japanese barberry, and greenbriar.

# Terrestrial - M

## **Orchids of Mountain Lakes**

A surprising variety of orchid species were found during the survey period, mostly in Wilcox and Frederick parks, and on conservation easement and private land near Route 46. Although there are approximately fifty-five species of terrestrial orchids found in New Jersey, none of them are particularly common in comparison with most other plant families which occur in the state. Nine species of orchids were found growing in the Borough: pink lady's-slipper, yellow lady's-slipper, spotted coral-root, autumn coral-root, club-spur orchid, ragged-fringed orchid, rattlesnake plantain, helleborine, and large whorled pogonia. None are threatened, endangered or rare listed species, but all except pink lady's slipper (sometimes called moccasin flower), are local, elusive, and not often seen. Some, like the coral-roots, may not appear above ground every year. Yellow lady's slipper, once a relatively common species in northern New Jersey, has greatly declined due to collecting and habitat destruction and degradation. The population of small whorled pogonia, which is rather uncommon, is large and in an unusual location; this is a very showy species, though it does not frequently bloom.

# The Orchids c

### **Threatened and Endangered Plant Species**

No federal or state listed threatened or endangered plant species was encountered during the survey. However, two species were found which are listed by the NJDEPE's Natural Heritage Program as S2, imperiled; or S3, rare (see below for explanation of ratings):

- 1) Several hundred individuals of star duckweed (*Lemna trisulca*), a minute, free-floating aquatic plant, were found in open water on both Birchwood and Mountain lakes. This species, which has historically been found in some of the northern counties and in one Coastal Plain site, is ranked by the Heritage as an S2 species.



2.) A small population of floating heart (*Nymphoides cordata*), ranked as an S3 species, was found at Birchwood Lake. This plant, which is a member of the gentian family, has been traditionally thought of as a Coastal Plain species in New Jersey, even though it ranges north to the Canadian Maritimes. A few populations have been discovered recently in Morris and Sussex counties (Radis 1994). Floating heart is listed as a protected plant by the Pinelands Commission.



Neither star duckweed nor floating heart has any legal standing or protected status in northern New Jersey; very few plants do, outside of the Pine Barrens and the Coastal (CAFRA) Zone. They should, however, be taken into consideration if activities such as weed control are considered at Birchwood or Mountain lakes. Control methods such as the use of non-specific herbicides or plant-control fish, both of which can entirely eliminate all vegetation in lakes, would be highly detrimental to the two species.

### Heritage Program Ranking Terms (in Snyder 1992)

S1. Critically imperiled in New Jersey because of extreme rarity (5 or few occurrences or very few remaining individuals or acres). Species ranked as S1 are often restricted to specialized habitats and/or restricted to an extremely small (+ or -3%) geographical area of the state. Also included are species which were formerly more abundant, but because of habitat destruction or some other critical factor of its biology, they have been demonstratively reduced in abundance. In essence, these are species for which, even with intensive searching, sizable additional occurrences are unlikely to be discovered.

S2. Imperiled in New Jersey because of rarity (6 to 20 occurrences). Historically many of these species may have been more frequent, but now, largely through habitat destruction, are known from fewer extant occurrences. The S2 rank also includes species which occur in habitats restricted to +/- 10% of the total state area.

S3. Rare in NJ with 21 to 50 occurrences. Includes species which are widely distributed in the state but often occurring in small populations, and also in habitats which may be common or widespread. Species having a moderately restricted distribution (but greater than 10%) in New Jersey, but are

locally abundant, are also included. Species ranked S3 are not yet imperiled in state but may soon be if additional populations are destroyed.

## **Nuisance and Invasive Species**

Humans are responsible for almost all of the invasive plant and animal problems. We have caused major ecological problems by introducing alien species into a new area perhaps because we are familiar with a plant from a prior house or simply because it looked pretty. The problem is that there are not natural pests or diseases to control the spread of the non-native plants thus enabling them to over take and choke out the native plants. It is generally accepted that one species supports 10 species of animals. This means, therefore, that if an invasive plant takes over a habitat, the impact of those lost native species will be measured in not only lost plants but in lost birds and animals as well. It also means that tax-payer monies are used to remove invasives from the lakes and public lands; money that could be directed to other uses were the problems of invasive plants to be reduced.

As noted earlier, many of the problems occur as a result of landscapers planting non-native plants in Mountain Lakes' gardens. Examples are: Norway maple, Japanese Barberry, Asian Bittersweet, English Ivy, Mimosa, Wisteria, Japanese Honeysuckle, Bugleweed, Bamboo, Day Lily, Purple Loosestrife, Tansy and Dame's Rocket. Other plants have escaped local or federal projects such as: Multi-flora Rose, Crown Vetch and Russian and Autumn Olive. In their native locations these plants are wonderful but not here in New Jersey. Some of the worst invasives in our woodlands are: Garlic Mustard, Japanese Barberry, Asian Bittersweet, Winged Euonymous (Burning Bush), Ailanthus (Tree of Heaven), Norway Maple, Polygonum (Japanese Knotweed), Privet, English Ivy and Multi-flora Rose. We also have a Purple Loosestrife problem, hopefully under control, at Sunset Lake.

In order to maintain the natural balance in Mountain Lakes, it is important to be careful what you plant. It is asked that residents remove unwanted invasive plants on their property and that they consult with the Woodlands Management Committee, Garden Club, Environmental Commission, or Shade Tree Commission for guidance if they're not sure a potential new plant is appropriate. The Woodlands Management Committee has compiled a [list of recommended trees](#).



## **FAUNA**

Mountain Lakes residents love to trade wildlife stories – whether it's the black bear that was treed during the Memorial Day presentation, the parade of wild turkeys on Intervale, or the tiny pitter patter of flying squirrels in the attics of the century-old homes. While viewing the occasional fox or bear may be the most exciting, there is much more that shares our home. The proximity of the lakes, wetlands and the woods lends itself to a fairly rich diversity of life.

In an attempt to understand this diversity, the Environmental Commission has commissioned two survey audits – one for flora and one for fauna. These audits involve spending a good deal of time in the environment recording what the naturalist sees or hears. Those species that have been viewed as recently as 2008 are listed in the report as “Present”. Those species that have been recorded from the early 1990's until 2007, or are known to live in neighboring towns, are listed as “Probable”. Those species that have not been seen but may exist due to the similarities of habitat, are listed as “Possible”. Information for “Possible” species was compiled from database searches, state sources, and unpublished material.

Ideally, as we learn more about our environment, we will be able to know with greater assurity which species share our home and we will be able to take the steps necessary to protect them for future Lakers.

### **2008 Fauna Survey**

The following data is taken from MOUNTAIN LAKES FAUNA INVENTORY: Compiled for the Mountain Lakes Environmental Commission, by Richard P. Radis (2008). The report was a limited



survey of vertebrate—fish, reptiles and amphibians, birds, and mammals— and some invertebrate species in Mountain Lakes Borough during late November and December, 2008.

## **Survey Methods**

A total of fifteen site visits were made between mid-November and December 23, 2008. Areas covered included Wilcox and Frederick Parks, Tower Hill, the Yorke Road forests, and Mountain, Wildwood, Sunset, Crystal, and Birchwood Lakes. A number of smaller ponds were also surveyed, as were smaller wooded tracts with vernal ponds; stream habitats; areas around the high school; and the remaining woods around the Lakeland Hills YMCA.

Because of the lateness of the season, the targets of most of the surveys were birds, but mammal tracks and signs, and potential areas for reptiles and amphibians, particularly vernal ponds, were also noted. Mammals were identified on sight and by signs and tracks.

Recordings of Barred Owl, Great Horned Owl, and Screech Owl were played at dusk on several days. Owls will often respond to recordings of their calls, as will eastern coyote. Other bird species were identified by binoculars or by their characteristic calls and flight notes.

Data about bats was compiled from informal surveys conducted by the writer with a bat detector and some limited netting, done in and around the Tourne County Park; and from more formal surveys done by the state and other organizations at the bat hibernaculum located in an old iron mine located in nearby Hibernia, Rockaway Township; and in Picatinny Arsenal. The Hibernia site is New Jersey's largest bat overwintering habitat, with up to 30,000 bats of six species recorded in some years in the abandoned mine shafts.

Because of the animals' mobility, it is thought that any of the nine species of regularly- or rarely- occurring bat species in New Jersey may occur in Mountain Lakes Borough.

## **Larger Mammals in Mountain Lakes**

Whitetail Deer: Deer and their tracks are observed throughout Mountain Lakes; in the larger wooded tracts and smaller ones, in athletic fields, occasionally crossing roads, and in yards and lawn areas. Deer are graceful and beautiful animals but left to their own devices, they can soon become too numerous and do great damage to the woodlands. The goal of the Woodlands Commission is to manage the population to less than 10 deer per square mile. To that end, the Commission works with the United Bow Hunters of NJ. In 2010, the hunters took 12 doe and have taken 9 thus far in 2011. Given the success of these efforts (which come at no expense to tax payers), it is estimated that the current deer population is approximately 45. This level is deemed sustainable.

The success of the hunting program can be seen in the vegetation of the larger wooded tracts. Wilcox Park and the Yorke Road woodlands now have a healthy and growing understory of shrub and tree saplings. They are returning to forest health. Young oak, tulip and other tree saplings are increasing, as are shrub species such as spicebush, blueberry species, maple-leaved viburnum, elderberry, and others. Deer browse on the buds and young stems of these plants is minimal and usually not recent, indicating that they will continue to grow and spread. When large trees fall due to storms and disease, there will be populations of young trees to take their place.

Woods in the Tower Hill and Frederick Park tracts also have a recovering sapling and shrub layer, but there are more deer tracks at these sites, and deer browse on buds and young stems is more extensive and more recent. In other words, there are more deer at these sites, and hunting has not thinned the herds as extensively. Deer tracks at these two sites are of smaller animals.

Smaller tracts—such as those in the vicinity of the municipal building, near St. Catherine’s Church along Pocono Road, and areas around the YMCA and the high school also have healthy recovering sapling and shrub layers, with some deer browse; though none appeared to be very recent.



Black Bear: Black bear tracks and scat are found in the Wilcox Park, Tower Hill, and Yorke Road woodlands tracts. The sizes of tracks and scat indicate that at least three and perhaps four black bears were present in the Borough during the 2008 survey period, including a large animal—possibly a male because of its size—and a small, young bear; the other two were of intermediate size but differing tracks. One animal was photographed apparently attempting to den-up under a deck in condominiums near Yorke Road; this is novel behavior for the species.

Because Mountain Lakes is surrounded by large contiguous tracts of parkland and preserved land in Boonton Township and nearby Rockaway Township, where black bears are known to be year-round residents, the Borough will continue to have stray bears wandering through, particularly in fall and spring.



**Eastern Coyote:** A group of three eastern coyotes was seen in Frederick Park along Morris Avenue in late December. Coyote tracks were also seen in Wilcox Park, Tower Hill, and the Yorke Road woodlands; along the Boulevard near the Wilson School; in the parking lot of St. Catherine's Church; in the train station parking lot; around the municipal building parking area and in woods across the street; and in the parking area at the rear of the YMCA. Several animals also howled in response to a Screech Owl tape played near Birchwood Lake in early December. This indicates that coyotes are distributed throughout the Borough, with a population of perhaps fifteen to twenty animals; perhaps three family groups. That they are rarely seen by residents is not surprising, as coyotes are usually nocturnal and are very wary and remarkably intelligent, traits produced by centuries of hunting.

Although they are a healthy part of the local environment—they are very effective rodent predators—coyotes will take roaming cats and small dogs, and are a potential, if rare, threat to very small children if they are left unattended; a 2007 coyote attack on a child in Middletown (Monmouth County) was reported in the Newark Star Ledger.



**Beaver:** Beavers, an actively maintained beaver dam, and evidence of beaver foraging activity were seen along the small stream which arises in Wilcox Park, continues through the Tourne, and drains into the Rockaway River near St. Claire's-Riverside. Although a number of small and medium-sized trees have been killed, and the rise in the water level will kill larger trees in the future, this is an entirely natural process which creates new types of habitat. The flooding will attract ducks, herons, salamanders, frogs, and other species, and will eventually produce a marsh in future decades.

No signs of beavers were found in other areas of the town, though the animals may seek new habitats in the lakes and ponds in the future.

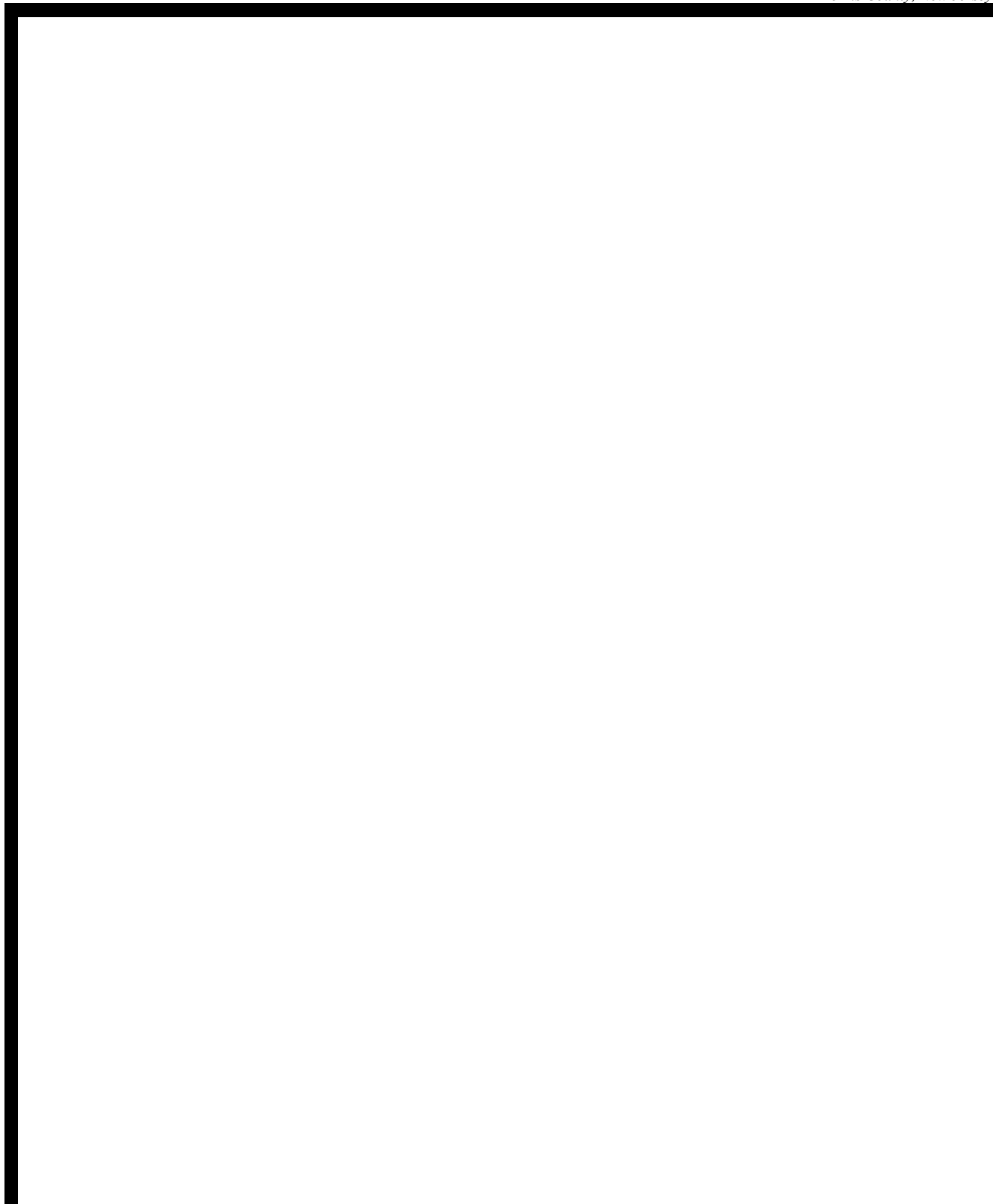


**Smaller Mammals of Mountain Lakes**

# Smaller Mammals

## Species

## Loca



## Probable Mammals Found in Mountain Lakes

Species: Big Brown Bat

Scientific Name: *Eptesicus fuscus*

Status in Mountain Lakes: Probable; occurs at the Tourne and in Rockaway. A common species.

## Possible Mammals Found in Mountain Lakes

Species: Masked Shrew

Scientific Name: *Sorex cinereus*

Status in Mountain Lakes: Possible; within the species' documented range in the state. It may occur in larger tracts such as Wilcox and Frederick Parks, and the Yorke Road and Tower Hill woodlands. The most likely site is the red maple swamp and marsh along the western edge Morris Avenue in Frederick Park, as the species prefers wetland habitats.

Species: Short-tailed Shrew

Scientific Name: *Blarina brevicauda*

Status in Mountain Lakes: A dead short-tailed shrew was found in the parking area of Birchwood Lake in 2007. This species is possible in wet areas around the Borough's lakes and ponds and in wetland areas of Wilcox and Frederick Parks and in the Yorke Road and Tower Hill woodlands

Species: White-footed Mouse

Scientific Name: *Peromyscus leucopus*

Status in Mountain Lakes: Possible. Within the species' range and habitat requirements.

Species: Meadow Vole, Woodland Vole

Scientific Name: *Microtus pennsylvanicus*; *M. pinetorum*

Status in Mountain Lakes: Possible, within the species' ranges and habitat requirements.

Species: Porcupine

Scientific Name: *Erethizon dorsatum*

Status in Mountain Lakes: Possible in wooded areas. Seen recently in Rockaway Township and in Denville near the Tourne.

Species: Gray Fox

Scientific Name: *Urocyon cinereoargenteus*

Status in Mountain Lakes: Reported to be in the Borough, but not verified.

Comments: Much less common than Red Fox, throughout the state.

Species: Long-tailed Weasel

Scientific Name: *Mustela frenata*

Status in Mountain Lakes: Possible. Occurs in the nearby Tourne county park, and in Rockaway Township.

Species: Little Brown Myotis, Little Brown Bat

Scientific Name: *Myotis lucifugus*

Status in Mountain Lakes: Possible. Occurs in the Hibernia bat hibernaculum.

Species: Indiana Bat

Scientific Name: *Myotis sodalis*

State Status: Endangered; Federal endangered species; Heritage Program rank S1.

Status in Mountain Lakes: Possible because it overwinters in the Hibernia and Picatinny hibernacula.

Species: Keen's Myotis  
Scientific Name: *Myotis septentrionalis*  
Status in Mountain Lakes: Possible; occurs in the Hibernia hibernaculum.

Species: Small-footed Myotis  
Scientific Name: *Myotis leebii*  
Status in Mountain Lakes: Possible; occurs in the Hibernia hibernaculum.

Species: Silver-haired Bat  
Scientific Name: *Lasionycteris noctivagans*  
State Status: None. Heritage Program rank SU  
Status in Mountain Lakes: Possible; a migratory species in northern New Jersey.

Species: Eastern Pipistrel  
Scientific Name: *Pipistrellus subflavus*  
State Status: Heritage Program rank SU.  
Status in Mountain Lakes: Possible; occurs in the Hibernia site.

Species: Hoary Bat  
Scientific Name: *Lasiurus cinereus*  
State Status: Heritage Program Rank SU.  
Status in Mountain Lakes: Possible; a rare migratory species.

## **Birds in Mountain Lakes**

There are an estimated over 160 bird species living in Mountain Lakes. This diversity is undoubtedly driven by the abundance of open water and woodlands. The lakes also attract migratory bird populations so no matter what season, there is always something interesting to look at in the sky.

A total of 66 species were seen during the late November through December 2008 Fauna surveys. This is a relatively low number even for late fall, and can be explained by the ice on some of the lakes and ponds—lowering the number of waterfowl—a poor acorn crop, colder than normal weather, early snowfall, and possibly other factors.

Of interest were four species listed as endangered or threatened; all of them raptors. These include Bald Eagle, Cooper's Hawk, Red-shouldered Hawk, and Barred Owl.

The following lists all resident and migratory birds seen in the inventory and/or known to be common in Mountain Lakes

# **Birds of Mountain Lakes**

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## Managing Canadian Geese

The Borough participates in a Cooperative Service Agreement with the USDA APHIS Wildlife Service whereby the goose population is actively controlled. This program was initiated in order to reduce the fecal count in the lakes that has resulted in beach closings in years' past. The word "actively controlled" means that the eggs are addled until the young are not viable. In 2011, a total of 6 nests (containing 33 eggs) were located and treated on Borough property and Vision Equities/Pinnacle Foods property. No capture and removal activities have been conducted since 2003.

## Threatened or Endangered Bird Species in Mountain Lakes

Species: Great Blue Heron

Scientific Name: *Ardea herodias*

State Status: Heritage Program rank S2B (rare breeding species).

Status in Mountain Lakes: Fairly common year-round; less so in severe winters when the Rockaway River freezes. The nearest breeding colony is in Troy Meadows in Parsippany and Whippany.

Species: Little Blue Heron

Scientific Name: *Egretta caerulea*

State Status: Heritage Program rank S2B (rare breeding species).

Status in Mountain Lakes: Immature (white) Little Blue Herons have been seen several times in August and early September at Birchwood Lake.

Comments: Breeds in heronries in south coastal New Jersey.

Species: Bald Eagle

Scientific Name: *Haliaeetus leucocephalis*

State Status: Endangered; Heritage Program rank S1B, S2N.

Status in Mountain Lakes: Uncommon to rare, year-round.

Comments: One of the great endangered species success stories, the Bald Eagle, once down to one non-breeding pair in New Jersey, now is breeding statewide. Most recently found nesting in Troy Meadows, in Parsippany.

Species: Osprey

Scientific Name: *Pandion haliaetus*

State Status: Threatened; Heritage Program rank S2B.

Status in Mountain Lakes: Uncommon in spring and fall migration, when it occasionally remains to fish for several days in the larger lakes. Rare in summer.

Comments: Slowly increasing as a breeding species in northern New Jersey.

Species: Northern Goshawk  
Scientific Name: *Accipiter gentilis*  
State Status: Endangered; Heritage Program rank S1B  
Status in Mountain Lakes: Rare in fall migration; rare in winter. Recently seen near Yorke Road off Intervale (Notestine 2008)  
Comments: This species has nested in nearby Rockaway Township in recent years.

Species: Red-shouldered Hawk  
Scientific Name: *Buteo lineatus*  
State Status: Endangered; Heritage Program rank S1B  
Status in Mountain Lakes: Uncommon fall migrant; rare in winter and spring.  
Comments: Some suitable nesting habitat is present in Wilcox Park near the Tourne.

Species: Broad-winged Hawk  
Scientific Name: *Buteo platypterus*  
State Status: Heritage Program rank S3B.  
Status in Mountain Lakes: Uncommon fall migrant; occasionally more numerous. Suitable breeding habitat is present in the three larger wooded tracts present in the town.

Species: Peregrine Falcon  
Scientific Name: *Falco peregrinus*  
State Status: Endangered; Heritage Program rank S1B.  
Status in Mountain Lakes: Rare fall migrant and winter transient; recently reported at the intersection of Yorke and Intervale Roads (Notestine 2008).

Species: American Coot  
Scientific Name: *Fulica americana*  
State Status: Heritage Program rank S1B.  
Status in Mountain Lakes: Uncommon fall and spring migrant.

Species: Spotted Sandpiper  
Scientific Name: *Actitis macularius*  
State Status: Heritage Program rank S3B.  
Status in Mountain Lakes: Uncommon in spring and fall on pond and lake shores.  
Comments: There is no suitable breeding habitat for this species in the Borough.

Species: Northern Saw-Whet Owl  
Scientific Name: *Aegolius funereus*  
State Status: Heritage Program rank S3B.  
Status in Mountain Lakes: Rare late fall and winter visitor. Seen in Wilcox park in 1998. A dead Saw-whet Owl was found along the Boulevard in late fall, 1986.

Species: Common Nighthawk  
Scientific Name: *Chordeiles minor*  
State Status: Heritage Program rank S3B.  
Status in Mountain Lakes: Uncommon late summer migrant; rare spring migrant.

Species: Blue-headed Vireo  
Scientific Name: *Vireo solitarius*  
State Status: S3B

Status in Mountain Lakes: Fairly common in spring and fall migration. Breeds in Rockaway Township.

Species: Pied-billed Grebe

Scientific Name: *Podilymbus podiceps*

State Status: Endangered as a breeder.

Status in Mountain Lakes: Occasional fall and spring migrant; rare in winter.

Comments: There is no suitable breeding habitat for this species in the Borough.

Species: Black-crowned Night Heron

Scientific Name: *Nycticorax nycticorax*

State Status: Threatened.

Status in Mountain Lakes: Rare in spring and summer around Birchwood Lake.

Comments: Breeds in colonies along the coast and in the Hackensack Meadows.

Species: Yellow-crowned Night Heron

Scientific Name: *Nyctanassa violacea*

State Status: Threatened

Status in Mountain Lakes: Rare. Seen once at Crystal Lake.

Comments: Breeds in south coastal N.J. and at few colonies in Bergen County and the Hackensack Meadows.

Species: Nashville Warbler

Scientific Name: *Vermivora ruficapilla*

State Status: Heritage Program rank S1B.

Status in Mountain Lakes: Uncommon spring and fall migrant.

Species: Northern Parula

Scientific Name: *Parula americana*

State Status: Heritage Program rank S3B.

Status in Mountain Lakes: Uncommon to common spring migrant; uncommon fall migrant.

Species: Magnolia Warbler

Scientific Name: *Dendroica magnolia*

State Status: Heritage Program rank S1B.

Status in Mountain Lakes: Fairly common spring and fall migrant.

Species: Black-throated Blue Warbler

Scientific Name: *Dendroica caerulescens*

State Status: Heritage Program rank S?B

Status in Mountain Lakes: Uncommon spring and fall migrant.

Species: Cerulean Warbler

Scientific Name: *Dendroica cerulea*

State Status: Heritage Program rank S3B.

Status in Mountain Lakes: Very rare spring migrant; seen twice in late April at Birchwood Lake.

Species: Canada Warbler

Scientific Name: *Wilsonia canadensis*

State Status: Heritage Program rank S3B.

Status in Mountain Lakes: Uncommon spring and fall migrant.

Species: Dark-eyed Junco

Scientific Name: *Junco hyemalis*



State Status: Heritage Program S1B.  
Status in Mountain Lakes: Common spring and fall migrant and winter resident.

Species: Pine Siskin  
Scientific Name: *Carduelis lawrencei*  
State Status: Heritage Program rank SPB.  
Status in Mountain Lakes: Uncommon to rare in fall and winter.

### **Infrequent Migrant Bird Species in Mountain Lakes**

Birds on this list sometimes or rarely migrate through Mountain Lakes.

Species: Snow Goose  
Scientific Name: *Chen caerulescens*  
Status in Mountain Lakes: Uncommon fall migrant in flocks overhead; injured individuals have been seen occasionally over the years with Canada Geese.

Species: Brant  
Scientific Name: *Branta bernica*  
Status in Mountain Lakes: Rare. Seen once in the fall of 2006 on Mountain Lake.  
Comments: An Arctic species which winters along the N.N. coast; rarely seen on inland lakes.

Species: Wood Duck  
Scientific Name: *Aix sponsa*  
Status in Mountain Lakes: Uncommon transient and breeding species.  
Comments: Usually nests in tree cavities away from the water.

Species: Eurasian Wigeon  
Scientific Name: *Anas penelope*  
Status in Mountain Lakes: Very rare. A drake was observed on Mountain Lake from October 29 to November 8, 1977.

Species: Northern Pintail  
Scientific Name: *Anas acuta*  
Status in Mountain Lakes: Uncommon spring and fall migrant; rare in winter.

Species: Blue-winged Teal  
Scientific Name: *Anas discors*  
Status in Mountain Lakes: Rare spring migrant.

Species: Northern Shoveler  
Scientific Name: *Anas clypeata*  
Status in Mountain Lakes: Uncommon spring and fall migrant; occasional in winter.  
Comments: Has increased in recent decades.

Species: Green-winged Teal  
Scientific Name: *Anas carolinensis*  
Status in Mountain Lakes: Uncommon spring and fall migrant; occasional in winter.

Species: Canvasback  
Scientific Name: *Aythya valisineria*  
Status in Mountain Lakes: Uncommon to rare fall and spring migrant; rare in winter.  
Comments: A declining species.

Species: Redhead  
Scientific Name: *Aythya americana*  
Status in Mountain Lakes: Rare fall and spring migrant.  
Comments: Redhead numbers have been increasing in the last few years.

Species: Lesser Scaup  
Scientific Name: *Aythya affinis*  
Status in Mountain Lakes: Uncommon spring and fall migrant.

Species: Greater Scaup  
Scientific Name: *Aythya marila*  
Status in Mountain Lakes: Uncommon to rare spring and fall migrant.

Species: Common Goldeneye  
Scientific Name: *Bucephala clangula*  
Status in Mountain Lakes: Rare spring and fall migrant.

Species: Red-breasted Merganser  
Scientific Name: *Mergus serrator*  
Status in Mountain Lakes: Rare fall migrant.  
Comments: Seldom occurs on inland lakes during migration.

Species: Red-throated Loon.  
Scientific Name: *Gavia stellata*  
Status in Mountain Lakes: Rare late fall migrant on Mountain Lake.

Species: Common Loon  
Scientific Name: *Gavia immer*  
Status in Mountain Lakes: Uncommon to rare fall migrant in the larger lakes.

Species: Horned Grebe  
Scientific Name: *Podiceps auritus*  
Status in Mountain Lakes: Rare fall migrant, uncommon spring migrant.

Species: Great Egret  
Scientific Name: *Ardea alba*  
Status in Mountain Lakes: Uncommon in summer and early fall around ponds and lakes.  
Comments: Breeds in south coastal New Jersey.

Species: Snowy Egret  
Scientific Name: *Egretta thula*  
Status in Mountain Lakes: Rare in late summer at Birchwood Lake.  
Comments: Breeds in south coastal New Jersey.

Species: Green Heron  
Scientific Name: *Butorides virescens*  
Status in Mountain Lakes: Uncommon in late spring and summer. Possible breeder.  
Species: Black Vulture

Scientific Name: *Coragyps atratus*  
Status in Mountain Lakes: Uncommon in spring, summer, and fall; rare in winter.  
Comments: Known to breed in rocky areas in Boonton Township and Parsippany.

Species: Golden Eagle.  
Scientific Name: *Aquila chrysaetos*  
Status in Mountain Lakes: Very rare. Seen flying over the Boulevard in December, 2007.

Species: American Kestrel  
Scientific Name: *Falco sparvensis*  
Status in Mountain Lakes: Uncommon fall migrant; absent other seasons.  
Comments: This small falcon has suffered a large decline in numbers in recent decades.

Species: Merlin  
Scientific Name: *Falco columbarius*  
Status in Mountain Lakes: Uncommon to rare in fall migration; absent other seasons.

Species: Killdeer  
Scientific Name: *Charadrius wilsonia*  
Status in Mountain Lakes: Occasional in large parking lots and athletic fields during fall and spring migration.

Species: Greater Yellowlegs  
Scientific Name: *Tringa melanoleuca*  
Status in Mountain Lakes: Uncommon spring and fall migrant on lake and pond shores.

Species: Lesser Yellowlegs  
Scientific Name: *Tringa flavipes*  
Status in Mountain Lakes: Uncommon to rare spring and fall migrant on lake and pond shores.

Species: Solitary Sandpiper  
Scientific Name: *Tringa solitaria*  
Status in Mountain Lakes: Uncommon spring and fall migrant on pond and lake shores.

Species: Least Sandpiper  
Scientific Name: *Calidris minutilla*  
Status in Mountain Lakes: Uncommon migrant in spring and fall on muddy pond and lake shores.

Species: American Woodcock  
Scientific Name: *Scolopax minor*  
Status in Mountain Lakes: Seen occasionally during spring and fall migration in Wilcox Park.  
Possible nesting species  
Comments: Suitable breeding habitat is present nearby in the fields to the south of Saint Claire's Hospital in Denville.

Species: Herring Gull  
Scientific Name: *Larus argentatus*  
Status in Mountain Lakes: Occasional in fall, winter, and spring on area lakes and parking lots.

Species: Iceland Gull  
Scientific Name: *Larus glaucoides*

Status in Mountain Lakes: Rare; seen once on Birchwood Lake in January, 1987.

Species: Great Black-backed Gull

Scientific Name: *Larus marinus*

Status in Mountain Lakes: Uncommon to rare in fall, winter, and spring on area lakes.

Species: Lesser Black-backed Gull

Scientific Name: *Larus fuscus*

Status in Mountain Lakes: Rare; seen once on Mountain Lake in December, 2002..

Species: Yellow-billed Cuckoo

Scientific Name: *Coccyzus americanus*

Status in Mountain Lakes: Uncommon spring and fall migrant.

Comments: May occasionally breed in the Borough.

Species: Black-billed Cuckoo

Scientific Name: *Coccyzus erythrophthalmus*

Status in Mountain Lakes: Uncommon spring and fall migrant.

Comments: Possible breeding species.

Species: Ruby-throated Hummingbird

Scientific Name: *Archilochus colubris*

Status in Mountain Lakes: Uncommon spring and fall migrant. Possible breeder in the Borough.

Species: Belted Kingfisher

Scientific Name: *Ceryle alcyon*

Status in Mountain Lakes: Uncommon spring, summer, and fall around lakes and ponds; rare in winter. Breeds adjacent to the Borough along the Rockaway River in Denville and Boonton Township.

Species: Yellow-bellied Sapsucker

Scientific Name: *Sphyrapicus thyroideus*

Status in Mountain Lakes: Uncommon spring and fall migrant; rare in winter.

Species: Least Flycatcher

Scientific Name: *Empidonax minimus*

Status in Mountain Lakes: Uncommon spring migrant.

Species: Empidonax flycatcher species

Scientific Name: *Empidonax* spp.

Status in Mountain Lakes: Uncommon spring and fall migrants.

Species: Yellow-throated Vireo

Scientific Name: *Vireo flavifrons*

Status in Mountain Lakes: Uncommon spring and fall migrant.

Species: Philadelphia Vireo

Scientific Name: *Vireo philadelphicus*

Status in Mountain Lakes: Rare early September migrant along woodland edges.

Species: Common Raven

Scientific Name: *Corvus corax*

Status in Mountain Lakes: Rare, but increasing. Seen occasionally in Wilcox Park and around Birchwood Lake. Comments: Now breeds in nearby Rockaway and Boonton Townships.

Species: Bank Swallow  
Scientific Name: *Riparia riparia*  
Status in Mountain Lakes: Uncommon spring and summer transient.

Species: Red-breasted Nuthatch  
Scientific Name: *Sitta canadensis*  
Status in Mountain Lakes: Uncommon fall and winter visitor; rare migrant in spring.

Species: Brown Creeper  
Scientific Name: *Certhia americana*  
Status in Mountain Lakes: Uncommon spring and fall migrant; uncommon winter resident.

Species: Blue-gray Gnatcatcher  
Scientific Name: *Polioptila caerulea*  
Status in Mountain Lakes: Rare breeder in spring and summer.

Species: Swainson's Thrush  
Scientific Name: *Catharus ustulatus*  
Status in Mountain Lakes: Uncommon spring and fall migrant.

Species: Brown Thrasher  
Scientific Name: *Toxostoma longirostre*  
Status in Mountain Lakes: Rare in spring, summer, and early fall; possible breeder.

Species: Blue-winged Warbler  
Scientific Name: *Vermivora pinus*  
Status in Mountain Lakes: Rare spring and fall migrant.

Species: Tennessee Warbler  
Scientific Name: *Vermivora peregrina*  
Status in Mountain Lakes: Rare spring and fall migrant.

Species: Chestnut-sided Warbler  
Scientific Name: *Dendroica pennsylvanica*  
Status in Mountain Lakes: Uncommon spring and fall migrant.

Species: Cape May Warbler  
Scientific Name: *Dendroica tigrina*  
Status in Mountain Lakes: Rare spring and fall migrant.

Species: Blackburnian Warbler  
Scientific Name: *Dendroica fusca*  
Status in Mountain Lakes: Uncommon spring and fall migrant.

Species: Pine Warbler  
Scientific Name: *Dendroica pinus*  
Status in Mountain Lakes: Uncommon spring and fall migrant.

Species: Prairie Warbler  
Scientific Name: *Dendroica discolor*  
Status in Mountain Lakes: Uncommon spring and fall migrant.

Species: Palm Warbler  
Scientific Name: *Dendroica palmarum*  
Status in Mountain Lakes: Uncommon spring and fall migrant.

Species: Yellow-Throated Warbler  
Scientific Name: *Dendroica dominica*  
Status in Mountain Lakes: Very rare spring migrant; seen twice in the YMCA parking lot in May 1983 and late April 2004.

Species: Bay-Breasted Warbler  
Scientific Name: *Dendroica castanea*  
Status in Mountain Lakes: Rare spring and fall migrant.

Species: Louisiana Waterthrush  
Scientific Name: *Seiurus motacilla*  
Status in Mountain Lakes: Rare spring and July migrant; has bred in past years along Troy Brook.

Species: Northern Waterthrush  
Scientific Name: *Seiurus noveboracensis*  
Status in Mountain Lakes: Uncommon spring migrant; rare fall migrant.

Species: Wilson's Warbler  
Scientific Name: *Wilsonia pusilla*  
Status in Mountain Lakes: Uncommon spring and fall migrant.

Species: Hooded Warbler  
Scientific Name: *Wilsonia citrina*  
Status in Mountain Lakes: Rare spring and fall migrant.

Species: Swamp Sparrow  
Scientific Name: *Melospiza georgiana*  
Status in Mountain Lakes: Uncommon fall migrant and winter resident.

Species: Fox Sparrow  
Scientific Name: *Passerella iliaca*  
Status in Mountain Lakes: Uncommon spring and fall migrant; rare in winter.

Species: White-crowned Sparrow  
Scientific Name: *Zonotrichia leucophrys*  
Status in Mountain Lakes: Rare spring and fall migrant.

Species: Rose-breasted Grosbeak  
Scientific Name: *Pheucticus ludovicianus*  
Status in Mountain Lakes: Uncommon spring and fall migrant.

Species: Rusty Blackbird  
Scientific Name: *Euphagus carolinus*  
Status in Mountain Lakes: Rare migrant spring and fall migrant; rare in winter.

Species: Orchard Oriole  
Scientific Name: *Icterus spurius*  
Status in Mountain Lakes: Rare migrant in spring and summer.

Species: Purple Finch  
Scientific Name: *Carpodacus purpureus*  
Status in Mountain Lakes: Uncommon migrant in spring and fall; sporadically rare to uncommon in winter.

Species: Evening Grosbeak  
Scientific Name: *Coccothraustes vespertinus*  
Status in Mountain Lakes: Rare. A few birds were seen flying over Wilcox Park on December 19, 2008.

Species: Worm-eating Warbler  
Scientific Name: *Helmitheros vermivorum*  
Status in Mountain Lakes: Rare spring migrant. Breeds in Wilcox Park and the adjacent Tourne county park.

Species: Ovenbird  
Scientific Name: *Seiurus aurocapilla*  
Status in Mountain Lakes: Uncommon breeding species in Wilcox and Frederick Parks, and in woods around Tower Hill.

Species: Scarlet Tanager  
Scientific Name: *Piranga olivacea*  
Status in Mountain Lakes: Uncommon spring and summer breeding species in wooded tracts.

Species: Eastern Towhee  
Scientific Name: *Pipilo erythrophthalmus*  
Status in Mountain Lakes: Uncommon spring, summer, and early fall resident; rare in winter.

Species: American Tree Sparrow  
Scientific Name: *Spizella arborea*  
Status in Mountain Lakes: Uncommon late fall and winter resident.

### **Possible Bird Species in Mountain Lakes**

Species: Ruffed Grouse  
Scientific Name: *Bonasa umbellus*  
Status in Mountain Lakes: Possible  
Comments: Formerly occurred in adjacent Boonton Township, Denville, and Parsippany. Ruffed Grouse is becoming one of the rarer breeding species in the state, and it is absent over most of its former range. Grouse prefer forested areas with a varied dense understory of tree saplings and shrubs, and it is thought that overbrowsing by deer have eliminated this habitat in many areas of the state.

## Invertebrates of Mountain Lakes

Ninety-eight percent of all animal species on the planet are invertebrates: a perhaps uncountable and bewildering array of insects, corals, mollusks, hydras, jellyfish, sea stars, crustaceans, arachnids, worms, and other forms which don't seem to fit in any evolutionary pigeonhole. By themselves, the beetles constitute over 350,000 species, a huge number and diversity that astounded Darwin and later biologists, who have puzzled over beetles species' abundance for over a century, without an explanation.

There are many thousands of aquatic and terrestrial invertebrate species in Mountain Lakes, the presence of which can denote all kinds of environmental factors, positive and negative. Documenting even a small majority of them would be a study of years or even decades.

Listed below are two groups, butterflies and odonates (dragonflies and damselflies), which have received a great deal of study in recent decades. Most of them are indicative of the habitats present in the Borough, as well as the general condition of those habitats.

### Butterflies of Mountain Lakes

(Radis 2008; Glassberg 1993)

Most butterflies are highly dependent on "food plants", usually a species or genera of a particular plant that their caterpillars feed upon before they transform into adults. If these plants are absent in an area, their associate butterflies—with the exception of migrant species such as Monarch—will also be absent. Nectar sources for adult butterflies are more varied.

Numbers of many butterfly species have declined greatly in recent decades due to habitat loss and indiscriminate pesticide use. Low butterfly diversity is usually indicative of overdevelopment and indiscriminate pesticide spraying over a long period.

Although, with a few exceptions, no published butterfly records exist for Mountain Lakes, those listed below have occurred from 1998 through 2008 in Parsippany, Boonton Township, and Denville Township, in habitats similar to those present in the Borough. For purposes of this ERI, species that were confirmed in 2008 and onwards are pictured below. All other species are listed as either "Probable" or "Possible" based upon either older sitings and/or known sitings in nearby towns.

# Butterflies of Mountain Lakes

## Species

## Food



## **Probable Butterflies in Mountain Lakes**

Species: Eastern Tiger Swallowtail

Scientific Name: *Papilio glaucus*

Status in Mountain Lakes: Probable. A common late spring and summer species in backyards and parks in Denville.

Comments: Food plants are cherry species and tulip tree, both common species in the Borough.

Species: Clouded Sulphur

Scientific Name: *Colias philodice*

Status in Mountain Lakes: Probable. Common in fields in surrounding towns.

Comments: Food plant is white clover.

Species: Orange Sulphur

Scientific Name: *Colias eurytheme*

Status in Mountain Lakes: Probable. Commonly present in yards and fields in surround towns.

Comments: Food plant alfalfa, vetch species, and other members of the bean (Fabaceae) family

Species: Eastern Tailed Blue

Scientific Name: *Everes comyntas*

Status in Mountain Lakes: Probable. Fairly common in the surrounding towns in yards, fields, and other open areas.

Comments: Food plants are species in the pea family.

Species: Spring Azure

Scientific Name: *Celastrina ladon*

Status in Mountain Lakes: Probable. Common in spring and summer in surrounding towns in woods, fields, swamps, and suburban yards.

Comments: Very diverse food plants. The very similar Summer Azure has been split off from this species.

Species: Great Spangled Fritillary

Scientific Name: *Speyeria cybele*

Status in Mountain Lakes: Seen occasionally flying around The Boulevard and near the YMCA parking lot. This spectacular midsummer butterfly is fairly common in surrounding towns in fields, yards, and roadsides.

Comments: Food plant is violets.

Species: Red Admiral

Scientific Name: *Vanessa alalanta*

Status in Mountain Lakes: Probable. Common during late spring and summer in the surrounding towns in suburban, field, and wooded edge habitats.

Comments: Food plant is nettles.

Species: Little Wood Satyr

Scientific Name: *Megisto cymela*

Status in Mountain Lakes: Probable. Fairly common on wooded edges in the surrounding towns.

Comments: Food plants are grass species.

Species: Silver-spotted Skipper  
Scientific Name: *Epargyreus clarus*  
Status in Mountain Lakes: Probable. Fairly common in the surrounding towns in fields and yards with flowering plants.  
Comments: Food plant is black locust.

Species: Northern Cloudywing  
Scientific Name: *Thorybes pylades*  
Status in Mountain Lakes: Probable. Commonly occurs in the surrounding towns in open areas.  
Comments: Food plants are legumes such as clovers.

Species: Juvenal's Duskywing  
Scientific Name: *Erynnis brizo*  
Status in Mountain Lakes: Probable. Fairly common in oak woods in surrounding towns.  
Comments: Food plant is oaks.

Species: Wild Indigo Duskywing  
Scientific Name: *Erynnis baptisiae*  
Status in Mountain Lakes: Probable. Common in Denville and Parsippany along roadsides where crown vetch is planted.  
Comments: Food plants are crown vetch and wild indigo.

Species: Least Skipper  
Scientific Name: *Ancyloxypha numitor*  
Status in Mountain Lakes: Probable. Occasionally common along wet roadside ditches and in meadows in Parsippany.  
Comments: Food plants are grasses.

Species: European Skipper  
Scientific Name: *Thymelicus lineola*  
Status in Mountain Lakes: Probable. Common in fields in surrounding towns.  
Comments: Food plant is timothy, a grass.

Species: Peck's Skipper  
Scientific Name: *Polites peckius*  
Status in Mountain Lakes: Probable. Common in late summer in open grassy areas in the surrounding towns.  
Comments: Food plants are grass species.

### **Possible Butterflies in Mountain Lakes**

Species: Black Swallowtail  
Scientific Name: *Papilio polyxenes*  
Status in Mountain Lakes: Possible; occasionally seen in the fields surrounding The Tourne county park.  
Comments: Uncommon in this area.

Species: Cloudless Sulphur  
Scientific Name: *Phoebis sennae*  
Status in Mountain Lakes: Seen in September, 2002 flying around the YMCA parking lot.  
Comments: This late-summer migrant from the South is rare in northern New Jersey.

Species: American Copper  
Scientific Name: *Lycaena phlaeas*  
Status in Mountain Lakes: Possible. Seen occasionally in Denville, in fields around The Tourne.  
Comments: Food plant is dock (*Rumex* sp.).

Species: Banded Hairstreak  
Scientific Name: *Satyrrium calanus*  
Status in Mountain Lakes: Possible. Seen occasionally in surrounding towns in fields with stands of milkweed.  
Comments: Food plants are oaks and hickories.

Species: White M Hairstreak  
Scientific Name: *Parrhasius m-album*  
Status in Mountain Lakes: Possible. Seen occasionally around the summit of The Tourne in Boonton Township.  
Comments: A rather rare butterfly in this area. Food plant is oaks.

Species: Meadow Fritillary  
Scientific Name: *Boloria bellona*  
Status in Mountain Lakes: Possible. Fairly common in surrounding towns in damp fields. A population is present in the fields across from St. Clair's Hospital in Denville.  
Comments: Food plant is violets.

Species: Pearl Crescent  
Scientific Name: *Phyciodes tharos*  
Status in Mountain Lakes: Possible. Fairly common in fields and wet meadows in surrounding towns.  
Comments: Food plant is asters.

Species: Question Mark  
Scientific Name: *Polygonia interrogationis*  
Status in Mountain Lakes: Possible. Seen occasionally in the Tourne, in Denville and Boonton Townships.  
Comments: Food plants are nettles, elm, and hackberry.

Species: Mourning Cloak  
Scientific Name: *Nymphalis antiopa*  
Status in Mountain Lakes: Seen on a balmy February day in 1998 at the YMCA parking lot. Present in surrounding towns in wooded and roadside habitats.  
Comments: Food plants are willows and a variety of other shrubs.

Species: American Lady  
Scientific Name: *Vanessa virgiiensis*  
Status in Mountain Lakes: Possible. Locally common in fields and roadsides in surrounding towns.  
Comments: Food plants are pearly everlasting and a variety of other composites.

Species: Painted Lady  
Scientific Name: *Vanessa cardui*  
Status in Mountain Lakes: Possible. Seen once in fields near the Tourne, in Denville.  
Comments: A rather rare migrant from the south. Food plant is thistles, and a variety of other species.

Species: Common Buckeye  
Scientific Name: *Junonia coenia*  
Status in Mountain Lakes: Possible. Occasional in the surrounding towns in dry open fields.  
Comments: Migrant from the south; food plants include plantains

Species: Red-spotted Purple  
Scientific Name: *Limenitis arthemis astyanax*  
Status in Mountain Lakes: Possible. Occasional in woodlands in surrounding towns.

Species: Viceroy  
Scientific Name: *Limenitis archippus*  
Status in Mountain Lakes: Possible. Seen occasionally in fields and streamsides around the Tourne.  
Comments: Food plant is willows.

Species: Appalachian Brown  
Scientific Name: *Satyroides appalachia*  
Status in Mountain Lakes: Possible. Seen in woods adjacent to Wilcox Park in the Tourne.  
Comments: Food plant is sedges.

Species: Common Wood Nymph  
Scientific Name: *Cercyonia pegala*  
Status in Mountain Lakes: Possible. Occasional in wooded ecotones, fields and other habitats in surrounding towns.  
Comments: Food plants are a variety of grass species.

### **Dragonflies and Damselflies of Mountain Lakes** (Carpenter 1991; Nikula et al. 2003; Radis 2008).

More than “just insects”, dragonflies and damselflies are superbly adapted fliers that can rival and surpass the aerobatics of birds; and they predate the birds in the fossil record by at least a hundred and fifty million years. Sometimes called the “most elegant creatures in the class Insecta” (Carpenter 1991), dragonfly motifs appear in the art and artifacts of many cultures.

The group is also a very good indicator water quality, as part of its life cycle is aquatic: Areas with polluted water will have few or no odonates, and vice versa. Widespread study of this group is relatively recent, but certain areas of New Jersey are known to have remarkable odonate species diversity, particularly in parts of Morris and Sussex Counties. Dragonfly adults and nymphs consume large numbers of mosquitoes, and are important in mosquito control. Many more species occur in Mountain Lakes than are listed below.

# **Odonates of Mount**

### **Probable Odonates in Mountain Lakes**

Species: Ebony Jewelwing

Scientific Name: *Colopteryx maculata*

Status in Mountain Lakes: Seen in past years along Troy Brook near Intervale Road. Common on the Rockaway River in Denville and Boonton Township.

Species: Wandering Glider

Scientific Name: *Pantala flavescens*

Status in Mountain Lakes: Seen several times in June and August, 2002 around the YMCA parking lot.

Comments: Accomplished fliers even compared to most other dragonfly species, Wandering Glider occurs in all continents except Antarctica, and is occasionally seen far out to sea.

Species: Calico Pennant

Scientific Name: *Celithemis elisa*

Status in Mountain Lakes: Probable; seen around the Tourne in past years.

Species: Halloween Pennant

Scientific Name: *Celithemis eponina*

Status in Mountain Lakes: Probable; frequently seen in surrounding towns around ponds and lakes.

### **Endangered Odonate Species in Mountain Lakes**

Species: Lateral Bluet

Scientific Name: *Enallagma laterale*

State Status: Heritage Program rank S1S2, threatened/endangered.

Status in Mountain Lakes: Several individuals of this rare bluet damselfly were found in May, 2008 at the north end of Birchwood Lake.

Species: Comet Darner

Scientific Name: *Anax longipes*

State Status: Heritage Program rank S2S3I rare-threatened.

Status in Mountain Lakes: One was seen flying around Birchwood Lake in late August, 2008.  
Comments: Uncommon throughout its range.

Species: Dragonhunter  
Scientific Name: Hagenius brevistylis  
State Status: Heritage Program rank S3S4, rare-uncommon.  
Status in Mountain Lakes: Seen at Mountain Lake in 1998.  
Comments: The largest clubtail dragonfly in North America, this species aggressively preys on other species of dragonflies.

## B. Vertebrates of Mountain Lakes

### 1.) Fish of Mountain Lakes

(N.J. Division of Fish and Wildlife 2005; Radis 2008)

Fishing is a popular sport in Mountain Lakes, usually from The Cove or the dock on Mountain Lake. Every April for the last 47 years, the Borough has stocked Birchwood Lake with trout and held the "Trout Derby". Most of these trout are caught which is fortunate as they would be unlikely to survive in Birchwood given the water temperature and oxygen levels.

Fish occurrence data comes from Freshwater Fish of New Jersey (NJDEP 2006), from TNH database information (Radis 2008), and from the Borough's website.

# Fish of Mountain Lakes

## Species

## Loc

### **Probable Fish in Mountain Lakes**

Species: Common Carp  
Scientific Name: *Cyprinus carpio*  
Status in Mountain Lakes: Probable. Common in most ponds and lakes in the surrounding area.

Species: Rock Bass  
Scientific Name: *Ambloplites rupestris*  
Status in Mountain Lakes: Probable. Present in Cedar Lake and other lakes and ponds in the area.

Species: Common Shiner  
Scientific Name: *Luxilus cornutus*  
Status in Mountain Lakes: Probably common in all the lakes and ponds of the town.

### **Possible Fish in Mountain Lakes**

Species: Rainbow Trout  
Scientific Name: *Oncorhynchus mykiss*  
Status in Mountain Lakes: Possible. Stocked fish present in Cedar and Indian Lake, and Lake Estling in Denville, and in Boonton Reservoir in Parsippany and Boonton.

Species: Brown Trout  
Scientific Name: *Salmo trutta*  
Status in Mountain Lakes: Possible. Stocked fish present in Cedar Lake in Denville and in Boonton Reservoir in Parsippany and Boonton.

Species: Smallmouth Bass  
Scientific Name: *Micropterus dolomieu*  
Status in Mountain Lakes: Possible. Present in similar lake habitat in the surrounding area.

Species: Walleye  
Scientific Name: *Sander vitreus*

Status in Mountain Lakes: ? No data.

### **Threatened or Endangered Fish of Mountain Lakes**

Species: Brook Trout

Scientific Name: *Salvelinus fontinalis*

State Status: None for stocked fish. Wild Brook Trout are ranked S3, rare, by the New Jersey Natural Heritage Program.

Status in Mountain Lakes: Several small wild Brook Trout were netted in the upper Troy Brook, near Intervale Road, in 1983 (Radis 2008).

## **2. Reptiles and Amphibians of Mountain Lakes**

### **a.) Turtles of Mountain Lakes**

Every elementary school aged child in the Borough is “educated” by older siblings, etc. about the presence of snapping turtles in Mountain and Birchwood lakes. Although no one actually knows anyone who has ever been bitten, these turtles are a source of fear throughout the ages!

# Turtles of N



### **Probable Turtle Species in Mountain Lakes**

Species: Common Musk Turtle; Stinkpot.

Scientific Name: *Sternotherus odoratus*.

Status in Mountain Lakes: A road-killed individual was found on the Boulevard near Borough Hall in 1993 (Radis 2008).

Comments: Confirmed to be present in Denville and Parsippany in 2002 (Radis 2008).

### **Possible Turtle Species in Mountain Lakes**

Species: Wood Turtle

Scientific Name: *Clemmys insculpta*

State Status: Threatened.

Status in Mountain Lakes: Possible.

Comments: No breeding habitat is present in the Borough, but an extant population exists in the Rockaway River in Denville and Boonton Townships, and a road-killed female (ca. 30 years old) was found along the intersection of Pocono Road and Old Boonton Road near the Rockaway River Country Club, a few hundred feet from the Mountain Lakes boundary (Radis 2008). Wood Turtles can wander up to a half-mile or more from their breeding areas in streams and rivers (Zappalorti 1982).

Species: Eastern Box Turtle

Scientific Name: *Terrapine carolina carolina*

Status in Mountain Lakes: Road-killed individuals were found on West Shore Drive in 1987 and 2003.

Comments: Thought to be greatly declining throughout its range in New Jersey (Radis 2008; Zappalorti 2008).

### **Lizards and Snakes of Mountain Lakes**

#### **b. Possible Lizard Species in Mountain Lakes**

Species: Five-lined Skink

Scientific Name: *Eumeces fasciatus*

Status in Mountain Lakes: Possible.

Comments: Occurs in wooded habitat in The Tourne in Boonton and Denville Townships. Richard Wilcox Park is immediately adjacent to this area, and has similar habitats. Probably not present in other areas of town.

#### **Snakes of Mountain Lakes**

# **Snakes of Mountain**

### c. Probable Snake Species in Mountain Lakes

Species: Eastern Garter Snake

Scientific Name: *Thamnophis sirtalis sirtalis*

Status in Mountain Lakes: Very probable, though there are no records for the town.

Comments: A common species statewide, in a wide variety of habitats including fragmented woods, disturbed areas, and suburban yards.

#### Possible Snake Species in Mountain Lakes

Species: Northern Redbelly Snake

Scientific Name: *Storeria occipitomaculata accipitomaculata*

Status in Mountain Lakes: Possible. Occurs in nearby areas in Denville, Boonton Township, and Parsippany.

Comments: Quite small, shy, and rarely seen.

Species: Eastern Worm Snake

Scientific Name: *Carphophis amoenus amoenus*

Status in Mountain Lakes: Possible. Known to occur in The Tourne county park in Denville and Boonton Townships.

Comments: A small snake that “looks very much like a large earthworm.” (Schwartz and Golden 2002).

Species: Northern Black Racer

Scientific Name: *Coluber constrictor constrictor*

Status in Mountain Lakes: Possible. Known to occur in The Tourne (Radis 2008).

Comments: From a distance resembles Northern Water Snake, but is not found in water.

Species: Black Rat Snake

Scientific Name: *Elaphe obsoleta obsoleta*

Status in Mountain Lakes: A small Black Rat Snake was found dead in the rear parking lot of the YMCA in 1997. Of possible occurrence in Wilcox Park, but probably not elsewhere in the borough.

Comments: Resembles Black Racer from a distance, but can be much larger.

Species: Northern Copperhead

Scientific Name: *Agkistrodon contortrix mokasen*

State Status: None; Heritage Program G4, undetermined (NJNHP 2001).

Status in Mountain Lakes: Possible. Occurs at several sites in Denville Township, in or near rocky wooded areas, as well as in The Tourne (Radis 2008). Similar suitable habitat is only present in Wilcox Park.

Comments: Poisonous, but usually quite shy, and prefers to flee rather than confront threats.

## **Amphibians of Mountain Lakes**

### **Salamanders of Mountain Lakes**

# **Salamanders of Mour**

### **Possible Salamander Species in Mountain Lakes**

Species: Red-spotted Newt

Scientific Name: *Notophthalmus viridescens viridescens*

Status in Mountain Lakes: Possible. The terrestrial form of Red-spotted Newt (an aquatic species), the red eft, has been found in the nearby Tourne County Park (Radis 2008), and probably also occurs in Wilcox Park. Possible elsewhere in wooded spots in other areas of the Borough.

Comments: The red eft, which is actually a brilliant Day-Glo orange, has several neurotoxins in its skin, and should not be handled without gloves.

Species: Northern Slimy Salamander

Scientific Name: *Plethodon glutinosus*

Status in Mountain Lakes: A few individuals of Slimy Salamander were found in 2007 on wooded slopes in Wilcox Park (Radis 2008). Because this species prefers sloping habitat such as wooded ravines and hillsides, it is probably not present elsewhere in the Borough.

Comments: Slimy Salamander gets its name from the gluey, sticky substance secreted from its skin; difficult to remove from human skin.

### **Endangered Salamanders of Mountain Lakes**

Salamander populations are declining worldwide. Mountain Lakes is fortunate to be home to x endangered or rare salamanders, highlighting the need to maintain vernal pools.

Species: Marbled Salamander

Scientific Name: *Ambystoma opacum*

State Status: Heritage Program rank S3, rare, declining (NJNHP 2001).

Status in Mountain Lakes: Found once, in 1989 under rotting logs near a dry vernal pool in what is now Frederick Park (Radis 2008). Possible in wooded areas throughout the Borough where there are vernal ponds.

Comments: Unlike the other salamanders in the area, Marbled Salamander breeds in the fall. A vernal pond-dependent species.

Species: Jefferson Salamander

Scientific Name: *Ambystoma jeffersonianum*

State Status: Heritage Program rank S3; rare, declining (NJNHP 2001).

Status in Mountain Lakes: Several were found in the spring of 2004 in a vernal pond complex adjacent to St. Catherine's Church on Pocono Road (Radis 2008). Six were found in 2009 and 3 in 2010. Possible in other wooded areas of the Borough where there are vernal ponds.

Species: Spotted Salamander

Scientific Name: *Ambystoma maculatum*

State Status: Heritage Program Rank S3, rare, declining (NJNHP 2001).

Status in Mountain Lakes: Found in 2007 in and near several vernal ponds in Wilcox Park; 27 found in 2009. Possible in other wooded areas of the Borough where vernal ponds are present.

Comments: A vernal pond-dependent species.

Species: Blue-spotted Salamander complex (includes hybrids with *A. jeffersonianum*)

Scientific Name: *Ambystoma laterale*

State Status: Endangered; Heritage Program rank S1 (NJNHP 2001).

Status in Mountain Lakes: Three Blue-spotted Salamanders, and egg masses, were found in 1988 in a vernal pond along Pocono Road near the intersection with Crane Road. 3 found in 2009. (Radis 2008).

Species: Four-toed Salamander

Scientific Name: *Hemidactylium scutatum*

State Status: Heritage Program S3, rare, declining (NJNHP 2001).

Status in Mountain Lakes: Found along the edge of a red maple swamp in Frederick Park in 2007; in sphagnum on Yorke Rd near vernal pool complex in 2010. (Radis 2008)

Comments: An elusive species which usually occurs in and near growths of Sphagnum moss in bogs and other wetlands.

Marbled Salamander:



## **Toad and Frog Species in Mountain Lakes**

# **Frogs and Toads of**

### **Possible Toad and Frog Species in Mountain Lakes**

Species: Fowler's Toad

Scientific Name: *Bufo woodhousii*

Status in Mountain Lakes Borough: Heard calling from a wooded area in Frederick Park along Morris Avenue in 1998 (Radis 2008). Possible in other areas of the Mountain Lakes; breeds in similar habitats as American Toad.

Comments: The common toad in south Jersey, where American Toad is absent. A Coastal Plain species which is rare in New Jersey north of southern Monmouth, Middlesex, and Mercer Counties, and unusual in Mountain Lakes.

Species: Northern Gray Treefrog

Scientific Name: *Hyla versicolor*

Status in Mountain Lakes: Possible. Occurs in The Tourne County Park in Denville and Boonton Townships (Radis 2008). Most likely to be found in Wilcox and Frederick Parks.

Comments: Breeds in vernal pools, and pond and swamp edges.

Species: Southern Leopard Frog

Scientific Name: *Rana utricularia*

Status in Mountain Lakes: Possible. Occurs in Troy Meadows in Parsippany, and in lower Troy Brook, which drains into the marsh.

Species: Pickerel Frog

Scientific Name: *Rana palustris*

Status in Mountain Lakes: Possible. Found in Denville, Boonton Township, and Parsippany.

Comments: Occurs with the previous species in Troy Meadows and along the Rockaway River in Denville.

### **Endangered Frogs of Mountain Lakes**

Species: Northern Cricket Frog

Scientific Name: *Acris crepitans crepitans*

State Status: Heritage Program rank S3, rare (NJNHP 2001).

Status in Mountain Lakes: Several were heard calling in May, 2008 near Crystal Lake. Possible in other areas of the town.

Comments: Thought to have greatly declined in recent decades (Radis 2008).

Species: Upland Chorus Frog, New Jersey Chorus Frog

Scientific Name: *Pseudacris triseriata ferarium*; *P. triseriata kalmi*

State Status: Protected

Status in Mountain Lakes: Both species/subspecies were found in Frederick Park in 1989 (Radis 2008). Possible in other areas of town.

## APPENDIX

### I. Borough Conservation Ordinance History

#### Borough Lands Dedicated As Parkland – 1964

Ordinance 347

Adopted October 14, 1964

- Entrance to Mountain Lakes at Crane Road                      0.8 acres  
Block 6, Lots 1 – 5  
Visual amenity and buffer; future wellsite
- Thorleif Fliflet Bird Sanctuary                                      2.6 acres  
Block 101, Lots 71-73, 79-83, 84A  
Flood plain, sluiceway cascade; bird watching; Helen Hull Memorial; fern planting
- Island Beach    1.5 acres  
Block 100, Lots 29, 30, 31A, 96  
A major recreational beach and boating area; lakefront access and parking and picnic sites
- Midvale Boat Dock    0.4 acres  
Block 101, Lots 30B, 31, 32A  
Boat launch and storage; lakefront access and parking; ice skating
- Memorial Park    0.2 acres  
Block 81, Lot 15B  
Historic site dedicated to the Borough's war dead
- Briarcliff Park    0.3 acres  
Block 78, Lots 33-34  
Lakefront access, ice skating, benches, fireplace
- Wildwood Dam    0.8 acres  
Block 78, Lots 42-43  
Lakefront access, fishing, skating, hiking
- Wildwood Park (presently overgrown and inaccessible) Block 78, Lot 67    0.7 acres  
Lakefront access and boat launch; picnic and skating facilities
- Birchwood Beach<sup>1</sup>    3.2 acres  
Block 30, Lots 1-20  
A major recreational beach, diving and swim lane area; lakefront access, parking and picnic site, fishing
- Parkland Northeast of Birchwood Lake\*                              122.3 acres

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1

Large undisturbed nature area, steep slopes, wetlands; passive recreation – hiking, jogging, cross country skiing, fishing flora and fauna – unique borough habitats

- North End of Crystal Lake 28.0 acres  
Block 31, Lots 29-68; Block 32  
Lake quality protection, steep slopes; contiguous to major parkland; hiking, rifle range
- Sunset Lake Northwest Side 4.3 acres  
Block 23, Lots 39-54; 56-58  
Control runoff and protect lake quality; nesting area

\*Named Richard M. Wilcox Park in 1974 at which time additional land was dedicated.

### **Borough Lands Dedicated As Parkland – 1974**

Ordinance 13-74

Adopted October 21, 1974

- Part of Richard M. Wilcox Park 31.3 acres  
(Parkland Surrounding Birchwood Lake)  
Block 29; Block 30, Lots 21-80; Block 41  
Protect drainage basin for Birchwood Lake; lakefront; recreation -- hiking, swimming, fishing, picnics; environmental amenity
- Lot on Sunset Lake 0.14 acres  
Block 23, Lot 71  
Lakefront - lake access and boat launch; recreation - ice skating
- Halsey A. Frederick Park 64.3 acres  
(Powerville Road to Fanny Road Site)  
Block 68, Lots 10-22; Block 69, Lots 11-24; Block 88, Lots 14, 15, 17, 21-24, 27  
Wetlands; flood plains; recreation -- hiking, tennis, baseball nature study
- Wetlands Between the Railroad right of way and the Village 34.6 acres  
Block 127F  
Flood plain; wetlands; steep slope; recreation -- hiking, games, bird watching, wildflowers; buffer -- sound/auto/visual pollution
- Midvale Field and Adjacent Borough-owned lands 20.9 acres  
Block 129; Block 129A, Lots 18B, 19, 20, 21;  
Block 129B, Lot 5; Block 129C, Lot 13  
Wetlands; recreation -- playfield; no slope
- Esplanade Park 0.4 acres  
Extension of Esplanade (Part of street right-of-way)  
Recreational - existing park; environmental amenity; historical site
- The Cove Park 0.2 acres  
Block 131, Lot 2  
Grass covered recreation area between Morris Ave. and the Cove Lakefront  
Popular viewing spot, benches; ice skating, boat launching, fishing



- Frank Kaufman Memorial Park 0.7 acres  
Block 80, Lots 1-6  
Site of old Borough Hall and firehouse  
Important bus stop and shelter; neighborhood mini-park; municipal Christmas Tree

## **Borough Lands Dedicated As Environmental Easements - 1985**

Ordinance 14-85

The following properties owned by and situate in the Borough of Mountain Lakes, identified by reference to the Official Tax Map of the Borough, are hereby found and declared to be valuable as environmental buffer areas which, while not appropriate for active park and recreational use, should be preserved in their natural state in order to protect and allow regeneration of natural resources and wildlife currently existing in the Borough. The Borough Attorney, Mayor, and Borough Clerk are hereby authorized and directed to prepare documents creating conservation easements for the stated purpose, and to cause them to be executed and recorded as permanent restrictions affecting the listed properties.

| Block         | Lot                              |
|---------------|----------------------------------|
| 5 through 7   |                                  |
| 16 through 18 |                                  |
| 21            | 33, 34, 37, 38, 41 and 42        |
| 22            | 20 through 24, and 10A, 15B, 16B |
| 34            | 5 through 18, 19A, 20A and 21A   |
| 58            | 10 through 13, 24, 25            |
| 59            | 46 and 47                        |
| 63            | 11 through 14                    |
| 64            | 11, 12, and 19 through 21        |
| 66            | 1 through 14, and 16 through 23  |
| 74            | 4, 5, 6A, and 21 through 23A     |
| 75            | 7 through 13, and 27 through 32  |
| 76            | 34 through 39A, 40A              |
| 107           | 10 through 15                    |
| 108           | 10 through 35                    |

## **Borough Lands Dedicated as Conservation Easements – January 5, 2004**

Grantor grants to itself, its successors and assigns an easement and interest in the Property for the purpose of protecting the Property in its natural, scenic, open and existing state according and subject to the following terms, conditions and limitations:

No trees, shrubs or other vegetation now or hereafter existing on the Property shall be destroyed or removed except as may be in furtherance of and consistent with the conservation purposes to be achieved hereby.

No topsoil, sand, gravel, loam, rock or other minerals shall be excavated, dredged or removed from the Property except as maybe required in order to permit construction of a pond wholly or partially on the Property, any such pond to be of such design and structure as to preserve the natural function of the flood plain of any stream which may pass through the Property.

No buildings or other structures shall be erected on the Property and no roads for motorized vehicles shall be construed thereon.

No dumping or placing of soil or other substance or material as landfill and no dumping or placing of trash, waste or unsightly or offensive materials shall be permitted on the Property.

No other activities shall be permitted on the Property which would or might be detrimental to drainage, flood control, water conservation, erosion control or soil conservation and no other acts or uses detrimental to the preservation of the Property shall be permitted.

Although the conservation easement granted and intended to be granted hereby has been created for the general welfare, nothing herein contained shall be construed to convey to the public any right of access to or to use the Property.

Nothing herein shall be construed to restrict the Borough of Mountain Lakes from taking any action to maintain the Property in a safe and healthy condition or to prevent the Borough of Mountain Lakes from using the Property for any public purpose which the Council of the Borough of Mountain Lakes may determine from time to time in its sole discretion. Grantor, its successors and assigns shall retain the exclusive right of access to and to use the Property as the Council of the Borough of Mountain Lakes may determine from time to time in its sole discretion.

It is understood that this instrument imposes no obligation on the Grantor and no restrictions on the use of the Property except as specifically set forth herein and nothing herein contained shall be construed to interfere with the right of the Grantor, its successors and assigns and its licensees and any party claiming under it to utilize the Property in such a manner as it or any of them may deem desirable from time to time in its sole discretion.

#### Schedule A

As set forth on the tax maps of the Borough of Mountain Lakes, Morris County, New Jersey:

| BLOCK | LOTS            |
|-------|-----------------|
| 9     | 1, 14, 22       |
| 46    | 15              |
| 47    | 8               |
| 48    | 28              |
| 50    | 23              |
| 54    | 12              |
| 56    | 14, 34,39,52,02 |
| 57    | 1               |
| 58    | 30              |
| 59    | 39              |
| 60    | 5,9,13,27       |
| 61    | 25,31,38,45     |
| 62    | 20,01,25,33,38  |
| 63    | 17              |
| 64    | 8               |
| 65    | 13              |
| 68    | 4               |

|        |                        |
|--------|------------------------|
| 70     | 6                      |
| 80     | 28                     |
| 86     | 1,9,13,18,22           |
| 86.01  | 32,33                  |
| 86     | 40,41                  |
| 88     | 1,6,9                  |
| 91     | 1,14,35,39,43,50,02,55 |
| 94     | 9,01,16                |
| 104    | 44,71,78               |
| 105    | 15,27                  |
| 110    | 33,40,46               |
| 111    | 10,02,19               |
| 112    | 6,45                   |
| 114    | 1,20                   |
| 116    | 3,06                   |
| 124    | 1                      |
| 127,05 | 6                      |
| 136    | 2                      |

#### **Annual Resolution Passed by Succeeding Councils to Protect Open Space Since 1974**

“WHEREAS, the Mountain Lakes Borough Council believes that all land owned by the Borough of Mountain Lakes is held in trust for future generations by the Councils and Citizens of this community, and

“WHEREAS, the woodland, wetlands, and open spaces of Mountain Lakes help define the character of the town and, beyond that, each succeeding year brings us more information on how vital such natural lands are to our collective well being and health of the world around us, and

“WHEREAS, they are also buffers which mitigate the effect of reasonable development of private lands, and

“WHEREAS, once converted to other use, such lands can not be replaced and therefore short term needs and pressures do not justify endangering the environment of our town, county and state, and

“WHEREAS, those who are most intimately associated with these lands are the most qualified to protect them,

“NOW, THEREFORE, BE IT RESOLVED

That the Borough of Mountain Lakes will protect these lands as its citizens and their elected officials deem necessary, and that the current Council of the Borough affirms and continues in the wisdom of its predecessors in owning, protecting and maintaining the public lands of Mountain Lakes.”

## **II. Historical Lake Treatment Data**

### **III. Flora References**

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#### IV. Flora\_Common and Technical Names Observed

##### **COMMON NAME / TECHNICAL NAME**

American beech / *Fagus grandifolia*  
American bittersweet / *Celastrus scandens*  
American chestnut / *Castanea dentata*  
American elm / *Ulmus americana*  
American hornbeam / *Carpinus caroliniana*  
Arrow arum / *Peltandra virginica*  
Arrowhead, common / *Sagittaria latifolia*  
Ash, swamp / *Fraxinus pennsylvanica*  
Ash, white / *Fraxinus americana*  
Aster, Schreber's / *Schreber's aster*  
Aster, calico / *Aster lateriflorus*  
Aster, hairy / *Aster pilosus*  
Aster, heart-leaved / *Aster cordifolius*  
Aster, white wood / *Aster divaricatus*  
Aster, whorled / *Aster acuminatus*  
Basswood / *Tilia americana*  
Beechdrops / *Epifagus virginiana*  
Birch, black / *Betula lenta*  
Birch, river / *Betula nigra*  
Birch, yellow / *Betula lutea*  
Black cherry / *Prunus serotina*  
Black huckleberry / *Gaylussacia frondosa*  
Black Haw / *Viburnum prunifolium*  
Black snakeroot / *Cimicifuga racemosa*  
Blackberry species / *Rubus* spp.  
Bladderwort, common / *Utricularia vulgaris*  
Bladderwort, humped / *Utricularia gibba*  
Blueberry, highbush / *Vaccinium corymbosum*  
Brachyelytrum / *Brachyelytrum erectum*  
Bristly sarsaparilla / *Aralia hispida*  
Bugleweed / *Lycopus uniflorus*  
Bulrush, linear / *Scirpus lineatus*  
Bulrush, soft-stemmed / *Scirpus validus*

Bur-reed, slender / *Sparganium americanum*  
Buttonbush / *Cephalanthus occidentalis*  
Canada mayflower / *Maianthemum canadensis*  
Carrion flower / *Smilax herbacea*  
Cattail, common / *Typha latifolia*  
Cattail, narrow-leaved / *Typha angustifolia*  
Chokeberry, black / *Aronia melanocarpa*  
Chokeberry, red / *Aronia arbutifolia*  
Club-spur orchid / *Habenaria clavellata*  
Clubmoss, shining / *Lycopodium lucidulum*  
Clubmoss, southern ground-cedar / *Lycopodium digitatum*  
Clubmoss, staghorn / *Lycopodium clavatum*  
Clubmoss, tree / *Lycopodium obscurum*  
Clubmoss, wiry / *Lycopodium tristachyum*

##### **COMMON NAME / TECHNICAL NAME**

Common boneset / *Eupatorium perfoliatum*  
Coral-root, autumn / *Corallorhiza odontorhiza*  
Coral-root spotted / *Corallorhiza maculata*  
Deerberry / *Vaccinium stamineum*  
Dogwood, flowering / *Cornus florida*  
Dogwood, red osier / *Cornus stolonifera*  
Dogwood, silky / *Cornus amomum*  
Dotted Wolfia / *Wolfia punctata*  
Downy rattlesnake plantain / *Goodyera pubescens*  
Duckweed, lesser / *Lemna minor*  
Duckweed, star / *Lemna trisulca*  
Eastern hemlock / *Tsuga canadensis*  
Elderberry / *Sambucus canadensis*  
Lady's-slipper, pink / *Cypripedium acaule*  
False Solomon's seal / *Smilacina racemosa*

Fanwort / *Caboma caroliniana*  
Fern, Christmas / *Polystichium acrostichoides*  
Fern, cinnamon / *Osmunda cinnamomea*  
Fern, crested / *Dryopteris cristata*  
Fern, ebony spleenwort / *Asplenium platyneuron*  
Fern, fancy / *Dryopteris intermedia*  
Fern, fragile / *Cystopteris fragilis*  
Fern, hay-scented / *Dennstaedtia punctilobula*  
Fern, interrupted / *Osmunda claytoniana*  
Fern, lace-leaved grape / *Botrychium dissectum*  
Fern, least grape / *Botrychium simplex* v. *tenebrosum*  
Fern, maidenhair / *Adiantum pedatum*  
Fern, marginal wood / *Dryopteris marginalis*  
Fern, marsh / *Thelypteris palustris*  
Fern, matricary grape / *Botrychium matricariaefolium*  
Fern, New York / *Thelypteris noveboracensis*  
Fern, northern lady / *Athyrium filix-femina*  
Fern, rattlesnake grape / *Botrychium virginianum*  
Fern, royal / *Osmunda regalis*  
Fern, sensitive / *Onoclea sensibilis*  
Fern, southern beech / *Thelypteris hexagonoptera*  
Fern, triangle grape / *Botrychium lanceolatum*  
Floating heart / *Nymphaeodes cordata*  
Fragrant raspberry / *Rubus odoratus*  
Fragrant water lily / *Nymphaea odorata*  
Garlic mustard / *Alliaria officinalis*  
Goldenrod, silver rod / *Solidago bicolor*  
Goldenrod, blue-stemmed / *Solidago caesia*  
Goldenrod, Canada / *Solidago Canadensis*

#### **COMMON NAME / TECHNICAL NAME**

Goldenrod, grass-leaved / *Euthamia graminifolia*  
Goldenrod, zig-zag / *Solidago flexicaulis*  
Greenbriar / *Smilax rotundifolia*  
Hairgrass / *Deschampsia flexuosa*  
Helleborine / *Epipactis helleborine*  
Indian pipe / *Monotropa uniflora*  
Jack-in-the-pulpit / *Arisaema triphyllum*  
Japanese Barberry / *Berberis thunbergii*  
Jewelweed / *Impatiens capensis*

Lady's-slipper, yellow / *Cypripedium calceolus* v. *pubescens*  
Large whorled pogonia / *Isotria verticellata*  
Laurel, mountain / *Kalmia latifolia*  
Laurel, sheep / *Kalmia angustifolia*  
Little bluestem / *Schizachyrium scoparium*  
Lousewort / *Pedicularis canadensis*  
Maple, box elder / *Acer negundo*  
Maple, red / *Acer rubrum*  
Maple, sugar / *Acer saccharum*  
Maple-leaved viburnum / *Viburnum acerifolium*  
Milfoil, low / *Myriophyllum humile*  
Milfoil, spiked / *Myriophyllum spicatum*  
Milkweed, common / *Asclepias syriaca*  
Milkweed, Poke / *Asclepias exaltata*  
Milkweed, swamp / *Asclepias incarnata*  
Naiad / *Najas flexilis*  
Nannyberry / *Viburnum lentago*  
Oak, black / *Quercus velutina*  
Oak, chestnut / *Quercus prinus*  
Oak, pin / *Quercus palustris*  
Oak, red / *Quercus rubra*  
Oak, scarlet / *Quercus coccinea*  
Oak, swamp white / *Quercus bicolor*  
Oak, white / *Quercus alba*  
Partridgeberry / *Mitchella repens*  
Peat moss species / *Sphagnum* spp.  
Pickerel weed / *Pontedaria cordata*  
Pinxter flower / *Rhododendron periclymenoides*  
Pondweed, curly / *Potamogeton crispus*  
Pondweed, floating / *Potamogeton natans*  
Pondweed, leafy / *Potamogeton foliosus*  
Pondweed, long-leaved / *Potamogeton nodosus*  
Pondweed, small / *Potamogeton pusillus*  
Purple loosestrife / *Lythrum salicaria*  
Quaking aspen / *Populus tremuloides*  
Quillwort, Engelmann's / *Isoetes engelmannii*  
Quillwort, spiny-spored / *Isoetes echinospora*  
Ragged-fringed orchid / *Habenaria lacera*  
Rush, bayonet / *Juncus militaris*  
Rush, Canada / *Juncus canadensis*  
Rush, chairmaker's / *Scirpus americana*  
Rush, marginal / *Juncus marginatus*

#### **COMMON NAME / TECHNICAL NAME**

Rush, soft / *Juncus effusus*

Rush, toad / *Juncus bufonius*  
Sassafras / *Sassafras albidum*  
Sedge, bladder / *Carex intumescens*  
Sedge, bottle-brush / *Carex comosa*  
Sedge, broad-leaved / *Carex platyphylla*  
Sedge, follicled / *Carex folliculata*  
Sedge, fox / *Carex vulpinoidea*  
Sedge, fringed / *Carex crinita*  
Sedge, Gray's / *Carex grayii*  
Sedge, hop / *Carex lupulina*  
Sedge, inflated / *Carex vesicaria*  
Sedge, loose-flowered / *Carex laxiflora*  
Sedge, lurid / *Carex lurida*  
Sedge, Pennsylvania / *Carex pennsylvanica*  
Sedge, silvery / *Carex canescens*  
Sedge, slender / *Carex gracillima*  
Sedge, Swan's / *Carex swanii*  
Sedge, tussock / *Carex stricta*  
Shadbush / *Amelanchier canadensis*  
Shagbark hickory / *Carya ovata*  
Smartweed, Pennsylvania / *Polygonum pennsylvanica*  
Smartweed, water / *Polygonum amphibium*  
Smooth alder / *Alnus serrulata*  
Solomon's seal / *Polygonatum biflorum*  
Sour gum / *Nyssa sylvatica*  
Southern arrowwood / *Viburnum dentatum*  
Spatterdock / *Nuphar advena*  
Spatterdock, streaked / *Nuphar variegata*  
Spicebush / *Lindera benzoin*  
Spotted Joe-pye weed / *Eupatorium maculatum*  
Spotted wintergreen / *Chimaphila maculata*  
Spring beauty / *Claytonia virginica*  
Starved panic grass / *Panicum depauperatum*  
Swamp azalea / *Rhododendron viscosum*  
Swamp rose / *Rosa palustris*  
Sweet pepperbush / *Clethra alnifolia*  
Switchgrass / *Panicum virgatum*  
Trailing arbutus / *Epigaea repens*  
Trout lily / *Erythronium americanum*  
Tulip tree / *Liriodendron tulipifera*  
Water shield / *Brassenia schreberi*  
White snakeroot / *Eupatorium rugosum*  
Wild grape / *Vitis aestivalis*  
Willow, silky / *Salix sericea*  
Winterberry / *Ilex verticellata*  
Wintergreen / *Gaultheria procumbens*  
Wintergreen, spotted / *Chimaphila maculata*  
Witch hazel / *Hamamelis virginiana*  
Wood rush / *Luzula acuminata*  
Wool grass / *Scirpus cyperinus*

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## **V. NJ Natural Heritage Program Status Codes**

### **Animals:**

Two animal lists provide state status codes after the Endangered and Nongame Species Conservation Act of 1973 (NSSA 23:2A-13 et. seq.): the list of endangered species (N.J.A.C. 7:25-4.13) and the list defining status of indigenous, nongame wildlife species of New Jersey (N.J.A.C. 7:25-4.17(a)). The status of animal species is determined by the Endangered and Nongame Species Program (ENSP), with the review and approval of the Endangered and Nongame Species Advisory Committee.

The state status codes and definitions provided reflect the most recent lists that were revised in the New Jersey Register, Monday, June 3, 1991.

EX -- Extirpated species-a species that formerly occurred in New Jersey, but is not now known to exist within the state.

E -- Endangered species-an endangered species is one whose prospects for survival within the state are in immediate danger due to one or many factors - a loss of habitat, over exploitation, predation, competition, disease. An endangered species requires immediate assistance or extinction will probably follow.

T -- Threatened species-a species that may become endangered if conditions surrounding the species begin to or continue to deteriorate.

D -- Declining species-a species which has exhibited a continued decline in population numbers over the years.

S -- Stable species-a species whose population is not undergoing any long-term increase/decrease within its natural cycle.

INC -- Increasing species-a species whose population has exhibited a significant increase, beyond the normal range of its life cycle, over a long term period.

P -- Peripheral species-a species whose occurrence in New Jersey is at the extreme edge of its present natural range.

U -- Undetermined species-a species about which there is not enough information available to determine the status.

I -- Introduced species-a species not native to New Jersey that could not have established itself here without the assistance of man.

Status for animals separated by a slash(/) indicate a dual status. First status refers to the state breeding population, and the second status refers to the migratory or winter population.

SC – Special Concern – applies to animal species that warrant special attention because of some evidence of decline, inherent vulnerability to environmental deterioration, or habitat modification that would result in their becoming a Threatened species. This category would also

be applied to species that meet the foregoing criteria and for which there is little understanding of their current population status in the state.

Plant taxa listed as endangered are from New Jersey's official Endangered Plant Species List (N.J.A.C. 7:5C – 5.1).

The Nature Conservancy developed a ranking system for use in identifying elements (rare species and ecological communities) of natural diversity most endangered with extinction. Each element is ranked according to its global, national, and state (or subnational in other countries) rarity. These ranks are used to prioritize conservation work so that the most endangered elements receive attention first. Definitions for element ranks are after The Nature Conservancy (1982: Chapter 4, 4.1-1 through 4.4.1.3-3).

## **STATE ELEMENT RANKS**

S1 Critically imperiled in New Jersey because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres). Elements so ranked are often restricted to very specialized conditions or habitats and/or restricted to an extremely small geographical area of the state. Also included are elements which were formerly more abundant, but because of habitat destruction or some other critical factor of its biology, they have been demonstrably reduced in abundance. In essence, these are elements for which, even with intensive searching, sizable additional occurrences are unlikely to be discovered.

S2 Imperiled in New Jersey because of rarity (6 to 20 occurrences). Historically many of these elements may have been more frequent but are now known from very few extant occurrences, primarily because of habitat destruction. Diligent searching may yield additional occurrences.

S3 Rare in state with 21 to 100 occurrences (plant species and ecological communities in this category have only 21 to 50 occurrences). Includes elements which are widely distributed in the state but with small populations/acreage or elements with restricted distribution, but locally abundant. Not yet imperiled in state but may soon be if current trends continue. Searching often yields additional occurrences.

S4 Apparently secure in state, with many occurrences.

S5 Demonstrably secure in state and essentially ineradicable under present conditions.

SA Accidental in state, including species (usually birds or butterflies) recorded once or twice or only at very great intervals, hundreds or even thousands of miles outside their usual range; a few of these species may even have bred on the one or two occasions they were recorded; examples include European strays or western birds on the East Coast and vice-versa.

SE Elements that are clearly exotic in New Jersey including those taxa not native to North America (introduced taxa) or taxa deliberately or accidentally introduced into the State from other parts of North America (adventive taxa). Taxa ranked SE are not a conservation priority (viable introduced occurrences of G1 or G2 elements may be exceptions).

SH Elements of historical occurrence in New Jersey. Despite some searching of historical occurrences and/or potential habitat, no extant occurrences are known. Since not all of the historical occurrences have been field surveyed, and unsearched potential habitat remains,

historically ranked taxa are considered possibly extant, and remain a conservation priority for continued field work.

SP Element has potential to occur in New Jersey, but no occurrences have been reported.

SR Elements reported from New Jersey, but without persuasive documentation which would provide a basis for either accepting or rejecting the report. In some instances documentation may exist, but as of yet, its source or location has not been determined.

SRF Elements erroneously reported from New Jersey, but this error persists in the literature.

SU Elements believed to be in peril but the degree of rarity uncertain. Also included are rare taxa of uncertain taxonomical standing. More information is needed to resolve rank.

SX Elements that have been determined or are presumed to be extirpated from New Jersey. All historical occurrences have been searched and a reasonable search of potential habitat has been completed. Extirpated taxa are not a current conservation priority.

SXC Elements presumed extirpated from New Jersey, but native populations collected from the wild exist in cultivation.

SZ Not of practical conservation concern in New Jersey, because there are no definable occurrences, although the taxon is native and appears regularly in the state. An SZ rank will generally be used for long distance migrants whose occurrences during their migrations are too irregular (in terms of repeated visitation to the same locations), transitory, and dispersed to be reliably identified, mapped and protected. In other words, the migrant regularly passes through the state, but enduring, mappable element occurrences cannot be defined.

Typically, the SZ rank applies to a non-breeding population (N) in the state - for example, birds on migration. An SZ rank may in a few instances also apply to a breeding population (B), for example certain Lepidoptera which regularly die out every year with no significant return migration.

Although the SZ rank typically applies to migrants, it should not be used indiscriminately. Just because a species is on migration does not mean it receives an SZ rank. SZ will only apply when the migrants occur in an irregular, transitory and dispersed manner.

B Refers to the breeding population of the element in the state.

N Refers to the non-breeding population of the element in the state.

T Element ranks containing a "T" indicate that the infraspecific taxon is being ranked differently than the full species. For example *Stachys palustris* var. *homotricha* is ranked "G5T? SH" meaning the full species is globally secure but the global rarity of the var. *homotricha* has not been determined; in New Jersey the variety is ranked historic.

Q Elements containing a "Q" in the global portion of its rank indicates that the taxon is of questionable, or uncertain taxonomical standing, e.g., some authors regard it as a full species, while others treat it at the subspecific level.

.1 Elements documented from a single location.

Note: To express uncertainty, the most likely rank is assigned and a question mark added (e.g., G2?). A range is indicated by combining two ranks (e.g., G1G2, S1S3).

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