



Division of Lands & Forests

Bureau of State Land Management

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**TWIN SHEDS  
UNIT MANAGEMENT PLAN  
DRAFT**

Towns of Caroline and Dryden, Tompkins County

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January 2013

NYS Department of Environmental Conservation

Region 7  
1285 Fisher Ave.  
Cortland, NY 13045  
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Governor **ANDREW M. CUOMO**

State Forester **ROB DAVIES**

Commissioner **JOE MARTENS**

# ***Draft Twin Sheds***

## **Unit Management Plan**

A Unit Management Plan Consisting of Two State Forests encompassing about 5,002 acres in  
New York's Central-Southern Tier.

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## **DEC's Mission**

"The quality of our environment is fundamental to our concern for the quality of life. It is hereby declared to be the policy of the State of New York to conserve, improve and protect its natural resources and environment and to prevent, abate and control water, land and air pollution, in order to enhance the health, safety and welfare of the people of the state and their overall economic and social well-being." - Environmental Conservation Law 1-0101(1)

## **Vision Statement**

State Forests on the Twin Sheds Unit will be managed in a sustainable manner by promoting ecosystem health, enhancing landscape biodiversity, protecting soil productivity and water quality. In addition, the State Forests on this unit will continue to provide the many recreational, social and economic benefits valued so highly by the people of New York State. DEC will continue the legacy which started more than 80 years ago, leaving these lands to the next generation in better condition than they are today.

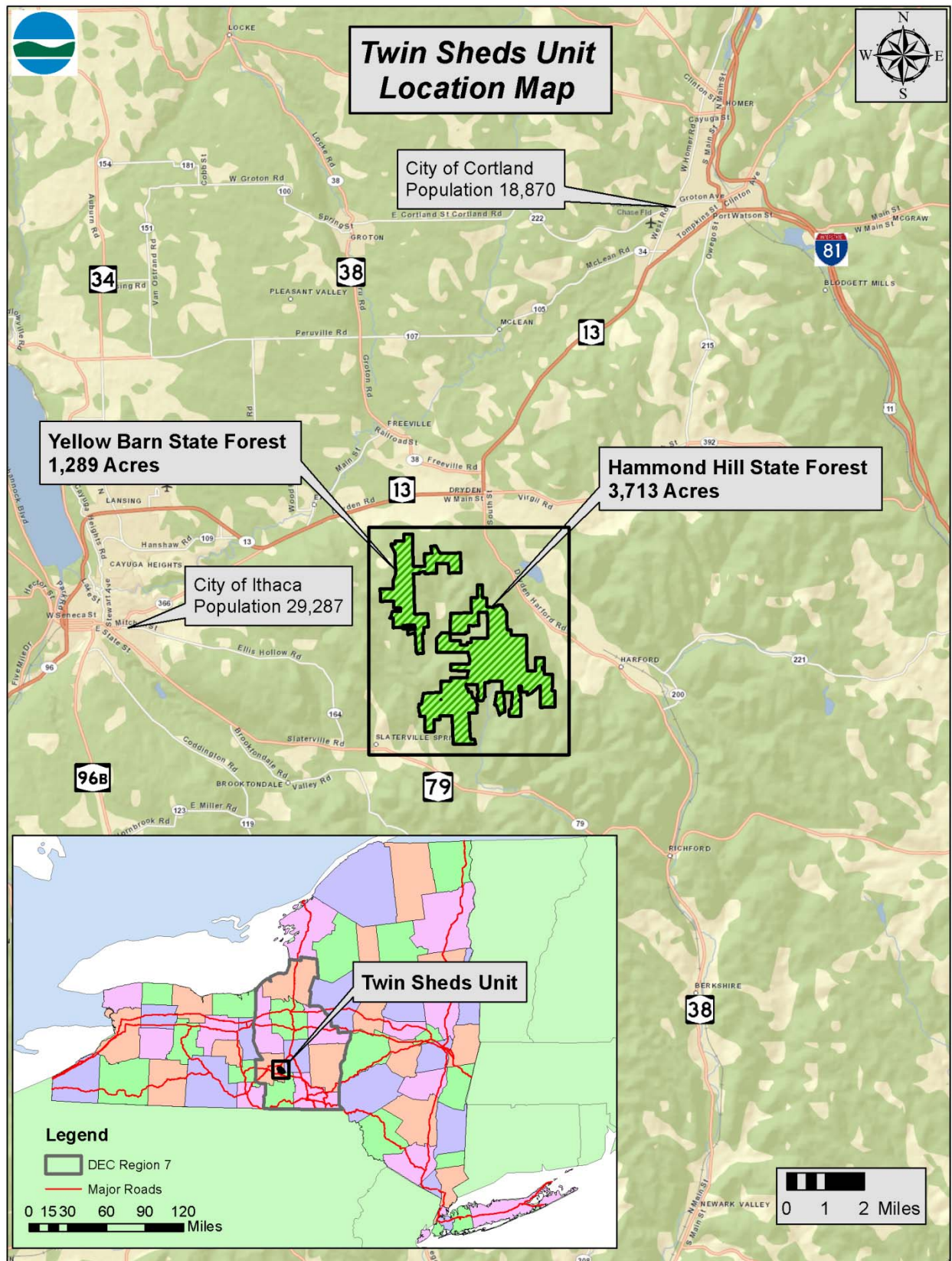
This plan sets the stage for DEC to reach these ambitious goals by applying the latest research and science, with guidance from the public, whose land we have been entrusted to manage.

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# Location Map



JMC 2/11/09  
REV 12/20/11

## Selected Photos from the Unit



*One of the many small streams on the Unit*



*Volunteers restoring the trail*



*Rattlesnake Plantain is on the Unit.*



*Round-leaved Orchid is on the Unit*



*Hammond Hill State Forest in the fall*

## Preface

It is the policy of the Department of Environmental Conservation (DEC) to manage public lands for multiple benefits in a sustainable fashion to conserve natural resources and serve our customers, the People of New York State. This Unit Management Plan (UMP) has been developed to strategically guide the management activities on the **State Forests** in the Twin Sheds Unit for the next 20 years, with a review scheduled after 10 years. The 5,002 acre Unit is comprised of the Hammond Hill and Yellow Barn State Forests. Covering about 8 square miles, the Forests are located in the Tompkins county towns of Caroline and Dryden. This Unit Management Plan has been named “Twin Sheds” as the State Forests in the Unit lay within two watersheds. The northern part of the Unit flows north into the Greater Lake Ontario basin and the southern portion flows into the Susquehanna River Basin.

An integral part of the Department’s planning process is public participation. As such, Department staff seeks public participation throughout the UMP process to insure that all stakeholders have a chance to make their views heard. Public participation adds significant value to the planning process and thereby greatly improves the quality of the final plan. Future management of the Forests will be guided by this document and the ability of the land resource to produce and sustain a diverse group of **ecosystem**\* and recreation services.

Through this plan, the Unit will continue to provide excellent recreational opportunities such as big and small game hunting, cross country skiing, fishing, hiking, horseback riding, informal camping, mountain biking, snowshoeing and trapping. The Twin Sheds Unit will continue to provide sustainable ecosystem services including clean water, carbon storage, nutrient recycling, wildlife **habitat**, and renewable forest products such as **pulpwood**, firewood and **sawtimber**. In addition, the Unit has the potential to provide oil and gas mineral resources to society. Natural resources provided by the Unit and its landscape add significant economic value by providing jobs and bringing tourism to the region. Diverse by nature, the Unit and its surrounding landscape provide habitats for more than two hundred birds, mammals, amphibians and reptiles.

Sustaining **biodiversity** through **adaptive management** strategies is one of the key goals of the plan. Included with this plan is a detailed list of proposed forest management actions by State Forest and year. The plan conserves, enhances and retains forests managed to provide late successional characteristics, natural and **protection areas** for plants, animals and insects that require large blocks of forest canopy. Additionally, the plan buffers and conserves water resources while creating early successional cover for wildlife **species** such as woodcock, grouse, song birds and butterflies. The plan outlines stewardship and land acquisition projects over a twenty (20) year period. It should be noted that some of the projects may be funded through state funds, timber sales and voluntary contributions of DEC Adopt-A-Natural Resource (AANR) partners and volunteers. However, if human and financial resources continue to be limited, some of the recommendations may not be implemented.

Opportunities exist to sustain and enhance biodiversity and ecosystem health at the landscape level by promoting additional collaboration between state and local governments, private landowners and environmental organizations. Approximately 92% of the landscape surrounding the Unit is owned by private landowners. As such, the Department should continue to work with rural **forestry** stakeholders to help make private landowners informed decision makers. The Twin Sheds Unit is administered locally by the DEC, Division of Lands and Forests Office in Cortland, New York, which manages approximately 90,000 acres of public State Forests, **Multiple Use** and Unique Areas in six Central New York counties. Additionally, Department

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\* The initial use of highlighted (**bold**) terms are defined in the glossary.

forestry staff also provides forest stewardship assistance to 1.1 million acres of privately owned forest land and 146 communities in the region.

## State Forest Overview

The public lands comprising this unit play a unique role in the landscape. Generally, the State Forests of the unit are described as follows:

- large, publicly owned land areas;
- managed by professional Department of Environmental Conservation (DEC) foresters;
- green certified jointly by the Forest Stewardship Council (FSC) & Sustainable Forestry Initiative (SFI);
- set aside for the sustainable use of natural resources, and;
- open to recreational use.

Management will ensure the **sustainability**, **biological diversity**, and protection of **functional ecosystems** and optimize the ecological benefits that these State lands provide, including the following:

- maintenance/increase of local and regional biodiversity
- response to shifting land use trends that affect habitat availability
- mitigation of impacts from **invasive species**
- response to climate change through carbon sequestration and habitat, soil and water protection

## Legal Considerations

Article 9, Titles 5 and 7, of the Environmental Conservation Law (ECL) authorize DEC to manage lands acquired outside the Adirondack and Catskill Parks. This management includes **watershed protection**, production of **timber** and other forest products, **recreation** and **kindred purposes**. For additional information on DEC's legal rights and responsibilities, please review the statewide Strategic Plan for State Forest Management (SPSFM) at <http://www.dec.ny.gov/lands/64567.html>. Refer specifically to pages 33 and 317.

## Management Planning Overview

The Twin Sheds Unit Management Plan (UMP) is based on a long range vision for the management of Hammond Hill and Yellow Barn State Forests, balancing long-term ecosystem health with current and future demands. This Plan addresses management activities on this unit for the next ten years, though some management recommendations will extend beyond the ten-year period. Factors such as budget constraints, wood product markets and forest health problems may necessitate deviations from the scheduled management activities.

## Public Participation

One of the most valuable and influential aspects of UMP development is public participation. Public meetings are held to solicit input and written and verbal comments are encouraged while management plans are in draft form. Mass mailings, press releases and other methods for soliciting input were used to obtain input from adjoining landowners, interest groups and the general public.

## Strategic Plan for State Forest Management

This unit management plan is designed to implement DEC's statewide Strategic Plan for State Forest Management (SPSFM). Management actions are designed to meet local needs while supporting statewide and eco-regional goals and objectives. The SPSFM is the statewide master document and Generic Environmental Impact Statement (GEIS) that guides the careful

management of natural and recreational resources on State Forests. The plan aligns future management with principles of landscape ecology, **ecosystem management**, multiple use management and the latest research and science available at this time. It provides a foundation for the development of Unit Management Plans. The SPSFM divides the State into 80 geographic “units,” composed of DEC administered State Forests that are adjacent and similar to one another. For more information on management planning, see SPSFM page 21 at <http://www.dec.ny.gov/lands/64567.html>.

## **DEC’s Management Approach and Goals**

### **Forest Certification of State Forests**

In 2000, New York State DEC-Bureau of State Land Management received Forest Stewardship Council® (FSC®) certification under an independent audit conducted by the National Wildlife Federation - SmartWood Program. This certification included 720,000 acres of State Forests in DEC Regions 3 through 9 managed for water quality protection, recreation, wildlife habitat, timber and mineral resources (multiple-use). To become certified, the Department had to meet more than 75 rigorous criteria established by FSC. Meeting these criteria established a benchmark for forests managed for long-term ecological, social and economic health. The original certification and contract was for five years.

By 2005 the original audit contract with the SmartWood Program expired. Recognizing the importance and the value of dual certification, the Bureau sought bids from prospective auditing firms to reassess the Bureaus State Forest management system to the two most internationally accepted standards - FSC and the Sustainable Forestry Initiative® (SFI®) program. However, contract delays and funding shortfalls slowed the Departments ability to award a new agreement until early 2007.

Following the signed contract with NSF-International Strategic Registrations and Scientific Certification Systems, the Department was again audited for dual certification against FSC and additionally the SFI program standards on over 762,000 acres of State Forests in Regions 3 through 9. This independent audit of State Forests was conducted by these auditing firms from May until July 2007 with dual certification awarded in January 2008.

State Forests continue to maintain certification under the most current FSC and SFI standards. Forest products derived from wood harvested off State Forests from this point forward may now be labeled as “certified” through chain-of-custody certificates. Forest certified labeling on wood products may assure consumers that the raw material was harvested from well-managed forests.

The Department is part of a growing number of public, industrial and private forest land owners throughout the United States and the world whose forests are certified as sustainably managed. The Department’s State Forests can also be counted as part a growing number of working forest land in New York that is *third-party certified* as well managed to protect habitat, cultural resources, water, recreation, and economic values now and for future generations.



The mark of  
responsible forestry  
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## Ecosystem Management Approach

State Forests on this unit will be managed using an ecosystem management approach which will holistically integrate principles of landscape ecology and multiple use management to promote habitat biodiversity, while enhancing the overall health and resiliency of the State Forests.

Ecosystem management is a process that considers the total environment - including all non-living and living components; from soil micro-organisms to large mammals, their complex interrelationships and habitat requirements and all social, cultural and economic factors. For more information on ecosystem management, see SPSFM page 39 at <http://www.dec.ny.gov/lands/64567.html>.



Landscape ecology seeks to improve landscape conditions, taking into account the existing habitats and land cover throughout the planning unit, including private lands

### ***Multiple-use Management***

DEC will seek to simultaneously provide many resource values on the unit such as, fish and wildlife, wood products, recreation, aesthetics, minerals, **watershed** protection and historic or scientific values.

### ***Landscape Ecology***

The guiding principle of multiple use management on the unit will be to provide a wide diversity of habitats that naturally occur within New York, while ensuring the protection of rare, endangered and **threatened species** and perpetuation of highly ranked unique natural communities. The actions included in this plan have been developed following an analysis of habitat needs and overall landscape conditions within the planning unit (i.e. the geographical area surrounding and including the State Forests) the larger ecoregion and New York State.

## ***Ecosystem Management Strategies***

The following strategies are the tools at DEC's disposal, which will be carefully employed to practice landscape ecology and multiple-use management on the unit. The management strategy will affect species composition and habitat in both the short and long term. For more information on these management strategies, please see SPSFM page 81 at <http://www.dec.ny.gov/lands/64567.html>.

### ***Passive Management***

DEC foresters will employ passive management strategies through the designation of natural and protection areas, and buffers around those areas, such as along streams, ponds and other **wetlands**, where activity is limited.

### ***Silviculture (Active Management)***

DEC foresters will practice **silviculture**; the art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands, in an effort to promote biodiversity and produce sustainable forest products. There are two fundamental silvicultural systems which can mimic the tree canopy openings and disturbances that occur naturally in all forests; even-aged management and uneven aged management. Each system favors a different set of tree species. In general, even-aged management includes creating wide openings for large groups of trees that require full sunlight to regenerate and grow together as a **cohort**, while uneven-aged management includes creating smaller patch openings for individual trees or small groups of trees that develop in the shade but need extra room to grow to their full potential.

## What is a Unit Management Plan?

A unit management plan (UMP) contains an assessment of the natural and physical resources on the unit and considers the **landscape** conditions in the surrounding geographic area. The UMP guides the Department's activities on the unit for a ten-year period, although a number of goals and objectives in the plan focus on a much longer time period. Each plan addresses specific objectives and actions for public use and ecosystem management. For a more detailed discussion of the Unit Management Planning Process please refer to the Strategic Plan for State Forest Management, Chapter 1, Management Planning Overview, page 22.

## Historical Background

### ***State Forest History***

The Strategic Plan for State Forest Management (SPSFM) provides a detailed account. For more information, please refer to page 15 of the SPSFM available at <http://www.dec.ny.gov/lands/64567.html>.

### ***Local History***

The State Forests of the Unit are on the Allegheny Plateau, which is made of uplifted sedimentary rock that formed about 350 million years ago when the region was covered by a warm ancient sea. Geologists believe that the plateau was formed as the continents of North America and Africa pushed against each other from 250 to 330 million years ago. As the continents slid past each other, the bedrock was tilted and uplifted. Most recently, the landscape has been shaped by the advance and retreat of continental ice sheets (glaciers) and the constant weathering of the uplifted bedrock. The last glacier reached its peak about 21,750 years ago.

Archeological evidence suggests that the earliest humans in the planning area were nomadic peoples whose ancestors had entered North America across the Bering Strait during the last ice age. These Native American peoples eventually established small communities and raised beans, corn and squash in the area for thousands of years (Vandrei, C., 2009).

Before Europeans arrived, the lands of the Twin Sheds Unit were home to the Cayuga Nation of the Iroquois Confederacy (also called Haudenosaunee). The Haudenosaunee was founded roughly in 1570 under the influence of the legendary Chief Hiawatha. Inspired by the region's natural resources, the Iroquois believed that the Finger Lakes were formed when the Great Spirit placed his hand on some of the most beautiful land ever created. American Colonists were inspired by the Iroquois Confederacy and included elements of its structure in the U.S. Constitution (Ellis, D.M, 1967).

By all accounts, the Cayuga, who were the main inhabitants of Tompkins County, did not heavily develop the land. Archeological evidence shows us that they had semi-permanent dwellings placed near freshwater sources, which allowed them to remain extremely mobile. Mobility was important for the Cayuga to locate and transport game, even though they preferred to travel by land. The locations of the villages near water sources also allowed the Cayuga to irrigate and cultivate crops. It is believed that villages were moved every 10 to 20 years, which kept areas under cultivation more productive as the land would lay fallow for a number of years between settlement periods (<http://caid.ca/RRCAP1.4.pdf>, 2011).

The American Revolution signaled great changes in the social, political, economic, and physical landscape of the region. During the Revolutionary War, the Cayuga, along with the entire

Iroquois Confederacy, sided with Great Britain because of a previously established trade agreement. Great Britain also promised to stop European settlers from moving into Iroquois lands upon defeat of the American Colonists. In retaliation to the British/Iroquois alliance, George Washington ordered Major John Sullivan to remove the Confederacy and all its members from Central New York in 1779. This military campaign later became known as the "Sullivan Expedition." Locally, Sullivan promptly directed Colonel Henry Dearborn and William Butler to move along the edges of Cayuga Lake with the order to destroy Cayuga villages and crops (<http://www.tompkins-co.org/historian/essay/page2.html>, 2011).

Based on historical evidence, the Sullivan Expedition was devastating and as a result the Cayugas surrendered their land in 1789. The Sullivan Expedition drove the Cayuga, and most of the Iroquois Nations out of New York State and into Canada or westward towards Ohio. The area cleared by the Sullivan Expedition during the Revolutionary War was largely incorporated into the "New Military Tract" in 1789. The New Military Tract was designed during the American Revolutionary War by New York State as a means of enticing New York residents to fight for freedom. Soldiers were offered a total of 600 acres each with officers receiving proportionally larger offers. By 1872, a tract of land totaling over 1.5 million acres was set aside across the Finger Lakes Region. The northern most part of Tompkins County was included in the military tracts. However, the lands that today comprise much of southern Tompkins County were not included (Dieckman, 1968).

The lands of southern Tompkins County and of the Twin Sheds Unit were part of the Watkins – Flint Purchase of 1794. New York City resident John W. Watkins, a lawyer, and Royal W. Flint and associates, purchased about 363,000 acres of land near what is now Candor, New York for three shillings and four pence (or about 25 cents) an acre. The land was purchased for investment purposes and sold to settlers.

The Twin Sheds Unit is in what today is called Tompkins County. Formed in 1817 from a part of Montgomery County, Tompkins County was named after Daniel D. Tompkins who was governor of New York from 1807 to 1817. Governor Tompkins also served as the sixth Vice President of the United States from 1817 to 1825. As European settlers arrived in ever increasing numbers, they cleared forests, built communities, and farmed the land. As a result, much of the landscape was transformed from forests to fields and pastures. Today, foundations, family cemeteries and old fruit orchards of the early homesteaders can still be found throughout the Unit's State Forests (Kammen, 2003). A total of 32 farms and two sawmills were mapped on Hammond Hill and Yellow Barn State Forests in the 1866 atlas. A map showing the approximate locations of the farms is provided at the end of this plan.

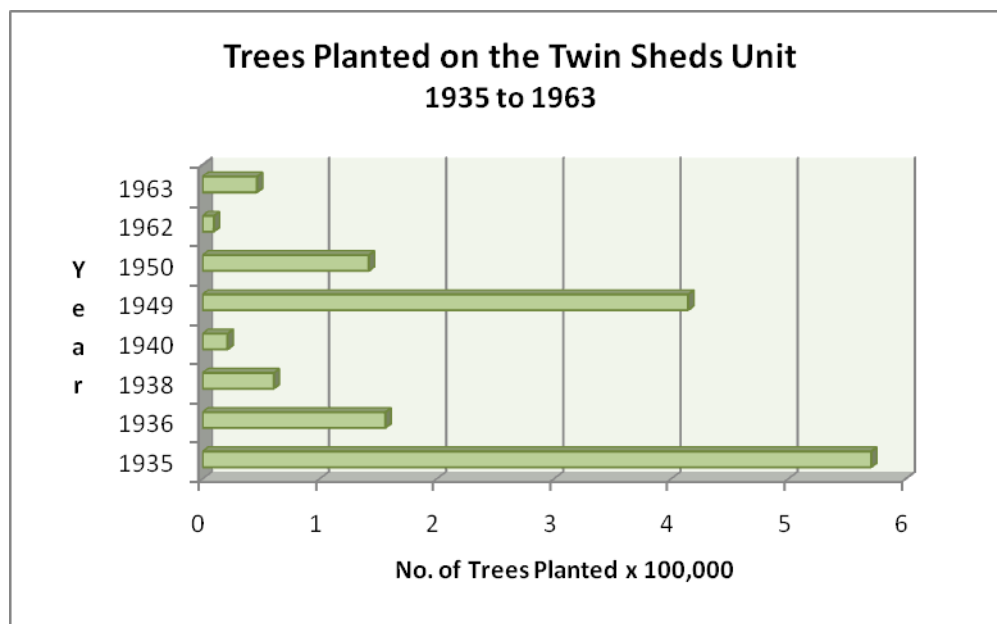
The invention of the steam engine and automobile brought further change to the region, as settlers moved west to farm the fertile soils of the Midwestern U.S., and the railroads connected farm products with markets across the nation. As time progressed, the thin upland soils of the northeastern United States became less productive and could not compete with the thick rich farmlands of the Midwest. Adding insult to injury, harsh economic times ushered in by the Great Depression drove many upland farmers into bankruptcy, greatly impacting rural economies and the quality of life.

In an effort to improve the land, provide jobs, and stabilize the tax base, then Governor Franklin Delano Roosevelt (FDR) led the charge to establish the State Reforestation Act (of 1929) and the Hewitt Amendment (of 1931) that established New York as a leader in forest policy and natural resource conservation. The State Reforestation Law and the Hewitt Amendment of 1931 provided funding to acquire abandoned farmland and create **State Reforestation Areas**. Because of the past farming on steep, sloping ground, soil erosion was a serious problem on the newly acquired lands. To solve this problem, a massive tree planting campaign began. After being elected as U.S. President in 1932, Franklin D. Roosevelt initiated

conservation policies very similar to what he had established in New York State. Once President, he led the charge to establish the Civilian Conservation Corps (CCC) with the goal of creating jobs and improving public lands and parks. The labor used to establish plantations of trees on the Twin Sheds Unit was provided by Civilian Conservation Corps (CCC) camp S-125 of Slaterville Springs, New York. Additional information on the history and legacy of the CCC is available at <http://www.cccalumni.org/>.

Although the Hewitt Amendment was a major land acquisition catalyst throughout New York State, about 3,000 acres of the Twin Sheds Unit (nearly 60%) was acquired from the federal government in January of 1956. From 1933 to 1937, as part of the Roosevelt Administration's New Deal, the federal government purchased about eight million acres in the Southern Appalachians through what was called the "submarginal" land purchase program. The program purchased land with limited crop production capacity and in some cases promoted the "resettlement" of farm families whose lands had been bought by the federal government. This concept was especially supported by Rexford Tugwell, undersecretary of the United States Department of Agriculture, who believed that American agriculture needed to be restructured by transferring small inefficient farmers working poor land to more productive employment. Initially established under the Federal Emergency Relief Administration (FERA), the program was headed by Harry L. Hopkins. Interestingly, Hopkins headed similar relief work when Roosevelt was governor of New York (Roth et al., 2002).

After the Unit's lands were acquired by the state and federal governments, CCC camp S-125 of Slaterville Springs, New York planted 1,421,150 tree **seedlings**. These seedlings included Norway spruce, red pine, Scotch pine, white spruce, black locust, Japanese larch, white pine, northern red oak, European larch and white ash. Major tree planting efforts ceased during the early 1940's to shift labor towards the production of wartime materials. A summary table of the trees planted on the Unit is in **Appendix A-14**.



**Figure 1 - Trees Planted**

### **Hammond Hill State Forest**

Hammond Hill State Forest (Tompkins Reforestation Area No. 2) was established between 1935 and 1950 to help reduce soil erosion, produce forest products, stabilize the tax base and to provide recreational opportunities for the citizens of New York State. The State Forest lies within

the towns of Caroline and Dryden. About half of the forest's 3,719 acres was acquired by the state from the federal government. Hammond Hill State Forest has a rich history of private ownership, starting in the early 1800's with Duncan McKeller. Mr. McKeller was one of the first residents of Hammond Hill. He was a progressive farmer in that his cattle barn was one of few to have a concrete floor (Leonard Georgi, Ann, personal communication, 2007). Portions of the McKeller farm foundations remain on the Hammond Hill State Forest to this day.

The majority of the lands that make up Hammond Hill State Forest were once used for farming and pastureland. The lands suffered from poor agricultural practices and were largely abandoned during the Great Depression when many of Upstate New York's farms due to difficult economic conditions. In what is now Hammond Hill State Forest all but one family farm was sold to the state, the Burch Rose Crest Farm owned by Burch and Rose Hammond. They kept their farm by using a small bank account of \$600 to pay the land taxes. After Rose's death in 1963, Burch sold the farm in part to the Three Fires Council of Camp Fire Girls to benefit the children he and Rose could not have and to Drs. Jay and Marion Georgi. Both parcels continue to be privately owned. Star Stanton Hill road was named after Starr Stanton, an early Hammond Hill resident and farmer. Mr. Stanton was born in 1850 and lived until 1920. Starr and his wife Delphine lived on the family farm on Star Stanton Hill road. The Stanton family farm is now part of Hammond Hill State Forest.

### ***Yellow Barn State Forest***

Yellow Barn State Forest (Tompkins Reforestation Area No. 5) falls solely within the town of Dryden, totaling around 1,289 acres. The lands that comprise the forest of today were once small farms. About 1,243 acres (96%) of the State Forest were initially acquired by the federal government under the sub-marginal land purchase program. In January of 1956, the New York State Conservation Department took title to the Federal lands. Additional purchases in 1976 and 2002 added to the present forest total. Previous owners of the properties in the Unit are listed in **Appendices A-11 and A-12.**

## **INFORMATION ON THE UNIT**

### **A. Geographic Information**

#### ***Location***

The Twin Sheds Management Unit is located about 7 miles east of the city of Ithaca, 11 miles southwest of Cortland and about 30 miles northwest of the Triple Cities of Endicott, Binghamton and Johnson City. Irish Settlement Road bisects the Unit and provides excellent access to local roads that serve the State Forests in the Unit.

The Unit includes two State Forests encompassing 5,002 acres and lies within the Appalachian Plateau-Central Appalachian ecozone and in the Cayuga Inlet, Fall Creek, Owego Creek and Virgil Creek sub-watersheds. About one half of the Unit drains into the Upper Susquehanna watershed of the greater Susquehanna River Basin. The other half of the Unit drains to the north into the Lake Ontario Basin. Elevation ranges from 1,200 to 2,000 feet above mean sea level. Not surprisingly, the lowest elevations are found along streams in valleys and hollows. The highest elevations are Star Stanton Hill on Hammond Hill State Forest (2,011 feet) and just off of Tower Road on Yellow Barn State Forest (1,868 feet).

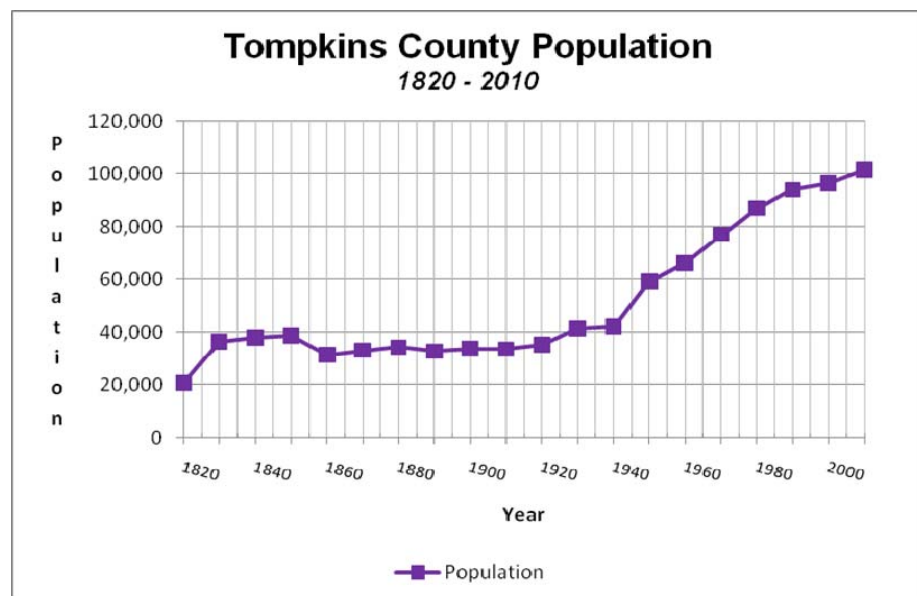
Table 1 - State forests in the Twin Sheds Unit Management Plan			
Reforestation Area	State Forest Name	County and Town	Acres
Tompkins No. 2	Hammond Hill	Tompkins County, Towns of Caroline & Dryden	3,713
Tompkins No. 5	Yellow Barn	Tompkins County, Town of Dryden	1,289
<b>Total Unit Acreage</b>			5,002
<i>Total acreage reported here is based on deed descriptions and proposal maps on file, and as reported by the DEC regional property office. Acreages generated by geographical information system (GIS) computations which potentially could vary as much as 1% from land record or deed acreages. These differences could be caused by cumulative errors in deed or GIS calculations, and/or rounding errors. This slight variation does not affect planning or management decision making.</i>			

The landscape immediately surrounding the Unit is a mosaic of forests, farms and residential dwellings. The nearest community centers to the Unit are the villages of Dryden and Freeville as well as the hamlets of Caroline, Etna, Harford, Slaterville Springs and Varna. Most of these small communities are anchored by a post office and are within five miles of the Unit. The Unit pays both town and school taxes and lies within the Dryden or Ithaca school districts.

### Demographics

During the past 150 years the Unit's landscape has been significantly changed by human settlement. Data from the New York State Department of Economic Development and U.S Census Bureau illustrates the rapid growth in population from 1940 to 2010 (New York State Department of Economic Development, 2009). In the year 2009, the population of the Tompkins County was estimated to be 101,799. According to U.S Census estimates, Tompkins county posted an estimated 5.5% growth in population from 2000 to 2009. The nearest urban centers are the cities of Cortland and Ithaca, with estimated populations of 18,870 and 29,287, respectively.

Local census tract data from year 2000 U.S Census was also analyzed for the Unit. The Unit lies within 3 U.S. census tracts which cover about 159 square miles. An estimated 5,357 households and 3,556 families lived in the census tracts. Population densities in these census tracts ranged from 52 to 187 people per square mile, with an average density of 122 people per square mile. The average household size was 3 people, and the median age of the population was about 36 years. As a comparison and for reference sake, New York State covers about 47,214 square miles and according to new 2010 U.S census estimates the state has a population of about 19,378,102 people. Thus, at the statewide level, the average population density is about 410 people per square mile (or about 1.6 acres of land per person).



**Figure 2 - Historic Population by County**

### ***Subdivision Trends***

Records obtained from the New York State Office of Real Property Services (ORPS) show that between 1998 and 2009 the number of real property land parcels in Tompkins County has increased by about 4.6%. On a related front, the average real property parcel size decreased by an estimated 4.4% during the same period. This data illustrates that the rural landscape surrounding the Unit is gradually being divided into smaller ownerships.

<b>Table 2 - Land Subdivision Trend Data, Tompkins County, Twin Sheds Planning Area</b>							
Estimated Acres	# Parcels (1998)	# Parcels (2009)	Change in Parcel #s	% Change (Parcels)	Ave. Parcel Size, Acres (1998)	Ave. Parcel Size, Acres (2009)	% Change (Size)
314,414	33,000	34,513	1,513	4.6	9.53	9.11	-4.4

Based on these trends, it is reasonable to expect that land parcel size will continue to decrease in Tompkins County. As a result, the landscape of the future will be managed by a greater number of private landowners. It is important to note that private landowners presently own about 95% of the landscape in Tompkins County. As such, the short and long term land use decisions made by private landowners will greatly influence the character and health of the Unit's **ecosystems**. Moreover, continued subdivision will likely increase the demand for forestry and agriculture related technical assistance and educational outreach services. Similarly, demand for recreation and forest based products/services is likely to increase, placing additional pressure on the Unit's forest ecosystems. Land subdivision associated with development will also place additional demands on roads, schools, public safety agencies and sanitary sewer systems.

### ***Local Climate***

The local climate is humid continental, as the summers are warm and the winters are cold. Additionally, the climate is strongly influenced by the Finger Lakes, Lake Ontario, Lake Erie and the Atlantic Ocean. The average annual rainfall averages 35 inches and historically has ranged from 26 to 47 inches. Annual snowfall averages 70 inches, with the greatest snowfall taking place during the months of January and February, as the area receives an average of 16.9 and 14.7 inches of snow, respectively. Lake effect snow from Lake Erie, Lake Ontario and Cayuga Lake is common, particularly during the early winter months when the lake temperatures are warm relative to the surrounding air. In terms of total precipitation, January, February and March are the driest months, as the area receives an average of 1.8, 2.0, and 2.3 inches of precipitation each month respectively. Precipitation is well distributed throughout the remaining months of the year, averaging 2.9 inches each month. The average annual temperature is approximately 46 degrees Fahrenheit. In terms of temperature extremes, the highest temperature on record is 103 degrees, and the record low is -35 degrees Fahrenheit. The month of July is the warmest month with an average temperature of 68.5 degrees Fahrenheit. January is the coldest month with an average temperature of 21.5 degrees Fahrenheit. The annual growing season is approximately 152 days (Northeast Regional Climate Center, 1995).

## **B. Geological Information**

### ***1. Surface Geology***

Most surface geology in the Finger Lakes region and Allegheny Plateau of the Southern Tier of New York was influenced by the processes of glaciation that occurred during the Pleistocene Epoch. Ice sheets from the last glacier (called the Wisconsinan glaciation episode) retreated from the area about ten thousand years ago. Glacial activity left behind numerous sedimentary deposits and surficial features. These included elongate scour features. Weathering and erosion by streams and rivers has continued to sculpt the surface geology of the Allegheny Plateau to present day, resulting in the hills and valleys prevalent throughout the region. Some features

filled with water creating numerous small and large lakes. A number of these lakes to the West and Northwest of this area are now called the Finger Lakes.

Most soils and sediments in the region are related to past glacial activity, and subsequent weathering and erosion processes over the last 20,000 years. The underlying parent rocks (rocks that were subjected to the processes of glaciation, weathering and erosion) of this region are sedimentary rocks; specifically shale, sandstone and minor limestone that were deposited in shallow seas that existed in this region during the Devonian Period of the Paleozoic Era, about 370 million years ago. Any post Devonian rocks have been eroded from the region. The presence of rounded igneous and metamorphic **clasts** are indicative of past glacial activity transporting material into the region from the Canadian Shield to the north. The resulting surface geology of the State lands included in this Unit Management Plan are similar due to their close proximity. Hammond Hill State Forest and Yellow Barn State Forest include surface geology consisting of glacial till as the dominant deposit in the area. There are minor intermittent areas in stream valleys where sand and gravel deposits exist as a result of fluvial deposition at the glacier front (glacial outwash) and deposition at the ice margin during deglaciation (kame moraine). Bedrock outcrops and subcrops of Devonian shales, siltstones, and sandstones are located intermittently on the sides and crests of ridges and hills in these areas, most likely due to the erosion of overlying glacial till, causing the exposure of the bedrock.

Further information on the surface geology of the region is provided by the: *Surficial Geologic Map of New York, New York State Museum - Geologic Survey - Map & Chart series #40, 1986.*

Table 3 - Surficial Geologic Material	
Name	Surficial Material
Hammond Hill State Forest (Tompkins 2)	Glacial till: Deposition beneath glacial ice (predominant material) Glacial outwash & kame moraine: Sands & gravels deposited next to glacial ice by meltwater (minor) Bedrock: Shales, siltstones & sandstones of the Upper Devonian Sonyea & West Falls Groups (minor outcrops)
Yellow Barn State Forest (Tompkins 5)	Glacial till: Deposition beneath glacial ice (predominant material) Kame moraine: Sands & gravels deposited next to the glacial ice by meltwater (very minor in southwest corner only of the state forest) Bedrock: Shales, siltstones & sandstones of the Upper Devonian Sonyea & West Falls Groups (minor outcrops)

## 2. Soils of the Twin Sheds Unit

The USDA Natural Resources Conservation Service (NRCS) soil type map identifies eighteen different soil types on the Unit. The top three soils on the Unit are Lordstown channery silt loam, Volusia channery silt loam and Mardin channery silt loam. These soils cover about 83% of the Unit are common throughout the Twin Sheds Unit area. The remaining 17% are combinations of gravely, silt and channery loams. As a group, they tend to be moderately deep, gently to moderately sloping, and are medium textured with a high clay content. Soils in the Unit typically formed in very low lime glacial till that was derived from local shale and sandstone rocks. The local shale and sandstone tends to be acidic. As a result, the soil is correspondingly moderately to strongly acid. Some of the soils also have a **fragipan** that restricts plant root growth, water movement, and overall **site** productivity. In terms of soil drainage, about 63% of the Unit is considered well drained, 29% somewhat poorly drained, and 8% poorly drained.

Overall, most of these soils have major limitations for intensive crop production including a seasonally high water table, low fertility, moderate to high acidity and erodibility on steep slopes. However, many of the soils in the Unit and the surrounding landscape are well suited to growing cool season grasses, shrubs and trees. Additional information on soils in the region is available

in the United States Soil Conservation Service (NRCS) soil survey Tompkins county (1965). A map illustrating the diversity of the Unit's soils is included at the end of this plan.

### **3. Bedrock Geology**

Bedrock underlying the Finger Lakes region and Allegheny Plateau of the Southern Tier of New York is inclusive of sedimentary rock units deposited in association with ancient seas and their marine-fluvial-deltaic environments of deposition during the Cambrian [550-500 million years ago (mya)], Ordovician (500-440 mya), Silurian (440-400 mya) and Devonian (400-350 mya) Periods of the Paleozoic Era. Younger bedrock units deposited during the post-Devonian periods (such as Mississippian and Pennsylvanian periods) have been subsequently eroded away by erosional and glacial processes. Underlying the Paleozoic rocks are pre - Paleozoic Era rocks or Pre-Cambrian rocks generally considered to be composed of igneous and metamorphic rocks. These rocks are generally referred to as "basement" rocks.

Rock units (bedrock) outcropping or subcropping at the surface in the Hammond Hill State Forest and Yellow Barn State Forest of the Allegheny Plateau in the southern tier of New York are shales, and intermittent siltstones and sandstones of the West Falls Group and Sonyea Group that were deposited during the Upper Devonian Period.

Further information on the bedrock geology of the region is provided by the: Geologic Map of New York - Finger Lake Sheet - New York State Museum and Science Service - Map and Chart #15, 1970.

### **4. Geologic Structure**

Subsurface rock formations dip (become deeper) to the south-southwest at an average dip angle of about one (1) degree, or deepen 100 feet per each mile traveled to the south-southwest. The *Geologic map of New York - Finger Lakes Sheet #15, 1970*, depicts progressively older rock units outcropping farther to the north, confirming the southerly dip of strata in the region.

Geologic structural features in the region generally trend in a northeast to southwest direction. North-south trending faults have also been identified in the region. Structural reference is available at the *Preliminary Brittle Structures Map of New York, New York State Museum-Map and Chart Series No.31E, 1974*.

## **C. Mineral Resources**

Article 23, Title 11, Section 23-1101 of the Environmental Conservation Law and State Finance Law authorizes the Department of Environmental Conservation to make leases on behalf of the State for exploration, production and development of oil and gas on State lands. In all areas covered by this Unit Management Plan, New York State manages the surface estate through the NYS DEC Division of Lands and Forests, and the mineral estate is managed through the NYS DEC Division of Mineral Resources.

Future decisions regarding oil and gas leasing will be made if and when the Unit is nominated for the leasing of oil and gas mineral resources. Drilling and energy technologies, scientific knowledge and public policies change with time. As such, assessments and decisions regarding the leasing of oil and gas resources will be based on the most current technologies, public policies, regulations, public feedback and the potential for environmental impacts. Assessments and decisions will not be made until the Unit is nominated. Possible future outcomes include: no leasing, non-surface occupancy leasing or surface occupancy leasing with significant safeguards and restrictions.

It is NYS DEC policy to recommend excluding operations in surface areas with sensitive habitats (stream banks, wetlands, steep slopes, rare communities etc.) or intensive recreational use. Any proposal for mineral development other than oil and gas would require SEQR review.

### ***1. Historical Drilling and Production***

The drilling of the first commercial oil well in the United States occurred in Titusville, Pennsylvania in 1859. The results of this drilling activity carried over into neighboring New York State in 1863. Eventually this activity extended into western and central New York.

Numerous wells have been drilled within the UMP area (however not on state forest lands in the Unit) in the Towns of Lansing, Danby, and Groton, Tompkins County. There are currently no producing gas wells in the UMP area. Many wells in the area were drilled during the 1940s and little information is available regarding their production. General information regarding historic drilling activity and gas production in the UMP area is provided in the paragraphs below.

Historic gas production in and immediately adjacent to the UMP area is generally associated with three fields in the Towns of Danby, Groton, and Lansing, Tompkins County with production reported from the Oriskany Sandstone. These fields were named the Danby, Groton, and Lansing Fields after the respective towns where they were located. Numerous additional wells were drilled over the years targeting the Oriskany Sandstone adjacent to these fields but they were unsuccessful. Three wells were drilled in the Danby field from 1939 through 1960. Only one well was known to have produced gas from the Oriskany Sandstone drilled to a total depth of 2,478 feet. These wells are located approximately eight miles southwest of the UMP area.

Eight wells were drilled in the Groton Field targeting the Oriskany Sandstone from 1940 through 1943. The Groton Field is located approximately six miles north of Yellow Barn State Forest. Records indicate that four of these wells produced from the Oriskany Sandstone with the total depths of these wells ranging from 1,987 to 2,192 feet. Numerous additional wells drilled to the Oriskany Sandstone to the northeast of this field between 1940 and 1949 were unsuccessful.

Three wells were drilled in 1942 targeting the Oriskany Sandstone in the Lansing Field. The Lansing Field is located approximately eight miles northwest of Yellow Barn State Forest. Two of the wells reportedly produced gas with their total depths ranging from 1,619 to 1,722 feet.

Approximately 11 miles northwest of Yellow Barn State Forest within the UMP area numerous solution salt mining wells were drilled on and adjacent to property that is currently owned by the NYSDEC (Myers Point Boat Launch). The wells were drilled between 1900 and 1950 and operated by International Salt Company. These wells have all been plugged.

### ***2. Recent Drilling and Production***

The closest natural gas commercial production is approximately 14 miles southwest of the UMP area in the Town of Van Etten, Chemung County where Talisman Energy USA Inc. drilled three wells targeting the Black River formation at an approximate depth of 9,400 feet in the Hulbert Hollow and McDuffy Hollow Fields. Production in these fields began in 2007.

The most recent drilling activity that has occurred near the state forest lands in the Unit is the Crissey #1 well drilled in 2001 and the Sega #1, #1-A, and #1-B wells drilled from 2003 through 2004. The Crissey #1 well, located in the Town of Dryden 4.5 miles due north of Yellow Barn State Forest, targeted the Oriskany Sandstone and was drilled to a total depth of 1,934 feet. The Sega wells, located in the Town of Virgil, Cortland County approximately 3.7 miles northeast of Yellow Barn State Forest, represent three sidetracks drilled from the vertical wellbore at this location which targeted the Black River formation at a depth of 7,126 feet. The Sega #1 and #1-A wells have been plugged. Chesapeake Appalachia, L.L.C. currently owns

both the Crissey #1 and the Sega #1-B wells which are temporarily abandoned and have never produced.

There have been numerous wells drilled in the northern portion of the UMP area and adjacent to the UMP area since 1998 targeting the Black River formation but none have been successful commercial producers. Columbia Natural Resources LLC drilled wells at three locations in the Town of Dryden in 1998 and 1999 approximately 3 to 5.5 miles northeast of Yellow Barn State Forest. These wells targeted the Black River and Oriskany formations but were unsuccessful and have been plugged. Several wells operated by Chesapeake Appalachia, L.L.C. located west of the UMP area were plugged back to the Queenston Sandstone from the Black River formation in 2007 but the wells are not currently in production.

Anschutz Exploration Corporation submitted an application in 2009 to drill the Cook #1 well in the Town of Dryden located adjacent to Yellow Barn State forest to the north targeting the Black River formation however, this application remains incomplete.

### ***3. Recent Leasing Activity***

An initial title review indicates New York State and the Federal Government own the mineral rights under a significant portion of State Land areas covered by this Unit. The above statement is made with the qualification that mineral reservations may exist and no expressed or implied warranty of title is being offered in this document. Both State Forests in the Twin Sheds Unit are not presently under oil and/or gas lease contracts.

### ***4. Future Leasing Activity***

Due to recent drilling and production activity related to the Trenton-Black River limestone and Marcellus shale formations, and interest in the western New York and the Finger Lakes Regions in general, the State may again receive requests to nominate lands for leasing. For further information on lease procedures, well drilling permitting procedures, historical and statistical information go to the Department's website at <http://www.dec.ny.gov/energy/205.html> or contact the NYS DEC Mineral Resource staff at (585) 226-5376 or by mail at Region 8, 6274 East Avon-Lima Road, Avon, New York 14414-9591. Additional contacts include; New York State Department of Environmental Conservation-Division of Mineral Resources- Bureau of Oil and Gas Regulation, 3rd Floor, 625 Broadway, Albany, New York 12233 (518) 402-8056.

### ***5. Gravel & Hard Rock Mining***

The bedrock outcropping or subcropping beneath surficial deposits in the UMP area generally consists of shale and siltstones of the Upper Devonian age Genesee and Sonyea Groups. Bedrock beneath Yellow Barn and Hammond Hill State Forests is mainly comprised of rocks of the Sonyea Group with shale and siltstones of the Upper Devonian age West Falls Group comprising the bedrock in some areas on hilltops. Shale can be excavated near the surface where it is weathered and used as a source of aggregate. There are currently no active shale pits or hard rock quarries on or in the immediate vicinity of the Unit.

There are additional mineral resources associated with the bedrock within the UMP area. There is an active bluestone quarry located approximately 4 miles west of Yellow Barn State Forest. Bluestone is defined as a dense, hard, indurated, fine-grained, quartz/feldspathic sandstone of Devonian Age, which is easily split along bedding planes. Commonly dark or slate gray, as well as blue, the term is applied to all varieties, irrespective of color. The bluestone mined is likely fine-grained sandstone from the Sonyea Group. Within the UMP area, approximately 10 miles northwest of Yellow Barn State Forest, there is an active limestone quarry (mining the Tully Limestone) operated by Cayuga Crushed Stone, Inc. This mine is due east of the Cargill, Inc. Cayuga Salt Mine which is an underground mining operation for the production of road salt.

Surficial deposits overlying bedrock in the Unit are predominantly glacial till with bedrock very close to the surface (within 1 to 3 meters) and occasional bedrock outcrops located intermittently on the flanks and crests of ridges and hills. Due east and west of the state forest lands in this Unit are extensive kame moraine deposits. There are also a few intermittent kame deposits due north of the state forest lands within the Unit and outwash sand and gravel deposits in the major stream valleys to the south and east of the state forests in the Unit. The kame moraine, kame, and outwash sand and gravel deposits associated with glacial meltwater fluvial systems would provide the best sand and gravel resources for potential mining operations. These types of deposits (kame moraine) only appear to be present in the extreme southwest corner of Hammond Hill State Forest.

## D. Landscape Analysis

### ***Landscape Ecology Assessment***

Ongoing research by universities and public environmental agencies suggests that ecosystem health is strongly related to biological diversity. As such, promoting and sustaining biodiversity has become the cornerstone of public land management. Biodiversity is the term used by conservation biologists to describe the entire diversity of life - encompassing all the species, genes, and ecosystems on earth (Perlman and Midler, 2005). Having a wide range of plant and animal species, land types, and ecosystems in a landscape increases biodiversity and ecosystem resiliency. Sustainable landscapes are connected to different land types by natural habitat features at many different scales and have core blocks of minimally fragmented habitat. To assess the landscape surrounding the Unit, Department foresters utilized the 2001 National Land Cover Database. The data was spatially analyzed using the Environmental Systems Research Institute's (ESRI's) ArcGIS 10 **geographic information system** (GIS) software. The Twin Shed's Unit landscape is chiefly comprised of rural forests and agriculture. Forests are clearly the most connected and most extensive landscape type in the planning Unit and, as such, play a dominant role in the function of the landscape (Forman and Godron, 1986). This **landscape matrix** is connected to other landscape types by natural features such as stream **corridors**, hedgerows and wetlands. Historically, much of the land that is presently forest was once cleared for pasture and cropland. Early farmers quickly learned that the thin, fine textured upland soils within the Unit would not support intensive agriculture. Many of the uplands in the Unit have reverted back into forest through the process of natural **succession** over the past 100 years.

Today, land use conversion, subdivision and landscape **fragmentation** is greatest within and in close proximity to the cities of Ithaca and Cortland. However, gradual residential and commercial development of agricultural and forested lands will continue to fragment the landscape and likely negatively impact the health, function and biodiversity of the region's ecosystems. Conversion of agricultural land to commercial or residential use typically reduces and/or fragments critical habitat components such as forests, hedgerows, grasslands, shrub-lands, wetlands and stream corridors. Conversion of natural landscapes to residential and commercial land use typically increases the amount of water flowing from a watershed, but also decreases its quality.

**Table 4** lists the land use **cover types** by area and relative percentage within the four watersheds from which surface water originating on Unit's land flows. For this analysis, the 11 digit hydrological unit watershed classification was used. Hydrologic Unit Codes (HUCs) are part of a U.S. Geologic Survey ([USGS](#)) [watershed classification system](#) and are based on size. A watershed and landscape analysis map is provided at the end of this plan.

<b>Table 4 - Land Cover Types in the Twin Sheds Watersheds (HUC 11)</b> <b>Note: Data is from the 2001 National Land Cover Database</b>		
<b>Land Cover Type</b>	<b>Acres</b>	<b>Percentage</b>
<b>Deciduous Forest</b>	96,013	31.5
Pasture/Hay	63,914	21.0
Mixed Forest	44,625	14.6
Cultivated Crops	32,205	10.6
Young Trees, Shrubs and Brush (Early Successional)	16,175	5.3
Woody Wetlands	15,768	5.2
Evergreen ( <b>Conifer</b> ) Forest	14,195	4.7
Developed Open Space	12,689	4.2
Developed, Low Intensity land Use	2,985	1.0
<b>Grassland</b> /Herbaceous Lands	2,712	0.9
Developed, Medium Intensity land Use	1,378	0.4
Open Water	685	0.2
Herbaceous Wetlands	644	0.2
Developed, High Intensity	378	0.1
Bedrock, Sand or Clay	225	0.1
<b>Total</b>	<b>304,591</b>	<b>100.0</b>

At the landscape scale, the unit drains into 5 smaller “sub” HUC 12 watersheds totaling about 304,592 acres or 76 square miles. According to recent satellite generated images, the Unit's landscape is about 51% forest, 21% pasture/hay, 11% cultivated crops and about 5% shrub/scrub. Evergreen forest covers about 5% of the landscape. About 6% of the landscape is considered developed; however, most of the development is considered low intensity or developed open space. High and medium intensity development covers just over one half of a percent. No extensive tracts of **old growth** forests are known to exist on the landscape. Thus, forests and agricultural lands are the dominant land cover types within the five sub-watersheds of the Twin Sheds Unit. The land cover types are further illustrated by the Watershed and Landscape Analysis Map located in the map section at the end of this plan.

### ***Critical Landscape Components***

#### ***Early Successional Habitats***

Young **seedling/sapling** and brush areas are often called early successional forests or mixed shrubland. Early successional habitat includes old fields, hedgerows, forest edges and managed forests up to about 20 years of age (Wasilco et al., 2010). This vegetation type is gradually disappearing from the landscape as farms naturally revert back into forest and as fields are developed into building lots. Early successional habitat is especially important in that it supports a high diversity of birds, mammals and reptiles (Perlman and Midler 2005). In fact, New York State's Comprehensive Wildlife Conservation Strategy developed by the DEC Division of Fish, Wildlife and Marine Resources, recognizes the value of this land cover type and identifies early successional birds as a “greatest conservation need” species group.

Early successional habitat provides unique and important habitat for many wildlife species. Species that benefit from the presence of early successional habitat include chestnut-sided warbler, golden winged warbler, yellow warbler, yellow-breasted chat, field sparrow, ruffed grouse, cottontail rabbit, woodcock, white-tail deer, and red and gray foxes. The 2001 **GAP analysis** of New York found that shrub lands comprise only 2% of the State, with “successional

shrub fields accounting for most of the cover.” Satellite imagery from the 2001 National Land Cover Database show about 3% of the state is covered by scrub/shrub cover, a very similar result. Most of the upland shrub land is privately owned state wide. However, 16% of the shrub swamp and salt shrub/maritime types are managed by state agencies. For ecosystem planning purposes, **pioneer hardwood** stands up to about 40 years of age containing a relatively high component of aspen trees are grouped with the early successional habitat type on the Twin Sheds Present and Future Major Habitat Type Maps in the map section at the end of this plan.

#### Late Successional Habitats with Old Growth Characteristics

Most of the landscape was cleared by early European settlers for agriculture. As such, the landscape lacks late successional forests with old growth characteristics such as **biological legacies** and pit and mound topography. **Late successional forests** are defined as: a forest beyond the age of economic maturity, generally beyond 100 years of age and typically contain some trees 100 to 200 years old. They may exhibit evidence of past human or natural disturbances. These forests may exist as entire stands or as smaller patches within younger stands. The term *late successional forest* implies a forest that is nearing one of potentially several old stages of forest condition after a relatively long period without a stand replacing disturbance.

*Eastern old growth forests* are conceptually described as being relatively old and relatively undisturbed by humans (Hunter, 1989). Some definitions describe old growth as a forest with trees older than 150 years with little or no human-caused **disturbance** in the forest **understory** during the past 80 to 100 years (Frelich, 1986). The Minnesota Department of Natural Resources defines old growth as forests defined by age, structural characteristics, and relative lack of human disturbance. These forests are essentially free from catastrophic disturbances, contain old trees (generally over 120 years old), large **snags**, and downed trees (1994). Experts estimate that approximately 251,000 acres (1.4% of the landscape) of old growth forest exist in New York State. These old growth forests are chiefly located in remote areas of the Adirondacks, Catskills and western New York (Leopold, 1996). No old growth forests are known to exist on the Unit or on the immediate landscape. The nearly 3 million acres of State Preserve in the Adirondacks and Catskills provide significant blocks of developing late successional forests with old growth characteristics at the state-wide landscape scale.

The DEC recognizes that *Old-Growth Forest* involves a convergence of many different, yet interrelated criteria. Each of these criteria can occur individually in an area that is not old growth. However, it is the presence of many factors that when combined, differentiate *Old-Growth Forest* from other forested ecosystems. These factors include: an abundance of **late successional** tree species, at least 180-200 years of age, a contiguous forested landscape that has evolved and reproduced itself naturally (with the capacity for self perpetuation) which is arranged in a stratified forest structure consisting of multiple growth layers throughout the canopy and forest floor. Other features include: (1) canopy **gaps** formed by natural disturbances creating an uneven canopy, and (2) a conspicuous absence of multiple stemmed trees originating from stumps, rocks, or branches.

Old growth forest sites typically (1) are characterized by an irregular forest floor containing an abundance of **coarse woody material**, which are often covered by mosses and lichens; (2) show limited signs of human disturbance since European settlement; and (3) have distinct soil horizons that include definite organic, mineral, illuvial accumulation, and unconsolidated layers. The forest understory displays well developed and diverse surface herbaceous layers.

Biological legacies are defined as the organisms, or a biologically derived structure or pattern inherited from a previous ecosystem. Biological legacies include large trees, snags and down logs after harvesting and other ecological features vulnerable to timber harvesting such as vernal pools, small forest wetlands and patches of rare or unusual plant species (Helms, 1998).

Biological legacies are lacking at the landscape level because forest ecosystems were significantly altered or converted to agricultural use during the European settlement of the region. Additionally, many privately owned forests are managed on a relatively short term basis, growing trees to a certain diameter in order to maximize return and generate income to pay for the costs of land ownership, primarily real property taxes. Short term ownership and management may lead to shorter forest harvesting intervals and lead to a reduction in biological legacy creation, conservation and retention rates.

### ***Landscape Challenges***

There are three significant long term challenges to maintaining biodiversity and the existing landscape matrix at the landscape level. First, residential and commercial development, if not properly planned, will continue to subdivide and fragment land cover on the landscape. Subdivision and conversion of rural forests and fields to other land uses will reduce available wildlife habitat and likely disrupt existing wildlife travel corridors. Second, non-native forest insects and diseases such as gypsy moth and chestnut blight, respectively, have historically damaged forest ecosystems. Introduction of new non-native insects and diseases through global trade is a significant threat to the region's forest ecosystem health. Third, many credible researchers believe that rapid global climate change related to increased global greenhouse gas emissions (largely carbon dioxide and methane) created by the burning of fossil fuels by humans will likely impact forest ecosystem health and productivity this century.

The public owns only a fraction of the Unit's landscape. New York State efforts to enhance biodiversity can be significantly enhanced by informing, educating and assisting adjacent private landowners. Private and public land stakeholder organizations such as the USDA Natural Resource Conservation Service (NRCS), the Nature Conservancy (TNC), the Finger Lakes Land Trust and Cornell Cooperative Extension can provide valuable information and education to rural forest landowners. Additionally, the DEC has a long history of providing technical assistance to forest landowners through its Cooperative Forest Management (CFM) program. All of these organizations can help provide information on many of the critical habitat components missing in the landscape.

The Unit is within the Nature Conservancy's High Alleghany Eco-region. A very detailed eco-regional landscape assessment is included in the NYS Strategic Plan for State Forest Management. The assessment and Strategic Plan helped guide the ecosystem based goals and objectives of this Unit Management Plan. The complete strategic plan can be found at: <http://www.dec.ny.gov/lands/64567.html> , 2012.

### ***State Forest Assessment***

To provide updated data for informed decision making at the State Forest level, both State Forests in the Twin Sheds Unit were re-inventoried during 2006. State Forest inventory data was collected on tree species, tree diameter, tree height, density, visible defect, **forest type**, topography and soil drainage. Additionally, in May of 2005, the New York Natural Heritage Program completed a Biodiversity Inventory of all State Forests in the Region. Data from the project was used during the development of this plan.

The DEC Region 7 Cortland Forestry Office also developed and implemented a supplemental inventory datasheet to capture natural resource features not typically collected during a forest inventory. Supplemental inventory attribution guidelines were also developed and implemented to insure that the data was organized in a consistent manner. **Table 5** illustrates the supplemental attributes collected during the State Forest inventory.

Table 5 - Supplemental Inventory Data Attributes	
Natural Resource Attribute/Feature	Description
Hydrology	Identifies various hydrologic resources at the forest <b>stand</b> level such as wetlands, ponds, streams spring seeps, waterfalls, erosion issues and beaver dams.
Herbaceous Plants	Identifies herbaceous plants observed in a forest stand related to site potential such as sensitive ferns, horsetails, blue cohosh, maiden-hair fern, trout lily, and orchids. Also notes the presence of rare and endangered plants.
Forest Health	Identifies general forest health observed in a stand; specifically stand decline, <b>blowdown</b> , <b>crown</b> damage or insect/disease issues.
Recreation	Identifies recreational activity in a forest stand. Specifically, informal camping, formal camp sites, mountain bike trails, trails for individuals with <b>MAPPWD</b> permits, e-country ski trails, hiking trails, multiple use trails and informal trail use.
Forest Treatment Recommendations	Specifies recommended treatment based on field observations at the stand level.
Safety	Identifies a public safety hazard at the stand level such as open water wells.
Forest Treatment Interval	Specifies a treatment interval in years for a given forest stand.
Forest Treatment Priority	Prioritizes stand level treatment needs.
Stand Age Structure (Present and Future)	Specified observed <b>stand structure</b> at the time of inventory; <b>even-aged</b> , <b>uneven-aged</b> or two-aged. Also provides a field for future (desired) age structure.
Wildlife Observations	Describes wildlife observed in the stand during the inventory/field inspection.
Evidence of Past Management	Identifies any past management activity in the stand as indicated by old stumps, tops, <b>skid trails</b> or tree marking paint.
Protection Zones	Identifies areas that should be considered as a special ecosystem protection zone that has the potential to develop into old growth forest or provide critical habitat for wildlife and herbaceous plant species.
Early Successional Habitats	Identifies areas that could be managed for species requiring <b>early successional habitat</b> .
Oil & Gas Conflicts	Describes potential oil and gas exploration conflicts; specifically hydrologic/wetland, recreation, unique <b>natural areas</b> , archeological, steep slopes or highly erodible soils.
Archeological Resources	Identifies archeological resources at the forest stand level; specifically features such as old foundations, stone walls or artifacts that appear over 75 years old.

It should be noted that not all the attributes listed in **Table 5** were measured or observed when the inventory was completed. Much of the inventory was conducted during fall, winter and spring. However, the State Forest Inventory Database will be updated during each 10-year forest inventory cycle, or when a forest stand is actively managed. Prior to managing a forest stand, DEC foresters develop a tree marking prescription after: evaluating the State Forest Inventory Database, reviewing the Department's GIS based Master Habitat Database and walking thru the stand. New stand data may be also be collected if the stand has significantly changed.

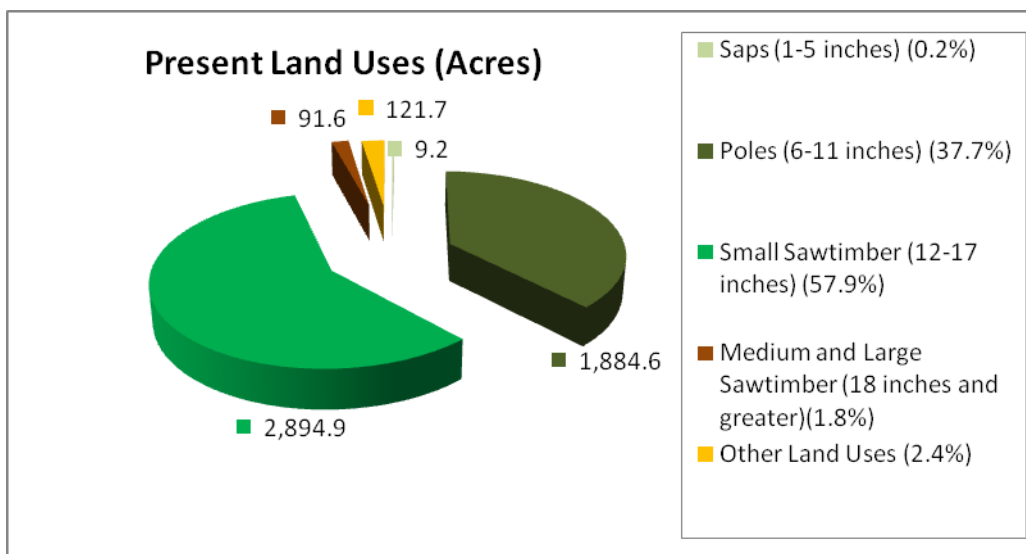
### **Spatial Analysis**

**Spatial analysis** may be defined as a process to analyze various sets of geographic based data - typically using a computer based Geographic Information System (GIS). Spatial analysis can be highly technical and mathematical or very simple and intuitive (Goodchild, 2001). The information provided by the GIS helps DEC staff make informed land management decisions at the landscape scale.

Many sources of data (information) were used to develop this plan. Specifically, data from the State Forest Inventory Database, the supplemental natural resource data presented in **Table 4**, the New York GAP Analysis Project, the National Land Cover Dataset and DEC's Master Habitat Database were used. Spatial analysis was conducted using ArcGIS 10 GIS software in order to assess land cover types on the Unit.

Results of the analysis are shown below in **Figure 3** and **Table 6**. Table 6 shows that only about 5% (252 acres) of the Twin Sheds Unit is characterized by early successional **sapling** and pioneer **hardwoods** forest. Similarly, only 2% percent (92 acres) of the Unit is characterized by forest stands with trees measuring eighteen (18) inches or greater in **diameter at breast height** (dbh). Forest stands with large diameter long lived trees such as eastern hemlock and eastern white pine have the greatest potential to provide late successional characteristics such as large coarse woody material and **den trees**. About 58% (2,895 acres) of the Unit is comprised of middle aged forest stands that are between 12 and 17 inches in diameter. For the past five to seven decades fields have grown back to forest through deliberate tree planting and through the natural process of succession. As with the surrounding landscape, the State Forests in the Unit clearly lack two important land cover types for wildlife:

- ☐ early successional forest cover and pioneer hardwoods pole sized timber with a significant aspen component (with young and relatively small trees typically less than 40 years of age)
- ☐ late successional forests with old developing growth characteristics (with a significant number of individual trees 180 to 200 years of age).



**Figure 3 - Present Land Use and Cover Types by Forest Stand Diameter**

<b>Table 6 - Present Land Uses and Cover Types by Forest Stand Diameters</b>						
		<b>Major Size Class</b>				
		1-5" Saps	6-11" Poles	12-17" Small Sawtimber	18"+ Med. & L. Sawtimber	Land Area
<b>Land Classification* (No. of Features)</b>	<b>Total (Ac.)</b>	<b>(Ac.)</b>	<b>(Ac.)</b>	<b>(Ac.)</b>	<b>(Ac.)</b>	<b>%</b>
<b>Forest Cover</b>						
Natural Hardwoods with an Oak Component (80)	1,263.3		409.9	820.6	32.8	25.3
Natural Hardwoods with Conifers (73)	1,204.6		455.1	730.2	19.3	24.1
Conifer Plantations (74)	1,033.7		433.2	600.5		20.7
Natural Hardwoods (49)	592.2		247.7	316.4	28.1	11.8
Early Successional and Pioneer Hardwoods (16)	242.5		206.3	36.2		5.0
Conifer Plantations with Hardwoods (14)	197.3		47.3	150.0		3.9
Natural Hardwoods with Oaks and Conifers (9)	170.9		11.6	147.9	11.4	3.4
Hardwood Plantations (5)	77.6		53.7	23.9		1.6
Natural Conifers (5)	58.2		5.0	53.2		1.2
Natural Hardwoods, Mostly Oak (3)	30.8		14.8	16.0		0.6
Early Successional (Seedling/Sapling) (1)	9.2	9.2				<0.2
<b>Sub-total</b>	<b>4,880.3</b>	<b>9.2</b>	<b>1,884.6</b>	<b>2,894.9</b>	<b>91.6</b>	<b>97.6%</b>
<b>Other Land Uses</b>						
Roads (Includes Town and PFAR)	51.2					1.0
Wetlands	45.2					0.9
Petroleum Pipe-line Corridor	13.3					0.3
Electric Power-line Corridor	10.2					0.2
Shale Pits (3)	1.8					<0.1
<b>Sub-total</b>	<b>121.7</b>					<b>2.4%</b>
<b>Total</b>	<b>5,002.0</b>	<b>9.2</b>	<b>1,884.6</b>	<b>2,894.9</b>	<b>91.6</b>	<b>100%</b>

**\*Notes on Land Classifications**

- ☐ Roads include town roads, seasonal town roads and **public forest access roads (PFAR's)**.
- ☐ The sapling size class represents early successional cover commonly containing small trees and shrubs.
- ☐ Pioneer Hardwoods are stands with a significant aspen component, often less than 40 years of age.
- ☐ Wetlands are areas that are classified as National wetlands and include additional small wetlands identified by DEC forestry staff during the forest inventory process. Wetlands are typically wet meadows with cattail rushes and sedges, shrubs, or forested lands along streams. Some of the wetlands on the Unit are forested with trees such as red maple and ash that tolerate low oxygen conditions, but most are best described as shrub/scrub wetlands along and connected to nearly flat or gently sloping stream corridors.
- ☐ Natural Conifers are stands that have been established without direct human intervention.

- ❑ Conifer Plantations contain trees that have been established by direct human action and are composed of species such as red pine, white pine, Scotch pine, Norway spruce, white spruce, white cedar and larch (Japanese and European).
- ❑ Conifer Plantations with Hardwoods are conifer plantations with a significant hardwood component.
- ❑ Natural Hardwood with Conifers are mixed stands that have been established without direct human intervention.
- ❑ Natural Hardwood stands have also been established without direct human intervention, but consist almost entirely of hardwood species such as sugar maple, red maple, beech, white ash and black cherry.
- ❑ Natural Hardwoods, Mostly Oak are stands dominated by northern red oak, with red maple, sugar maple, beech, black cherry and white ash as typical associates.
- ❑ Natural Hardwoods with Oaks and Conifers are stands dominated by northern red oak, with eastern hemlock, eastern white pine, white ash, beech and red maple as typical associates.

Detailed information about plant communities can be found in the publication entitled Ecological Communities of New York State (Edinger 2002).

### **Forest Stand Structure**

The updated forest inventory data was spatially analyzed to establish the existing age structure of each stand on the forest and to predict future stand structure as depicted in **Table 7**.

<b>Table 7 - Present Forest Stand Structure</b>			
<b># Features</b>	<b>Structure</b>	<b>Acres</b>	<b>Percentage</b>
205	Even-aged	2,826	56.5
108	Uneven-aged	1,651	33.0
16	Protection/Natural area (Even & Uneven-aged)	403	8.1
-	Wetlands	45	0.9
52	Non-forested	77	1.5
<b>TOTAL 381</b>		<b>5,002</b>	<b>100</b>

## **E. Wetland and Water Resources**

### ***Watershed Characteristics***

The Unit's watershed was split in half by the Valley Heads Moraine, a moraine built by the Laurentide Ice Sheet as the ice cap melted and withdrew from the region between 13,000 and 14,000 years ago. This interesting fact was the basis for calling the management unit "Twin Sheds." The moraine dammed the southern ends of the Finger Lakes and formed an east-west natural boundary line, splitting the watershed into two drainage basins. This boundary is similar in concept to the continental drainage divide of the U.S., which is created by the Rocky Mountains. Before the Finger Lakes were blocked, the Unit's watersheds drained to the south. Today, rainfall and snowmelt originating on the northern part of the unit flows north into the Greater Lake Ontario basin and the southern portion flows into the Susquehanna River basin. About 2,676 acres (53%) of the Twin Sheds Unit lie within the Oswego River/Finger Lakes drainage basin. Nearly 2,362 acres (47%) drains into Sixmile Creek and 314 acres (6%) drain into Fall and Virgil Creeks, all of which eventually flows into Lake Ontario through the Oswego River/Finger Lakes drainage basin. The remaining 2,326 acres (47%) of the Unit's watershed flows south to the Susquehanna River through Owego Creek. About 53% of the Unit directly drains into a watershed that has an "AA" classification. Watersheds classified as "AA" are used as a source of drinking water.

The Oswego River/Finger Lakes drainage basin encompasses the area drained by the Oswego, Oneida, Seneca and Clyde Rivers. The headwaters of these rivers originate along the northern edge of the Appalachian Plateau and the southwestern Adirondacks and flow across the central

lowlands before emptying into Lake Ontario (DEC Division of Water, 2008). The basin is one of the largest in the state, draining 5,070 square miles (11%) of New York State. The most recent Oswego River/Finger Lakes Basin Waterbody Inventory/Priority Waterbodies List Report provides additional detail on the basin and is available at <http://www.dec.ny.gov/lands/48023.html>, 2012.

The Susquehanna River basin covers about 4,500 square miles (10%) of New York State and contains about 5,500 miles of rivers and streams. It is the second largest river basin - next to the Ohio River Basin - east of the Mississippi River and the largest on the Atlantic seaboard (DEC Division of Water, 2009). Due to the primarily rural-agricultural character of the Susquehanna River Drainage Basin, most water quality issues in the basin tend to be the result of agricultural activities and other **nonpoint sources** that are becoming a growing concern all across the state and throughout the country. Within the basin, stream bank erosion and various agricultural activities result in **riparian buffer** loss and excessive nutrient and sediment loading to tributary watersheds. The 2009 Susquehanna River Basin Waterbody Inventory and Priority Waterbodies List, published by DEC's Division of Water, provides additional detail on the basin and is available at <http://www.dec.ny.gov/lands/48020.html>, 2012.

### **Streams**

A combination of activities such as land clearing, plowing of the ground, road building and the construction of municipal storm water drainage systems gradually reduced stream water quality throughout the state and the region. As rapid settlement of the region took place, forest cover was lost, increasing soil erosion and stream sedimentation. Stream temperatures also increased. As a consequence, water clarity and dissolved oxygen levels decreased, reducing habitat quality for cold water species, particularly wild brook trout. Additionally, small streams were dammed to harness energy from the flowing water to run sawmills, breaking the connections between smaller and larger stream ecosystems necessary for fish spawning. With time, the water quality of the Unit's streams has gradually improved with the return of forest cover, the creation of water quality protection regulations and the implementation of **best management practices**.

Today, about 20.4 miles of both year around and seasonal flowing streams flow within the Unit. Of these, 5.2 miles are class A (drinking water quality) waters, 0.8 miles are class A(T) (drinking quality/trout waters), 1.2 miles are class C(T) (trout quality waters) and 4.9 miles are class C (suitable for fish) quality waters. Additionally, about 8.3 miles of smaller headwater streams without a specific water classification have been mapped. Fishing for wild brook trout on the small headwater streams of the Unit is limited but probably does occur. Historically, protected status was given to streams where trout had been collected or were considered, by observation, to be suitable for trout at the time the DEC Protection of Waters Program began. Protected status can be attained for unprotected streams now supporting trout following an evaluation of the stream by DEC Bureau of Fisheries staff.

The streams associated with the Sixmile Creek watershed are all designated as Class "A" (drinking water) streams primarily because Sixmile Creek is the main water supply for the City of Ithaca. Many of the streams in the Sixmile Creek watershed are also protected trout streams. Additional information on DEC's Protection of Waters Program is available at <http://www.dec.ny.gov/permits/6042.html>, 2012)

Few fish sampling surveys have been carried out on the Sixmile Creek watershed within the Twin Sheds Unit. In 1978, landlocked salmon were collected in a section of Sixmile Creek in Hammond Hill **State Forest** during a survey to evaluate the success of a Cayuga Lake tributary salmon **stocking** program which was conducted in the late 1970s and early 1980s. Fingerling salmon were stocked in the headwater areas of some of Cayuga Lake's larger tributaries where they spent one or two years before entering the lake. Once in Cayuga Lake, these fish

contributed to its important coldwater sport fishery. The tributary stocking program was eventually discontinued and replaced with direct lake stocking of yearling landlocked salmon. Also collected during the 1978 survey were brook trout, brown trout, white sucker, sculpin, central stoneroller, longnose dace, blacknose dace and creek chub. Given the remote headwater location of this survey, the brook trout and brown trout collected were likely wild fish. The other fish species collected in the 1978 survey were typical of those inhabiting streams in the Oswego River watershed such as blacknose dace, slimy sculpin and tessellated darter. As such, survey results suggest other unsurveyed streams in the Unit may support wild brook trout.

Fish survey work will be conducted in the future throughout the Sixmile Creek watershed within the Twin Sheds Unit to determine the current extent of wild trout inhabitation. A 5.4 mile long section of Sixmile Creek between Creamery Road and Banks Road in the Town of Caroline located just downstream of the Twin Sheds Unit is stocked with yearling brown trout. Maintaining good water quality in the Twin Sheds Unit is essential to the well-being of these fish as well as the wild fish residing throughout Sixmile Creek.

There is currently a major project proposed by the City of Ithaca to dredge its navigable waterways which include the Ithaca Flood Control Channel, Cayuga Inlet and the lower reaches of Sixmile Creek, Fall Creek and Cascadilla Creek. Suspended sediment from the mid reach of Sixmile Creek is a significant source of the material to be dredged. The Department is an active participant in the planning and design of this project. It is important that the other active participants (City of Ithaca, USACE, NYSCC, etc.) are aware that the Department is doing everything reasonably possible to minimize siltation in Sixmile Creek within the Twin Sheds Unit.

### ***Freshwater Wetlands***

The Twin Sheds Unit has valuable water resources as the Unit has 17 **national wetlands** covering about 13 acres in total that range from 1/3 of an acre to almost 5 acres in size. Most of these small wetlands are classified as Palustrine Wetlands in the National Wetlands Inventory. Palustrine wetlands are low places that collect water to a depth of only a few inches or feet. The Palustrine System was developed to group the vegetated wetlands traditionally called by such names as marsh, swamp, bog, fen and prairie, which are found throughout the United States (Cowardin et al. U.S. Fish and Wildlife Service, 1979). Such wetlands are often dry during a portion of the year. Most of these wetlands exist along the floodplains of small stream channels. In addition, DEC forestry staff identified 32 acres of scrub-shrub, emergent and **forested wetlands** in the Unit while conducting forest inventory. Thus, in total, the Unit has about 46 acres of wetlands. There are no **DEC regulated wetlands** on the Unit.

Wetlands significantly impact how water moves within a watershed by absorbing, storing and slowing down the movement of rain and melt water, thereby minimizing flooding and stabilizing stream flow. In many cases, wetlands serve as groundwater recharge and discharge sites. In doing so, wetlands help maintain water levels in streams, rivers, ponds and lakes - especially during the summer months. Additionally, wetlands are one of the most productive habitats for feeding, nesting, spawning, resting and cover for fish and wildlife, including many rare and **endangered species**. Additional information is available on DEC's Freshwater Wetland Program is available at <http://www.dec.ny.gov/lands/4937.html>, 2012).

### **Spring Seeps**

Many spring seeps and some vernal pools can be found on the property. These spring seeps and vernal pools enhance the biodiversity of the entire parcel as they enhance wildlife habitat. Spring seeps are broad shallow flows that occur where groundwater emerges on sloping terrain usually on the lower slopes of hillsides and mountains.

Spring seeps are valuable to wildlife, particularly wild turkey in severe winters because the emerging groundwater provides snow-free feeding sites in winter and are among the first sites to provide green plants in spring. Spring seeps are used by amphibians such as the Jefferson salamander, spotted salamander and by **neotropical migratory birds** such as the veery and wood thrush.

### ***Vernal Pools and Ponds***

Vernal pools and ponds are small areas that are wet in the spring of the year. Vernal pools and ponds derive their name from *vernal*, the Latin word for spring, because they result from various combinations of snowmelt, precipitation, and high water tables associated with the spring season. The ponds tend to occur in small depressions and while many dry up in late summer, a few have water year round. By definition, vernal pools and ponds are free of fish and can support a rich **community** of amphibians and invertebrates that would be difficult to sustain if fish were present ([http://www.na.fs.fed.us/spfo/pubs/n\\_resource/wetlands/](http://www.na.fs.fed.us/spfo/pubs/n_resource/wetlands/), 2012).

## **F. Wildlife Resources**

The State Forests of the Twin Sheds Unit and the surrounding landscape are home to a wide range of wildlife. As previously mentioned, the State Forest inventory procedure was enhanced to include collection of data related to wildlife resources. DEC has also relied on several peer reviewed resources and surveys to predict which species can be potentially found on or near the Unit.

The New York GAP Analysis Project (NY GAP), a project led by United States Geological Survey, New York Herp Atlas and Breeding Bird Atlas studies were combined with state forest inventory and field observations to help obtain a “snap-shot” of the wildlife that potentially frequent the State Forests and surrounding landscape. The United States Geological Survey (USGS) states that “GAP analysis is a scientific means for assessing to what extent **native animal and plant species** are being protected. It can be done at a state, local, regional, or national level.” GAP analysis is a **coarse filter approach** to biodiversity protection. “The land cover types mapped in GAP analysis serve directly as a coarse filter, the goal being to assure adequate representation of all native vegetation community types in biodiversity management areas” (Smith et. al, 2001). Additional information on the NY GAP Analysis Project is available at ([http://iris.css.cornell.edu/GIS\\_NYS\\_GAP.html](http://iris.css.cornell.edu/GIS_NYS_GAP.html), 2012).

The goal of GAP analysis is to maintain the highest level of biodiversity possible by protecting habitats that support rare and **endangered species** and hot spots of species richness in a network of conservation areas. In addition, GAP analysis strives to “keep common species common” by identifying those species and plant communities that are not adequately represented in existing conservation lands. Common species are those not presently threatened with extinction. By identifying their habitats, GAP analysis gives land managers, planners, scientists, and policy makers the information they need to make better-informed decisions when identifying priority areas for conservation.

NY GAP came out of the realization that an ecosystem based land management strategy at the landscape level is an effective way to address loss of biodiversity. Many researchers believe that a species-by-species approach to conservation is not effective because it does not address the continual loss and fragmentation of natural landscapes. “Only by protecting regions already rich in habitat, can we adequately protect the animal species that inhabit them”. NY GAP, which was developed as part of a nationwide initiative by the University of Idaho, uses predictive modeling to map species that breed or use habitats in a given landscape. To predict their distributions, species are associated with mapped habitat characteristics using computerized GIS tools. The resulting maps are checked for accuracy against verified checklists and public reports of species occurrences and peer reviewed by experts species by species. The ability to

successfully map natural communities and species in terrestrial as well as aquatic environments is the result of recent advances in science, technology, and effective partnering of federal, state and private conservation agencies.

To help assess biodiversity, NY GAP uses the U.S. EPA's Environmental Monitoring and Assessment Program (EMAP) hexagon mapping unit. EMAP is a national research program that is developing the tools necessary to monitor and assess the status and trends of national ecological resources. EMAP's goal is to develop the scientific understanding for translating environmental monitoring data from multiple spatial and temporal scales into assessments of present ecological condition and forecasts of future risks to our natural resources.

EMAP aims to advance the science of ecological monitoring and ecological risk assessment, guide national monitoring with improved scientific understanding of ecosystem integrity and dynamics, and demonstrate multi-agency monitoring through large regional projects. EMAP develops indicators to monitor the condition of ecological resources. EMAP also investigates designs that address the acquisition, aggregation, and analysis of multiscale and multilayer data (<http://www.epa.gov/emap/>, 2012). The Unit lies within EPA EMAP hexagon 420. The EMAP hexagon is based on the EPA's global hexagonal grid system. Each hexagon is approximately 160,200 acres in size, or about 250 square miles.

### ***Reptiles and Amphibians***

The New York Gap Analysis Project confirmed or predicted 41 species of reptiles and amphibians within EMAP hexagon 420. Confirmed species are known to exist within the EMAP hexagon; occurrence of predicted species is forecasted by the NY GAP model. Predicted species have not been confirmed on the ground within the hexagon. **Appendix A-4** lists amphibians and reptiles predicted or confirmed by NY GAP in EMAP hexagon 420. The New York State Amphibian and Reptile Atlas lists and confirms 22 reptiles and amphibians within the USGS Dryden quadrangle map that covers the Unit.

Amphibians and reptiles are vertebrates like birds and mammals, but they are fundamentally different in one important way. Frogs, toads and salamanders are amphibians, while turtles, snakes and lizards are reptiles. The word "herp" is short for herpetofauna, which is the general term for amphibians and reptiles as a group. Herps are cold blooded, whereas birds and mammals are warm blooded. Warm blooded animals must eat regularly to fuel the biochemical mechanisms producing body heat. As such, most warm blooded animals are active year round (Partners in Amphibians and Reptile Conservation, 2003). In contrast, cold blooded animals such as salamanders and turtles are only active during the late spring, summer and early fall during warmer temperatures. Amphibians do not have scales, feathers or fur to insulate their bodies, so they are especially sensitive to changes in temperature and humidity. Most amphibians require moist habitats such as a shaded forest floor. Reptiles are covered in scales and are therefore less vulnerable to changes in temperature and humidity.

While encounters with some herps, such as frogs or toads can heighten some people's trips afield, the herps as a group include many species, which often go unnoticed other than to those specifically looking for them. Despite this, herps are an important group, as their presence, absence and relative abundance are an indicator of the ecological health of a site. Naturalists, scientists and land managers agree that local habitat destruction is the primary cause of reptile and amphibian declines in the northeast. Activities such as urbanization, wetland destruction, subdivision, stream channelization and poorly planned agriculture and/or timber harvesting are the primary causes of habitat destruction and loss.

### ***Principal Reptile and Amphibian Habitats Provided by the Twin Sheds Unit***

***Late Successional Forest Habitat*** - The Unit provides extensive forest cover, often with late successional characteristics such as coarse woody material, moderate to heavy shade and cool moist forest floor conditions. Amphibians such as the red backed salamander, northern dusky salamander, spotted and Jefferson salamander complexes require this type of habitat. The red backed salamander can reach very high densities in northeastern hardwood forests. The biomass (combined weight of all individuals) can be more than all the mammals combined and equal to all the birds combined (Partners in Amphibian and Reptile Conservation, 2003). Salamanders are of vital importance to the ecosystem as a whole because they consume invertebrates and serve as prey for other vertebrates (Crawford and Semlitsch, 2007).

**Appendix A-4** summarizes the specific species confirmed or predicted to occur within and near the Unit based on data from the NY GAP Analysis Program and the HERP Atlas. Information on the HERP Atlas Project is available at: <http://www.dec.ny.gov/animals/7140.html>.

***Ponds, Vernal Pools/Ponds, Wetlands, Seepages, Spring and Stream Habitats*** - The lands of the Unit also provide about 20 miles of headwater stream corridors, 45 acres of wetlands, many seepages and scattered vernal pools/ponds that provide valuable habitat for several species of salamanders, frogs, snakes and turtles.

### ***Mammals***

The NY GAP predicts or confirms 52 species of mammals on the Unit's landscape. Adaptive forest management that provides young, middle and old-aged forests will help diversify the landscape and contribute toward maintaining a diverse population of mammals. State Forests are home to the majority of Norway spruce plantations of Upstate New York's rural landscape, which provide unique habitats for mammals such as the red squirrel. Large blocks (500 acres or more) of forest with late successional characteristics provide unique habitats for mammals such as silver-haired bat, eastern red bat, and hoary bat, northern flying squirrel and black bear. The Twin Sheds Unit and the private lands that surround it provide a matrix of different landscape and cover types for a wide range of mammals. **Appendix A-5** lists the mammals predicted or confirmed by NY GAP in EMAP hexagon 420.

### ***Principal Mammal Habitats Provided by the Twin Sheds Unit***

***Late Successional Forest Habitat*** - The State Forests in the Unit can provide a substantial block of connected forests that are developing late successional forest habitat characteristics. Late successional forest habitat provides important open space and habitat for mammals that require blocks of forest with late successional forest characteristics (typically with 65% or greater average canopy closure) such as the black bear, bobcat, fisher, smokey shrew, pygmy shrew and northern flying squirrel. This type of forest cover also provides hollow trees and snags that act as homes for animals such as the gray squirrel, red squirrel, northern flying squirrel, Keen's myotis (bat), Indiana myotis (bat), little brown myotis (bat), silver-haired bat, red bat, hoary bat and raccoon.

***Long-Lived Conifer Forest Habitat*** - The State Forests in the Unit provide significant long term and critical open space habitat for mammals that require conifer cover in the form of Norway spruce, white spruce, red pine, larch and white pine plantations. All of these species growing on the correct site, and in the absence of a stand replacing event such as a wind storm, can be long lived. The Unit also has areas of natural eastern white pine and eastern hemlock, often mixed with natural hardwoods. Conifer forests moderate temperature extremes and thereby provide winter thermal cover. Mammals that require or benefit from conifer cover include the red squirrel, snowshoe hare, white tailed deer and bobcat.

***Early Successional Forest Habitat*** - The State Forests in the Unit presently provide a small amount of critical early successional forest habitat (seedling/sapling and brush growth) for mammals. Many mammals benefit from a variety of habitats and **edges** with adjacent cover

types. Species that use brushy areas include the red fox, gray fox, white tailed deer, eastern cottontail, woodland vole, eastern chipmunk, woodchuck, southern bog lemming and meadow jumping mouse. Early successional habitats are disappearing from the surrounding landscape as forests grow and mature in the landscape. Early successional habitat is also gradually being lost through subdivision and urban sprawl. As such, early successional habitat will continue to decrease with time unless steps are taken to deliberately create, enhance and sustain new habitat, particularly on publicly managed lands. There is no consensus within the scientific community as to what is the optimal percentage of the landscape occupied by early successional cover. However, many bird and mammal species dependent on early successional habitat are declining in population, and will benefit from the creation and maintenance of this habitat type.

### ***Ponds, Vernal Pools/Ponds, Wetlands, Seepages, Spring and Stream Habitats***

The 45 acres of wetlands and 20 miles of headwater streams on the Unit provide valuable shallow freshwater habitats and travel corridors for mammals that live, visit and reproduce on the State Forests.

### ***Birds***

One of the best available inventories of bird populations is the NYS Breeding Bird Atlas (BBA). The BBA is a comprehensive, statewide survey that reveals the present distribution of breeding birds in New York. The New York State Ornithological Association and the DEC sponsor the project in cooperation with the New York Cooperative Fish and Wildlife Research Unit at Cornell University, Cornell University Department of Natural Resources, Cornell Laboratory of Ornithology, and Audubon New York. The backbone of the atlas is a dedicated group of volunteers who do the actual on the ground survey. Originally conducted from 1980 to 1985, the 2000 BBA shows a change in bird occurrence in parts of the state.

The breeding bird survey areas are organized into ten regions based upon the "Kingbird" reporting regions for the New York State Ornithological Association. One or two Regional Coordinators are responsible for seeing that all of the blocks in their region are surveyed. Each block measures 5 x 5 km (3 x 3 mi); there are 5,335 blocks in the entire state. BBA volunteers visit various habitats within their assigned block(s) and record evidence of breeding for the birds they see, using defined breeding codes. The State Forests in the Twin Sheds Unit fall within BBA blocks 3869A, 3869B, 3869D, 3870C and 3870D. In 2000, 134 different bird species were observed in the BBA blocks that intersect the State Forests of the Twin Sheds Unit; of these, 87 species of birds were classified as confirmed breeding. As an additional measure of bird species diversity, the NY GAP estimates 173 bird species use the habitats within and surrounding the Unit. Appendices A-6 and A-7 provide additional detail. Information on the Breeding Bird Atlas is available at <http://www.dec.ny.gov/animals/7312.html>.

Why are birds important? The opportunity to hear and see birds enhances the field experiences of many people. Moreover, diversity and size of bird populations are related to overall ecosystem health - on a local, regional and global scale. Region wide, there are several species of birds identified on the Unit which are known to be suffering declines and are of conservation concern. Many of the birds that are of conservation concern such as the Henslow's sparrow, black-billed cuckoo and prairie warbler require early successional (brush and young trees) or grassland habitat to breed and nest. Some species of conservation concern such as the Cerulean warbler require larger tracts (greater than 500 continuous acres) of **mature forest cover** with late successional characteristics to successfully nest and reproduce. Other species, such as the woodthrush and northern saw-whet owl, use a variety of habitats. Many of the birds that visit or breed in the region are neo-tropical migrants. Neo-tropical migrants nest and breed in the north and fly south to warmer climates in the winter.

It is suspected that habitat change is responsible for the decline in the bird species mentioned above. In the Central Appalachian region, millions of acres of former agricultural land have reverted to back to forest over the past 100 years. This changing habitat creates opportunities for some bird species and represents a potential threat to species that require early successional vegetation habitats and grasslands. Researchers suspect that changes in land use in Central and South American winter habitat may be impacting neo-tropical migrant bird populations as well.

The U.S. Fish and Wildlife Service (USFWS) uses the North American Bird Conservation Initiative (NABCI) Bird Conservation Regions (BCRs) to track bird populations across the North American landscape. The purpose of NABCI is to ensure the long-term health of North America's native bird populations through cooperation between public and private North American conservation organizations. BCRs are ecologically defined units that provide a spatial framework for bird conservation across the North American landscape (U.S. Fish and Wildlife Service, 2002). BCRs are being used to help assign "conservation priority" scores for bird species. Each BCR, regardless of internal political boundaries, has its own priority species list. Species contained on a given BCR list are ranked by conservation importance according to a standardized set of criteria determined by partners from Mexico, the United States and Canada. Derived BCR lists of priority species help guide conservation activities throughout the continent (<http://www.bsc-eoc.org/international/bcmain.html>, 2012).

The Twin Sheds Unit falls within the Appalachian BCR (region 28). In the report entitled *The Birds of Conservation Concern 2008*, the USFWS identifies several birds of concern that are known to exist within or near the Unit. **Table 8** summarizes the bird species of conservation concern that have been observed within Unit's landscape, and describes the basic habitat requirements for each bird, respectively.

<b>Table 8 - U.S. Fish and Wildlife Service Birds of Conservation Concern in the Twin Sheds Unit's Landscape</b>	
<b>Common Name</b>	<b>Habitat Requirements</b>
Blue-winged Warbler	Edges of woods, bushy overgrown fields or borders of wooded swamps. Prefers old fields with saplings greater than 10 feet tall (Robbins et al.1966). Often near streams (DeGraaf and Rudis, 1986).
Canada Warbler	Breeding habitat is lowland and upland habitats, including swamps, streamside thickets, brushy ravines, moist forests and regenerating timber cuts, (Ellison 1984, Smith 1994, Conway 1999). They forage among shrubs and primarily nest on the ground (Vermont Institute of Natural Science 2005).
Cerulean Warbler	Typically found in mature forested areas with large and tall trees of broad-leaved deciduous species and an open understory, but may also inhabit wet bottomlands, some second-growth forests and <b>mesic</b> upland slopes (Audubon, 2005).
Golden-winged Warbler	Prefers early successional habitats for nesting. Recently abandoned farms and <b>regeneration</b> harvests are ideal. These habitats, however, do not last long, and the warbler often quickly disappears from an area. Return of forest cover is reducing available breeding habitat (Cornell lab of Ornithology Website, 2005).
Henslow's Sparrow	Breeds in weedy grasslands of the east-central United States. Its population numbers have declined steadily over the past few decades, largely because of habitat loss (Cornell Lab of Ornithology Website, 2005).
Kentucky Warbler	Bottomland hardwoods and woods near streams with dense understory, often at low elevations. Rarely observed in agricultural habitats (Robbins et al. 1992). Well-developed ground cover for ground nesting, and a thick understory, are essential (Cornell lab of Ornithology Website, 2005).

<b>Table 8 - U.S. Fish and Wildlife Service Birds of Conservation Concern in the Twin Sheds Unit's Landscape</b>	
<b>Common Name</b>	<b>Habitat Requirements</b>
Louisiana Waterthrush	Moist forest, woodland, and ravines along streams; mature deciduous, mixed floodplain and swamp forests. Prefers areas with moderate to sparse undergrowth (Prosser & Brooks 1998) near rapid-flowing water of hill and mountain streams (Brown et al. 1999).
Prairie Warbler	Optimal breeding habitats are usually associated with poor soils and include brushy dune/lakeshore communities, fallow fields with scattered trees, young jack pine stands, pine plantations (especially Christmas tree plantings), oak clearcuts and power line right-of-ways (Evers 1994). Large openings surrounding or containing clumps of shrubs are typical components of breeding habitat (USFWS, 2005).
Red-headed Woodpecker	Prefers open areas with <b>snags</b> and lush herbaceous ground cover. Breeds in lowland and upland habitats, river bottoms, wooded swamps, groves of dead and dying trees and beaver swamps (DeGraaf and Rudis, 1986).
Upland Sandpiper	Requires large open grasslands and shows a preference for nesting, feeding, and courtship in vegetation less than 2 feet tall (Ailes 1976, Kirsch & Higgins 1976), most commonly in areas interspersed with taller grasses which provide concealment (Johnsgard 1981, White 1988, Carter 1992). Birds require open areas 125 acres or greater in size.
Whip-poor-will	Dry, open, predominantly deciduous woodlands, often will use small to medium trees of oak, pine and beech (DeGraaf and Rudis, 1986).
Wood Thrush	Requires moderate to dense understory & shrub density with a lot of shade, moist soil, and decaying leaf litter. Shows much variation in habitat use, from mature deciduous forests to shrubby second-growth forests and suburban parks in the Northeast to riparian habitats in the Great Plains (Corned Lab of Ornithology Website, 2005).
Worm-eating Warbler	Well-drained upland deciduous forests with understory patches of mountain laurel or other shrubs, drier portions of stream swamps with an understory of mountain laurel, deciduous woods near streams; almost always associated with hillsides.
<i>Note: Breeding bird atlas data, including applicable global and state listings - and New York status as a game, special concern, protected, threatened or endangered species is included in the appendix section of this plan.</i>	

### ***Principal Bird Habitats Provided by the Twin Sheds Unit***

The Twin Sheds State Forest Unit and its surrounding landscape provide significant habitats for many species of breeding birds. It is apparent to the casual observer that the landscape provides many valuable habitats as demonstrated by the richness of breeding bird species within and surrounding the Unit. The Twin Sheds Unit's State Forests provide four important and critical bird habitats.

**Late Successional Forest Habitat** - The Unit has managed uneven-aged forest, along with natural and protection areas that provide significant blocks of forest canopy with late successional forest characteristics (with 65% or greater average canopy closure). This type of cover provides habitat for neotropical migrant birds that are moderate to high in conservation priority in the region such as the wood thrush, scarlet tanager, Louisiana waterthrush and black-throated blue warbler. Other birds that prefer mature deciduous and mixed coniferous-deciduous forests include the red-eyed vireo, veery, American redstart, ovenbird, blue headed-vireo, black throated green warbler and yellow-bellied sapsucker.

Additionally, habitats with late successional characteristic, when compared to other forest cover, tend to have higher densities of live or dead hollow trees greater than 10 inches in diameter at breast height that provide homes and/or forage areas for cavity nesting birds. These birds include the: northern flicker, yellow-bellied sapsucker, black-capped chickadee, downy woodpecker, hairy woodpecker, red-bellied woodpecker, eastern screech owl, great crested

flycatcher, wood duck and pileated woodpecker. The managed uneven-aged forest also provides nesting habitat for raptors (birds of prey) that require extensive forested areas such as the northern goshawk.

*Long-lived Conifer Habitat* - The **long-lived conifers** on the Twin Sheds Unit provide important habitat for a **suite** of bird species requiring conifers such as the Magnolia warbler, Blackburnian warbler, pine warbler, yellow-rumped warbler, red-breasted nuthatch and black throated green warbler. Mature tall conifers also provide important nesting habitat for raptors such as the northern goshawk and sharp shinned hawk.

*Early Successional Forest Habitat* - Early successional seedling/sapling sized forest provides critical habitat for a suite of birds that require young dense vegetation for breeding, nesting, and foraging. Bird species that require such habitat include the ruffed grouse, American woodcock, white-throated sparrow, American goldfinch, rufous-sided towhee, chestnut sided warbler, yellow warbler, blue winged warbler, white-eyed vireo, alder flycatcher, willow flycatcher, least flycatcher, hermit thrush, brown thrasher, Indigo bunting and gray catbird. In fact, New York State's Comprehensive Wildlife Conservation Strategy recognizes the value of this land cover type and identifies early successional birds as a "greatest conservation need" species group.

*Ponds, Vernal Pools/Ponds, Wetlands, Seepages, Spring and Stream Habitats.* The 20 miles of headwater streams and 45 acres of wetlands provide habitat for birds that require water in close proximity for breeding, nesting or foraging. Specifically, the streams, pools, and shallow wetland waters provide habitats for birds such as the tree swallow, Kentucky warbler, Louisiana waterthrush, worm eating warbler, wood duck, hooded merganser, mallard, American black duck, blue wing teal, green heron and Canada goose.

### **Major Game Species**

Several game or furbearer species exist on the Unit. A few species of high importance with regards to use demands, habitat management needs or impact to forest ecosystems are discussed below.

### **White-tailed Deer**

White-tailed deer are an important component of the Unit's wildlife, both for their recreational value and their capacity to impact other resources and human activities and interests. The recently published NYSDEC Management Plan for White-tailed Deer in New York (2012-2016) outlines the components of New York's deer management plan in a single document. It also provides a strategic direction for deer management in New York over the next five years. The plan describes six primary goals identified by DEC that encompass the current priorities for deer management and the values and issues expressed by the public: 1) manage deer populations at levels that are appropriate for human and ecological concerns; 2) promote and enhance deer hunting as an important recreational activity, tradition and management tool in New York; 3) reduce the negative impacts caused by deer; 4) foster understanding and communication about deer ecology, management, economic aspects and recreational opportunities while enhancing DEC's understanding of the public's interest; 5) manage deer to promote healthy and sustainable forests and enhance habitat conservation efforts to benefit deer and other species; and 6) ensure that the necessary resources are available to support the proper management of white-tailed deer in New York. DEC seeks to achieve these goals through implementation of sound scientific management principles in a manner that is responsive to the complex ecological, cultural, recreational, and economic dynamics associated with deer in New York. The complete NYSDEC Management Plan for White-tailed Deer is available at:

<http://www.dec.ny.gov/animals/7211.html>

According to the NYSDEC Management Plan for White-tailed deer, successful deer population management requires assessing public desires, ecological impacts and population trends. Then

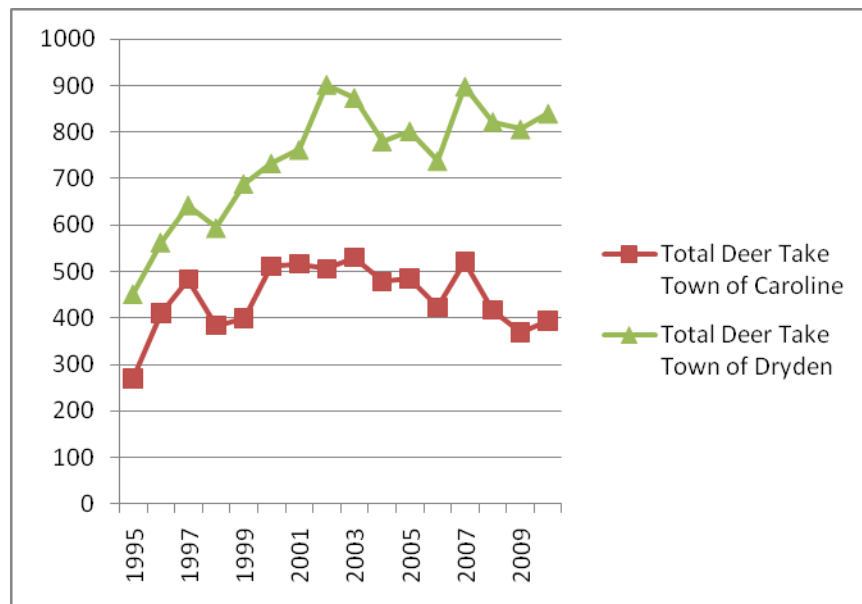
goals and management activities can be identified, implemented and evaluated. Though estimates of deer population abundance and density are frequently sought by the public, meaningful estimates are difficult and expensive to acquire for free-ranging deer populations. Moreover, population estimates may not provide essential information for management. Rather, deer managers use indices to monitor trends in population size, condition and impact on the environment. Together, these factors are more valuable than precise knowledge of the number of deer.

In New York, DEC uses the annual buck harvest, expressed as bucks taken per square mile and deer sighting rates by bowhunters as methods to monitor changes in deer population size. However, as patterns in access to land for deer hunting become less uniform and hunters become more selective by choosing not to take young, small-antlered bucks, annual buck harvest density may become a less sensitive index of population change. To compensate, DEC is exploring mechanisms to enhance current indices and integrate alternative methods to monitor population trends. DEC utilizes Citizen Task Force(s) (CTF) to set a DEC Wildlife Management Unit (WMU) deer population objective. The CTF process convenes representatives from various community interests, i.e. farming, forestry, hunting, highway safety, ecology and small businesses. The task force provides a way for these potentially affected interest groups to share interests and concerns, and ultimately make a recommendation on the desired deer population.

This process seeks to obtain a community view on appropriate deer numbers and requires compromise by many participants, since all interests cannot be fully satisfied. Deer management permits are issued by the Department's Division of Fish and Wildlife, Bureau of Wildlife, to control the number of female deer taken by hunters in each Unit. Citizen Task Forces are formed in each WMU to represent the various community interests in deer management. Task forces consider hunting and agricultural interests, the number of deer/auto collisions, damage to residential landscaping and any other impacts deer have on society. They then make a recommendation as to how many deer they want to see in any given Wildlife Management Unit – more, less or the same. The Department's Bureau of Wildlife then sets the quota of deer management permits that will be issued to move the deer population in the direction recommended by the task force.

The most recent CTF for WMU 7R to update deer population objectives was completed in 2009. The current CTF recommendation is to maintain the current deer harvest intensity in WMU 7R with a Buck Take Objective of 2.7 bucks per square mile. The

BTO is the average number of bucks per square mile expected to be taken when the deer population is at the level recommended by the task force. Prior to 2009, the CTF met during the winter of 2003-2004. At that time, the CTF recommended that the deer the population be reduced by 35%. The Unit's Buck Take Objective (BTO) was then adjusted to its current value

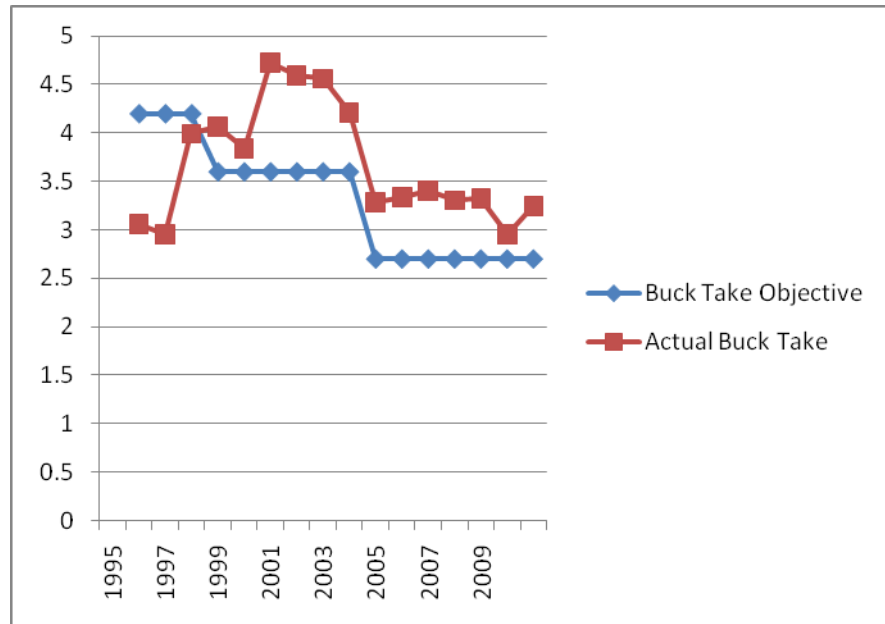


**Figure 4A - Deer Take by town**

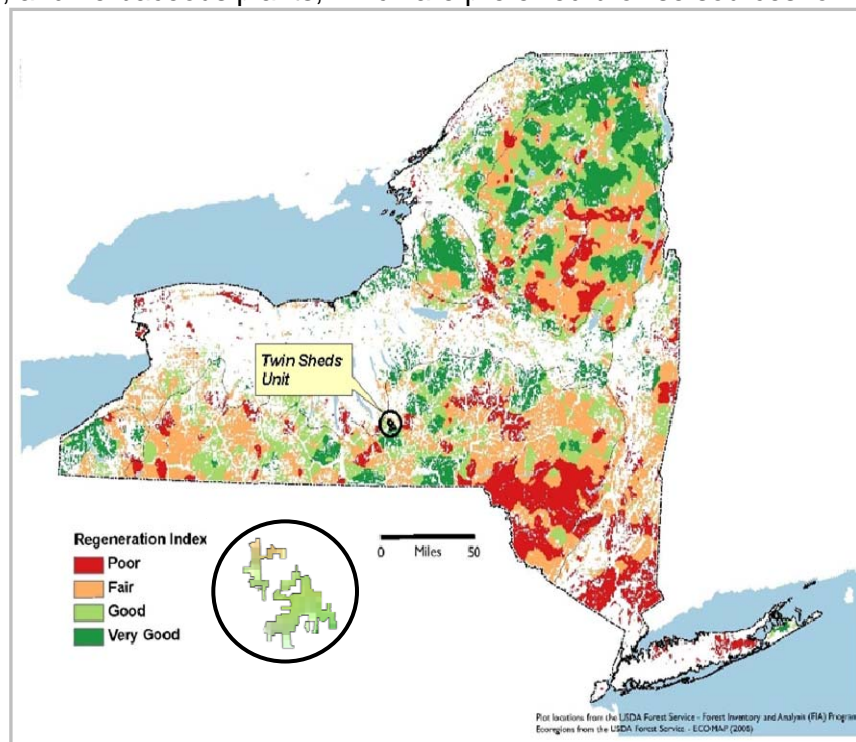
of 2.7 bucks per square mile. The Department's Bureau of Wildlife monitors the deer population and annually adjusts the quota of deer management permits available to hunters to maintain a Unit's deer population at the level recommended by a task force. Figure 4A shows the deer take in the two towns that comprise the Twin Sheds Unit from 1995 to 2010. Figure 4B compares the actual buck take to the BTO in WMU 7R for the same period. For the period, deer population levels appear to have peaked from 2001 to 2002. It also appears as though the downward trend reversed in 2010.

Research on the Allegheny National Forest has shown that high deer populations over an extended period of time can negatively impact **species richness** and the overall productivity and health of forest ecosystems (Marquis, 1981). In portions of the Allegheny National Forest in northwestern Pennsylvania with excessive deer populations, researchers have noted changes in the forest understory associated with excessive deer **browse**. In some areas, specific trees, shrubs, and herbaceous plants, which are preferred browse sources for deer such as birch, ash, witch hobble, sumac, wild raisin, blueberry and wintergreen, have become scarce in the forest understory. Lack of a herbaceous/shrub layer leads to higher nest predation of ground-nesting and shrub-nesting birds. It also directly alters the habitat and food sources for small mammals.

In 2010, an assessment of data from the USDA Forest Inventory and Analysis (FIA) program by the Eastern Chapter of the Nature Conservancy indicated that regeneration was adequate in 43% of the U.S. Forest Service inventory plots for species



**Figure 4B - Objective Vs. Actual Take WMU 7R**



**Figure 5 - Predicted Values for Regeneration Index of Desirable Timber Species in New York State**  
Source: The Nature Conservancy, Eastern New York Chapter

with substantial timber value at the state-wide level (Shirer and Zimmerman, 2010). The study found that nearly one-third (32%) of the state may not have sufficient regeneration to replace the forest canopy after a significant **overstory** disturbance. Regeneration success varied geographically, with forests in southeastern New York generally faring worse than other eco-regions. In the High Alleghany Eco-region, the eco-region in which the Unit is located, the Nature Conservancy study found that American beech made up nearly 29% of the native tree species regeneration. The Nature Conservancy study points out that deer browsing (Marquis 1981, Rooney 2001, Horsley et al. 2003, Rooney and Waller 2003, Russell et al. 2001, Sage et al. 2003, Rawinski 2008, Wiegmann and Waller 2006) competition from understory vegetation such as beech (Horsley and Marquis 1983, Royo and Carson 1986) and acid deposition (Lovett and Mitchell 2004) can all suppress desirable regeneration (DEC Deer Management Plan, 2011). Beech seedlings are not a preferred deer food and are seldom heavily browsed.

**Beech bark disease** has killed many mature beech trees statewide and within the Unit. Beech prolifically re-sprouts from the roots. However, most researchers believe that less than 1% of the trees are resistant to beech bark disease. As such, most re-sprouting beech will never reach maturity and will effectively shade out desirable tree seedlings such as maple, cherry and oak.

Today, and for the near term, deer populations within the Unit's immediate landscape are being managed within reasonable limits but appear to be trending slightly upward at the DEC wildlife management unit scale. Recent work by the Nature Conservancy predicts that desirable forest regeneration (excluding beech) is fair in the northern most part of the Unit. Intensive recreational use on the Unit's formal recreational trail network may disturb deer and reduce hunter success. A specific study to assess the deer population at the State Forest unit scale has not been conducted. However, the DEC is cooperating with Cornell researchers on the Unit. Cornell researchers from the Department of Natural Resources are conducting an assessment of deer and earthworm impacts on native plants. The objective of the study is to assess the effects of earthworms and deer on native forest understory plant species. This five to ten year study requires the fencing of four 50 x 50 meter study sites on the Unit, which will give a good indication of how desirable forest regeneration is impacted by deer browsing.

Based on 2006 forest inventory data collected and analyzed by DEC state forest staff, significant portions of the forest have beech seedlings and saplings in the forest understory, and natural reestablishment of desirable tree seedlings in the forest understory is less than typically desired or expected. A map showing beech interference at the forest stand scale is at the end of this plan. The map shows that about 46% of the stands in the Unit have a beech understory interference problem. This beech interference problem may be caused, at least in part, by excessive deer browsing of the desirable native vegetation. Deer hunting is not allowed on some of the neighboring lands surrounding the Unit, which may be contributing to the beech interference issue. It is expected that at the local State Forest scale, deer populations will likely trend upward as the land is gradually developed and hunting pressure decreases outside the State Forest boundaries. Recently, state foresters in the Regional 7 Sherburne sub-office have worked with NYSDEC Bureau of Wildlife biologists to obtain additional deer tags through the Deer Management Assistance Program for specific State Forests that have excessive deer browsing damage.

The Deer Management Assistance Program (DMAP) enables DEC biologists to help landowners and land managers implement site specific deer management on their lands. DEC issues a special permit and a determined number of deer tags to a landowner, land manager or a group of landowners or land managers, whose property is in need of site specific deer management efforts. DMAP permits are valid for use only during the open deer hunting seasons and can only be used by licensed hunters. Only deer without antlers or having antlers measuring less than three inches in length may be taken under the authority of a DMAP permit. Under DMAP, the landowner or land manager is responsible for distributing the antlerless deer

tags. They are also required to maintain and submit a summary report card to DEC listing the deer taken. Additional information on DMAP program is available at <http://www.dec.ny.gov/animals/33973.html>

### **Wild Turkey**

Wild turkey can be found throughout the Unit as the forests and fields found in the landscape provide excellent food and cover. In the spring and summer of the year, adult wild turkeys feed on wild leeks, roots, fruits, grasshoppers, dragonflies and snails. During the winter the animals feed on acorns, seeds and left over fruits. In agricultural areas, they also feed on manure, silage and any residual grains. The bird has made a remarkable recovery after disappearing from the State around the mid-1840s as the landscape was cleared for farmland.

As farming declined on the infertile hilltops, the land gradually reverted back into brush and forest. By the late 1940's, much of New York's southern tier was again capable of supporting turkeys. Around 1948, wild turkeys from a small remnant population in northern Pennsylvania crossed the border into western New York. These were the first birds in the State after an absence of 100 years. In 1959, these natural populations were supplemented by a trap and release program begun by the then New York State Conservation Department (DEC Bureau of Wildlife, NYS Chapter of the National Wild Turkey Federation, 2004).

Humans have been an important predator of wild turkeys for many thousands of years and are part of the region's natural heritage. This wonderful bird is now legally protected as a game species by spring and fall hunting seasons, which are closely monitored by State biologists. This management has helped increase the number of turkeys throughout most of the State.

Additional information on turkey management is available at

<http://www.dec.ny.gov/education/68491.html>

### **Ruffed Grouse and Woodcock**

In the 20<sup>th</sup> century, farm abandonment and the recovery of forests from unregulated logging and fires produced habitats which probably resulted in the greatest abundance of ruffed grouse in recent times in most of the northern and northeastern United States. But as forests mature under protection from fire and regeneration cutting, they lose the habitat qualities ruffed grouse require. Continued loss of early successional forest habitats are likely on private forest lands as ownership subdivision increases and average parcel size decreases. Ruffed grouse and American woodcock depend on shrub-dominated and young forest habitats (Dessecker, McAuley). The high tree and shrub densities characteristic of these habitats protect them from predators and enable local populations to attain levels substantially greater than on landscapes dominated by mature forest (Sepik and Dwyer, 1982). In many regions, Ruffed grouse and woodcock numbers have declined as forests have become more extensive and older.

Ruffed grouse and woodcock are both listed as species of "greatest conservation need" in the State's Comprehensive Wildlife Conservation Strategy (NYSDEC, 2006). They are two of the many species which would benefit from the creation and maintenance of early successional habitats. Their numbers can often be readily enhanced or restored by creating habitat through heavy forest regeneration cutting on a regular basis or through the use of prescribed fire to allow open habitats for young growing grouse to feed on insects, a high protein source. Forest stands with low to moderately low potential productivity, that have aspen as an existing component, are good candidates for grouse and woodcock habitat management. The overall goal is to provide a diversity of **age classes** of aspen to meet the food and cover requirements in a manner consistent with their limited mobility (The Ruffed Grouse Society, 2005). Additional information on ruffed grouse is available at <http://www.ruffedgrousesociety.org/our-projects>

### **Eastern Cottontail Rabbit**

New York's cottontail rabbit population was relatively small prior to European settlement when forests covered much of the State. By the early 20<sup>th</sup> century, most of New York's forests had been cleared. Formerly cleared areas grew back to brush and young forests, providing excellent habitat for rabbits for several decades. Today, young early successional cover has declined as the forests have matured. Management techniques such as periodic mowing, brushing or regeneration cutting help provide brushy cover. Additionally, maintenance of existing old field grass, goldenrod and aster habitats by annual mowing to prevent succession is recommended in order to provide desired habitat for this species.

### **Black Bear**

The Twin Sheds Unit is within black bear range and bear are becoming more common. More sightings have been reported in recent years and the number of nuisance complaints has risen as well. Black bear require large blocks of remote mature forest cover with a thick forest understory. They also require abundant sources of hard and soft **mast** from plants such as northern red oak, chestnut oak, white oak, wild blueberry, elderberries and blackberries. These large mammals have returned with the natural reestablishment of large blocks of upland transitional oak and **northern hardwood forest** in the region. Additional information on black bears is available at <http://www.dec.ny.gov/animals/6960.html>

### **Beaver**

Beaver populations in New York are abundant and their populations are secure. The Department regulates trapping seasons to ensure the continued security of New York's furbearer populations (DEC Division of Fish and Wildlife, 2005). Beaver require small to large slowly flowing brooks, streams or rivers that are usually, but not necessarily, bordered by woodland (DeGraff and Rudis, 1986). The west branch of Owego Creek and portions of Six Mile Creek and their floodplains provide good beaver habitat. Trapping provides important benefits for New Yorkers including: control of nuisance wildlife damage, economic benefits to trappers and people involved in the fur industry, and recreation for trappers. The colonization of a site by beavers often results in the flooding of an area and subsequent changes in wildlife habitats. Most of the changes related to beaver flooding create new habitat opportunities for other plant and animal species. However, flooding can impact trout habitat, forest health and highways.

## **G. Endangered, Threatened, Special Concern and Significant Species**

As previously illustrated, the Twin Sheds Unit is located in a diverse landscape that is dominated by forest cover and open farmland with some residential development. Analysis of the Breeding Bird Atlas and the New York GAP model data illustrate that the landscape potentially supports over 269 species of birds, mammals, fish, reptiles and amphibians. Additionally, the landscape is the home to many species of invertebrate animals such as dragonflies, skippers and butterflies.

### ***Important Species within the Unit and at the Landscape Level***

The Environmental Conservation Law of New York, Section 11-0535 and 6 NYCRR (New York Code of Rules and Regulations) Part 182 authorizes the Department to list and protect endangered, threatened and special concern wildlife species. There are no known threatened, endangered or rare plant and wildlife species recorded within the State Forests that comprise the Twin Sheds Unit at the time of this writing. The Round leafed orchid (*Habenaria orbicula*), and Rattlesnake Plantain (*Goodyera pubescens*) are found on the Hammond Hill State Forest, east of Canaan Rd. along recreational trail Yellow 5 in an area which is commonly referred to as "the orchid glade." The Conservation Advisory Council of the Town of Dryden and professional botanists from Cornell University believe that the Hammond Hill State Forest orchid glade has the largest round leafed orchid population in Tompkins County. The orchid glade has been referred to as a botanically sensitive area (Karig, 2001).

At the landscape level encompassing the Unit, several species listed in New York State as endangered, threatened or special concern species have been recorded by the 2000 Breeding Bird Atlas census, New York Natural Heritage Program staff and/or confirmed or predicted by the New York **GAP Analysis** Model. **Table 9** lists these species and their required habitats.

<b>Table 9 - Endangered, Threatened and Special Concern Species at the Landscape Level</b>			
<b>Common Name</b>	<b>Habitat Requirements</b>	<b>Record Source</b>	<b>NY Status</b>
Cerulean Warbler	Breeds in forests with tall deciduous trees and open understory, such as wet bottomlands and dry slopes. (Cornell Lab of Ornithology, 2005).	NY Gap CONF	PSC
Common Nighthawk	Breeding in open areas such as plowed fields, gravel beaches, barren areas with rocky soil, railroad right of ways, large woodland clearings and cities. (DeGraff & Rudis, 1986).	NY Gap CONF	PSC
Cooper's Hawk	Breeds and winters in extensive deciduous or mixed woodlands that are dense or in open, scattered woodlots interspersed with open fields (DeGraff and Rudis, 1986).	NY Gap CONF	PSC
Gray Petaltail	Hillside seeps and fens in areas of deciduous forest (Dunkle 2000). In New York, all known populations are found at rocky gorges and glens with deciduous or mixed forests. Small shallow streams flow through the gorges and glens, and these streams are fed by hillside seepage areas, groundwater fed seepage streamlets or fens. The seepage areas represent the larval habitat for these populations, while the adults use both seepage areas and stream courses (New York Natural Heritage Program 2006).	NYNHP	PSC
Southern Grizzled Skipper	Open, sparsely grassed and barren areas in close proximity (usually less than 30 m) to oak or pine forests (Schweitzer 1989). The presence of its larval host plant, dwarf cinquefoil ( <i>Potentilla canadensis</i> ), is also an important habitat requirement for this species (New Jersey Department of Fish, Game & Wildlife Website, 2011).	NYNHP	Endan
Henslow's Sparrow	Henslow's sparrows historically bred in native tallgrass prairie habitat; in the East grasslands maintained by natural disturbances or fires set by Native Americans provided habitat (Burhans, 2002)	BBA NY Gap CONF	Threat
Indiana Myotis (bat)	Females congregate in nursery colonies under the loose bark of dead trees. Only a handful of such colonies have ever been discovered. These trees are located along the banks of streams or lakes in forested habitat. In New York State, these bats are known to winter in only seven caves or mines, with nearly one-half of the world's population being found in only two caves. Even though other populations have been discovered in recent years, the additions have not offset the losses recorded over the full extent of the species range (DEC Endangered Species Unit, 1999).	NY Gap PRED	Endan
Jefferson Salamander	Found in undisturbed damp, shady deciduous or mixed woods, bottomlands, swamps, moist pastures, or lakeshores. Requires temporary ponds with a pH > 5 (DeGraff & Rudis, 1986).	NY Gap CONF	PSC
Loggerhead Shrike	Open country with scattered trees, shrubs and road side hedges. Is attracted to areas with thorny trees such as hawthorn and honey locust. Favors low elevations (DeGraff & Rudis, 1986).	NY Gap PRED	Endan

<b>Table 9 - Endangered, Threatened and Special Concern Species at the Landscape Level</b>			
<b>Common Name</b>	<b>Habitat Requirements</b>	<b>Record Source</b>	<b>NY Status</b>
Longtail Salamander	Clean, calcareous (limestone) spring-fed seepages, spring kettleholes, swampy floodplains, artesian wells, and ponds associated with springs. Aquatic habitats often occur within upland deciduous forests that may also contain calcareous fens, limestone outcrops or caves. <b>Forest types</b> typically include mature, closed canopy maple/mixed deciduous, mixed hardwood or hemlock/mixed deciduous woodlands (New Jersey Department of Fish, Game & Wildlife Website, 2011).	NYNHP NY Gap PRED	PSC
Northern Goshawk	Breeds and winters in interiors of remote and heavily forested areas of coniferous and mixed forests (DeGraff & Rudis, 1986).	BBA NY Gap CONF	PSC
Northern Harrier	Nest on ground in swamps, cut-over areas, swamps with low shrub and clearings, sometimes built up over water on a stick foundation, sedge tussock or willow clump (DeGraff & Rudis, 1986).	NYNHP NY Gap CONF	Threat
Pied-billed Grebe	Breeds on seasonal or permanent ponds with dense stands of emergent vegetation, bays and sloughs. Uses most types of wetlands in winter. (Cornell lab of Ornithology, 2005).	BBA NY Gap CONF	Threat
Red-Shouldered Hawk	Breeds and winters in moist hardwood or mixed woodlands, wooded swamps, bottomlands, and wooded margins often close to cultivated fields (DeGraff & Rudis, 1986).	BBA NY Gap CONF	PSC
Sharp-skinned Hawk	Breeds and winters in open mixed or coniferous woodlands, clearings, and edges. A bird of cold-temperate conifer forest and temperate deciduous woodlands (DeGraff & Rudis, 1986).	BBA NY Gap CONF	PSC
Short-eared Owl	A bird of open grasslands, the Short-eared Owl is one of the most widely distributed owls in the world – but is endangered in New York State. It is distributed across North America, South America and Eurasia. The bird is common in northern portion of breeding range, but populations fluctuate greatly along with prey population cycles (Cornell lab of Ornithology, 2008).	NY Gap PRED	Endan
Spotted Turtle	Requires unpolluted, small, shallow bodies of water such as woodland streams, wet meadows, bog holes, small ponds, marshes, swamps, and roadside ditches (DeGraff & Rudis, 1986).	NY Gap PRED	PSC
Upland Sandpiper	Breeds in wide open pastures or grassy fields, often hayfields with alfalfa or clover, occasionally in forest openings. (DeGraff & Rudis, 1986).	BBA NY Gap CONF	Threat
Vesper Sparrow	Found in various open habitats with grass, including prairie, sagebrush steppe, meadows, pastures, and roadsides. (Cornell Lab of Ornithology, 2005).	BBA NY Gap CONF	PSC
Wood Turtle	Frequents slow-moving, meandering streams with sandy bottoms and overhanging alders. Disperses from water sources during summer months to fields, woods and roadsides (DeGraff & Rudis, 1986).	NY Gap CONF	PSC
Yellow-breasted Chat	Breeds in dense thickets around wood edges, riparian areas, and in overgrown clearings. In the eastern and southern portions of the range, abandoned agricultural fields left unmanaged for 10 years and the removal of trees and encouragement of a shrub layer in powerline rights-of-way will create suitable chat habitat. Wherever marginal cropland is abandoned, the species should benefit before canopy closure (Nature Conservancy, 1998).	NY Gap CONF	PSC

Key to Table 9	
BBA - 2000 Breeding Bird Atlas	NYNHP - New York Natural Heritage Program
CONF - Confirmed Species	PRED - Predicted Species
Edan - Endangered Species (New York)	PSC - Protected, Special Concern Species
NY Gap - NY Gap Analysis Program	Threat - Threatened Species (New York)

### **Keystone Species**

**Keystone species** are species that play roles affecting many other organisms in an ecosystem (Miller, 2004). Keystone species are organisms whose health is often linked to the health of an entire ecosystem. A keystone species creates habitat that is required by other species. Therefore, the presence, absence, increase or decrease of a keystone species across a landscape is an indicator of ecosystem health. Examples of Central Appalachian ecozone keystone species found on the Unit include the Eastern white pine, Eastern hemlock, pileated woodpecker and beaver. American chestnut was a keystone species, but beginning in 1904, chestnut blight, a non-native disease, effectively eliminated American chestnut from the eco-region's landscape. By 1950 (except for the shrubby root sprouts the species continually produces and which also quickly become infected) this keystone species disappeared from its 200 million acre range. The loss of American chestnut dramatically changed the forest, and significantly reduced the amount of hard mast for wildlife. Today, other trees such as northern red oak have filled the American chestnut's niche, but not completely. Additional information on the American chestnut is available at <http://www.acf.org/>, 2012.

## **H. Cultural Resources**

The term cultural resources encompasses a number of categories of human created resources including structures, archaeological sites and related resources. The Department is required by the New York State Historic Preservation Act (SHPA) (PRHPL Article 14) and SEQR (ECL Article 8) to include such resources in the range of environmental values that are managed on public lands.

On lands managed by the Department's Region 7 Division of Lands and Forests Office, the number of standing structures is minimal. Statewide, those structures that remain are related to the Department's land management activities such as fire towers, "ranger" cabins, maintenance facilities, and related resources. Fire towers, as a class of resources, have been the subject of considerable public interest over the last decade. The majority of surviving fire towers have been found eligible for inclusion on the State and National Registers of Historic Places and a number of towers were formally listed in the Registers in 2001. For state agencies, Register listing or eligibility are effectively the same; obligating the Department to treat these resources appropriately and requiring that special procedures be followed should it be necessary to remove or affect these resources. While conducting forest inventory, Department forestry staff made note of cultural resources such as cemeteries, foundations, stone walls, cisterns and former water well sites. As a part of the inventory effort associated with the development of this plan, Department staff reviewed the archaeological site inventories maintained by the New York State Museum and the Office of Parks, Recreation and Historic Preservation to identify known archaeological resources that might be located within or near the Unit. The two inventories overlap to an extent, but do not entirely duplicate one another. The purpose of this effort was to identify any known sites that might be affected by actions proposed within the Unit and to assist in understanding and characterizing past human use and occupation of the Unit. No such sites are known to exist on the Unit.

The quality of the site inventory information varies a great deal in all respects. Very little systematic archaeological survey has been undertaken in New York State. Therefore, all present inventories must be considered incomplete. Even fewer sites have been investigated to any degree that would permit their significance to be evaluated. Many reported site locations result from 19th century antiquarian information artifact collector reports that have not been field

verified. Often very little is known about the age, function or size of these sites. This means that reported site locations can be unreliable and encompass a large area. Should systematic archaeological inventory be undertaken at some point in the future, it is very likely that additional archeological resources will be identified.

### **Archaeological Site Protection**

The archaeological sites located within this Unit and any unrecorded sites that may exist on the property are protected by the provisions of the New York State Historic Preservation Act (SHPA - Article 14 PRHPL), Article 9 of Environmental Conservation Law and Section 233 of Education Law. No actions that would impact these resources are proposed in this Unit Management Plan. Should any such actions be proposed in the future they will be reviewed in accordance with SHPA. Unauthorized excavation and removal of materials from any of these sites is prohibited by Article 9 of Environmental Conservation Law and Section 233 of Education Law.

Archaeological sites are locations where materials (artifacts and ecofacts) or modifications to the landscape reveal evidence of past human activity. This includes resources that range from Native American camps and villages to farm homesteads established by European immigrants during the nineteenth and early twentieth centuries. Such sites can be entirely subsurface or can contain above ground remains such as foundation walls or earthwork features. Old homestead foundations, water wells, stone walls and barbed wire attest to the agricultural history of the Unit and its landscape. Archeological sites within the State date back as far as 12,000 years and are located in a wide variety of settings, from forests and **flood plains** to waterways and mountain tops (NYS Office of Parks, Recreation and Historic Preservation, 2005). In preparing this plan, an 1866 census map was used to plot locations of 32 former farms and sawmills on the Unit's forests.

### **Archaeological Research**

The archaeological sites located on this Unit as well as additional unrecorded sites that may exist on the property will be made available for appropriate research. All future archaeological research to be conducted on the property will be accomplished under the auspices of all appropriate permits. Research permits will be issued only after consultation with the New York State Museum and the Office of Parks, Recreation and Historic Preservation (OPRHP). Extensive excavations are not contemplated as part of any research program in order to assure that the sites are available to future researchers who are likely to have more advanced tools and techniques as well as different research questions.

## **I. Roads**

Early needs for State Forest access roads were for tree planting and forest fire protection, since over one half of the acquired acreage was in grassland or light brush. Early access was primarily via old town roads and former farm lanes. Where these were not sufficient, new roads were constructed by the Civilian Conservation Corps (CCC). In the days of the CCC, labor was not expensive. Large crews of men built roads and trails using limited machinery and mainly hand labor. Some of the roads were built extra wide to serve as fire breaks to protect the newly established plantations.

Although there were few heavy trucks used at that time, the CCC roads were generally built to a high standard and many still exist today. Decades later, as the plantations and natural forests matured, access to stands was needed for **timber stand improvement thinning**. New roads were built as needed to do this work. Some of these projects involved and were funded by sales of forest products, which included mostly firewood, pulpwood and Christmas trees.

An estimated 11.4 miles of town, county and state roads provides access to, from and through the State Forests on the Unit. These roads are critical assets in that they provide access to the Unit for recreationists, DEC land managers and forest harvesting equipment. The roads are

maintained by the towns of Caroline and Dryden and Tompkins and Tioga counties. Town roads represent about 6.4 miles (56%) of the road network. About 2.6 miles (41%) of the town roads are classified as seasonal, and, as such, are not plowed or sanded. Plowed town roads cover about 3.8 miles (59%). County roads comprise 20% of the road network; all of the county roads are plowed and sanded and/or salted.

The State Forest road system provides both public and administrative access to the Unit. **Public Forest Access Roads (PFARs)** are constructed by the Department to standards that will provide reasonably safe travel and keep maintenance costs at a minimum. These roads are not normally plowed or sanded. There are three types of roads that provide interior access to the State Forests in the Unit: public forest access roads, (formerly called truck trails), **haul roads** and **access trails**. These roads provide different levels of access depending on the level of standards to which they were constructed.

Public forest access roads are permanent, unpaved roads. These roads are open for the public use unless the road is gated and/or signed to prohibit use. The roads may be designed for all-weather use depending on their respective location and surfacing. These roads provide primary access to the Unit. The standards for these roads are those of the Class A and Class B access roads as described in the Department's Forest Road Handbook (Swartz, et al. 2004). The speed limit is 25 miles per hour. The 1.5 mile Canaan Road and the 1.1 mile Red Man Run, both on the Hammond Hill State Forest, are the Unit's only public forest access roads.

*Haul* roads are permanent, unpaved roads, but are not designed for all weather use. They are constructed primarily for the removal of forest products and provide only limited access to the Unit. Most of these roads are not open for motor vehicle use by the public and are blocked by soil berms, rocks, or gates to prevent unauthorized motor vehicle use. The standards for these roads are those of a Class C road as described in the Department's Forest Road Handbook. There is 0.1 mile of haul road on the Unit.

Access trails may be permanent, are unpaved, and do not provide all weather access on the Unit. These trails are originally designed for removal of forest products and may be used for recreational purposes. These trails are constructed according to best management practices and are typically designed for temporary use. Approximately 9 miles of access trails are located throughout the Unit. Some of these access trails are blocked by dirt berms to prevent unauthorized motor vehicle use.

Former town roads are part of the present day road system, or, in some cases, are no longer used. For example, on the Hammond Hill State Forest, old atlas maps show Star Stanton Road and Red Man Run Road continuing downhill to NYS Route 38. The Official Town Map mentioned earlier shows the western portion of Star Stanton Road as a year round public road changing to a seasonal road somewhere in the private lands between Tract 64 and Tract 87. Red Man Run Road was reportedly qualified abandoned on 9/8/1992 from Canaan Road northeast for 5,800 feet, which appears to cover the full length of Red Man Run Road within the State Forest (Kwasnowski, 2010). Canaan Road was reportedly qualified abandoned on 9/8/1992 from Star Stanton Road south for 8,477 feet, which appears to cover the full length of that road within the State Forest. The old atlas maps and survey map 4156 also show a road running east and west between Hammond Hill Road and Canaan Road. The official status of that road is unknown (Wolford, 2011).

On the Yellow Barn State Forest, old atlas maps show the "Old Ox Tail Road," as it is sometimes called, running north from Irish Settlement Road all the way to Tehan Road, a distance of over 2.5 miles. The most northern portion of that road is now known as Signal Tower Road. The old atlas maps also show Tehan Road continued west to Yellow Barn Road. Card Road is reportedly abandoned from a point starting 1,297 feet west of Irish Settlement Road and

that it is 2,615 feet further to Signal Tower Road. Signal Tower Road is noted as being abandoned from a point 600 feet south of Tehan Road and that it is 2,900 feet further to Card Road. However, the notes also state that the abandonment of portions of Signal Tower Road were not yet determined (2008) and the preliminary Official Town Map showed portions of those roads within the State Forest as “seasonal use” by the legend with only the middle 1/3 of Card Road having no symbol. That map shows nothing in the location of the Old Ox Tail Road. Research has been unable to determine if a public road existed along part of the north line of Tract 12.

## **J. Recreational Assets**

Historically, State Forests have provided open space for outdoor recreational activities that require minimal facilities. Such activities include hunting, fishing, trapping, hiking, nature observation, picnicking, mountain biking, snowshoeing, snowmobiling and cross country skiing. In the past, the intensity of recreational use was low. This resulted in low environmental impacts and few user conflicts. However, during the 1990s, demand for recreational trails increased substantially (DEC Region 7 Draft Recreation Plan, 2001).

### ***Adopt-A-Natural Resource Program***

To help meet the increasing demand for recreation, the Department increasingly depends on partnerships with recreation groups to help maintain, enhance and construct recreational assets. Partnerships between recreation groups and the Department are formalized through the Department’s Adopt a Natural Resource program (AANR). The AANR program is authorized by Section 9-0113 of the Environmental Conservation Law. The statute authorizes the Department to use a stewardship agreement for activities it approves for the preservation, maintenance or enhancement of state-owned natural resources.

Volunteerism is the cornerstone of the AANR program. It is a means for completing work that helps preserve, maintain and enhance natural resources at minimum cost to the State. Individuals and groups interested in providing volunteer services are afforded a formal opportunity to propose activities that meet management needs of state-owned natural resources. Such activities may involve remediating vandalism, establishing or maintaining access or nature trails, building camping sites, providing interpretive services for school groups and other citizens, managing fish and wildlife habitats and otherwise providing positive benefits to the natural resource.

The AANR program has been very successful in Region 7. The Unit’s volunteer stewards are listed in Table 10 below. Since the inception of the program, volunteers have cleared miles of trails from ice storm damage, have built and maintained miles of new trail, groomed snowmobile trails and have removed large volumes of trash. These volunteer construction and maintenance activities are of great value to the State Forest system and the people it serves. Vitally important assets, the Department’s AANR partners are strongly committed to enhancing and protecting natural resources on the Unit. Not surprisingly, AANR partners have developed a strong sense of ownership, are advocates, and are very interested in the planning and natural resource management activities that take place on the State Forests in the Unit.

**Table 10 - Adopt-A-Natural Resources Volunteer Stewards**

<b>AANR Volunteer Stewards</b>	<b>State Forest</b>
Dryden Caroline Drifters	Hammond Hill and Yellow Barn
Finger Lakes Trail and Cayuga Trail Conferences	Hammond Hill
Friends of Hammond Hill (includes the Cayuga Nordic Ski Club)	Hammond Hill

### ***Popular Activities***

The Unit is a very popular destination for cross country skiing, horseback riding, mountain biking, snowmobiling, snowshoeing and hiking due to the Unit’s close proximity to the city of

Ithaca. The Friends of Hammond Hill, DEC Adopt-A-Natural Resource Partners, maintain the Hammond Hill trail multiple use trail network cooperatively with the DEC and have developed a strong sense of ownership. Hammond Hill State Forest is also a popular place for group events such as orienteering, cross country ski racing, community gatherings, group horse-back riding, trail runs and a family oriented winter outing called "Snowfest." In contrast, Yellow Barn has only 1 designated snowmobile trail about 3 miles in length. Yellow Barn provides informal paths, former roads and logging trails for hiking, hunting and exploration. The Region 7 Draft Recreation Plan called for minimal recreational development on the Yellow Barn State Forest.

Before this plan was completed, the Department sought and encouraged public participation through an open-house style informational meeting, direct mailings, web site postings and press releases. Based on feedback provided by stakeholders during the initial public participation process, the public continues to be interested in a wide range of recreational activities such as mountain bike riding, camping, horse-back riding, wildlife observation, cross country skiing, snowshoeing, hunting, trapping and fishing. Many recreationists are concerned that oil and gas drilling on State Land would negatively impact their recreational experience and the environment.

The 13 mile Hammond Hill multiple use trail network is very popular with local recreationists, and is frequented by local residents, Cornell University and Ithaca College students as well as visitors from outside of the immediate area. The current multiple use trail network was upgraded from 1996 to 2001 by DEC Operations Staff. The upgrades included trail resurfacing, new culverts, trail widening and some trail closures and reroutes. Maintained mostly by volunteers, the trail system is a cooperative effort between the Friends of Hammond Hill and the DEC. Volunteer stewardship, trail advocacy and use continue to grow. As time has progressed, trail use and wear has increased, and a greater number of trained volunteers and trail maintenance resources such as geo-textile fabric, gravel and equipment will be needed. In 2007, a recreation analysis of the Hammond Hill State Forest was completed by a SUNY Cortland Intern under the guidance of DEC staff. The analysis concluded that significant work was needed on about 6% of the trail tread across the trail network. The analysis also helped identify and prioritize future trail related maintenance needs at over 50 locations on the Unit as shown on the Stewardship Needs map at the end of this plan. In 2008, the Friends of Hammond Hill received a grant in the amount of \$8,600 from the New York State Horse Trail Council to resurface the trail tread and to upgrade drainage on about 1,800 feet of portions of Y1 and Y6. DEC staff developed an action plan and the 2008 upgrade was successfully completed by a local contractor under DEC guidance.

Snowmobiling continues to be a popular activity on the Unit as well. Corridor snowmobile trail development and maintenance activities across the State are promoted and funded via a local grant program administered by the New York State Office of Parks, Recreation and Historic Preservation (OPRHP). Approximately \$1.1 million per year is distributed to counties, towns and villages across the state. Much of this money is passed on to the clubs that do the actual work. There are approximately 8,500 miles of funded trails in New York State. The Dryden Caroline Drifters Snowmobile Club corridor trails are funded in part by the program. The club grooms their respective trail networks on a regular basis. About 10 miles of snowmobile trail are presently on the Unit.

The Cayuga Trails Club (CTC), affiliated with the Finger Lakes Trail Conference (FLTC), has been building and maintaining hiking trails throughout the Unit planning area and Finger Lakes Region since the early 1960's (<http://www.cayugatrailsclub.org/> 2012). Today, the Twin Sheds

Unit has nearly 3 miles of primary use hiking trails, built and maintained entirely by volunteers. Information on the Finger Lakes Trail Conference is available at (<http://www.fltconference.org/trails/>, 2012).

### ***Organized Events and Temporary Revocable Permits***

The Twin Sheds Unit continues to provide opportunities for organized group events such as trail runs, bike races, ski races or orienteering club meets. Group events involving 21 or more individuals and all **competitive events or activities** require a **Temporary Revocable Permit (TRP)**. Such organized events often require additional parking, portable toilets and emergency medical support services. To protect public health, public safety and the environment, the Department has developed four types of TRPs, three of which apply to the Twin Sheds Unit. These three types are: 1) expedited TRPs, 2) routine TRPs and 3) non-routine TRPs.

Expedited TRPs are issued when events are non-competitive and the group size is between 21 to 50 individuals. Generally, no permit is required for non-competitive events or group activities of 20 individuals or less. Expedited TRP's do not require an application fee or proof of liability insurance and are issued by regional DEC staff as designated by the Regional Manager.

Routine permits apply to applications for group events of over 51 and up to 100 individuals. All competitive activities and any group event involving more than 100 individuals require a non-routine TRP which must be approved in Albany. There is currently a \$25.00 non-refundable application fee for routine and non-routine TRP's. Routine and non-routine TRPs may also be subject to additional fees necessary to cover costs incurred by the Department directly associated with permit administration, use of facilities and/or oversight. Routine and non-routine TRP applicants must provide a certificate of liability insurance to indemnify The People of the State of New York against any and all claims for injury to property or person or death arising out of or relating to the operations of the applicant. Routine and non-routine TRP applications must be submitted to the Cortland Lands and Forest sub-office, including proof of insurance, at least 30 days prior to the requested use date. A table providing examples of activities that require a temporary revocable permit is included in the **Appendix 17** of this plan.

For more complete information on the Department's most current TRP policies, applicability, application process, insurance requirements and applicable fees, please contact the Lands and Forests Office at **(607) 753-3095 ext. 217**. TRP applications are available on-line at <http://www.dec.ny.gov/regulations/51387.html>. Applicants are encouraged to contact the DEC Lands and Forests Cortland Office to check if their respective event requires a TRP before filing an application.

### ***ATV Use Issues***

Illegal ATV use is an issue that faces many private and public landowners in the region. Use of the machines to reach remote outdoor destinations is increasing at a rapid pace. To prevent chronic adverse environmental impacts associated with frequent use, ATV trails open for use for the general public must be properly designed and maintained, be situated on relatively well drained ground and be placed in blocks of open space 5,000 acres or more away from residential areas. Many of the soils in the Twin Sheds Unit are wet with seasonally high water tables. Damage from chronic illegal ATV use includes: rutting, soil erosion and sedimentation of streams. Often, unregulated ATV use conflicts with other sanctioned recreational activities such as hunting, horseback riding, hiking, mountain biking, running, wildlife observation and cross-country skiing. To prevent excessive trail damage and user conflicts, the policy has been to restrict ATV use by the general public. However, the DEC does provide access to people with qualifying disabilities through the Motorized Access Permit for People with Disabilities (MAPPWD) Program. About 1 mile of trail is presently designated for use on the Unit under this program. More information can be found on page 177 in the Strategic Plan for State Forest Management which is available at: <http://www.dec.ny.gov/lands/64567.html>

### ***Recreational Asset Summary***

In summary, the Unit's recreational assets significantly add to the quality of life and to the overall value of the Unit's land to the People of the State of New York. Long term, as

subdivision, fragmentation and posting of the privately owned landscape continues, it is expected that the Twin Sheds Unit will increasingly provide significant and highly valued recreational opportunities for a diverse group of stakeholders. As demand increases, the Department will seek to improve or maintain recreational services while balancing stakeholder interests with the overall ecosystem based management goals, objectives and actions discussed later in this plan. One thing is for certain - volunteers will continue to be a key asset in terms of providing trail system maintenance, advocacy and support. Increased recreational use on the State Forests in the Unit will benefit local economies as well.

## K. Other Facilities that Require Maintenance

**Table 11** lists other facilities that require maintenance on the Unit.

Table 11 - Facilities on the Twin Sheds Unit				
Boundary Lines				
State Forest	Miles			
Hammond Hill	30.4			
Yellow Barn	13.3			
Total	43.7			
Designated Recreational Trails				
State Forest	Type	Mi.	Comments	
Hammond Hill	Multiple Use Trail Network	13	13 miles, maintained by the Friends of Hammond Hill in cooperation with the DEC.	
Hammond Hill	Snowmobile Trail	8	10 miles, maintained by the Dryden-Caroline Drifters in cooperation with the DEC (includes seasonal roads used on the Unit).	
Hammond Hill	Finger Lakes Hiking Trail	3	3 miles, maintained by the Finger Lakes Trail Conference in cooperation with the DEC.	
Hammond Hill	MAPPWD Trail	1	Provides ATV access to the State Forest for people with mobility impairments.	
Yellow Barn	Snowmobile Trail	2	3 miles, maintained by the Dryden-Caroline Drifters in cooperation with the DEC (includes seasonal roads).	
Signs and Registers				
State Forest	Type	No.	Comments	
Hammond Hill	Identification Sign	1	Maintained by DEC.	
Hammond Hill	Canaan PFAR Speed Limit Sign	2	Maintained by DEC.	
Hammond Hill	Multiple Use Trail Register	1	Maintained by DEC and the Friends of Hammond Hill AANR.	
Yellow Barn	Identification Sign	1	Maintained by DEC.	
Shale Pits				
State Forest	Location	Size (ac)	Comments	
Hammond Hill	End of Red Man Run PFAR	.3	Maintained by DEC.	
Hammond Hill	West of Canaan PFAR	1.0	Maintained by DEC.	
Hammond Hill	West of Hammond Hill Rd.	.4	Maintained by DEC.	
Parking Areas				
State Forest	Location		Cars	Geog. Coordinates

Table 11 - Facilities on the Twin Sheds Unit				
Hammond Hill	Intersection Canaan PFAR & Star Stanton Hill Rd.		2	Lat: 42.44158 Lon: -76.28918
Hammond Hill	North end of Red Man Run PFAR		3	Lat: 42.43385 Lon: -76.27797
Utility Lines (All Privately Owned and Maintained)				
State Forest	Type	No.	Size	Comments
Hammond Hill	Gas pipeline and corridor	1	13.3 acres	Constructed in 1963 through a TRP (50 feet wide) and authorized maintenance to a 30 foot width through a TRP issued in 1963. The conveyance of an easement cannot be accomplished through the issuance of a TRP. The Department will determine if an easement exists, and, if an easement does not exist, work with the utility company to resolve the matter.
Yellow Barn	Electric power and corridor	1	10.2 acres	Constructed in 1929 (100 feet wide) and 2008 (an additional 25 feet in total, 12.5 feet both sides) through easements. Work on the 12.5 foot ROW requires a TRP.
Key: AANR – Adopt-A-Natural Resource Agreement, TRP – Temporary Revocable Permit				

## L. Taxes Paid on the State Forests

Many State Forests are subject to fire district, school and town taxes, but are exempt for county taxes. State Forest land is taxed at the same rate as private forest land. In 2009, \$149,157.00 in property taxes were paid by New York State for Hammond Hill and Yellow Barn State Forests. A summary of town, school and fire district property taxes paid by township can be found in **Appendix A-10**.

## M. Property Use Agreements

The State Forests on this Unit are subject to the following deed restrictions and easements. The following information in **Table 12** was provided by the NYSDEC Real Property office located in Syracuse, New York. Please note that the Abstracts of Title for the tracts/proposals in these areas were not reviewed. Real Property office records are not complete. Additional research and field inspections may be necessary to resolve specific issues and unresolved questions.

<b>Table 12 - Exceptions and Deed Restrictions</b>			
Facility Name	RA #	Description	Proposal ID (Surveyor's Reference)
Hammond Hill State Forest	2	1,803 acres of USA lands conveyed to the State of New York. The land is to be used for public purposes or shall immediately revert back to the USA. The deed refers to a previous lease with the State executed on 11/27/1940 and on 4/16/1941.	Deed, 7/25/1955
Hammond Hill State Forest	2	Excepts and reserves to the USA $\frac{3}{4}$ interest in all coal, oil gas and other minerals including sand, gravel, stone, clay and similar materials. The State is permitted to use the quantities of sand, gravel, stone, clay, etc. necessary for the operation of the lands conveyed. Excepts the portion of Tract 91A conveyed to Philip J. Coyle.	Deed, 7/25/1955 Tract 91A
Hammond Hill State Forest	2	The State's deed (1934) is subject to an oil and gas lease from Susie L. Depew and Amy C. Atwater to John E. Dubois, Jr. dated 4/18/1931. The lease is assumed to have expired.	Proposal B 224/412

**Table 12 - Exceptions and Deed Restrictions**

<b>Facility Name</b>	<b>RA #</b>	<b>Description</b>	<b>Proposal ID (Surveyor's Reference)</b>
Hammond Hill State Forest	2	The State's deed (1934) is subject to an oil and gas lease from Fred C. and Clara Meir to the Reserve Oil Corporation dated 7/18/1930. The lease was assigned to the Lycoming Producing Corporation in (1932) but is assumed to have expired.	Proposal B 228/133 228/323
Hammond Hill State Forest	2	The Texas Eastern Transmission Corp. was issued a TRP by letter on 12/17/1963 for a petroleum products pipeline for a maximum construction width of 50 feet and an operation and maintenance width of 30 feet.	Proposals C, E, I, N Tracts 91A, 106A, 122 Survey file 7-55-465
Hammond Hill State Forest	2	The State's deed (1934) is subject to oil and gas leases with the Reserve Oil Corporation of Binghamton, NY and the Cayuga Gas Company. The leases have assumed to have expired. When it was acquired, proposal D was also subject to a 2 rod wide ROW running from Canaan road to tract 105, which was then in Federal ownership.	Proposal D
Hammond Hill State Forest	2	The State's deed (1934) is subject to oil and gas leases with the Reserve Oil Corporation dated 7/7/1930 and with the Belmont Quadrangle Drilling Corporation of Bradford, PA dated 5/12/1932.	Proposal E 228/126
Hammond Hill State Forest	2	The State acquired all water rights or rights of the grantor to take water from premises adjoining the proposal. There is no additional information on these rights in the deed or on the map.	Proposal H
Hammond Hill State Forest	2	The State's deed (1934) is subject to an oil and gas lease from Margaret Kinsley to Henry M. Brown, agent, dated 11/12/1930. The 1934 lease was held by the Cayuga Gas Company, but it is assumed to have expired.	Proposal J 224/13
Hammond Hill State Forest	2	The appropriation of this proposal (1962) excluded rights of the Western Union Telegraph Company, the New York State Natural Gas Corporation and any public utility easements affecting the premises. Map 6941 shows an access road leading northwesterly from Speed Rd. (Hardford-Slaterville Rd.) through portions of this proposal to the Ithaca Microwave Relay Site and labels the road "centerline of perpetual right of way 30' wide owned by the Western Union Telegraph Company." In 1979, Western Union granted access over this ROW to Gutches Lumber Company for the purpose of a timber harvest. DEC Real property files also have a copy of a 1985 letter from DEC's Regional Supervisor of Real Property to Clair Gutches stating that a portion of the proposal is subject to a ROW in favor of George A. and Burt Smith with the location described as "to and from the north end of said lot in the east side of said 70 acres." Nothing more was found in DEC files about this ROW or its location. The appropriation in 1962 didn't mention it as a specific exception.	Proposal N Map 6941
Hammond Hill State Forest	2	The abstract for the proposal includes an easement granted to NYSEG dated 11/1/1944 and recorded on 8/27/1946, but doesn't include a reference to the book and page. The brief summary of the easement in the abstract states that it is for "construction, operation and maintenance of an electric transmission line fronting on the highway know as the Dryden-Harford Road." The abstract also includes an oil and gas lease to the New York State Natural Gas Corporation dated 6/11/1958 and recorded on 7/25/1958. Cancellation of the lease was recorded in 439/552.	Proposal N 408/431 439/552

**Table 12 - Exceptions and Deed Restrictions**

<b>Facility Name</b>	<b>RA #</b>	<b>Description</b>	<b>Proposal ID (Surveyor's Reference)</b>
Hammond Hill State Forest	2	The acquisition by the State included a 25' wide ROW for vehicles and foot passage from the Harford-Slaterville Rd. (Speed Rd.) conveyed in a ROW Agreement between Sylvia Ecker Parker and Clair Gutches dated 5/25/1975. It also included a 25' wide ROW described in an Amended Right of Way Agreement between the same parties dated 10/14/1977 and recorded on 10/28/1977. The ROW is to be used in common with the underlying fee owner. The location of the two ROWs are shown on map 10442. A private survey in 2008 of the 5 acre parcel at the southwest corner of the proposal showed the ROWs in a different location than map 10442.	Proposal P 545/360 561/142 561/144 DEC map No. 10442
Hammond Hill State Forest	2	Research for a survey of part of Tract 91-A in 1992 found that the State may have acquired a 33 foot wide ROW along the west line of 91-A as part of the lands acquired from the USA. It was not mentioned in the deeds into the USA, but the ROW described in 3/178 and 160/519 appeared to serve land acquired by the USA and could reasonably be assumed to have been conveyed to the USA and later the State.	Proposal P Tract 91A 3/178 160/519
Hammond Hill State Forest	2	The deed into the USA included a 2 rod wide ROW from Canaan Road. The land affected by the ROW was later acquired as Proposal D.	Proposal P Tract 105
Hammond Hill State Forest	2	In the deed into the USA grantor William C. Gallagher reserved all of his rights under a certain oil and gas lease dated 10/20/1930 and recorded on 12/8/1930 in 224/27.	Proposal P Tract 125 224/27
Yellow Barn State Forest	5	1,243 acres of USA lands conveyed to the State of New York. Excepts and reserves to the USA $\frac{3}{4}$ interest in all coal, oil gas and other minerals including sand, gravel, stone, clay and similar materials. The State is permitted to use the quantities of sand, gravel, stone, clay, etc. necessary for the operation of the lands conveyed. The land is to be used for public purposes or shall immediately revert back to the USA. The deed refers to a previous lease with the State executed on 11/27/1940 and on 4/16/1941.	Deed, 7/25/1955
Yellow Barn State Forest	5	The abstract of title includes a copy of misc. records dated 8/20/1951, a Town of Dryden resolution to grant NYSEG the right to lay natural gas lines along all highways, streets, lands and public places in said town.	Proposal D
Yellow Barn State Forest	5	A 100 foot wide utility easement across these parcels pre-existed acquisition of the tracts by the USA. The easement is for the transmission of electric present for any purpose including telephone. The original easements were granted by private owners in 1929. The rights are presently held by NYSEG and a recent land exchange with the NYSDEC widened the easements by 12.5 feet on both sides. The terms of the easement over the additional 12.5 feet were much more restrictive than the original easements and included: 1) Rights are limited to transmission and distribution lines for electric power; 2) Clearing by manual or mechanical means is allowed, but the use of chemicals/herbicides requires DEC approval; 3) Work on the 12.5 foot ROW requires a TRP; 4) Removal of danger trees (defined) outside the ROW also requires a TRP except in emergencies; 5) NYSEG must pay for the value of all trees cut down.	Proposal D Tracts 7, 8 12 218/344 218/347 218/421
Yellow Barn State Forest	5	The deed into the USA is subject to a ROW to 25 acres of land adjoining the tract on the east and owned by John Reid (1938). Land of J. Reid is shown on map 4163 and a ROW to it would most likely run east from the abandoned road that leads north from Irish Settlement Road.	Tract 93 (aka Tract 1511)

Table 12 - Exceptions and Deed Restrictions			
Facility Name	RA #	Description	Proposal ID (Surveyor's Reference)
Yellow Barn State Forest	5	A boundary line agreement in 2009 established the location of the southern portion of the west line of Tract 93 and the south line of Proposal E. The agreement also resolved a dispute over the right of two adjoiners on the west side of the "Old Ox Tail Road", an abandoned road, to travel over the road where it is located on State Forest lands. The right of access was subject to certain terms set by the agreement including the requirement for a gate to be built by one of the private owners.	Proposal E Tract 93 (aka Tract 1511)
Yellow Barn State Forest	5	A 4/23/1979 letter from the Regional Forester to Dr. Kraig Adler of the Division of Biological Sciences at Cornell University extended permission previously granted to conduct research on salamanders and other amphibians on Yellow Barn and Hammond Hill State Forests. The letter refers to a fenced research site that would be protected from timber harvests.	Unknown

## N. Resource Demands

The demand for traditional and non-traditional forest products, ecosystem based services and mineral resources on the State Forests of the Unit have as a whole, increased over-time. To help assess the present demand for these products and services, written and verbal comments concerning the development of this plan and the Unit's resources were requested and gathered from the public through: 1) direct contact with DEC AANR volunteers, 2) press releases, 3) a direct mailing to about 261 landowners that own 4,188 acres, (6½ square miles) around the Unit, and 4) a public information meeting attended by 87 people, held in Dryden (January 2010).

### Forest Product Demands

The following is a list of forest products and associated demand trends that State foresters and the public have observed in the Twin Sheds Unit over the past two decades.

<u>Product</u>	<u>Trend</u>
Firewood	Increased
<b>Softwood</b> Sawtimber	Increased
Hardwood Sawtimber	Increased
Hardwood Pulpwood	Increased
Softwood Pulpwood	Variable
Wood chips	Increased
Mushrooms	Increased
Medicinal Plants	Increased
Ginseng	Increased
Honey	Decreased
Fence Posts	Decreased

The following comments regarding forest products and ecosystem management were received through the public participation process.

- ☐ The return of black bear, bobcat and fisher are proof of a healthy ecosystem.
- ☐ Use even-aged treatments to regenerate early successional forest communities; this is essential if we are to stop/reverse declines in wildlife populations that require young forest.

- ☐ Protect orchid habitats with no harvest zones.
- ☐ Create jobs in the rural areas by harvesting timber.
- ☐ Manage the forest for wood products and timber.
- ☐ Focus tree harvest(s) on non-native tree plantations.
- ☐ Allow natural forest regeneration/planting of native tree species.
- ☐ State Forests should be managed based on science.
- ☐ Keep the forests healthy by planning ahead for insect infestations and using control methods to minimize mortality and recover value.
- ☐ Protect the water!
- ☐ Deer are the #1 threat to native flora, (their) population needs to be reduced.

### **Fossil Fuel Demands**

Long term, domestic and global demand for fossil fuels such as coal, oil and natural gas will likely increase rapidly as world population and infrastructure development exponentially increases in nations such as China and India. Improved exploration and drilling technologies coupled with increased demand has renewed interest in South-Central New York's deep (greater than 6,000 feet below ground) natural gas resources in the Marcellus shale and Trenton-Black River dolostone/limestone formations. For further discussion of this topic, please refer to Chapter 5 of the Strategic Plan for State Forest Management, available online at <http://www.dec.ny.gov/lands/64567.html>.

The following comments regarding oil and gas exploration and development were received during the public scoping process.

- ☐ No gas leases - too important for recreation and for protecting water (much of which drains to Cayuga Lake which is drinking water source for much of Tompkins County).
- ☐ Keep the trails uncomplicated by gas drilling infrastructure and pipelines.
- ☐ Ban hydro-fracking on these State Lands.
- ☐ Eliminate gas drilling in any forest land or any adjacent lands.

### **Demands for Ecosystem Based Products, Services and Values**

Diverse ecosystems and ecosystem based products, services and values are very important to the public. As mentioned, stakeholders provided comments and suggestions concerning the ecosystem based products, values and services of the Unit during the initial public phase of the planning project.

## **O. Public Use and Facility Demands on the Unit**

### **Recreational Uses**

Based on casual observations, surveys and reports from recreational groups, overall demand for recreational opportunities and related services continues to increase in the Unit, and, as such, is a long term management challenge. The following lists a variety of recreational pursuits and their estimated trends based on observations by Department foresters during the past 10 years:

#### **USE**

Hunting  
Trapping  
Fishing  
Horseback Riding  
Hiking  
Camping  
Snowmobiling

#### **TREND**

Decreased  
Decreased  
Stable  
Increased  
Increased  
Increased  
Increased

Cross-Country Skiing	Increased
Mountain Biking	Increased
<b>Geocaching</b>	Increased
Illegal ATV Use	Increased
Nature Observation	Increased

### Recreational Facility Demands

Demands for the following facilities have been expressed through public comment index cards, emails, letters, phone calls and informal dialogue. Additional detail is available in the *Twin Sheds Unit Management Plan Public Meeting Comment Summary* (DEC, January 2010).

- ☐ Keep ATV's and motorcycles out.
- ☐ Maintain hiking trails, particularly regarding disruption from gas drilling.
- ☐ Keep the Finger Lakes Trail for high quality hiking.
- ☐ Keep trails open to horses.
- ☐ Share the trails lovingly.
- ☐ Keep trail registers more up to date.
- ☐ Hammond Hill parking gets very full, especially on weekends (10-12 trailers max).
- ☐ New maps of Hammond Hill are useless, go back to the old maps.
- ☐ Keep existing snowmobile trails open.
- ☐ Have an option to expand the snowmobile trail.

## P. Management Challenges on the Unit

### Physical Challenges

The following factors create physical management challenges for the Unit's lands and waters: steep slopes, variable soil characteristics, demand for recreational trails, potential insect and disease infestations, climate change, exponential global human population increases, fluctuations in wood markets, global economic change, limited access, presence of rare or endangered species, presence of cultural resources, proximity of the Unit's forests and the presence of county, town and state roads, electrical transmission lines, telephone lines, pipelines, easements and **exotic** (non-native) conifer species planted on incompatible soils.

### Administrative Challenges

The following factors are administrative limitations on the management of the Unit: increased illegal ATV use, limited budgets, limited program staffing, limited enforcement staffing, increased recreational demand, changing forest product market conditions, increased fuel and material costs, introduction of new invasive plant and insect species requiring additional staff resource time, periodic natural disturbances such as insect defoliation, ice and wind storms and the reduced availability of inmate work crews.

### Societal Challenges

Changing public opinion and values about public forest land impact how forest ecosystem management is practiced on the Unit. The State Forests have traditionally produced a sustainable supply of forest products and have also been used for outdoor recreation such as trapping, hunting and hiking. As large open space gradually becomes developed, the forests of the Unit are increasingly valued for the recreational services they provide. As previously mentioned, activities such as mountain-biking, snowshoeing, snowmobiling, geo-caching, bird watching and cross country skiing are becoming increasingly popular.

Moreover, many people value the forest as a place for reflection, relaxation and spiritual values. Ecosystem management activities such as patch cutting to create **early successional wildlife habitat** and natural disturbances caused by ice or wind events can impact **aesthetics**. However, aesthetic impacts caused by such disturbances don't last very long, as our temperate

forest typically reestablishes itself with vegetation within 10 to 15 years of disturbance events. Thus, as the Unit receives a greater number of visitors, Department forest land managers must continuously adapt and balance ecosystem management goals, objectives and practices with the changing ecological and social demands on the Unit.

### **Legal Considerations**

Please refer to page 317 of the Strategic Plan for State Forest Management for additional information. The plan is available at: <http://www.dec.ny.gov/lands/64567.html>

## **LANDSCAPE MANAGEMENT STRATEGIES - UNIT GOALS, OBJECTIVES AND ACTIONS**

### **GOAL 1. Provide Healthy and Biologically Diverse Forest Ecosystems**

#### ***Background***

The Department's principal goal is to provide healthy, sustainable and biologically diverse forest ecosystems using the principles of ecosystem management. Ecosystem management is a process that considers the total environment - including all living and non-living components. It requires the skillful use of ecological, economic, social, political, managerial and leadership principles to produce, restore, or sustain ecosystem integrity and desired conditions, uses, products, values and services over the long term. Ecosystem management recognizes that people and their social and economic needs are an integral part of ecological systems (Bureau of Land Management, 1994).

One of the simplest definitions of ecosystem management points out the complexity of understanding and managing an ecosystem. That definition is in the form of a slogan on a United States Forest Service poster promoting ecosystem management. The slogan simply defines ecosystem management as "Considering All Things." This approach asks that management decisions consider all living things from soil micro-organisms to large mammals, including their complex interrelationships and habitat requirements; all non-living components of the ecosystem, including physical, natural, and geological components; and all social, cultural, and economic factors as well. As ecosystem management is conceptually applied through the actions recommended in this plan, the Department will strive to strike a balance between human needs and ecosystem health. To achieve this goal, this plan recommends actions that promote biodiversity at the landscape level, and healthy, productive and sustainable forest ecosystems.

The cornerstone of ecosystem management is promotion of a biologically diverse landscape. As previously mentioned, the landscape includes the Unit's State Forests and the surrounding geographical area. Biodiversity refers to the variety and abundance of living things, their habitats, and their interdependence in a given area or "landscape." Ecosystem integrity cannot be sustained or enhanced without considering land uses and cover types beyond the State Forests of the Unit. For example, important landscape features such as grasslands and forests need to be present in relatively large blocks and be connected to one another by hedgerows, **riparian zones**, or wetlands to be completely functional.

Biodiversity, by definition, is greater when there are many species of plants and animals present in the landscape. It is further enhanced if each respective population has a wide range of genetic variability and ages. Having many different habitats also contributes to greater biodiversity. Peer reviewed scientific studies strongly suggest that diverse ecosystems are more resilient to environmental stresses, human impacts and attacks by insects and disease. The resulting diversity of species and vegetation helps insure that at least a subset of the managed forests will not be affected extensively by global change (Puettmann, 2011). Recommendations to increase biodiversity are often based on the insurance hypothesis, which insures ecosystems

against declines in their functioning because many species provide greater guarantees that some will maintain functioning even if others fail (Yachi and Loreau, 1999). Another way of viewing biodiversity is that it encourages redundancy in ecosystem function; if one component fails, another can take its place.

Diversity within the Unit can be broadly measured and interpreted by assessing the variety of species and the range of land cover types and **forest development stages** present. Maintaining and enhancing such diversity will require a number of specific objectives and actions. The biodiversity objective can be achieved through both passive and active management strategies. Foresters employ passive management strategies through designation of natural and protection areas and riparian buffers. When actively managing forest ecosystems to produce forest products, foresters employ two silvicultural systems to mimic natural disturbance patterns and help promote biodiversity. The two systems are referred to as even-aged and uneven-aged management.

Trees in an even-aged stand originated at approximately the same time, either naturally or by planting. They grow, are cared for, and may undergo various **intermediate improvement thinnings** during their development. Ultimately, trees are removed in one or more major harvest cuts after which a new stand is released or established. As such, a stand managed even-aged has a beginning and an ending point in time. The even-aged management system is an important land management tool because it creates early forest developmental stages necessary for the survival of many plant and animal species. It favors the establishment of **shade intolerant** light loving tree species such as aspen, black cherry, pin cherry, red oak, white oak, chestnut oak, shagbark hickory, tulip poplar, white ash and eastern white pine. These species have significant environmental, biological and financial values. Additionally, even-aged management favors the establishment of many tree species that produce mast, such as black cherry, white oak, chestnut oak and northern red oak. These mast producing species provide valuable food for wildlife. Over the years, the availability of hard mast producing trees has declined in the landscape as a result of diseases which have severely impacted beech and butternut trees and caused the virtual extinction of the American chestnut.

The uneven-aged management system differs from the even-aged system in several important ways. Instead of maintaining one dominant age condition in the stand, this system establishes and maintains at least three or more age groups (cohorts) ranging from seedlings and saplings to very large, mature trees. Uneven-aged management uses two different methods: single tree selection and **group selection**. Single tree selection is used to maintain a relatively closed forest canopy as desired in the uneven-aged forest areas. Group selection is used to create openings for the regeneration of shade-intolerant species such as white ash, red oak, white oak, and black cherry and enhances species diversity within the stand.

The uneven-aged single tree system tends to favor **shade tolerant** tree species such as Eastern hemlock, American beech and sugar maple. Many of these species are long-lived. Through this system a vertical layering of the forest canopy is created with multiple **crown classes**. Each layer of vegetation provides distinct habitat niches. Uneven-aged management promotes the development of late successional habitat characteristics such as large diameter trees, multiple layers of forest canopy, standing dead trees and a moist forest floor.

About 57% of the Twin Sheds Unit is comprised of even-aged forest stands as a result of land clearing during European settlement of the area. To promote biodiversity and create additional blocks of forests with late successional characteristics, some even-aged stands will be gradually converted to **uneven-aged stands** through **variable density thinnings**, single tree, group selection silviculture. This forest ecosystem management strategy will help minimize the size of openings in the canopy, leaving retention trees and biological legacies, thereby helping to conserve and expand the area of forests with late successional characteristics on the Unit.

Blocks of forests 500 acres or greater in size with late successional forest characteristics such as the presence of old large diameter trees, large amounts of coarse woody material on the forest floor and a reasonable number of dead standing hollow trees are environmentally significant as they provide habitat for wildlife species such as the Northern goshawk, black bear, wood thrush, scarlet tanager, Louisiana waterthrush and black-throated blue warbler. Additionally, large forest blocks provide effective wildlife travel corridors between adjacent habitats on public and private lands. Uneven-aged silviculture is a forest ecosystem management strategy that can be used to build late successional forest characteristics over time.

The process to convert an even-aged forest to an uneven-aged forest structure typically takes more than 100 years. This plan recommends **conversion** of even-aged stands to uneven-aged stands when environmental conditions are favorable and other goals and values are not significantly compromised. Stands that are good candidates for long term uneven-aged management are typically located on productive ground that is capable of growing shade tolerant **long lived** tree species such as sugar maple and Eastern hemlock.

It should be noted that a significant number of stands that are outside of the core forest areas identified suitable for uneven-aged management, including natural areas, protection areas and stream side connective corridors, will continue to be managed on an even-aged basis in an effort to diversify wildlife habitat, contribute hard mast and provide early successional cover. Maps of present and future management directions are included with this plan help illustrate this concept.

This plan provides a conceptual framework to strategically apply adaptive even-aged and uneven-aged forest ecosystem management techniques to help create or maintain diverse ecosystems, stages of succession and forest stand structures. Forest ecosystem management activities may vary due to shifting DEC staff capabilities, newly identified threatened or endangered species, unplanned natural disturbances such as ice storms, insect and disease outbreaks and changing market demands - particularly for low grade forest products.

#### **Objective 1.1: Apply a Landscape and Ecosystem Health Perspective to Decision Making.**

The management actions recommended by this plan identify and focus on opportunities to sustain or increase the biodiversity of the Twin Sheds Unit's landscape. These actions will be balanced with other economic, social, recreational and ecosystem management goals. The long term public ownership of State Forests provides exciting opportunities to contribute unique landscape components that are more difficult to provide from private lands with shorter term ownership patterns. Specifically, the State Forests of the Twin Sheds Unit will be managed to provide forests that have early successional, mid-successional, late successional and old growth characteristics.

Ecosystems are very complex systems where almost all life forms are interrelated in some manner. Managing an ecosystem on a species-by-species basis is a difficult task. Typically, enhancements made to the ecosystem to benefit one species will invariably affect numerous other species as well, in both a positive and negative fashion. It is impossible to determine and rank the value of all the common species present on the forest in order to choose which populations should be helped at the expense of others. For these reasons, this plan strategically promotes biodiversity and sustains ecosystem health through diversification of horizontal and vertical forest structure, conservation of gene pools, establishment of natural and protection areas and protection of water resources. Adaptive forest management will be applied to sustain and enhance ecosystems (and the services provided by them) for a suite of wildlife **indicator species**, particularly neo-tropical migrant songbirds, reptiles, and amphibians. Department land managers will employ land planning and management strategies to create, maintain, or

enhance uneven-aged forest areas with late successional characteristics and with appropriate **special management zones** that **buffer** and connect streams, wetlands and vernal pools. Natural and protection areas will be strategically linked with managed uneven-aged forest and riparian zone protection areas.

***Action 1.1.1: Apply adaptive ecosystem management using GIS technology.***

Geographic Information Systems (GIS) and GAP analysis tools are increasingly used by conservation organizations to develop appropriate landscape level management strategies, goals, objectives and actions. As previously mentioned, GIS technologies use computer-based mapping and databases to assist with decision-making and spatial analysis. GIS technologies are continually employed to make informed ecosystem based decisions at the landscape level. Use of improving GIS technologies will help Department foresters continue to create and maintain a variety of ecosystems and associated wildlife habitats. Additionally, Department staff will seek additional opportunities to collaborate and share this plan and its associated GIS data sets with municipal land use planners and land conservation organizations.

***Action 1.1.2: Establish special management zones (SMZ's), natural and protected areas.***

Special management zones (SMZ's) are established along stream banks, wetlands, spring seeps and vernal pools as described by the DEC Division of Lands and Forests Management Rules for Special Management Zones on State Forests and the Strategic Plan for State Forest Management which is available at <http://www.dec.ny.gov/lands/64567.html>

To help conserve, enhance and protect ecosystem function, stream habitats and overall surface water quality, natural and protection areas have been established with special management zones along the estimated 20 linear miles of streams and 46 acres of wetlands. A total of 45 forest stands comprising 778 acres of natural and protection areas have been established to complement the SMZs.

Generally, **riparian buffer zones** will range from 100 to 250 feet from the asset edge, depending on the nature and type of the water resource asset being protected. In addition, stream banks are protected so that mechanical disturbance does not cause excessive soil movement, mineral soil exposure, erosion and degradation of water quality. Any newly constructed forest access roads, haul roads or work associated with oil and gas development and pipeline construction will avoid these areas as well.

***Action 1.1.3: Promote forest health with biomass and coarse wood material retention.***

Coarse woody material such as limbs, stems, tree tops, den, snag and living reserve trees (either singly or in patches) will be left to minimize losses of important soil nutrients such as calcium, magnesium, nitrogen, phosphorus and potassium per the Department's Strategic Plan for State Forest Management and associated retention policy.

Recent research conducted by forestry agencies, conservation organizations, and universities demonstrate that coarse woody material is an important component of a forest ecosystem. Coarse woody material stores moisture, cycles nutrients as it decays and provides habitat niches for insects, reptiles, plants and fungi. Coarse wood material naturally occurs when limbs break, trees are blown over or dead trees (snags) fall.

Coarse woody material is provided as follows:

- ☐ tops of felled trees will not be sold for firewood following sawtimber harvests, except along travel corridors or where aesthetics are important;
- ☐ some non-commercial logs are left in the woods during harvesting;
- ☐ minimum utilization limits will generally not be required in timber harvests;

- ❑ snags and natural coarse woody material is retained, especially in no cut protection zones.

Den and snag trees are retained whenever possible during forest ecosystem management activities. This provides foraging, perching, and nesting opportunities for cavity nesting birds (such as woodpeckers, owls, wrens, nuthatches, vultures, ducks) and cavity nesting mammals (such as raccoons, squirrels, bats, mice, opossum, black bear, porcupine) as well as insects. Snags will eventually become coarse woody material. To enhance existing and provide additional wildlife habitat, den and snag trees are left near water, fields, and edges when possible. This wildlife management strategy is applied in both even-aged and **uneven-aged systems**. In many instances, den trees and snags are not present (i.e. red pine plantations). If den trees and snags do not exist, they will be encouraged by leaving retention trees when a forest stand is managed and harvested. Declining trees are typically retained to become future den and snag trees as needed to meet the Department's retention policy. Additional information on retention is provided by the Strategic Plan for State Forest Management and the Department's retention policy on State Forests, both of which can be found at <http://www.dec.ny.gov/lands/64567.html>

The Federal Occupational Safety and Health Administration (OHSA) consider snag trees to be an occupational hazard. During harvesting operations, loggers are required to stay two (2) tree lengths away from hazard trees, or fell the tree(s) to the ground. As such, it is challenging to retain snag trees across every acre of managed forest. However, high concentrations of snag trees will naturally develop in the Unit's designated natural, protected and riparian buffer areas as time passes.

***Action 1.1.4: Prohibit whole tree harvesting.***

Whole tree harvesting removes the entire tree stem and crown. Some refer to this practice as forest biomass harvesting, the practice of removing the entire above-ground portions of trees with harvesting machines. At the U.S. Forest Service Hubbard Brook Experimental Forest in New Hampshire and at other places, researchers have found that nutrient concentrations are intermediate in the bark and branches and highest in the twigs and leaves of trees. Nutrient concentrations are lowest in the larger **stemwood** (Likens and Bormann, 1970, Yanai, 1997).

Studies conducted over the past two decades in the U.S. at places such as the Hubbard Brook Experimental Forest in New Hampshire and in the United Kingdom have concluded that repeated whole tree harvesting impacts nutrient element cycling on a short term basis. In some instances, whole tree harvesting may deplete from the top-soil important nutrients such as calcium, magnesium, nitrogen, phosphorus and potassium on a long term basis (Brierley, E et al, 2004). Long term nutrient element loss from whole tree harvesting is of special concern on sites that naturally have low fertility such as glacial outwash sands, wet or shallow-to-bedrock soils (Pierce et al., 1993). The vast majority of the forests in and outside of the Unit are second or third growth forest (sometimes called **secondary forest**) as most of the landscape was intensively clear cut, burned, then farmed during European settlement. Clearing and farming of the land, particularly on the hilltops, caused significant soil erosion of the topsoil. The loss of top soil caused significant soil nutrient losses. Today, the forest soils continue to recover and evolve.

***Action 1.1.5: Retain healthy tree species threatened by serious and potentially catastrophic insect and disease.***

Beech, white ash and butternut trees have been declining in recent years. Beech bark disease has damaged and killed many of the oldest beech trees. The disease involves a scale insect and a fungus. The insect pierces the bark to feed, creating a place for the fungus to enter at a later date. The fungus begins to grow within the bark, resulting in round scars. Fungal activity

interrupts the tree's normal water and nutrient uptake processes and a severely infected tree will eventually die. Trees that do not die will remain weak and become more susceptible to wind damage.

**Ash decline** has been used to describe the decline and death of ash trees by unknown pathogens. Some pathogens may include diseases, poor soil/sites, cankers, insects, winter injury, or drought. Ash yellows and ash anthracnose are two additional diseases that negatively impact ash tree health. The discovery of the emerald ash borer in Cattaraugus County in 2009, in Genesee, Greene, Steuben and Ulster counties in 2010, and in Albany, Erie, Monroe and Orange counties in 2011 will likely accelerate the loss of ash. Presently, many healthy white ash trees can still be found within the Unit and the surrounding landscape.

The forests in the Unit and its landscape are within the native range of butternut, but this species is rarely observed during forest inventory or casual observation. Unfortunately, butternut is dying throughout its range as the result of infection by a fungus that researchers believe was introduced from outside North America. Initially, the disease, called **butternut canker**, infects trees through buds, leaf scars, and possibly insect wounds or other openings in the bark. Next, the fungus rapidly kills small branches and spreads throughout the tree. Fortunately, Butternut is the only natural host known to be killed by the fungus. However, the fungus can survive on dead trees for at least two years.

For butternut, forest ecosystem management activities will retain potentially resistant trees using the following guidelines:

1. Retain trees with more than 70% live crown and with less than 20% of the combined circumference of the stem and root flares affected by symptoms;
2. Retain some dead or declining trees for their wildlife value (snags and/or coarse woody material);
3. Retain trees free of symptoms with at least 50% live crown and growing among diseased trees. These trees may be resistant and have value for the gene pool.

Forest tent caterpillar outbreaks historically have defoliated many acres on private and public lands. Forest tent caterpillars feed chiefly on sugar maple, and sometimes on white ash and northern red oak. The insects are native, and outbreaks are typically cyclical in nature, occurring about every ten years. Historically, populations build for a year or two and then subside naturally. Recently, however, forest tent caterpillar outbreaks have lasted longer than typically expected, resulting in patches of forest mortality, particularly on drier hilltop sites. It is suspected that these drier sites make sugar maple trees more susceptible to being stressed by drought, and consequently insect damage. At the time of this writing, the Department has no plans to apply pesticides to control forest tent caterpillar outbreaks. Generally, trees with greater than 50% live crown canopy are left as seed source when affected stands are **salvaged**.

Since this plan is based on an **adaptive management** approach, the proposed management activities may be altered in the event that exotic pests species such as Asian long-horned beetle (*Anoplophora glabripennis*), hemlock wooly adelgid (*Adelges tsugae*) and wood wasps (*sirex noctilio*) invade the Unit. For example, emerald ash borer (*Agrilus planipennis*), is getting closer to the Unit every year. Therefore, when possible, forest management activities will parallel guidelines outlined in the Department's Emerald Ash Borer Management Response Plan available at <http://www.dec.ny.gov/animals/7253.html>. Hemlock wooly adelgid has been found in Tompkins County. As a result, the Department will monitor the Unit for the adelgid and, if found, will consider the control options available at that time.

***Action 1.1.6 Monitor forest health and control invasive exotic species.***

Forest health is monitored on the ground by Department staff and during annual aerial forest health surveys. Aerial forest health surveys are conducted with small airplanes and are primarily intended to cost effectively detect forest defoliation and mortality at the landscape scale.

Additionally, the Department plans to protect aquatic and terrestrial ecosystems by monitoring and controlling invasive exotic species as available resources permit. Initially, control efforts will focus on exotic invasive species that immediately threaten specific habitats of threatened, endangered, or special concern species. Herbicides may be used to control invasive exotic (non-native) plants and insects, but only after an approved **herbicide** action plan and the guidelines required the Strategic Plan for State Forest Management are followed. Prescribed fire may also be considered.

Natural control methods are employed when possible and practical. Integrated pest management (IPM) will also be used. IPM is a comprehensive approach to controlling insects, weeds, and plant pathogens with environmentally and economically sound practices that minimize risks to people and the environment. Promoting animal and plant species diversity, habitat diversity, and good forest health are cornerstones of IPM on the Unit, as healthy forest ecosystems are better able to resist insect and disease outbreaks. In addition, the Department will continue to collaborate with the Federal Animal and Plant Health Inspection Service (APHIS), the New York State Department of Agriculture and Markets and universities such as the SUNY College of Environmental Science and Forestry and the New York State College of Agriculture and Life Sciences at Cornell University in an effort to seek effective control solutions, grant funding and student internships.

**Objective 1.2: Conserve, Protect and Enhance Wildlife Habitat**

***Action 1.2.1: Diversify the Unit's landscape.***

The plan provides a strategy to manage and promote a variety of forest habitats at the early, mid and late stages of forest succession to promote biodiversity and for entire suites of plant and animal species. This adaptive ecosystem management approach will help common species remain common and provide opportunities for less common species to become more prevalent. Over the next two to three decades, if fully implemented, this plan manages forests at the stand and at the landscape level to enhance, sustain or create an estimated 2,166 acres (43%) of late successional habitat, 1,947 acres (39%) of mid-successional habitat and eventually 767 acres (15%) of early successional (including pioneer hardwoods) wildlife habitat. Between 2% and 3% of the Unit is expected to remain in nonforest cover in the form of existing roads, shale pits, power line and petroleum pipe line corridors.

***Action 1.2.2: Use a shifting mosaic concept to manage forest habitats.***

The Shifting Mosaic Project, as developed by the Manomet Center for Conservation Sciences, based in Manomet, Massachusetts, proposes to shift habitats across the landscape, over the decade's scale, in a configuration that allows plant and animal populations to "track" suitable habitat (Hagan and Whittman, 2004). Animal and plant habitats shift over time due to natural and human-induced disturbances. The shifting mosaic concept recognizes this and attempts to provide a variety of habitats by shifting them across the landscape over many years. In the Twin Sheds Unit core habitats with late successional characteristics are established, built around sensitive areas such as steep slopes, wetlands and stream corridors. New early successional habitats are created around this core as time progresses, often in poor conifer plantations and natural hardwood forests. Over a very large time scale (say hundreds of years) portions of the late successional core area will likely be impacted by natural disturbance events, such as wind and ice storms and insect damage, which will create new early successional habitat. Adaptively, new late successional core areas will need to be added when unplanned natural disturbance events turn planned late successional habitats into early successional habitats. Maps of the

Unit's habitats, including natural and protection areas are included at the end of this plan. **Table 13** shows how the Unit's forest structure would conceptually change if this plan was fully implemented. **Table 14** shows how land cover types and associated wildlife habitats would change over time.

<b>Table 13 - Summary of Present and Predicted Future Management Direction</b>								
<i>Present Stand Structure</i>				<i>Predicted Future Stand Structure (Circa 2035)</i>				
# Stands/ Features	Structure	Acres	%	# Stands/ Features	Structure	Acres	%	Change (Acres)
205	Even-aged	2,826	56.5	162	Even-aged	2,338	46.7	-488.0
108	Uneven-aged	1,651	33.0	91	Uneven-aged	1,388	27.8	-263.0
16	Protection/Natural Area (Uneven-aged)	403	8.1	45	Protection/Natural Area (Uneven-aged)	778	15.6	375.0
-	Uneven-or-Even-aged	-	-	31	Uneven-or-Even-aged	376	7.5	376.0
-	Wetlands	45	0.9		Wetlands	45	0.9	0.0
52	*Other/Non-forest	77	1.5	52	* Other/Non-forest	77	1.5	0.0
<b>381</b>		<b>5,002</b>	<b>100</b>	<b>381</b>		<b>5,002</b>	<b>100</b>	
<b>*Note:</b> Other includes roads, shale pits, parking lots and utility line corridors.								

<b>Table 14 - Present vs. Objective Land Uses and Wildlife Habitat Cover Types</b>					
Land Classification	Present		Future Objective* (Year 2035 estimate)		Change
	Acres	%	Acres	%	Acres
Natural Hardwood with an Oak Component	1,263.3	25.3	1,296.0	25.9	32.7
Natural Hardwoods with Conifers	1,204.6	24.1	1,151.6	23.0	-53.0
Conifer Plantation	1,033.7	20.7	0.0	0.0	-1,033.7
Natural Hardwoods	592.2	11.8	624.5	12.5	32.3
Early Successional and Pioneer Hardwoods	251.7	5.0	766.5	15.3	514.8
Conifer Plantation with Hardwoods	197.3	3.9	637.7	12.8	440.4
Natural Hardwood with Oak and Conifers	170.9	3.4	310.1	6.2	139.2
Hardwood Plantations	77.6	1.6	4.9	<0.1	-72.7
Natural Conifers	58.2	1.2	58.2	1.2	0.0
Roads	51.2	1.0	51.2	1.0	0.0
Wetlands	45.2	0.9	45.2	0.9	0.0
Natural Hardwood, mostly Oak	30.8	0.6	30.8	0.6	0.0
Petroleum Pipe-line Corridor**	13.3	0.3	13.3	0.3	**0.0
Electric Power-line Corridor	10.2	0.2	10.2	0.2	0.0
Shale Pits	1.8	0.0	1.8	0.0	0.0
<b>TOTAL</b>	<b>5,002.0</b>	<b>100.0</b>	<b>5,002.0</b>	<b>100.0</b>	<b>0.0</b>
<b>*Notes:</b> The Future Objective estimate is based on current conditions and the expected land classification changes through direct management actions and the natural process of succession as the forest grows and changes over time. It does not account for a major natural disturbance at the landscape scale such as a tornado, straight line wind storm, ice storm or broad scale insect/disease damage. It also assumes that human and economic resources are available to fully implement the plan. <b>** Best estimate:</b> may change if regional oil and gas development expands.					

**Action 1.2.3: Manage about 20% of the Unit to provide long term conifer cover.**

Analysis of the landscape shows that State Forests have the highest percentage of conifer cover in the Unit's watersheds. Since this important habitat type is less abundant across the landscape, about 20% of the Unit will be managed for long term conifer cover.

This will be accomplished by the gradual, sustainable harvest of forest products in 58 stands comprising an estimated 1,002 acres of long-lived conifers as listed in the table below. Long-lived conifer stands contribute to the Unit's late successional habitat types. For purposes of this plan, long term conifers are defined as long-lived species - specifically eastern hemlock, eastern white pine, white cedar and Norway spruce.

<b>Table 15 - Summary of Stands Managed for Long Lived Conifer (LLC)</b>			
<b>Present Forest Type</b>	<b># Stands</b>	<b>Acres</b>	<b>LLC Percentage</b>
Northern Hardwood - Hemlock	23	473	47%
Norway Spruce	18	212	21%
Oak - Hemlock	2	127	13%
Spruce - Natural Species	5	64	6%
Northern Hardwood - White Pine	3	58	6%
Hemlock	5	57	6%
White Pine - Hemlock	2	11	1%
<b>TOTAL</b>	<b>58</b>	<b>1,002</b>	<b>100%</b>

Conifer stands provide valuable habitat for many groups of wildlife species, particularly white-tailed deer, grouse and wild turkey. As such, long term conifer stands and retention areas were identified through the forest inventory process because this cover type is especially important to wildlife, **aesthetics**, recreation, and for biodiversity. For example, in native eastern hemlock stands, total wildlife species richness increases with age (DeGraff et. al.,1986).

Historically, under State and Federal policy guidelines, previously abandoned agricultural lands were replanted with pine and spruce by the Civilian Conservation Corps. (CCC) in the 1930s and 1940s. The Conservation Department continued reforestation newly acquired lands until as recently as the late 1960s. Norway spruce, a non-native tree species, can be managed for the long term - potentially as long as 150 years on better sites. Additionally, some **natural regeneration** of Norway spruce has been observed. Conversely, plantation conifer species such as red pine and Scots pine don't live as long in this region, and typically fail to regenerate in sufficient numbers to function as a long term conifer component. Norway spruce is considered a long term conifer species because it has proven well suited to the heavy clay soils of Central New York and produces large and predictable seed crops for wildlife (Young, 2006). Also, it is a desirable forest product, regenerates more readily than most native conifers, is relatively disease resistant, is not heavily browsed by deer and has proven to be a valuable substitute for natural conifers. Creating additional softwood acreage by future tree planting may be considered. However, natural regeneration methods will be attempted first as tree planting may require extensive **site preparation**, the use of herbicides and considerable expense.

**Action 1.2.4: Maintain an oak component on the State Forests in the Unit.**

Manage about 1,249 acres (about 25% of the Unit) at the stand level to conserve, enhance and sustain oak types. The oak types in the region are often called transition oak types, since the percentage of oak declines as shade tolerant species occupy the site. Heavy overstory removal actions, either natural or human-implemented, favor the perpetuation of oak species provided that interfering species such as American beech saplings have not become heavily established. Partial cutting tends to favor shade tolerant species such as sugar maple, American beech, eastern hemlock and red maple. As such, deliberate planting of oak in tree shelters, installing tree shelters over existing seedlings, limited deer fencing, mechanical cutting of competing vegetation as well as herbicides or controlled burning to control competing vegetation may be

employed on a case by case basis to help reestablish oak. The table below summarizes the stands identified through the forest inventory process as candidates for long term oak management.

<b>Table 16 - Summary of Stands Managed for Oak by Forest Type</b>			
<b>Present Forest Type</b>	<b># Stands</b>	<b>Acres</b>	<b>Percentage</b>
Transition Hardwoods (NH - Oak)	46	784	63%
Oak	14	223	18%
Northern Hardwood	5	58	5%
Northern Hardwood - White Pine	4	53	4%
Oak - Hemlock	4	29	2%
Oak - Pine	4	26	2%
Northern Hardwood - Hemlock	1	22	2%
Pioneer Hardwood	2	18	1%
Red Pine-Plt*	2	16	1%
White Pine-Plt*	1	14	1%
White Spruce*	1	4	<1%
Pine - Natural Species*	1	2	<1%
<b>TOTAL</b>	<b>85</b>	<b>1,249</b>	<b>100%</b>
*Note: These stands had advanced oak seedling and/or sapling sized regeneration when the forest inventory was conducted.			

The plan schedules the following management actions:

- ☐ Manage 78 stands on about 1,057 acres (21% of the Unit) using an even-aged management strategy on a 20 to 40 year cutting cycle.
- ☐ Manage 6 stands on about 183 acres (4% of the Unit) using an uneven-aged management strategy on a 15 to 30 year cutting cycle.
- ☐ Manage 1 stand about 9 acres in size using either an even or uneven-aged management strategy.

Through these actions, the oak component on the Unit will be conserved, enhanced and sustained. Red and white oaks are a highly valued food source for wildlife. Additionally, oaks are long lived and capable of growing to 36 inches in diameter at breast height on good growing sites. Large long lived trees provide a wide range of environmental and aesthetic values.

***Action 1.2.5: Provide late successional habitats and old growth forest characteristics***

Presently, there are no known old growth forests in the landscape surrounding the State Forest. The long term public ownership of the Unit's State Forests presents options to contribute to needed landscape components such as late successional habitats that sustain and enhance biodiversity. As such, 45 forest stands comprising 778 acres (about 16%) of the Unit have been designated as natural or protection areas. The establishment of these areas coupled with managed uneven-aged forests will provide significant blocks of late successional habitat. Some of these habitats, in the absence of catastrophic natural disturbances, should develop old growth forest characteristics as time progresses.

About 10 stands of oak mixed with northern hardwoods and eastern hemlock encompassing about 238 acres are part of the larger 778 acre suite of natural and protection areas. Although most of the stands are accessible by timber harvesting equipment, they will not be managed for the production of forest products. These stands were selected because they are along streams, provide habitat connectivity or have round leafed orchid populations. Some of the individual dominant oak trees will likely grow to biological maturity and have the opportunity to become

biological legacies and snag trees for wildlife. Control of invasive species, beech or striped maple seedlings and saplings may be needed to help conserve orchid habitats in some of these stands using **focused fire**, brush saws and/or herbicides. Natural and protection areas are further described below.

*Natural areas* are defined as areas left in a natural condition, usually without human intervention, to attain and sustain a climax condition, the final stage of succession. By management direction, these areas are not managed for the production of wood products or mineral resources.

*Protection areas* are defined as land excluded from most active management to protect sensitive sites. Exclusions include: wood product management, oil and gas exploration and development, and some recreational activities. These sites most often include steep slopes, wet woodlands and riparian zones along stream corridors.

***Action 1.2.6: Address forest fragmentation by identifying, establishing and connecting forest stands that presently demonstrate or have potential to develop late successional characteristics. About 43% of the Unit will be managed to provide large blocks of forest with multiple canopy layers.***

Blocks of forest over 500 acres in size with multiple canopy layers are lacking in the landscape surrounding the Unit. Private land development in the future will likely cause additional subdivision and forest fragmentation. The following management strategies will be used to create, enhance and sustain connected forest canopy blocks. These large blocks of forest canopy will eventually develop late successional forest characteristics such as large trees, snags, den trees, canopy gaps and coarse woody material.

- ☐ Designate 45 stands totaling about 778 acres (about 16% of the Unit) as natural and protection areas.
- ☐ Manage 91 stands totaling 1,388 acres (about 28% of the Unit) using uneven-aged management. These stands will provide relatively closed canopy conditions, multiple canopy layers along with den trees, snags and coarse woody material for plants and wildlife. Group selection will often be used, with group size ranging from ½ to 2 acres in size on a cutting cycle of 20 to 30 years. Strategies such as variable density thinning and single tree selection will also be employed. As a result, forest canopy closure will typically range between 50% and 80%.

Natural disturbances such as small scale storm damage or insect infestations often help create den trees, snags and coarse woody material. As such, trees damaged by small scale natural disturbances may be left for retention purposes. However, catastrophic damage from larger scale natural disturbances may be salvaged for forest health purposes and to reduce fire danger. When salvaging wood products from a large scale natural disturbance event, some damaged and undamaged trees will be strategically left in the forest for retention purposes.

***Action 1.2.7: Use a shifting mosaic concept to manage 15% of the Unit to provide early successional habitat and 39% of the Unit to provide mid successional habitat.***

Address decreasing diversity in terms of forest structure and habitat at the regional and local level by increasing young early successional forest acreage on the Unit through natural regeneration harvests. The long term goal will be to maintain 15 to 20% of the Unit in an early successional forest stage. Young early successional forests provide critical habitat for a suite of wildlife species that require early successional cover such as the ruffed grouse, blue-winged warbler, Canada warbler, golden-winged warbler, prairie warbler, American woodcock, white-

throated sparrow, chestnut sided warbler, yellow warbler, Adler flycatcher, brown thrasher, turkey, gray catbird and white tailed deer. Decisions concerning the management of early successional habitat on the Unit were made in consideration of both current and historic population levels of these species, public input during the development of this plan and within the context of the amount of early successional habitat on other lands in the surrounding landscape as described in Chapter 2 of Statewide Landscape Assessment of the Strategic Plan for State Forest Management available at <http://www.dec.ny.gov/lands/64567.html>

- ❑ Over the next 20 years, manage 39 stands totaling about 528 acres that currently have an aspen component to strategically create early successional wildlife habitat. Larger stands may be converted to natural hardwoods with a series of smaller regeneration harvests over time, instead of one large regeneration harvest. Most regeneration harvest patches will range from 1 to 10 acres in size. Several entries may be required to manage the entire stand. Strategies such as single tree and **patch retention** will be used to retain **course woody material** on site as per the Strategic Plan for State Forest Management and the Department's retention policy. Twenty of the stands scheduled for early successional habitat management are currently red pine, white pine, scotch pine, red pine-spruce or jack pine plantations. These stands will be converted to natural hardwoods.

Many of these stands contain aspen and will be managed to perpetuate aspen. Aspen is a relatively short-lived tree with an average life span of about 60 to 80 years. It can be a prolific seeder with good germination given the proper conditions. The preferred method of aspen regeneration is by even-aged management. Aspen is well known for its sprouting capabilities. Cutting stands to induce regeneration by sprouts is known as the **coppice** method. The conditions created in this approach provide important habitat for many species, most notably woodcock and ruffed grouse. The regenerated aspen thickets provide ideal brood cover while older trees provide good winter food. Aspen management may be accomplished as sale related work with a commercial forest products sale that is conducted in the vicinity of these stands.

- ❑ Manage 12 stands totaling about 239 acres to reestablish young natural hardwoods, particularly northern red oak, white oak and black cherry for future wildlife food source and forest products. Most of these stands are currently red and scotch pine. These regeneration harvests will also follow the guidelines provided by the Strategic Plan for State Forest Management.

In total, 767 acres (15% of the Unit) is scheduled for even-aged regeneration harvests. These regeneration harvests are scheduled throughout a 20 period to provide a shifting mosaic of early successional habitat. The size and shape of harvests will often mimic natural disturbances such as heavy wind and ice events.

- ❑ Mid successional habitat is a relatively long stage in the progression of succession. It represents the time period between early and late successional stages of growth. The long term goal will be to maintain about 1,947 acres (39%) of the Unit in a mid successional forest stage. Stands that have been regenerated will over time grow from early to mid successional habitat. Strategies such as integrated commercial thinnings, thin/harvests or multiple stage **shelterwood** harvests will be used.

***Action 1.2.8: Insure adequate forest regeneration.***

Take appropriate steps to obtain adequate forest regeneration, using appropriate silvicultural techniques such as retention of seed trees as per the Department's retention policy. When natural regeneration is unsuccessful, consider using tree shelters, fencing,

tree planting and/or direct seeding to help reestablish desirable tree species. Control of invasive species, hay-scented fern, beech (and other woody interference) may require the use of herbicides, prescribed burning or focused fire.

**Objective 1.3: Protect, Endangered, Threatened and Special-Concern Species.**

Protection of endangered, threatened and special-concern species by conserving, protecting or creating new habitats is a priority. There were no endangered, threatened and special-concern species observed by New York Natural Heritage staff during a 2005 biodiversity survey of State Forest Lands in the region (Evans, et al.). At the landscape scale, several threatened and special-concern animal species are known or predicted to occur by DEC's Master Habitat Database and the New York Gap Analysis Model. Several of these species are raptors (birds of prey) such as the Northern Harrier, Sharp-shinned hawk and Northern Goshawk - or birds such as Henslow's sparrow and the golden-winged warbler. Some of the animals are amphibians and birds that require blocks of forest and mid to late successional habitat, such as the Jefferson salamander and Cerulean warbler, respectively. In its' entirety, this plan seeks to provide a diverse suite of early, mid and late successional habitats for many species.

It should also be noted that the Natural Heritage Program observed the arrowhead spiketail dragonfly (*Cordulegaster obliqua*) on the landscape surrounding the Unit during the New York Natural Heritage Biodiversity Survey published in 2005. The presence of this species suggests that the area has good quality spring seeps. The New York Natural Heritage Program has recorded this species in approximately 16 locations in 11 separate counties across a broad extent of the southern tier, Finger Lakes and Hudson Valley and a number of these locations have been found in the past 5 to 10 years. The program reports that the habitat is not uncommon within the broad range occupied by the species and many additional populations will undoubtedly be discovered as a result of more extensive survey efforts. However, there are a number of potentially significant threats to the habitat required by these dragonflies and populations at individual sites are not expected to be large (<http://www.acris.nynhp.org/guide.php?id=8181>, 2012). Habitat may be lost as wet grassy sites revert back into forest or are developed.

***Action 1.3.1: Identify the locations of endangered, threatened and special-concern species.***

Continue to collaborate with the New York Natural Heritage Program, SUNY ESF, Cornell University and the public to identify any endangered, threatened or special-concern species on the Unit. If additional species are found, adaptive ecosystem management strategies will be employed to conserve, enhance or protect habitats based on the best scientific information available. Overall, this document provides management actions and guidelines that diversify, conserve and protect wildlife habitats across the entire Unit and connecting landscape.

***Action 1.3.2: Build vernal pools/ponds.***

Build 10 to 20 small vernal pools/ponds, 300 to 3,000 square feet in size. Some of the pools may be carefully built in natural or protection areas. The pools will create additional habitat for species such as the Jefferson salamander, blue spotted salamander and wood frog. Based on GIS based analysis of soils and topography, an estimated 4 sites covering about 11 acres of suitable woodland sites exist on the Unit. This project would require use of a small track-hoe excavator and/or bulldozer. Team up with DEC Bureau of Wildlife, Upper Susquehanna Watershed Coalition and U.S. Fish and Wildlife service for technical assistance and funding whenever possible. Some of this work may be accomplished during other forest ecosystem management activities such as timber harvesting. A list and map of possible sites are included in the appendix of this plan.

***Action 1.3.3: Protect active nesting sites for raptors listed as Threatened, Endangered or Special Concern.***

Many raptors in New York are listed as species of special concern. Within the Unit, these include: Northern Harrier, Sharp-shinned Hawk, Cooper's Hawk, Northern Goshawk and Red-shouldered Hawk. Each species has specific habitat requirements when nesting. Birds may occupy territory seasonally, or return to the same location yearly. During breeding season, usually between April and July, human activity near nests may disrupt breeding or cause the adult birds to abandon their young. DEC Bureau of Wildlife staff will be consulted and management activities will be adapted to minimize disturbance to birds that are known to be nesting on the Unit.

Adaptive management strategies and actions will be developed and applied on a case by case basis. These strategies may place restrictions on timber harvesting and gas exploration activities and could include: setbacks, no-cut or no disturbance zones, or seasonal restrictions. For recreational uses, actions may include trail closures or rerouting of trails. When specific management strategies for individual species are developed, they will be incorporated into the management plan.

***Action 1.3.4 a: Falconry.***

Licensed falconers will be permitted to remove raptors from the Unit, in compliance with ECL Article 11, Title 10 and 6 NYCRR Part 173.

***Action 1.3.4 b: Monitoring and Research.***

The Department will encourage monitoring and research on the status of northern goshawks to ensure sustainable populations, and to ensure that our knowledge of the natural history and ecology of these raptors continues to increase

***Action 1.3.5: Monitor and address changing deer populations.***

High deer populations can adversely impact forest regeneration, herbs and wildflowers. Over-browsing by deer can drastically alter biodiversity and change the dynamics of forest ecosystems. A map showing beech interference at the forest stand scale is at the end of this plan. The map shows that 46% of the stands in the Unit have a beech understory interference problem. This beech interference problem may be caused, at least in part, by excessive deer browsing of the desirable native vegetation. Thus, as time progresses, the Department may need to address impacts from excessive deer browsing on the Unit. If so, Department foresters will collaborate with Department biologists to address the issue. Forestry staff will conduct surveys of deer density on State Forests where impacts are evident. If surveys indicate that excessive deer browsing is an issue, the following actions will be considered:

- ☐ collaborating with neighboring landowners to encourage hunting on private lands;
- ☐ fencing to protect a site with a rare, endangered or special concern plant species;
- ☐ adjusting the scale of forest management activities;
- ☐ taking measures to reduce deer numbers on the Unit through the DMAP program
- ☐ use tree shelters to protect desired natural seedling/sapling regeneration and/or native hardwood restoration plantings.

If deer population reduction is needed, measures seeking to maximize deer harvest through traditional hunting programs would be used and use of the Department's Deer Management Assistance Program (DMAP) would be considered. DMAP provides a mechanism for landowners or managers to boost doe harvests by providing additional antlerless tags valid only on designated lands.

**Action 1.3.6: Preserve the Hammond Hill State Forest Orchid Glade**

The Hammond Hill State Orchid glade has been designated a natural area as part of the late successional forest habitat component of the Unit. It complements the core blocks of late successional habitat cover types established by this plan. Control of invasive plant species and beech, or other woody interference with focused herbicide or fire may be needed to preserve plant habitats. Botanists from SUNY ESF and/or Cornell University will be consulted if invasive plants, beech, other woody interference or high deer populations significantly threaten orchid populations. Excessive damage from deer would be addressed as previously described by action 1.3.5.

**Action: 1.3.7: Use the Predicted Richness Overlay (PRO) Zones for Management and Planning Purposes**

The New York Natural Heritage Program has developed models conceptually similar to the National and NY GAP Analysis Project. The model predicts plant and animal distributions and is available to DEC staff on the DEC's Master Habitat geo-database. The PRO model is a work in progress. It was consulted during the development of the plan. Most of potential plant and animal habitats currently identified by the PRO model falls within and in close proximity to natural and protection areas and special management zones along streams. The model will be consulted when employing management actions within the Unit.

**Objective 1.4: Protect Soil and Water Resources.**

Sustainability of a forest ecosystem largely depends on the protection of soil and water resources. The aquatic, riparian, and wetland ecosystems on the Unit and its landscape provide food, breeding areas, and cover for numerous plant and animal species. These water resources are an integral part of the larger hydrologic cycle (the route water takes from rainfall to evaporation through condensation to rainfall again) providing sediment filters, regulating runoff and recharging aquifers. Reducing and preventing soil erosion and sedimentation caused by water flowing over bare mineral soil throughout the Unit and its landscape is of critical importance.

**1.4.1: Apply best management practices (BMPs).**

Apply BMPs on all State Forest land management operations including timber harvesting, the development of recreational facilities and oil or gas exploration and/or development. Continue to encourage the voluntary use of BMPs on private lands through the Department's Division of Lands and Forests, Bureau of Private Land Services Cooperative Forest Management (CFM) program.

Harvesting and construction activities are not a major cause of water quality problems when properly managed. When minimally disturbed, forest soils retain their capacity to absorb tremendous amount of water. However, construction of skid trails, roads, **log landings**, well pads, parking lots, and any large scale earth moving project has the potential to become a source of erosion, sedimentation and siltation. Such water quality issues are primarily caused by water flowing over the surface of disturbed mineral soil during heavy rain or snowmelt events. Sedimentation and turbidity (cloudiness) is caused when eroded soil gets into a stream, wetland, pond, or lake. This condition can damage fish habitat, spawning areas, and make the water unsuitable for other uses downstream. Severe erosion moves large quantity of soil and can negatively impact ecosystems.

The key to protecting water quality is proper planning and the appropriate use of BMPs. These simple, often low-cost practices and techniques are incorporated into timber harvests and construction projects. BMPs keep water clean, maintain the productivity of the forest, improve public confidence in logging, and maintain public support for activities which are essential for **sustainable forest management.**

Forestry BMPs will be followed for all construction, maintenance, logging, log landings and mineral extraction projects. All main skid trails will be located by Department Foresters prior to harvesting. BMP recommendations for road placement, grading, water diversion devices and culverts will be followed. Whenever possible, log landings will be located at least 250 feet away from water bodies. If any log landings are located closer than 250 feet, additional sediment control methods will be employed (including straw bales and silt fences) to prevent sedimentation and minimize erosion. Cutting and filling on roads and trails will be limited. Goal 3 of this plan details specific buffer guidelines for extraction of minerals.

Upon completion of a logging job, the log landing will typically be back-bladed and seeded with an appropriate conservation seed mixture of appropriate grasses and legumes and/or mulched with hay or straw at a rate of about 2 tons per acre (approximately 2 ½ 40 pound bales per 1,000 square feet) (NYS Forestry BMP Field Guide, 2011). The grass seed mix may include up to 20% (by weight) of annual ryegrass as a cover crop. Alternatively, a mix of native, warm-season grass may be used if the landing is large enough and the soil type is appropriate. The warm-season grass species may include big bluestem (*Andropogon gerardi*) var. 'Niagara', little bluestem (*Schizachyrium scoparium*), switchgrass (*Panicum virgatum*), eastern gamma grass (*Tripsacum dactyloides*) and/or Tioga deer tongue (*Panicum clandestinum*). Depending on the species used, seedling rates may range from 10 pounds to 25 pounds per acre.

New York's BMPs are consistent with the United States Environmental Protection Agency approved Non-Point Source Pollution Management Plan. The 2011 Edition of the BMP Field Guide is available at <http://www.dec.ny.gov/lands/37845.html>

#### ***1.4.2: Establish special management zones (SMZ).***

Establish and implement in the field SMZs as described by DEC Division of Lands and Forests Management Rules for Establishment of Special Management Zones on State Forests (2008) and the Strategic Plan for State Forest Management.

#### ***1.4.3: Protect aquatic ecosystems by controlling invasive exotic species.***

Control invasive species in aquatic ecosystems as resources allow.

#### ***1.4.4: Pick up litter.***

Collaborate with DEC AANR volunteer partners and the towns of Caroline and Dryden highway departments to keep the Unit free of litter as resources allow.

#### ***1.4.5: Communicate and enforce regulations.***

Collaborate with DEC Forest Rangers and Environmental Conservation Officers to reduce illegal ATV and 4x4 vehicle use on the Unit through education and enforcement of regulations. Post appropriate notices and signs to educate the Unit's visitors.

#### ***1.4.6: Block facilities from illegal vehicle use.***

Block selected firelanes, shale pits, skid trail and haul roads with rocks and gates to prevent illegal traffic, soil erosion and dumping. The locations of these areas are shown in the stewardship needs map at the end of this plan.

### **Objective 1.5: Conduct Periodic Forest and Natural Resources Inventories.**

#### ***Action 1.5.1: Update forest inventory.***

The State Forest Information Database (SFID) has been updated and continues to collect and manage natural resource information at the stand level (stands average about 17 acres in size). The updated software provides improved data storage and sharing capabilities. As such, it supports ecosystem based planning initiatives. Additionally, DEC forestry technicians and

foresters will continue to collect the locations of stone walls, foundations and special natural features each inventory cycle and place the information into the Department's GIS based database.

***Action 1.5.2: Inventory the Forest before Updating the Plan.***

Forest re-inventory will be conducted on a 10 year schedule and before updating the plan.

**Objective 1.6: Conserve, Protect and Enhance Ecosystem Connectivity.**

***Action 1.6.1: Manage 2,166 acres (43%) of the Unit for late successional habitat characteristics.***

Blocks of connected forest canopy over 500 acres in size are noticeably lacking in the surrounding landscape outside of the Unit. New York State Office of Real Property Services records show that the landscape surrounding the Unit is gradually being divided into smaller parcels. Subdivision often negatively impacts rural ecosystems as habitat becomes increasingly fragmented from new building construction and related infrastructure development. In the long term, the ability of rural watersheds to absorb, filter and transmit surface and ground water is impacted as well. It is expected that future private land development will likely result in additional subdivision and forest fragmentation. This action will encourage a minimally fragmented forest canopy and promote biodiversity and to help address this habitat gap.

***Action 1.6.2: Help conserve ecosystem connectivity of the landscape.***

To help address conserve ecosystem connectivity, the Department will continue to build relationships and offer management advice free of charge to private forest landowners. In doing so, Department foresters encourage proactive forest ecosystem management and stewardship, thereby fostering forest land ownership retention, thus reducing subdivision. Additionally, the Department will seek opportunities to conserve ecosystem connectivity to adjacent private lands by collaborating with land conservation and planning organizations such as the Finger Lakes Land Trust, Finger Lakes Trail Conference, Nature Conservancy and Tompkins County Planning Department as part of the *Emerald Necklace Project* as listed in the New York State Open Space Plan (2009). On a voluntary basis, this plan seeks to conserve and enhance ecosystem connectivity on adjacent private land parcels through fee simple acquisition or conservation easements from willing sellers. The New York State Open Space Conservation Plan is available at: <http://www.dec.ny.gov/lands/47990.html>

***Action 1.6.3: Consider Tompkins County Unique Natural Areas Resource Values.***

When possible and compatible, incorporate the natural resource values identified by Tompkins County Unique Natural Areas (UNA) 116 (Star Stanton Hill) and 117 (Slaterville Wildflower Preserve) into ecosystem management planning efforts on the Unit. The lands mapped as these UNA's are mostly natural forest on hillsides with areas of conifer forest plantations. These areas were designated as unique by Tompkins County for factors such as: recreational value, quality examples of plant communities, scenic/aesthetic values, diverse flora, birding sites, geologic importance and old growth forest. It should be noted that based on DEC forest inventory work, no old growth forest is known to exist within the Twin Sheds Unit.

Together, UNA 116 and 117 cover about 1,317 acres of public and private land. About 407 acres (about 31%) of these UNA's are within the Twin Sheds Unit. On the 407 acres of UNA's within the Twin Sheds Unit, about 278 acres (68%) are scheduled to be managed as late successional forest, 116 acres (29%) as mid-successional forest and 13 acres (3%) as early successional forest.

The goals, objectives and actions of this plan, the Strategic Plan for State Forest Management and the Department's retention policy in fact conserve, protect or enhance most of the values

identified by the Tompkins County Environmental Management Council's Unique Natural Area project.

### ***Background***

As a guide to landowners, municipal governing and town planning boards, the Environmental Management Council of Tompkins County created the Unique Natural Area Inventory. This inventory identifies areas in the county that are special, and, in many respects, contain one-of-a-kind natural features. The UNA inventory was started in 1973. It was greatly expanded and updated in 1990 and it recently has been revised. Presently, within Tompkins County there are 192 UNAs. These sites were included in the inventory based on the work of ecologists, botanists, animal scientists, geologists, and wetland specialists who surveyed many of these sites on foot. Other parcels that were not field-visited were surveyed from the road or adjacent parcels, or by using topographic maps and aerial photography ([http://www.tompkins-co.org/emc/docs/11\\_una\\_brochure.pdf](http://www.tompkins-co.org/emc/docs/11_una_brochure.pdf), 2012).

### **Objective 1.7: Monitor Ecosystem Health and Plan Progress.**

#### ***Action 1.7.1: Encourage, Design and Implement a Monitoring Program***

Encourage design and development of a method to monitor the effectiveness of adaptive ecosystem management principles and strategies outlined by this plan. Embrace opportunities to collaborate with educational institutions to develop and employ internships for qualified undergraduate and graduate students in an ecosystem monitoring project at the Unit level. Monitoring at the larger landscape scale will likely continue through the New York Natural Heritage Program.

## **GOAL 2. Provide Recreational Opportunities for People of all Ages and Abilities**

The Department's goal is to provide a variety of rustic, forest-based recreational opportunities that are sustainable and compatible with forest resources. Trails are designed for family enjoyment for beginner to intermediate-level users. When possible and appropriate, new recreational facilities will be designed to provide access for people with disabilities in compliance with the Americans with Disabilities Act (ADA). Construction will be guided by the Principles of **Universal Design**.

Compatible recreation is a mainstay in a use-oriented land management plan. Outdoor activities are widely enjoyed by millions of Americans. State Forests provide opportunities for both active and passive forms of recreation. Some of the important attributes that contribute to pleasurable recreational experiences include public safety, accessibility, aesthetic character and quality of facilities.

It should be noted that a landscape perspective was applied when evaluating recreational resources, opportunities and demands on the State Forests of the Twin Sheds Unit. The natural resources of the Unit sustain several types of rustic outdoor recreation, such as berry picking, bird watching, fishing, hiking, horse-back riding, hunting, informal camping, mountain biking, snowshoeing, cross country skiing, snowmobiling and trapping. The Department strives to provide quality multiple use opportunities throughout the Unit and the larger region on the land that it administers. Additional recreational opportunities can be found at private and public facilities throughout the region.

## **Objective 2.1: Support Rustic and Kindred Uses of the Unit's State Forests.**

### ***Action 2.1.1: Continue to support rustic and kindred uses.***

Continue to support uses such as berry picking, bird watching, fishing, hiking, horse-back riding, hunting, informal camping, mountain biking, snowshoeing, cross country skiing, snowmobiling and trapping.

## **Objective 2.2: Maintain, Conserve and Enhance Existing Recreation Trails and Facilities.**

The Department will focus resources on the maintenance of existing trail systems in a way that protects the resource and maintains the rural, rustic character of the State Forests in the Twin Sheds Unit. To achieve this objective, the Department will continue to work cooperatively with user groups through AANR Agreements to maintain existing trails. Volunteers with the Dryden-Caroline Drifters Snowmobile Club, Finger Lakes Trail Conference and Friends of Hammond Hill devote countless hours to maintenance of the trail systems on the Unit. The present trail systems would not be possible without their dedicated support and commitment. Trail re-routes are sometimes necessary due to natural weather events or forest management activities. Trail relocation requests will be considered on a case-by-case basis. Additional trail development and/or relocations will be considered and may be authorized through a written amendment to the AANR agreement.

### ***Action 2.2.1: Prevent conflicts with winter recreation enthusiasts.***

Mountain bikes and horses will be restricted from the trail system during snow covered conditions.

### ***Action 2.2.2: Prevent unauthorized construction of trails and structures.***

Per Department regulations, building trails without authorization from the DEC is prohibited. In addition, structures such as jumps are not allowed unless specifically approved in writing by the Department. Accordingly, Lands and Forest staff will 1) collaborate with DEC Adopt-A-Natural Resource Stewards, neighboring landowners and the DEC Division of Law Enforcement to educate and inform the public of applicable policy and regulations, and 2) work with law enforcement officials to enforce applicable regulations if necessary.

### ***Action 2.2.3: Maintain hiking trails.***

Maintain about 3 miles of the Finger Lakes Hiking Trail and hiking trail structures (such as foot bridges, waterbars, trail marking dips and rock armoring) with volunteers through the DEC's Adopt-A-Natural Resource program. Most of the trail is designed and designated for pedestrian use only. About 1,200 feet (8%) of the trail shares a section of the multiple use trail network. The entire trail network is maintained by volunteers in cooperation with Department staff.

### ***Action 2.2.4: Maintain the Multiple Use Trail Network.***

Maintain the trail network, including resurfacing with geotextile fabric and gravel, water bar and broad based dip clean-out and repair and culvert clean-out or replacement. The Twin Sheds Stewardship Needs Map at the end of this plan shows the approximate locations of these maintenance needs. About 3,400 feet of the trail tread will need grading, smoothing, resurfacing and broad based dip/water bar repair. Continued collaboration with and advocacy from the Friends of Hammond Hill, Finger Lakes Trail Conference, Cayuga Trails Conference and the Dryden-Caroline Drifters snowmobile club will be needed in order to maintain the trail network. Outside funding and materials will also be needed.

### ***Action 2.2.5: Maintain snowmobile trails.***

The Department has an AANR agreement with the Dryden Caroline Drifters Snowmobile Club on both the Hammond Hill and Yellow Barn State Forests to groom and maintain about 10 miles of trail on the Unit. Routine trail maintenance is performed by volunteers in cooperation with Department foresters under AANR agreements. Funding for these activities is provided in part

by the Snowmobile Trail Fund administered by the New State Office of Parks, Recreation and Historic Programs (OPRHP). Snowmobiles primarily use corridor trails which pass through the State Forests in the Unit. Requests for additional corridor trail connections will be considered on a case-by-case basis through the AANR agreement process.

***Action 2.2.6: Buffer designated recreational trails.***

Buffer zones of minimally disturbed vegetation will be left along DEC **designated recreational trails** to minimize the aesthetic impacts associated with ecosystem management and silvicultural activities. When possible, natural regeneration cutting will be avoided over and across any designated recreational trail. Whenever harvesting close to or over a designated recreational trail, contact will be made with the AANR steward to explain the rationale for the harvest. Additionally, educational or interpretive signs explaining the rationale for the harvest will be installed on the site. Tops and slash will be kept at least 25 feet back from the edge of the trails. In some cases, trails may be relocated to minimize aesthetic impacts from ecosystem and silvicultural management actions or weather events. As always, the DEC will work with AANR partners when planning and conducting ecosystem management projects and silvicultural activities along designated trails.

In terms of oil and gas exploration and development, well pads will not be developed within 250 feet of designated trails. All oil and gas exploration and development related activities will require a TRP, which will address additional trail buffering needs for activities such as seismic testing or pipeline construction if exploration and/or development take place. For additional information, please refer to objective 3.2 and the site assessment classification system for oil and natural gas exploration and drilling.

***Action 2.2.7: Construct a Pedestrian Connector Hiking Trail.***

In collaboration with the Cayuga Trails Club and the Finger Lakes Land Trust, construct a one mile hiking trail that provides access to Six Mile Creek from the town of Dryden parking lot on Hammond Hill road. The connecting trail will provide pedestrian access to the Yellow Barn State Forest through the Finger Lakes Land Trust's Roy H. Park Preserve-Baldwin Tract. The trail may be upgraded for cross country ski use in collaboration with the Cayuga Nordic Ski Club and the Finger Lakes Land Trust if sufficient resources are available.

***Action 2.2.8: Provide parking.***

Continue to collaborate with the town of Dryden to provide year round parking for cars, trucks and horse trailers at the town parking lot on Hammond Hill road adjacent to the Unit. The town maintains and plows the parking lot. Maintain the two other small seasonal parking lots at: 1) the intersection of Star Stanton Hill road and Canaan road and, 2) at the end of Red Man Run.

***Action 2.2.9: Formerly establish trail easement and network gateway.***

As resources allow, negotiate a trail network gateway conservation easement across private land to maintain and enhance access from the town parking lot on Hammond Hill road to the Unit's trail network through trail Y1. Based on GIS analysis, the easement would be about 825 feet long. If acquired, develop an action plan and seek funds along with broad based stakeholder support to upgrade the trail base, trail tread and water drainage system. Upgrading of the trail easement segment would require collaboration between the Friends of Hammond Hill, the town of Dryden and the DEC.

***Action 2.2.10: Trail re-routes.***

Permanent and temporary trail re-routes may be occasionally needed due to natural weather events or forest management activities. The Department will collaborate with the appropriate DEC Adopt-A-Natural Resource Steward before a trail reroute takes place. Reroute requests from outside of the Department will be considered on a case by case basis.

***Action 2.2.11: Limit trail development.***

No new trail networks are currently planned on the Unit. Trails that connect the Unit's existing trail network to other trail systems will be considered on a case by case basis. The total unit trail network, including any new connecting trails, will not exceed 30 miles (a change of about 11%) during the planning period (the current trail network is about 27 miles).

***Action 2.2.12: Limit Mountain Biking to the Multiple Use Trail Network and Public Roads***

Limit mountain bike use to the multiple use trail network, public roads and parking lots. Close all areas to mountain bike use on the Twin Sheds Unit (including undesignated routes, fire lanes, former logging trails and single use pedestrian foot trails), except the Multiple Use Trail Network and Public Forest Access Roads.

Unauthorized building of single track mountain bike trail has recently increased on the Unit, particularly on the Hammond Hill State Forest. The Department has received several complaints regarding unauthorized single track trail and structure construction from volunteer stewards and neighboring landowners, and, unless curtailed, the problem will continue to grow. Unauthorized trail and structure building is of concern because: 1) improperly built unauthorized trails and structures may create a personal safety hazard, 2) unauthorized trails are not officially mapped or marked and may confuse novice recreationists, 3) improperly located trails may result in chronic erosion and maintenance problems, stretching already thin volunteer and DEC stewardship capabilities, and 4) closing of established unauthorized trails and removal of structures requires significant resources.

**Objective 2.3: Enhance Public Information and Access.**

***Action 2.3.1: Install or replace signage.***

Install and/or replace large wooden State Forest identification signs; maintain four large signs on each State Forest on the Unit (please see the Stewardship Needs maps for specific locations).

***Action 2.3.2: Update brochures and maps.***

Collaborate with the Unit's AANR partners to update the Hammond Hill trail network brochure and the Department's web site maps as necessary. Interactive maps are available through the State Lands Interactive Mapper at: <http://www.dec.ny.gov/outdoor/45415.html>. Information about State lands in DEC Region 7 (Central New York) is available at <http://www.dec.ny.gov/outdoor/7792.html>

***Action 2.3.3: Upgrade the Hammond Hill Informational Kiosk.***

Upgrade the Hammond Hill State Forest kiosk to two or three panels in size and include information about the Yellow Barn State Forest. The kiosk will also include information such as: emergency contacts, ecosystem/wildlife habitat management, silviculture, local history, state forest rules and regulations, volunteer stewardship organizations and volunteer opportunities. Collaborate with the town of Dryden to install the updated kiosk at the public parking area on Hammond Hill road.

**Objective 2.4: Restrict ATV (All Terrain Vehicle) Use to Protect Forest Sustainability.**

***Action 2.4.1: Restrict ATV use to those that hold a DEC-issued Motorized Access Permit for People with Disabilities Trails (MAPPWD).***

Based on evaluation of past efforts to accommodate ATV use and the many impacts and constraints associated with off road vehicles as outlined in the Strategic Plan for State Forest Management, the Department does not permit public ATV use on State Forests, except;

- ☐ as may be considered to accommodate a public “connector trail” through Unit Management Planning or a similar public process; and;
- ☐ on those specific routes designated for use by DEC-issued Motorized Access Permit for People with Disabilities (MAPPWD).

Per DEC policy, a connector trail through a portion of State Land could be considered. However, a connector trail was not considered for the following reasons;

- ☐ there is no public trail in the area;
- ☐ according to the USDA soil survey, about 37% of the soils on the Unit are fine textured, have high clay content and are imperfectly or poorly drained, and therefore cannot sustainably support intense ATV use;
- ☐ illegal ATV use has been a problem on the Hammond Hill multiple use trail network; constructing a formal ATV connector trail would intensify illegal use and damage the multiple use trail network;
- ☐ overall all appropriate soil conditions, maintenance and enforcement funds must exist to ensure that roads and trails can be maintained to prevent chronic environmental damage or development of hazardous trail conditions. Presently, DEC resources for construction and maintenance are very limited. An ATV connector trail for the general public would require additional resources from DEC’s Office of Public Protection.
- ☐ part of the Unit drains into watersheds that are sources of drinking water. Also, part of the Unit drains into the West Branch of Owego Creek, an important trout fishery that is stocked by the Department and the County Sportsman Federation and Six Mile Creek. A connector trail would encourage illegal ATV use throughout the Unit and could impact water quality for people, fish and wildlife.

#### **Objective 2.5: Provide Recreational Opportunities Through Universal Design**

The following is a summary of the Americans with Disabilities Act (ADA) and its influence on management actions for recreation and related facilities.

The Americans with Disabilities Act (ADA), along with the Architectural Barriers Act of 1968 (ABA) and the Rehabilitation Act of 1973; Title V, Section 504, have had a profound effect on the manner by which people with disabilities are afforded equality in their recreational pursuits. The ADA is a comprehensive law prohibiting discrimination against people with disabilities in employment practices, use of public transportation, use of telecommunication facilities and use of public accommodations. Title II of the ADA requires, in part, that reasonable modifications must be made to the services and programs of public entities, so that when those services and programs are viewed in their entirety, they are readily accessible to and usable by people with disabilities. This must be done unless such modification would result in a fundamental alteration in the nature of the service, program or activity or an undue financial or administrative burden. Consistent with ADA requirements, the Department incorporates accessibility for people with disabilities into the planning, construction and alteration of recreational facilities and assets supporting them. This UMP incorporates an inventory of all the recreational facilities or assets supporting the programs and services available on the unit, and an assessment of the programs, services and facilities on the unit to determine the level of accessibility provided. In conducting this assessment, DEC employs guidelines which ensure that programs are accessible, including buildings, facilities, and vehicles, in terms of architecture and design,

transportation and communication to individuals with disabilities. A federal agency known as the Access Board has issued the ADA Accessibility Guidelines (ADAAG) for this purpose.

An assessment was conducted, in the development of this UMP, to determine appropriate accessibility enhancements which may include developing new or upgrading of existing facilities or assets. The Department is not required to make each of its existing facilities and assets accessible so long as the Department's programs, taken as a whole, are accessible. Any facilities, assets and accessibility improvements to existing facilities or assets proposed in this UMP are identified in the Proposed Management Actions section.

For copies of any of the above mentioned laws or guidelines relating to accessibility, contact Carole Fraser, DEC Universal Access Program Coordinator at (518)-402-9428 or [cafraser@qw.dec.state.ny.us](mailto:cafraser@qw.dec.state.ny.us)

***Action 2.5.1: Consider the Principles of Universal Design in trail rehabilitation and assets***

Taking ADAAG one step further is the application of the Principles of Universal Design. Universal Design makes products and environments usable by all people, to the greatest extent possible, without the need for adaptation or specialized design. The intent of Universal Design is to make things easily usable by as many people as possible at little or no extra cost. Universal Design benefits people of all ages and abilities (Ron Mace, founder and program director of The Center for Universal Design, North Carolina State University, and Raleigh, North Carolina).

When possible and appropriate, all new construction of facilities and trails on the forests will follow ADA requirements, the Principles of Universal Design and the ADAAG.

***Action 2.5.2: Maintain and enhance existing MAPPWD trail on Hammond Hill***

Inspect 1.1 the miles of trail annually and replace trail signage. As required, smooth and drain portions of the trail periodically to help maintain the trail tread. Inspect and replace culverts as required. Build a 2 car parking lot.

### **GOAL 3. Provide Economic Benefits to the People of the State**

***Ecotourism***

State Forests provide a base for eco-tourism business. Individuals using the forests for recreational purposes also frequent local businesses for other needs. Thus, the recreational services provided by the lands in the Twin Sheds Unit benefit the service and retail sectors of the local economy.

***Renewable Resources***

Well managed forests produce sustainable forest products. Properly designed prescriptions and harvest plans promote biodiversity and forest health. At the same time, the State Forests of the Unit provide jobs and locally produced natural material to support the local economy.

***Mineral Resources***

The leasing and development of natural gas and oil resources can provide jobs and income to the State while increasing domestic energy supplies. Oil and natural gas are valuable resources which can provide energy and revenue, as well as the opportunity for improvements to the existing infrastructure of the Twin Sheds Unit (such as improving safe and restricted access through upgrading existing roads, culverts and gates) and creation of additional early successional wildlife habitat which may or may not enhance habitat diversity. As with any other human activity on State lands, oil and natural gas exploration and development can impact the environment. Natural gas is a cleaner energy alternative to fossil fuels such as coal and diesel fuel.

**Objective 3.1: Provide a Steady Flow of Forest Products to Generate Income to the State of New York, Raw Materials to the Forest Products Industry and Create Local Jobs while Protecting Sensitive Areas and Other Management Objectives.**

***Action 3.1.1: Manage forest ecosystems.***

Schedule about 3,666 acres (73%) of the Unit for sustainable forest management through harvesting using science-based silvicultural systems over a 20 year period. This equates to about 183 acres per year Unit wide. About 3,837 acres (77%) of the Unit is managed working forest. The 171 acres (3%) not presently scheduled for management will be reevaluated during forest inventory and plan updates.

***Action 3.1.2: Salvage forest products.***

**Salvage** forest stands that are destroyed or severely damaged by natural events before they lose significant value from decay and insect infestation. Leave some snag trees and coarse woody material for wildlife and conservation of soil nutrients during salvage operations as per the Department's retention policy.

**Objective 3.2: Provide for Mineral Resource Exploration and Development while Protecting Natural Resources and Sustaining Quality Recreation Opportunities.**

***Action 3.2.1: Prohibit surface disturbance associated with high-volume hydraulic fracturing***

Disturbance associated with high-volume hydraulic fracturing is inconsistent with the purposes for which the lands within the Unit were acquired. This prohibition is subject to change if the Draft Supplemental Generic Environmental Statements regarding Well Permit Issuance for Horizontal Drilling and High-Volume Fracturing to Develop the Marcellus Shale and Other Low-Permeability Gas Reservoirs is amended during finalization processes.

***Action 3.2.2: Restrict surface mining***

Restrict surface mining of shale, sand, gravel or other aggregate and underground mining of "hard rock" minerals such as metal ores, gem minerals, and salt. The Department's current policy is to decline any commercial mining application(s) pertaining to any lands covered by this UMP as these activities are not compatible with the purposes for which State Forests were purchased. Maintain eight shale pits across the Unit for infrastructure purposes. These surface mines will occasionally be used for road and parking area maintenance and construction activities.

***Action 3.2.3: Consider leasing the State Forests for oil and natural gas exploration and development.***

Consider leasing. The Unit cannot be leased until it is nominated. If nominated, limit the geophysical, geochemical and/or surface sampling procedures for the exploration of mineral resources with an approved lease. Once nominated, and before the Unit is leased, a public meeting would be held to provide information about natural gas development specific to the Unit and to receive public comments. A 30-day public comment period would follow. The Department would consider all comments and conduct an oil and gas exploration and development tract assessment of the Unit prior to making a decision. If the Department decided to pursue a lease, the Division of Lands and Forests would collaborate with the Division of Mineral Resources to incorporate special conditions into the proposed lease. These conditions would include, but not be limited to, criteria for site selection, mitigation of impacts and land reclamation upon completion of drilling. Any parcel designated as a non-surface entry lease will no longer be subject to the process detailed above due to the prohibition of surface disturbance(s).

In addition to an approved lease, a Temporary Revocable Permit (TRP) is also needed to explore State Forest land for mineral resources. For additional information see the Guidelines for Seismic Testing on DEC Administered State Land. These guidelines are available at [http://www.dec.ny.gov/docs/lands\\_forests\\_pdf/sfseismic.pdf](http://www.dec.ny.gov/docs/lands_forests_pdf/sfseismic.pdf)

***Action 3.2.4: Minimize well pad density.***

If leasing occurs, the Division of Lands and Forests recommends that well density does not exceed one well pad per 320 acres. Consistent with the Strategic Plan for State Forest Management, DEC may consider well pad densities of greater than one well pad in 320 acres only when the additional impact can be managed with heightened mitigation measures and well location restrictions. These will address well site placement, along with routing considerations for supporting roads and pipelines. Well pad densities of one well pad in 40 acres or greater will not be considered. Additional well pad development would be required to be compatible with oil and gas exploration and development tract assessments conducted in association with the lease and the goals and objectives of this plan.

***Action 3.2.5\*: Develop and implement a three category tract assessment classification system for oil and natural gas exploration and drilling.***

If the State Forests in the Unit are nominated for leasing by the oil and gas industry, the Department would develop an oil and gas lease tract assessment. A hierarchical approach would be used to focus surface disturbances on the least sensitive areas of the Unit and to exclude the highly sensitive areas. The hierarchical approach will classify the forests into three categories:

***Category A - Compatible with well pad and access road development.*** Defined as areas compatible for well pad development and associated access roads on slopes between 0 and 15%. Category A areas are the least sensitive to surface disturbances and should be considered first for well placement to limit the overall environmental impact of well pad and access road development. These areas include existing shale pits and land with 250 feet of existing public highways and public forest access roads which would be preferred areas for development. The hierarchy will first consider drilling in areas such as fields and conifer plantations. Drilling options will decrease as stand management moves from even aged to uneven aged conditions. The least favorable locations for drilling will be in stands managed for old growth characteristics. Upon completion of drilling, well sites will be reclaimed with native vegetation to a condition consistent with the surrounding stand management objectives. Any areas within this category that have limitations related to soils, slope, streams and wetlands as well as high use recreational areas are *excluded* from this classification. Also *excluded* are features such as wetlands, homestead foundations and cemeteries, as well as natural and protection areas. The intent is to focus any future surface disturbances in this zone to reduce environmental impacts.

***Category B - 250 foot stream and designated recreational trail buffers. Not compatible with well pad development; may be compatible with road and utility development.***

This category includes the following:

- ☐ streams and a 250-foot buffer.
- ☐ designated and signed recreational trails and a 250 foot buffer.

**Category C - Not compatible with well pad or road development.**

This category includes:

- ☐ water bodies and wetlands and a 250-foot buffer around them;
- ☐ slope greater than 15%;
- ☐ archeological and cultural concerns;
- ☐ known occurrences of rare and endangered species;
- ☐ natural and protection areas not related to buffers and slope;
- ☐ spring seeps, vernal pools and an appropriate buffer (determined in the field).

Exceptions to special conditions developed from oil and gas lease tract assessments are possible if additional analysis, protective measures, new technology or other issues warrant a change in the compatibility status of an area.

**Action 3.2.6\*\*: Minimize environmental impacts from pipelines.**

Pipelines may be constructed on State Forest lands only if a portion of the mineral resources to be transported was extracted from State lands. Pipeline and road development must be in compliance with State Forest tract assessments, the Strategic Plan for State Forest Management, and the Generic Environmental Impact Statement and Supplemental Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program.

Pipelines will be located immediately adjacent to Public Forest Access Roads. The location of the roads and pipelines will be in compliance with tract assessments. Pipelines may be located in stands managed for closed canopy conditions only along pre-existing roads that intersect such area. Additional surface disturbance associated with such construction will be considered only in areas other than stands which are managed for relatively unbroken canopy conditions. Areas managed for unbroken canopy conditions may be referred to using various terms such as "uneven-aged," "uneven-aged variable retention," "all aged," "high canopy," "closed canopy" or others.

Pipeline development on State land will not be permitted if the Department determines that it creates a significant long-term conflict with any management activities or public use of the State Forests, or with other management objectives in this plan. All pipelines will be gated to restrict motorized access, and if necessary hardened crossings or bridges will be installed, to allow heavy equipment access across pipelines. These requirements will be satisfied by the Lessee.

Exceptions to the above guidance must be approved by the Division of Lands and Forests, in consultation with the Division of Mineral Resources.

**Action 3.2.7\*\*: New road development or rehabilitation.**

Any new roads built to access well sites will be located based on the three category tract assessment classification system for oil and natural gas exploration and drilling, with the intent of protecting the Unit's natural resources and to limit the impacts on other forest uses and values. Access roads associated with well sites will not exceed 14' in width between ditches and will be designed to maintain closed canopy conditions, where appropriate. On turns and intersections, roads will not exceed a total cleared width of 36 feet. Roads will be constructed with gravel over filter fabric to minimize soil disturbance. Regardless of the spacing unit, State land which is not leased or leased with no surface occupancy, road development will not be permitted on State land. Upon completion of drilling, access roads may be closed to the public and will be reclaimed to a condition capable of supporting both vegetation and periodic access to maintain the well site. Site restoration will be a condition of the lease and will be authorized by a Temporary Revocable Permit (TRP).

Note 1\*: Where criteria for these categories overlap, the most restrictive classification would be applied. Note 2\*\*: The Department will allow access to State Forest land in the Unit from adjacent private lands when access is required to drill or develop wells and associated infrastructure. This will only be permitted when written permission is provided from the private landowner granting access. The lessee will be required to build a gate to Department specifications at the state boundary line and must maintain the gate for the duration of the lease. *Access to private land across State Land will not be permitted.*

### **Objective 3.3: Provide Property Tax Income to Local Governments and Schools.**

#### ***Action 3.3.1: Pay real property taxes.***

The State Forests are subject to town, school and fire district property taxes, but are exempted from county taxes. State Forest land is taxed at the same rate as private forest land. **Appendix A-10** of this plan estimates the Real Property taxes paid by the State Forests in the Unit.

## **GOAL 4. Provide Sound Stewardship of the State Forest**

### **Objective 4.1: Protect the Cultural Resources on the State Forests.**

#### ***Action 4.1.1: Protect stone walls, cisterns, fire ponds and old foundations.***

Stone walls and old foundations on the State Forests will be protected during management activities and recreational trail development. Should stone wall disturbances be necessary for access during forest product sales or oil and gas development, the contract will require that the structures be returned to their pre-impact condition.

#### ***Action 4.1.2: Update archeological information***

Add archeological data regarding the location, size and condition of assets such as stone walls, cisterns and foundations to the DEC's geo-database during inventory and re-inventory.

### **Objective 4.2: Protect the Natural Resources on the State Forests.**

#### ***Action 4.2.1: Protect the natural resources from uncontrolled wildfire.***

A wildfire protection program will be maintained to assure minimum risk of loss to humans, structures and forest resources associated with uncontrolled wildfire. This program is the responsibility of State Forest Rangers from the Department's Division of Forest Protection and Fire Management. Prescribed burning may be used to control invasive species, beech or other woody interference as staff resources permit.

#### ***Action 4.2.2: Protect natural resources from insects, disease and invasive species.***

The protection of resources from injurious insects, diseases and invasive exotic (non-native) species will be accomplished through a program of integrated pest management. This program includes elements of reconnaissance, analysis and determination of thresholds and controls when necessary. The use of pesticides, mechanical cutting and/or prescribed fire may be required.

#### ***Action 4.2.3: Prohibit target shooting on the Unit.***

The shale pits will be posted to prohibit target shooting because of the high level of recreational use in the Unit. Target shooting takes place at shale pits or at log landings and leaves litter in the form of spent shell casings and targets. Trees and signs are often damaged as well. As such, target shooting reduces the quality of outdoor recreation provided by the natural resources of the Unit. There are numerous rod and gun clubs in the area that provide safe and appropriate target shooting facilities.

***Action 4.2.4: Protect the natural resources from damage by beavers.***

The colonization of a site by beavers results in the flooding of an area. This on occasion can inundate sites with rare plants or other rare habitat features. Beavers can also cause flooding damage to adjoining property owners, recreational trails and roads. Currently there are no known sites where beaver have damaged adjoining property owners, rare plants or other rare habitat features. However, there are two sites in the Unit where beavers have caused damage to roads in the past. In many cases flooding by beavers enhances biodiversity. Ponds created by beavers can provide valuable habitat for amphibians, aquatic insects, fish, waterfowl as well as water for a variety of wildlife. Therefore, the Department will only look to control beaver numbers in sensitive areas and areas that would adversely impact adjoining property owners, recreational trails and roads. Recreational trapping is a valuable tool in beaver population control. However, reduced popularity in trapping and fluctuations in the markets for beaver fur have caused an overall reduction in recreational trapping. If recreational trapping is not effective in controlling beaver populations on the Unit, the Department may obtain an Article 11 permit and hire a nuisance wildlife trapper to remove problem beavers.

**Objective 4.3: Prevent Illegal Activities on the State Forests.**

***Action 4.3.1: Patrol and enforce State and local regulations on the Unit.***

Communicate closely with the Department's Forest Rangers and Environmental Conservation Officers to provide routine patrols and identify specific enforcement needs on the Unit. Encourage the public and DEC AANR partners to report specific information on illegal activities they observe to the DEC Forest Ranger and land manager.

**Objective 4.4: Maintain Access Trails, Haul Roads and Public Forest Access Roads.**

***Action 4.4.1: Maintain forest access trails, haul roads and public forest access roads during forest product sales and through Department operations staff as resources allow.***

Forest product sales contracts will be written to include terms for road protection, repair and maintenance. Routine maintenance for activities such as grading of roads and mowing of road shoulder may be conducted by DEC Operations staff if resources are available.

**Objective 4.5: Maintain Boundary Lines and Identify State Land to Users.**

Timber theft and trespass is a significant threat to the natural resource assets of the Unit. Properly marked and maintained boundary lines deter timber trespass. Periodic maintenance of the 68.4 miles of boundary lines on the Twin Sheds Unit combined with surveying when necessary will maintain the integrity of the property lines.

***Action 4.5.1: Maintain boundary lines.***

Post State Forest signs about 400 feet apart along public roads passing through the State Forests in the Unit and about 660 feet apart along interior boundary lines. Repaint all 68.4 miles of boundary lines every seven years according to the following schedule:

<b>Table 18 - State Forest Boundary Line Maintenance Schedule</b>				
<b>Ref. Area</b>	<b>State Forests</b>	<b>Boundary Line (Miles)</b>	<b>Last Year Painted/Signed</b>	<b>Next Year Painted/Signed</b>
Tompkins 2	Hammond Hill	30.4	2011	2018
Tompkins 5	Yellow Barn	13.3	2011	2018
<b>Total</b>		<b>43.7</b>		

#### **Objective 4.6: Acquire Adjacent Land from Willing Sellers that Consolidate State Ownership.**

##### ***Action 4.6.1: State Forest Consolidation and Connectivity***

It is the intention of the Department to purchase in fee, or a conservation easement, parcels that will consolidate State ownership (in-holdings and properties surrounded on three sides by State property) or will protect endangered species or habitat. The purchase of in-holdings, lands that will consolidate boundary lines and lands that connect two or more State Forests will facilitate public and administrative access, reduce management costs and provide larger blocks of undeveloped forest land on the landscape. Projects listed in the New York State Open Space Conservation Plan, such as the Emerald Necklace project, will also guide land purchases. As resources allow, the Department will pursue fee title or a conservation easement of unimproved parcels which fit the criteria above, if they are offered for sale by their owner. Purchases will only be made from willing sellers. The Department may be interested in all or only a portion of larger parcels.

##### ***Action 4.6.2: Trail Corridor Easement***

Acquire a conservation easement for the trail corridor that connects the town of Dryden parking area on Hammond Hill road to the multiple use trail network on the State Forest. This is the only parking available to the public that provides winter access to the multiple use trail system. There is a .2 mile section of yellow trail #1 that connects that parking area with the multiple use trail system that is on private land. In order to continue to provide public access to the trails, the Department will seek to acquire a conservation easement to conserve this gateway trail corridor.

#### **Objective 4.7: Maintain Usable Shale Pit.**

##### ***Action 4.7.1: Maintain the shale pits on the Unit.***

Shale from former pits may be used to repair and resurface portions of the public forest access road, to build and maintain parking lots and maintain recreational trails on the Unit. Each time a shale pit is used the active face will be restored upon completion of use. The Regional Mined Land Reclamation Specialist will be notified and given the opportunity to make an assessment of materials that will be extracted to determine if a mined land use permit is required. The town will need a TRP to remove shale from the pit.

## **APPENDICES**

### **A-1 and A-2. Management Action Schedules**

Tables listing the proposed management actions follow. Additionally, maps illustrating land cover changes and wildlife habitat types are at the end of this plan. The following table presents a 20-year schedule of planned management actions referenced by stand number and year of management.

### **Key to Land Management Action Schedules**

To save space, codes have been used in the management action tables. The key to codes are follow below.

<b>Objective Forest Type Codes</b>	
<b>Code</b>	<b>Forest Type (Land Classification)</b>
CHP	Conifer Plantations with Hardwoods
CP	Conifer Plantations
ES	Early Successional and Pioneer Hardwoods
HP	Hardwood Plantations
NC	Natural Conifers

Objective Forest Type Codes	
Code	Forest Type (Land Classification)
NH	Natural Hardwoods
NHC	Natural Hardwoods with Conifers
NHO	Natural Hardwoods with an Oak Component
NHOC	Natural Hardwoods with Oaks and Conifers
NOA	Natural Hardwoods, Mostly Oak

Forest Type Codes		Tree Type Codes	
Code	DEC Type	Code	Species
10	Natural: Northern Hardwood	APL	Apple
11	Natural: Northern Hardwood-Hemlock	ASP	Aspen, Bigtooth or Quaking
12	Natural: Northern Hardwood-White Pine	BAS	American Basswood
14	Natural: Pioneer Hardwood	BC	Black Cherry
15	Natural: Swamp Hardwood	BEE	American Beech
16	Natural: Oak	BB	Black Birch
17	Natural: Black Locust	BF	Balsam Fir
18	Natural: Oak-Hickory	BL	Black Locust
19	Natural: Oak-Hemlock	BBE	Blue Beech
20	Natural: Hemlock	ELM	American Elm
21	Natural: White Pine	EL	European Larch
22	Natural: White Pine-Hemlock	HEM	Eastern Hemlock
30	Natural: Oak-Pine	HM	Sugar (Hard) Maple
31	Natural: Transition Hardwood	IWD	Ironwood (hophornbeam)
32	Natural: Other	JL	Japanese Larch
40	Natural: Red Pine	JP	Jack Pine
41	Natural: White Pine	NS	Norway Spruce
42	Natural: Scotch Pine	PC	Pin Cherry
43	Natural: Austrian Pine	RM	Red (Soft) Maple
45	Natural: Norway Spruce	RO	Northern Red Oak
47	Natural: Japanese Larch	RP	Red Pine
48	Natural: European Larch	SP	Scotch Pine
49	Natural: White Cedar	STR	Striped Maple
51	Natural: Balsam Fir	TAP	Thornapple
52	Plantation: Black Locust	WA	White Ash
53	Plantation: Pitch Pine	WC	Northern White Cedar
54	Plantation: Miscellaneous Pure Species	WP	Eastern White Pine
60	Plantation: Red Pine-White Pine	WS	White Spruce
61	Plantation: Red Pine-Spruce	YB	Yellow Birch
62	Plantation: Red Pine-Larch		
63	Plantation: White Pine-Spruce		
64	Plantation: White Pine-Larch		
68	Plantation: Bucket Mix		
70	Plantation: Pine-Natural Species		
71	Plantation: Spruce-Natural Species		
99	Non-forest		

Size and Age Class Codes			
Size Class		Future Age Class Codes	
Size	Definition	Age	Definition
S-S	Seedling-Sapling; trees up to 5" diameter at breast height	EA	Even-aged
PT	<b>Poletimber</b> ; trees 6"-11" diameter at breast height	UA	Uneven-aged
SST	Small Sawtimber; trees 12"-17" diameter at breast height	UE	Even or Uneven-aged
MST	Medium Sawtimber; trees 18"-23" diameter at breast height		

Management Action Codes and Time Periods			
Action Codes		Time Period	
Action Codes	Definition	Period	Time (Years)
ATR	Apple Tree <b>Release</b>	A	2014-2018
CTR	Crop Tree Release	B	2019-2023
FSI	Forest Stand Improvement	C	2024-2028
GS	Group Selection	D	2029-2033
ICT	Intermediate Commercial Thinning (Includes Thin/Harvest Option)		
PTR	Patch Retention		
NTR	No Treatment Recommended		
RCH	Regeneration Cuts for Habitat		
RWST	Row or strip thinning		
SST	Shelterwood/ <b>Seed Tree Cut</b>		
STGS	Single Tree and Group Selection		
STS	Single Tree Selection		
VDT	Variable Density Thinning		
<i>Please note:</i> Stand acreages in the land management action schedules that follow were generated by geographical information system (GIS) computations which potentially could vary as much as 1% from land record or deed acreages. These differences could be caused by cumulative errors in deed or GIS calculations, and/or rounding errors. This slight variation does not affect management decision making. Additionally, the estimated action acreage does not include fully include additional buffering of visual, archeological or water resources as required by Department policy as described by the Strategic Plan for State Forest Management found at <a href="http://www.dec.ny.gov/outdoor/7792.html">http://www.dec.ny.gov/outdoor/7792.html</a> .			

A-1. Land Management Action Schedule - Hammond Hill State Forest (Tompkins No. 2)																		
Stand	Type	Size	TPA	BA	Obj Typ	Fut. Age	Top Five Species					Action Options/Choices			Time			Ac
A-01	31	PT	187	139	NHO	EA	RM	RO	WA	BE	HM	ICT	CTR		C			12
A-02	11	SST	185	163	NHC	UA	HEM	BE	RM	RO	WA	STGS	ICT	VDT	C			23
A-04	11	SST	184	168	NHC	UA	HEM	RM	BE	HM	WA	STGS	ICT	VDT	C			60
A-05	31	SST	165	157	ES	EA	RM	RO	ASP	HM	BE	RCH	SST		C			6
A-06	63	SST	274	187	CHP	EA	NS	RM	WP	WA	BC	REST	ICT	ATR	A			6
A-08	10	SST	138	117	NH	UA	RM	RO	BBE	BB	HM	STGS	ICT	VDT	C			9
A-09	11	SST	166	160	NHC	UA	HEM	RO	RM	WA	HM	STGS	ICT		C			3
A-10	31	SST	128	135	NHO	EA	RO	RM	BE	ASP	HEM	ICT	CTR	SST	C			5
A-11	40	SST	212	146	PH	EA	RP	SP	RM	WA	BC	RCH	SST		A			67
A-13	65	SST	154	126	CHP	EA	NS	SP	BC	WA	RM	RWST	SST	ICT	D			8
A-14	10	SST	174	150	NH	UA	BC	HM	WA	RM	ELM	STGS	ICT		A			2
A-17	45	SST	217	150	CHP	EA	NS	ASP	RM	RO	BC	ICT	RWST	SST	D			12
A-18	45	PT	274	173	CHP	EA	NS	RM	WP	ASP	BC	ICT	RWST		D			8
A-19	32	PT	210	147	NHC	EA	RM	BB	HEM	ASP	WA	ICT	SST		A			14
A-20	40	PT	261	163	NHC	EA	RP	HM	RM	SP	BC	SST	PTR		A			16
A-21	11	PT	285	217	NHC	UA	HEM	RM	RO	BE	HM	ICT	VDT	STGS	A			7
A-23	40	SST	352	233	NHO	UE	RP	RM	HM	SHR	BC	ICT	VDT	SST	A			8
A-26	14	SST	164	144	NH	UE	RM	BC	WP	ASP	BBE	ICT	STGS	VDT	A			10
A-27	11	SST	152	155	NHC	UA	HM	RM	HEM	WA	YB	STGS	ICT	VDT	A			16
A-28	20	SST	254	195	NC	UA	HEM	RM	YB	BAS	WA	STGS	ICT	VDT	C			12
A-29	10	PT	199	160	NH	UA	RM	SHR	RO	ASP	YB	ICT	CTR		A			4
A-30	31	PT	168	153	NHO	EA	RM	BC	RO	HEM	HM	ICT	CTR		A			11
A-31	10	SST	231	185	ES	EA	RM	ASP	HEM	WP	HM	RCH	SST		A			21

A-1. Land Management Action Schedule - Hammond Hill State Forest (Tompkins No. 2)																		
Stand	Type	Size	TPA	BA	Obj Typ	Fut. Age	Top Five Species					Action Options/Choices			Time			Ac
A-32	45	SST	271	194	CHP	EA	NS	RM	ASP	BL	WA	ICT	RWST		C			10
A-33	10	SST	126	120	NH	UA	HM	RM	BE	WA	BC	STGS	GS	STS	A			9
A-34	22	SST	159	163	NC	UA	WP	HEM	RM	BE	WA	STGS	ICT	VDT	D			6
A-35	10	SST	125	113	NH	UA	RM	BC	BB	WA	WP	STGS	ICT	VDT	A			8
A-36	61	SST	161	130	ES	EA	RM	NS	ASP	RP	BC	RCH	SST		D			22
A-37	61	SST	146	153	CHP	EA	NS	RP	RM	ST	WA	RWST	ICT	SST	D			37
A-38	10	MST	162	145	NHC	UA	BE	HEM	RM	RO	HM	STGS	GS	VDT	A			5
A-39	45	SST	224	220	CHP	UE	NS	RM	BC			ICT	RWST		C			3
A-40	10	SST	154	163	NHO	UA	RM	RO	BE	WA	HM	STGS	ICT	VDT	B			12
A-41	31	MST	118	155	NHO	EA	RO	BE	WA	HM	BC	SST	ICT		B			2
A-42	19	SST	192	187	NHOC	EA	RM	HEM	RO	HM	WA	SST	ICT		B			5
A-43	31	SST	131	138	NHO	EA	RO	RM	BE	WA	HM	ICT	CTR	SST	B			10
A-44	31	SST	175	140	NHO	EA	RM	RO	WA	HM	ASP	ICT	CTR	SST	B			9
A-45	61	SST	332	227	CHP	EA	RP	NS	RM	BB	RO	RWST	ICT		A	C		14
A-46	10	MST	136	152	NH	UA	HM	BE	RO	WA	RM	STGS	GS	VDT	B			25
A-47	31	PT	228	170	NHO	EA	RO	RM	BE	HM	WP	ICT	CTR		B			13
B-01	31	SST	135	125	NHO	EA	HM	BE	RO	WA	IWD	ICT	CTR	SST	B			6
B-02	31	SST	172	136	NHO	EA	RO	RM	ASP	BE	HM	ICT	CTR	SST	B			7
B-03	61	SST	341	229	CHP	EA	RP	NS	RM	WA	WP	RWST	ICT		A	C		25
B-04	10	MST	134	155	NHO	UA	RO	HM	RM	BE	WA	GS	STGS	VDT	B			2
B-05	61	SST	316	220	CHP	EA	NS	RP	RM	RO	WP	RWST	ICT		A	C		18
B-06	31	MST	118	136	NHO	EA	RO	RM	BE	WA	WO	SST	ICT		B			6
B-07	45	SST	153	165	CHP	EA	NS	RM	WA	RO	BB	ICT	RWST		C			3
B-08	45	SST	248	205	CHP	EA	NS	RM	ASP	WA	WP	ICT	RWST		C			14
B-09	16	MST	145	157	NHO	EA	RO	RM	BE	WP	IWD	SST	ICT		B			4
B-10	11	SST	236	178	NHC	UA	RM	HEM	RO	ASP	WA	STGS	ICT		B			3
C-01	10	SST	143	127	NH	UA	WA	RM	BC	BE	HM	STGS	ICT		C			4
C-02	31	PT	162	134	NHO	EA	RM	RO	BE	HM	BC	ICT	CTR		C			11
C-03	10	SST	152	140	NHC	UA	RM	WA	HM	BC	RO	STGS	ICT	VDT	B			17
C-04	11	PT	160	154	NHC	UA	HEM	RM	RO	BE	HM	ICT	VDT	STGS	B			43
C-05	12	SST	187	145	NHC	UA	RM	HEM	WP	HM	RO	STGS	GS	VDT	C			10
C-06	11	SST	133	130	NHC	UA	BB	RM	BE	HM	RO	STGS	ICT	VDT	C			13
C-07	11	SST	175	142	NHC	UA	RM	HEM	BB	BE	WP	STGS	ICT	VDT	C			15
C-08	42	SST	181	125	ES	EA	RM	SP	ASP	WA	WP	RCH	SST		C			11
C-09	10	SST	237	180	ES	EA	RM	ASP	WA	RO	BB	RCH	SST		B			8
C-10	61	PT	309	173	CHP	UE	RM	RP	NS	WA	ASP	RWST	VDT	PTR	C			11
C-11	10	SST	192	186	NHO	UA	HM	WA	RO	RM	BE	STGS	ICT	VDT	B			15
C-12	10	SST	158	143	ES	EA	HM	RM	ASP	BC	YB	RCH	SST		B			4
C-13	61	SST	168	122	CHP	UE	NS	RP	WA	RM	BC	RWST	ICT	VDT	D			55
C-14	44	PT	143	101	NH	UE	WA	RM	JP	BC	RO	RWST	ICT	ATR	D			19

# A-1. Land Management Action Schedule - Hammond Hill State Forest (Tompkins No. 2)

Stand	Type	Size	TPA	BA	Obj Typ	Fut. Age	Top Five Species					Action Options/Choices			Time			Ac
C-15	32	PT	158	128	NHO	UE	HM	NS	BC	WA	RO	RWST	ICT	ATR	A			7
C-16	72	SST	155	150	HP	UE	RO	WA	BC	ASP		ICT	VDT	CTR	A			5
C-18	11	SST	222	193	NHC	UA	HEM	RM	RO	HM	BE	STGS	ICT	VDT	A			32
C-19	44	PT	218	110	ES	EA	RM	JP	ASP	BC		RCH	SST		D			15
C-20	16	SST	158	145	NOA	EA	RO	RM	HM	WP	IWD	ICT	SST		A			11
C-21	11	PT	221	138	NHOC	EA	RM	RO	BB	HEM	BE	ICT	CTR		C			22
C-22	11	SST	235	183	NHC	UA	RM	WA	BB	HEM	BE	STGS	ICT	VDT	A			10
C-23	10	SST	115	123	NHC	UA	HM	BE	RM	WA	HEM	STGS	ICT		A			4
C-24	31	PT	202	167	NHO	EA	RM	RO	HM	WA	ASP	ICT	CTR		A			36
C-25	31	PT	148	123	NHO	EA	RO	RM	HM	HEM	WP	ICT	CTR		A			10
C-27	12	PT	259	0	NHC	UA	RM	WP	WA	BC	RO	NTR			E			16
D-01	31	MST	170	200	NHO	EA	RO	BE	RM			SST	ICT		C			5
D-03	11	SST	125	147	NHC	UA	RM	RO	HEM	BE	WP	STGS	ICT	VDT	C			9
D-04	31	SST	181	163	NHO	EA	RM	BE	RO	WA	ASP	ICT	CTR	SST	C			14
D-05	11	SST	178	154	NHC	UA	HEM	RM	RO	BE	BC	STGS	VDT	ICT	C			24
D-06	11	PT	245	174	NHC	UA	ASP	RM	HEM	HM	BE	ICT	VDT	STGS	C			19
D-07	10	PT	157	105	ES	EA	RM	HEM	ASP	BE	RO	RCH	SST		C			30
D-08	31	SST	105	135	NHC	EA	HEM	RM	BE	RO	HM	ICT	SST		B			11
D-09	11	SST	186	169	NHC	UA	RM	HEM	ASP	RO	HM	STGS	ICT	VDT	A			24
D-10	20	SST	198	168	NC	UA	HEM	RM	RO	BB	HM	STGS	ICT	VDT	A	B		28
D-11	12	PT	245	183	NHC	UA	RM	WP	HEM	ASP	RO	ICT	VDT	STGS	C			20
D-12	31	SST	149	145	NHO	EA	RO	BB	HEM	RM	ASP	ICT	CTR	SST	C			12
D-13	31	SST	216	175	ES	EA	WP	RO	ASP	RM	WO	RCH	SST		C			4
D-14	42	SST	143	124	PH	EA	PP	RM	SP	JP	WA	RCH	SST		C			50
D-15	10	PT	248	130	NH	UA	RM	WP	HM	SP	WA	ICT	VDT	STGS	C			7
D-17	42	SST	168	133	ES	EA	ASP	RM	HM	SP	YP	RCH	SST		C			18
D-18	31	SST	120	131	NHO	UA	HM	RO	RM	BE	IWD	GS	STGS	VDT	C			29
D-19	31	SST	162	155	NHC	UA	BE	HEM	HM	RM	RO	STGS	STS	VDT	C			26
D-20	10	SST	148	142	NH	UA	HM	WA	BE	HEM	RM	STGS	ICT	VDT	C			17
D-21	31	SST	154	120	NHO	EA	RO	HM				ICT	CTR	SST	A			4
D-22	10	SST	164	123	NH	UA	HM	BE	BAS	BB	WA	STGS	ICT		A			4
D-23	11	SST	122	128	NHC	UA	HM	WA	HEM	BE	RM	NTR			E			34
D-24	10	PT	289	190	ES	EA	RM	HM	ASP	BB	BE	RCH	SST		B			13
D-25	10	SST	138	138	NHO	EA	HM	RO	WA	BC	BE	ICT	CTR	SST	B			14
E-01	31	SST	163	153	NHO	EA	HM	RM	WA	RO	BE	ICT	CTR	SST	B			46
E-02	10	PT	244	180	NH	UA	RM	WA	BAS	RO	ASP	STGS	ICT		B			2
E-03	14	PT	270	160	ES	EA	ASP	RM	RO	WA	HM	RCH	SST		B			16
E-04	45	SST	278	200	CHP	EA	NS	RM	BL	ASP	BC	ICT	RWST	SST	D			10
E-05	16	PT	269	176	ES	EA	RO	RM	ASP	HM	BC	RCH	SST		B			18
E-06	10	SST	146	145	NH	UA	HM	BE	RM	WA	RO	STGS	ICT	VDT	B			8

A-1. Land Management Action Schedule - Hammond Hill State Forest (Tompkins No. 2)																		
Stand	Type	Size	TPA	BA	Obj Typ	Fut. Age	Top Five Species					Action Options/Choices			Time			Ac
E-08	10	SST	213	170	NH	UA	BE	RM	RO	HM	HEM	STGS	ICT	VDT	B			11
E-09	31	PT	176	130	NHO	EA	RM	WA	ASP	BE	RO	ICT	CTR		B			27
E-10	11	PT	300	195	NHC	UA	HEM	ASP	RM	YB	BB	STGS	ICT		B			1
E-11	31	SST	200	158	NHO	UA	RM	HM	RO	BE	ASP	GS	STGS	VDT	B			62
E-13	10	PT	487	98	PH	EA	WS	RM	ASP	RO	WP	NTR			E			43
E-14	45	SST	249	170	CHP	UE	NS	RM	ASP	HM	WP	ICT	RWST	VDT	D			8
E-15	31	PT	172	133	NHO	EA	RO	RM	WA	HM	PC	ICT	CTR		A			10
E-17	12	SST	180	150	NHC	UA	WP	HM	ASP	RM	RO	STGS	ICT	VDT	C			5
E-18	31	PT	206	163	NHO	EA	RM	RO	BE	WA	HEM	ICT	CTR		A			36
E-19	12	SST	166	147	NHC	EA	RM	WA	RO	HM	BE	ICT	SST		C			21
E-20	10	PT	157	133	NHO	UA	RM	RO	HM	WA	BE	ICT	VDT	STGS	A			6
E-21	11	SST	189	158	NHC	UA	HEM	RM	HM	RO	BAS	STGS	ICT	VDT	C			11
E-22	20	SST	211	187	NC	UA	HEM	RM	BE	ASP	WA	STGS	ICT		C			4
E-23	12	PT	202	142	NHC	UA	RM	WP	ASP	WA	NS	ICT	VDT	STGS	C			14
E-24	10	PT	198	144	NHC	UA	BE	RM	RO	ASP	WA	ICT	VDT	STGS	A			14
E-25	61	SST	178	115	CHP	EA	NS	RM	RP	BC	WP	RWST	ICT	SST	D			10
E-26	10	SST	173	153	NHO	EA	RO	RM	HM	BE	WA	ICT	CTR	SST	A			20
E-27	45	SST	186	207	CHP	UE	NS	RM	BC	SHR	RO	ICT	RWST	VDT	D			27
E-28	10	MST	123	165	NHO	UA	WA	RO	HM	IWD	RM	GS	STGS	VDT	B			4
E-29	71	PT	191	135	CHP	UE	NS	BC	WA	RO	HM	ICT	RWST	VDT	C			8
E-32	10	PT	175	133	ES	EA	RM	ASP	RO	WP	BE	RCH	SST		B			47
E-33	31	SST	175	150	NHO	EA	RO	BE	RM	ASP	HEM	ICT	CTR	SST	B			15
E-34	11	PT	232	170	NHC	UA	HEM	RM	YB	RO	WA	ICT	VDT	STGS	B			11
E-35	31	PT	218	150	ES	EA	RO	RM	ASP	WP	BE	RCG	SST		B			6
E-36	12	PT	173	125	NHO	UA	WP	RM	ASP	RO		NTR			E			5
E-37	61	SST	181	170	CHP	UE	NS	RP	RM	EL	WA	RWST	ICT	VDT	D			6
E-38	14	PT	170	127	ES	EA	ASP	RO	WA	HM	BAS	RCH	SST		B			2
E-40	61	SST	242	196	CHP	EA	NS	RP	RM	WP	WA	RWST	ICT	SST	D			15
E-42	45	SST	287	213	CHP	EA	NS	RM	ASP	YB	RO	ICT	RWST	SST	D			4
E-43	45	PT	333	183	CHP	UE	WA	ASP	RM	NS	HEM	ICT	RWST	VDT	D			9
E-44	14	PT	208	148	ES	EA	RO	RM	ASP	WA	HEM	RCH	SST		A			15
E-45	68	SST	214	145	CHP	UE	NS	EL	RM	SP	RO	RWST	ICT	VDT	D			5
E-48	11	PT	269	187	NHC	UA	HEM	RM	RO	BE	YB	ICT	VDT	STGS	A			26
E-49	10	SST	216	174	NHC	UA	RM	RO	HEM	HM	WA	STGS	GS	VDT	A			11
E-50	31	SST	99	123	NHO	EA	HM	RO	RM	BC	WA	ICT	CTR	SST	A			3
E-51	10	SST	169	147	NH	UA	RM	HM	RO	BE	HEM	STGS	ICT	VDT	A			20
E-52	31	SST	206	151	NHO	EA	RM	RO	WA	BAS	WP	ICT	CTR	SST	A			17
E-53	31	PT	195	156	ES	EA	RO	RM	ASP	BE	SHR	RCH	SST		A			15
E-55	19	SST	219	169	NHOC	UA	RM	RO	HEM	HM	BE	ICT	SST	VDT	A			36
E-56	10	SST	154	157	NH	UA	HM	WA	BAS	BC	RM	STGS	ICT	VDT	A			5

A-1. Land Management Action Schedule - Hammond Hill State Forest (Tompkins No. 2)																		
Stand	Type	Size	TPA	BA	Obj Typ	Fut. Age	Top Five Species					Action Options/Choices			Time			Ac
E-57	31	SST	178	158	NHO	UA	RO	RM	HM	HEM	BE	GS	STGS	VDT	C			39
E-58	40	PT	315	200	ES	EA	RP	ASP	RM	BB	WA	RCH	SST		A			3
E-59	31	PT	213	138	ES	EA	RM	RO	ASP	HEM	WA	ICT	SST		B			2
E-60	19	PT	250	170	NHOC	EA	BE	HEM	RM	RO	WO	ICT	RWST		C			7
E-61	40	SST	247	159	NHO	EA	RP	EL	RO	RM	BE	ICT	CTR	SST	A			26
E-62	61	SST	213	130	CHP	EA	RP	NS	RM			ICT	SST		A	C		2
F-02	30	PT	213	150	NHOC	EA	RO	RM	WP	HEM	WA	ICT	RWST		C			4
F-03	40	SST	197	140	CHP	EA	RP	EL	RM	BB	BE	RCH	SST		A			11
F-04	31	PT	213	138	ES	EA	RM	RO	ASP	BB	WA	RCH	SST		C			8
F-05	40	SST	274	220	PH	EA	RP	RM				RCH	SST		A			4
F-06	31	SST	178	160	ES	EA	RO	RM	ASP	BE	IWD	RCH	SST		C			8
F-07	46	PT	294	178	NHO	EA	RM	WS	RO	WP	BC	ICT	CTR		A			4
F-08	10	PT	188	130	NH	UA	HM	WA	RM	BE	BAS	ICT	VDT	STGS	C			9
F-09	11	SST	193	160	NHC	UA	HEM	HM	WA	RM	BE	ICT	VDT	STGS	C			12
F-10	11	PT	256	167	NHC	UA	RM	HEM	WP	WA	ASP	ICT	VDT	STGS	C			19
F-11	41	PT	153	75	CHP	UE	BC	WA	WP	RM	HM	NTR			E			4
F-13	32	PT	239	143	ES	EA	RM	RO	ASP	WP	NS	RCH	SST		C			17
F-14	70	PT	203	136	ES	EA	WP	RM	ASP	BC	WA	RCH	SST		D			12
F-15	31	PT	180	120	ES	EA	RM	RO	ASP	WP	HM	RCH	SST		C			24
F-16	19	SST	99	115	NHOC	EA	RO	RM	HM	HEM	BC	ICT	CTR	SST	D			8
F-17	11	PT	191	125	NHC	UA	HEM	RM	HM	BE	WA	STGS	VDT	GS	D			25
F-18	10	SST	157	148	NH	UA	HM	BC	WA	RM	BAS	STGS	ICT	VDT	C			7
F-19	10	SST	175	135	NH	UA	HM	WA	BE	BB	RM	STGS	ICT	VDT	B			9
F-20	31	PT	192	160	NHO	EA	RO	BE	RM	HM	BC	ICT	CTR		B			9
F-21	31	PT	195	145	NHO	EA	RO	RM	BE	HEM	HM	ICT	CTR		B			38
F-22	12	PT	204	145	NHC	UA	RM	HEM	WP	WA	BB	ICT	VDT	STGS	D			17
F-24	40	PT	292	130	PH	EA	RP	BC	RM	HM		RCH	SST		A			7
F-25	19	PT	802	160	PH	EA	RM	BC	HM	WP		NTR			E			1
F-26	45	PT	460	188	CHP	EA	NS	RM	WP			RWST	ICT		A			14
F-27	31	SST	148	115	NHO	EA	RM	RO	BC	WP	HM	ICT	CTR	SST	B			4
F-28	10	SST	112	100	NH	UA	HM	BE	BAS	ST	WA	STGS	VDT	GS	D			10
F-30	31	PT	560	121	NHO	EA	RM	RO	ASP	HEM	PC	NTR			E			40
F-31	16	MST	94	103	NHO	EA	RO	BE	HM	RM	BB	SST	ICT		D			8
F-32	40	PT	375	175	PH	EA	RP	RM	WP	WA	ASP	RCH	SST		A			11
F-34	30	MST	87	117	NHOC	EA	RO	RM	BE	WP	HEM	SST	ICT		D			7
F-35	12	MST	101	138	NHC	EA	WP	RM	RO	HM	BE	SST	ICT		D			11
F-36	45	PT	25	197	CHP	EA	NS					NTR			E			2
F-37	12	SST	228	177	NHC	EA	WP	RM	WA	BB	BC	ICT	SST		B			19
F-38	31	SST	143	160	NHO	UA	BE	RM	RO	HM	HEM	GS	STGS	VDT	B			12
F-39	31	SST	167	150	NHO	UA	HM	BC	RO	WA	BE	GS	STGS	VDT	B			8

A-1. Land Management Action Schedule - Hammond Hill State Forest (Tompkins No. 2)																		
Stand	Type	Size	TPA	BA	Obj Typ	Fut. Age	Top Five Species					Action Options/Choices			Time			Ac
F-40	31	SST	203	138	NHO	EA	BE	RM	RO	BC	HM	ICT	CTR	SST	B			16
F-41	31	PT	190	115	NHO	EA	BE	RO	RM	HM	BB	ICT	CTR		B			11
F-42	10	SST	150	128	NH	UA	WA	HM	RM	BAS	RO	STGS	ICT	VDT	B			12
F-43	45	PT	245	153	CHP	EA	NS	RM	ASP			ICT	RWST		A			6
F-44	32	PT	258	140	NH	EA	RM	ASP	WA	HM	RO	ICT	CTR		B			11
F-45	10	SST	166	118	NH	UA	HM	BC	WA	RM	BAS	NTR			E			26
G-03	10	PT	76	68	NH	UA	HM	BE	RM	PC	BB	ICT	VDT	STGS	D			18
G-04	30	MST	147	140	NHOC	EA	RM	WP	RO	BE	ST	SST	ICT		D			4
G-05	31	SST	92	105	NHO	EA	RM	RO	BE	HM	ST	ICT	CTR	SST	B			5
G-06	12	SST	109	145	NHC	UA	WP	RM	RO	ASP		STGS	GS	ICT	D			2
* Table does not include natural and protection areas or non-forested areas.														Total		2,746		

A-2. Land Management Action Schedule - Yellow Barn State Forest (Tompkins No. 5)																		
Stand	Type	Size	TPA	BA	Obj Typ	Fut. Age	Top 5 Species					Actions Options/Choices			Time			Ac
A-01	16	SST	113	105	NHO	EA	RO	HM	WA	IWD		ICT	CTR	SST	D			5
A-02	32	SST	177	120	NH	EA	RM	WA	RO	HM	BH	ICT	CTR	SST	D			9
A-04	10	SST	135	103	NH	UA	HM	BE	SH	WA	BU	STGS	GS	VDT	D			7
A-06	47	PT	339	173	NH	EA	JL	WA	RM	HM	BC	RWST	SST		A	B	C	10
A-08	12	SST	179	137	NHC	UA	HM	BH	RM	RO	WP	STGS	GS	ICT	D			2
A-09	14	PT	171	104	NHO	EA	WA	RM	WP	RO	HM	CTR	FSI	ICT	D			16
A-10	47	PT	358	191	NH	EA	JL	WA	BH	RM	RO	RWST	SST		A	B	C	18
A-11	32	PT	373	180	CHP	EA	JL	WA	RM	BC		RWST	SST		A			11
A-13	62	SST	174	123	NH	UE	WA	RP	JL	RM	APL	RWST	VDT	ATR	D			7
B-01	10	PT	216	110	NH	UA	WA	BC				ICT	CTR	FSI	D			2
B-02	47	PT	346	165	NH	EA	JL	WA	HM	RO	RM	RWST	SST		A	B	C	7
B-03	47	PT	358	210	NH	EA	JL	RM				RWST	SST		A	B	C	3
B-04	52	PT	200	125	NH	EA	BC	BL	HM			ICT	CTR	FSI	D			5
B-05	67	SST	214	163	CHP	EA	HM	JL	NS	RM	BC	RWST	ICT	SST	D			7
B-06	40	SST	243	155	PH	EA	RP	RM				RCH	SST		A			7
B-07	31	PT	237	180	ES	EA	RM	ASP	WA	RO	BC	RCH	SST		D			2
C-01	62	SST	257	173	NH	UE	RP	JL	RM	BC	ASP	ICT	SST	VDT	A			16
C-02	29	PT	401	193	CHP	EA	JL	RM	WA	SHR	BB	RWST	ICT		D			18
C-03	47	PT	360	195	NH	EA	JL	RM	RO	BB	BC	RWST	SST		A	B	C	19
C-04	14	PT	153	90	NH	EA	RP	RM	WP	BB		CTR	FSI	ICT	D			5
C-05	16	SST	124	113	NHO	EA	RO	RM	BE	WP	BC	ICT	CTR	SST	D			10
C-06	70	PT	220	100	ES	EA	ASP	RM	SP	HM		RCH	SST		A			5
C-07	12	PT	172	115	NHC	UA	ASP	WP	HM	RM	BE	ICT	STS	STGS	D			4
C-09	70	SST	191	123	NHC	EA	RM	WP	HM	RO	WA	ICT	CTR	SST	D			13
C-10	12	SST	162	133	NHC	EA	RM	ASP	RO	WP	BE	ICT	CTR	SST	D			6
C-11	16	SST	150	140	NOA	EA	RO	RM	BE			ICT	CTR	SST	D			5

A-2. Land Management Action Schedule - Yellow Barn State Forest (Tompkins No. 5)																		
Stand	Type	Size	TPA	BA	Obj Typ	Fut. Age	Top 5 Species					Actions Options/Choices			Time			Ac
C-12	16	PT	165	126	NOA	EA	RO	RM	BE	WO	HM	ICT	CTR		B			12
C-13	31	S-S	87	90	PH	UE	RM	JP	RO	ASP	BE	CTR	FSI	VDT	D			9
C-14	12	PT	219	148	NHC	UA	ASP	RM	WP	RO	HM	ICT	VDT	STGS	D			28
C-15	70	SST	180	138	ES	EA	RM	WP	ASP	RO	WA	RCH	SST		D			14
C-16	31	PT	187	150	NHO	EA	RO	RM	BB	BC	WP	ICT	PTR		B			6
C-17	31	PT	166	112	NHO	EA	RM	RO	BE	WA	HEM	ICT	CTR		B			57
C-18	10	LST	103	90	NHOC	EA	WP	RO	RM			SST	PTR		B			3
C-19	16	SST	164	129	NHO	EA	RO	RM	WO	HM	ASP	ICT	CTR	SST	B			30
C-20	16	PT	183	120	NHO	EA	RM	RO	YB	ASP	BE	ICT	CTR		B			8
C-21	40	SST	222	147	NHOC	EA	RP	RM	WP	WA	RO	RCH	PTR		C			7
C-22	31	PT	226	140	ES	EA	RO	ASP	RM			RCH	SST		D			2
C-24	31	PT	156	110	NHO	EA	RO	RM	BE	BS	WO	ICT	CTR	FSI	D			3
C-25	10	SST	95	93	NH	UA	HM	BE	BC	RM		STGS	GS	VDT	D			17
C-26	31	SST	180	130	ES	EA	RO	HM	ASP	RM		RCH	SST		D			5
C-27	40	PT	310	141	ES	EA	RP	HM	ASP	RO	RM	RCH	SST		C			18
C-28	60	SST	260	200	ES	EA	RP	HM	ASP	WA	RM	RCH	SST		C			5
C-29	31	SST	119	100	ES	EA	RO	YB	ASP	RM	WA	RCH	SST		B			5
C-30	40	PT	223	140	PH	EA	RP	RM	WA	BC	SHR	RCH	PTR		C			5
C-31	60	PT	259	154	CHP	EA	RP	RM	NS	WP	BC	RWST	ICT	SST	D			10
C-32	30	PT	444	133	PH	EA	RM	WP	RO	SHR	ASP	NTR			E			11
C-33	31	PT	170	108	NHO	EA	RO	RM	BB	ASP	HM	ICT	CTR		B			13
C-34	16	SST	96	98	NHO	EA	RO	HM	BE	RM	BAS	ICT	CTR	SST	D			39
C-35	16	SST	121	120	NHO	EA	RO	BE	RM	HM	WA	ICT	CTR	SST	D			42
C-36	19	SST	197	135	NHOC	EA	RO	RM	ASP	BE	WA	ICT	CTR	SST	D			8
C-37	14	PT	220	134	ES	EA	RM	ASP	WP	WA	BB	RCH	SST		D			21
C-38	40	SST	218	147	NH	EA	RM	WA	WP	RP	BC	RCH	PTR		C			6
C-39	12	SST	114	90	NHC	EA	HM	WP	RO	WA	BC	ICT	CTR	SST	D			5
C-40	10	SST	171	138	NHO	EA	RO	SH	RM	BE	ASP	ICT	CTR	SST	D			15
C-41	40	PT	449	207	ES	EA	RP	WA	ASP	RM	DF	RCH	SST		D			12
C-42	16	PT	243	200	NHO	EA	RO	BE	RM	WA	IWD	ICT	CTR	FSI	D			4
C-43	60	PT	260	157	NH	EA	RP	RM	WP	WA	ASP	RWST	ICT	SST	D			41
C-44	11	SST	205	167	NHC	UA	HEM	HM	RM	BAS	WA	STGS	STS	GS	D			4
C-46	11	SST	159	155	NHC	UA	HEM	RO	HM	BE	WA	STGS	VDT	GS	D			13
C-47	12	PT	177	120	NHC	UA	RM	RO	WP	WA	ASP	ICT	VDT	STGS	D			28
C-48	41	PT	234	116	ES	EA	WP	ASP	WA	RM	BB	RCH	CTR		A			24
C-49	11	SST	205	140	NHC	UA	HEM	RM	HM	BE		STGS	VDT	GS	D			3
C-50	11	SST	211	150	NHC	UA	HEM	HM	RM	WA	BB	STGS	ICT	GS	D			2
C-51	11	SST	225	145	NHC	UA	HEM	RM	HM	WA	BE	STGS	VDT	GS	D			13
C-52	12	PT	202	122	NHOC	EA	RM	WP	WA	BB	WO	ICT	CTR	FSI	D			12
C-53	63	SST	175	125	CHP	EA	RP	NS	SP	WP	RM	NTR			E			4

A-2. Land Management Action Schedule - Yellow Barn State Forest (Tompkins No. 5)																		
Stand	Type	Size	TPA	BA	Obj Typ	Fut. Age	Top 5 Species					Actions Options/Choices			Time			Ac
D-01	31	SST	97	85	NHO	EA	RO	BE	WA	RM	BC	ICT	CTR	SST	D			7
D-02	31	SST	97	85	NHO	EA	RO	BE	WA	RM	BC	ICT	CTR	SST	D			16
D-03	10	SST	131	115	NH	UA	BE	HM	RM	BC	WA	STGS	GS	VDT	D			5
D-04	11	SST	109	100	NHC	UA	RM	HE M	WA	BB	RO	NTR			E			2
D-06	31	SST	134	103	NHO	EA	RO	BE	RM	WO	BC	ICT	CTR	SST	D			8
D-07	16	SST	119	121	NHO	EA	RO	RM	WO	BE	HM	ICT	CTR	SST	D			20
D-08	71	PT	297	182	CHP	EA	NS	WP	RM	RO	WO	ICT	RW ST		D			12
D-09	42	SST	166	110	PH	EA	JL	SP	RM	WP	NS	RWST	SST	ICT	D			10
D-10	14	SST	156	124	ES	EA	RM	ASP	RO	WO	BB	RCH	SST		D			20
D-11	10	PT	219	134	NH	UA	BC	BL	RM	HM	RO	ICT	VDT	FSI	D			32
D-12	67	SST	201	165	CHP	EA	HM	NS	BC	JL	WA	RWST	ICT	SST	D			1
D-15	31	SST	145	114	NHO	EA	RO	WA	BC	BB	RM	ICT	CTR	SST	D			18
D-17	52	PT	171	112	NH	UE	BC	BL	RO	RM	HM	ICT	VDT	CTR	C			32
D-18	10	SST	145	120	NHO	EA	BC	RM	SHR	HM	RO	ICT	CTR	SST	C			5
D-19	52	PT	236	150	NH	EA	RM	BL	WA	BC	RO	ICT	CTR		C			16
D-22	11	SST	233	187	NHC	UA	HEM	RM	RO	BE	BB	NTR			F			6
D-23	41	PT	196	107	NHOC	EA	RM	WP	HM	WA	BC	ICT	CTR		A			14
D-24	14	PT	163	110	NH	UA	RM	BC	WA	WP	RO	ICT	VDT	STGS	C			7
D-25	31	PT	152	117	ES	EA	ASP	WA	RM	RO	BE	RCH	SST		C			10
D-26	70	PT	142	85	NHOC	EA	RM	JP	WA	SHR	RO	ICT	SST		A			2
D-27	31	SST	152	116	ES	EA	RO	HM	ASP	RM	WA	RCH	SST		C			12
D-28	16	SST	97	90	NHO	EA	RO	HM	RM	WA	BB	ICT	CTR	SST	C			9
D-29	10	PT	183	128	NHO	UA	RM	RO	HM	WA	ASP	ICT	VDT	STGS	C			8
D-30	71	PT	140	100	CHP	EA	NS	RO	RP	RM	ASP	ICT	SST		A			11
D-31	63	SST	177	144	CHP	EA	NS	RM	RP	HM	BC	ICT	SST		A			19
D-32	63	SST	174	127	CHP	EA	RP	NS	SP	WP	HM	ICT	SST		A			6
* Table does not include natural and protection areas or non-forested areas.														Total			1,091	

<b>A-3. Facility Maintenance and Improvement Projects by Priority</b>		
<b>Annual Projects</b>		
State Forest	Project Description	Priority
Tompkins #2	Inspect and clear about 1 mile of MAPPWD trail; replace trail signs as necessary.	1
Unit wide	Mark and inspect commercial forest product sales and wildlife habitat improvement projects as staff, forest product markets and weather permit (on average 183 acres per year if the plan is fully implemented). Monitor and address forest regeneration as described in the plan.	1
Unit wide	Communicate with DEC ANNRR volunteer partners regarding management actions outlined in the plan.	1
Unit wide	Communicate and collaborate with other DEC Divisions, including DEC Forest Rangers, Environmental Conservation Officers, town and county highway departments.	1
Unit wide	Administer temporary revocable permits (TRP's) for special events.	1
Tompkins #2	Collaborate with the Friends of Hammond Hill to inspect and maintain the multiple use trail network, clear brush and deadfall and maintain trail markers.	2

<b>A-3. Facility Maintenance and Improvement Projects by Priority</b>		
<b>Annual Projects</b>		
<b>State Forest</b>	<b>Project Description</b>	<b>Priority</b>
Tompkins #2	Collaborate with the Finger Lakes Trail Conference to inspect and maintain the Finger Lakes trail, clear brush and deadfall and maintain trail marking.	2
Unit wide	Monitor forest health, including participating in the annual aerial survey over the region.	2
Unit wide	Collaborate with the Caroline Drifters Snowmobile Club to inspect, maintain and groom the snowmobile trail network; clear deadfall and maintain trail markers/signs.	2
Unit wide	Pick-up trash on the Unit each spring. Work with AANR volunteer partners, town highway departments and correction facility crews (if available) to pick up trash.	3
<b>New Projects</b>		
Tompkins #2	Seek to acquire a trail network gateway conservation easement across private land to maintain and improve access from the town parking lot on Hammond Hill road to the Unit's trail network through trail Y1. Based on GIS analysis, the easement would be about 825 feet long. If acquired, develop an action plan and seek funds along with broad based stakeholder support to upgrade the trail base, trail tread and water drainage system. Upgrading of the trail easement segment would require collaboration between the Friends of Hammond Hill, the town of Dryden and the DEC.	1
Tompkins #5	Block with rocks or a dirt berm the former snowmobile connector trail on that crosses the west section of the forest, west of Yellow Barn road.	1
Unit wide	Design, develop and install a two or three panel kiosk with input from AANR partners and collaborate with the town of Dryden to install it at the public parking lot on Hammond Hill road. Include Yellow Barn State Forest on the kiosk and update the Hammond Hill brochure to include Yellow Barn.	1
Tompkins #2	Build a new 2 car parking lot for MAPPWD trail off of Star Stanton Hill road; inspect and replace culverts as resources allow and smooth/drain the trail tread as required.	2
Tompkins #2	Replace the large wood State Forest ID sign at the corner of Hammond Hill and Irish Settlement roads. Plan on replacing the sign every 5 years.	2
Tompkins #2	Collaborate with the Finger Lakes Trust, Cayuga Trails Club and other AANR partners to build a 1 mile pedestrian connector trail that provides access to Six Mile Creek from the town of Dryden public parking lot on Hammond Hill road. Consider upgrading the trail to allow for cross country ski use if demand is sufficient and resources are available.	2
Tompkins #2	Build vernal up to 20 vernal pools 300 to 3,000 square feet in size. Fund construction through grants, partnerships or forest products harvesting management actions.	2
Tompkins #2	Grade, smooth, resurface or reroute about 2,200 feet of trail as shown on the Stewardship Needs Map.	2
Tompkins #2	Grade, smooth, surface or reroute about 500 feet of wet trail sections as shown on the Stewardship Needs Map.	2
Unit wide	Install water bars and broad-based dips at the estimated 20 trail segment locations shown on the Stewardship Needs Map with a small trail dozer (SWECO) or a mini excavator. An estimated 700 feet of trail needs new water bars and dips. This need will increase over time as trail use increases.	2
Unit wide	Collaborate with AANR groups to inspect, flag and rebuild existing water bars and dips throughout the trail network on the Unit; especially at the locations noted on the Stewardship Needs Map.	2
Tompkins #2	Block the Canaan road shale pit with several large rocks and the entrance to Y6. Leave enough space for trail users to pass through.	3
Tompkins #2	Build and install 3 heavy duty gates 15 feet wide help to restrict ATV and 4 x 4 traffic - especially on the snowmobile trail network (see Stewardship needs Map for locations). Large 3 to 4 ton rocks may be needed in some instances to supplement the gates.	3
Tompkins #2	Install a new large wood State Forest ID sign on Harford-Slaterville road; work with DEC Operations on the final sign location.	3
Tompkins #5	Collaborate with the Finger Lakes Land Trust and other Conservation Partners to	3

<b>A-3. Facility Maintenance and Improvement Projects by Priority</b>		
<b>Annual Projects</b>		
<b>State Forest</b>	<b>Project Description</b>	<b>Priority</b>
	establish a connector trail from Hammond Hill State Forest to Yellow Barn State Forest west towards the City of Ithaca.	
Tompkins #5	Install a new large wood State Forest ID sign on Yellow Barn Rd.; work with DEC Operations on the final sign location. Once installed, plan on replacing the sign every 5 years.	3
<b>Periodic Projects</b>		
Tompkins #2	Grade, rake and mow the shoulders of the 1.6 mile Canaan Rd. PFAR and 1.0 miles of Red Man Run PFAR once every 5 years. Remove fallen tree limbs and branches from the road shoulders. Clean and inspect culverts prior to grading; replace as necessary. Mow the road shoulders no more than 10 feet from the ditch line. Consider conducting culvert replacement, resurfacing, grading and mowing as part of forest product sale related work.	1
Unit wide	Paint and maintain 43.7 miles of boundary lines; replace small State Forest ID signs, placing signs about 400 feet apart along maintained public roads and 660 feet apart along interior lines. Replace witness posts as needed every 7 years.	1
Tompkins #2	Inspect and maintain the two wood 25 MPH signs on the Canaan road PFAR; replace the signs every 5 years.	2
Tompkins #5	Inspect and maintain the existing large wood State Forest ID sign on Irish Settlement road; replace the sign every 5 years.	2
Tompkins #5	Determine boundary along the north line of Tract 12 east of Irish Settlement Road, mark, monument corners and paint line, Survey 7-55-595.	2
Unit wide	Seek fee simple acquisition and/or purchase of development rights through conservation easements to consolidate boundary lines and/or to provide landscape connectivity for wildlife and recreationists as described by the Emerald necklace in the New York State 2009 Open Space Plan. Information on the Open Space Plan is available at <a href="http://www.dec.ny.gov/lands/47990.html">http://www.dec.ny.gov/lands/47990.html</a>	2
Tompkins #2	Inspect and resolve boundary line discrepancy along the west side of Hammond Hill road, east line of sub lot 2 in lot 98, tracts 106A, 125A.	3
Tompkins #2	Monument the corners and blaze the exterior lines of Proposal M, Survey No. 7-55-50.	3
Tompkins #5	Inspect, monument corners and paint boundary lines along 4 acres of private land north of Card Road, Survey No. 7-55-491 (1991) Proposals B and C.	3
Unit wide	Encourage design and development of a method to monitor the effectiveness of adaptive ecosystem management principles and strategies outlined by this plan. Embrace opportunities to collaborate with educational institutions to develop and employ internships for qualified undergraduate and graduate students in an ecosystem monitoring project. Develop job descriptions and expectations in collaboration with educational institutions.	3

<b>A-4. Amphibians &amp; Reptiles New York GAP Analysis Data EMAP Hexagon 420 and HERP * Atlas</b>			
<b>No.</b>	<b>Common Name</b>	<b>Scientific Name</b>	<b>Model Status</b>
1	Allegheny Dusky Salamander *	Desmognathus ochrophaeus	Confirmed & Predicted
2	American Toad *	Bufo americanus	HERP Atlas Only
3	Black Rat Snake	Elaphe o. obsoleta	Confirmed & Predicted
4	Bullfrog *	Rana catesbeiana	Confirmed & Predicted
5	Common Garter Snake *	Thamnophis sirtalis	Confirmed & Predicted
6	Common Map Turtle	Graptemys geographica	Predicted
7	Common Mudpuppy	Necturus maculosus	Predicted
8	Common Snapping Turtle *	Chelydra s. serpentina	Confirmed & Predicted
9	E. Ribbon Snake	Thamnophis sauritus	Predicted
10	Eastern American Toad	Bufo a. americanus	Confirmed & Predicted
11	Eastern Box Turtle	Terrapene c. carolina	Predicted
12	Eastern Milk Snake	Lampropeltis t. triangulum	Confirmed & Predicted
13	Four-Toed Salamander	Hemidactylium scutatum	Confirmed & Predicted

#### A-4. Amphibians & Reptiles New York GAP Analysis Data EMAP Hexagon 420 and HERP \* Atlas

No.	Common Name	Scientific Name	Model Status
14	Gray Treefrog *	<i>Hyla versicolor</i>	Confirmed & Predicted
15	Green Frog *	<i>Rana clamitans melanota</i>	Confirmed & Predicted
16	Jefferson Salamander	<i>Ambystoma jeffersonianum</i>	Confirmed & Predicted
17	Jefferson Salamander Complex	<i>Ambystoma jeffersonianum x later</i>	Predicted
18	Longtail Salamander	<i>Eurycea l. longicauda</i>	Predicted
19	N. Red Salamander	<i>Pseudotriton r. ruber</i>	Confirmed & Predicted
20	Northern Black Racer	<i>Coluber c. constrictor</i>	Predicted
21	Northern Brown Snake	<i>Storeria d. dekayi</i>	Confirmed & Predicted
22	Northern Coal Skink	<i>Eumeces a. anthracinus</i>	Confirmed & Predicted
23	Northern Dusky Salamander *	<i>Desmognathus fuscus</i>	Confirmed & Predicted
24	Northern Leopard Frog *	<i>Rana pipiens</i>	Confirmed & Predicted
25	Northern Redback Salamander *	<i>Plethodon c. cinereus</i>	Confirmed & Predicted
26	Northern Redbelly Snake	<i>Storeria o. occipitomaculata</i>	Confirmed & Predicted
27	Northern Ringneck Snake *	<i>Diadophis punctatus edwardsii</i>	Confirmed & Predicted
28	Northern Slimy Salamander *	<i>Plethodon glutinosus</i>	Confirmed & Predicted
29	Northern Spring Peeper *	<i>Pseudacris c. crucifer</i>	Confirmed & Predicted
30	Northern Spring Salamander *	<i>Gyrinophilus p. porphyriticus</i>	Confirmed & Predicted
31	Northern Two-lined Salamander *	<i>Eurycea bislineata</i>	Confirmed & Predicted
32	Northern Water Snake *	<i>Nerodia s. sipedon</i>	Confirmed & Predicted
33	Painted Turtle *	<i>Chrysemys picta</i>	Confirmed & Predicted
34	Pickering Frog *	<i>Rana palustris</i>	Confirmed & Predicted
35	Red-spotted Newt *	<i>Notophthalmus v. viridescens</i>	Confirmed & Predicted
36	Smooth Green Snake	<i>Liophorophis vernalis</i>	Confirmed & Predicted
37	Spotted Salamander *	<i>Ambystoma maculatum</i>	Confirmed & Predicted
38	Spotted Turtle	<i>Clemmys guttata</i>	Predicted
39	Spring Peeper *	<i>Pseudacris crucifer</i>	Herp Atlas Only
40	Timber Rattlesnake	<i>Crotalus horridus</i>	Predicted
41	Western Chorus Frog	<i>Pseudacris triseriata</i>	Predicted
42	Wood Frog *	<i>Rana sylvatica</i>	Confirmed & Predicted
43	Wood Turtle	<i>Clemmys insculpta</i>	Confirmed & Predicted

Please note: Species with an "\*" are listed in the Dryden USGS quadrangle of the New York State Reptile and Amphibian Reptile (also known as HERP Atlas Project0. Additionally, data from the NY GAP project was reviewed with regional wildlife biologists and edited based on their recommendations. Additional information on the HERP Atlas Project is available at <http://www.dec.ny.gov/animals/7140.html>.

#### A-5. Mammals New York GAP Analysis Data - EMAP Hexagon 420

No.	Common Name	Scientific Name	Model Status
1	American Beaver	<i>Castor canadensis</i>	Confirmed & Predicted
2	Big Brown Bat	<i>Eptesicus fuscus</i>	Confirmed & Predicted
3	Black Bear	<i>Ursus americanus</i>	Predicted
4	Bobcat	<i>Lynx rufus</i>	Predicted
5	Common Muskrat	<i>Ondatra zibethicus</i>	Confirmed & Predicted
6	Common Raccoon	<i>Procyon lotor</i>	Confirmed & Predicted
7	Coyote	<i>Canis latrans</i>	Confirmed & Predicted
8	Deer Mouse	<i>Peromyscus maniculatus</i>	Confirmed & Predicted
9	E. small-footed Myotis	<i>Myotis leibii</i>	Predicted
10	Eastern Chipmunk	<i>Tamias striatus</i>	Confirmed & Predicted
11	Eastern Cottontail	<i>Sylvilagus floridanus</i>	Confirmed & Predicted
12	Eastern Gray Squirrel	<i>Sciurus carolinensis</i>	Confirmed & Predicted
13	Eastern Pipistrelle	<i>Pipistrellus subflavus</i>	Confirmed & Predicted
14	Eastern Red Bat	<i>Lasiurus borealis</i>	Confirmed & Predicted
15	Fisher	<i>Martes pennanti</i>	Predicted

**A-5. Mammals New York GAP Analysis Data - EMAP Hexagon 420**

No.	Common Name	Scientific Name	Model Status
16	Fox Squirrel	<i>Sciurus niger</i>	Confirmed & Predicted
17	Gray Fox	<i>Urocyon cinereoargenteus</i>	Confirmed & Predicted
18	Hairy-tailed Mole	<i>Parascalops breweri</i>	Confirmed & Predicted
19	Hoary Bat	<i>Lasiurus cinereus</i>	Confirmed & Predicted
20	House Mouse	<i>Mus musculus</i>	Confirmed & Predicted
21	Indiana Myotis	<i>Myotis sodalis</i>	Predicted
22	Least Shrew	<i>Cryptotis parva</i>	Predicted
23	Little Brown Myotis	<i>Myotis lucifugus</i>	Confirmed & Predicted
24	Long-tailed Weasel	<i>Mustela frenata</i>	Confirmed & Predicted
25	Masked Shrew	<i>Sorex cinereus</i>	Confirmed & Predicted
26	Meadow Jumping Mouse	<i>Zapus hudsonius</i>	Confirmed & Predicted
27	Meadow Vole	<i>Microtus pennsylvanicus</i>	Confirmed & Predicted
28	Mink	<i>Mustela vison</i>	Confirmed & Predicted
29	N. Short-tailed Shrew	<i>Blarina brevicauda</i>	Confirmed & Predicted
30	Northern Flying Squirrel	<i>Glaucomys sabrinus</i>	Confirmed & Predicted
31	Northern Myotis	<i>Myotis septentrionalis</i>	Confirmed & Predicted
32	Norway Rat	<i>Rattus norvegicus</i>	Confirmed & Predicted
33	Porcupine	<i>Erethizon dorsatum</i>	Predicted
34	Pygmy Shrew	<i>Sorex hoyi</i>	Confirmed & Predicted
35	Red Fox	<i>Vulpes vulpes</i>	Confirmed & Predicted
36	Red Squirrel	<i>Tamiasciurus hudsonicus</i>	Confirmed & Predicted
37	River Otter	<i>Lutra canadensis</i>	Confirmed & Predicted
38	Short-tailed Weasel (Ermine)	<i>Mustela erminea</i>	Confirmed & Predicted
39	Silver-haired Bat	<i>Lasionycteris noctivagans</i>	Confirmed & Predicted
40	Smoky Shrew	<i>Sorex fumeus</i>	Confirmed & Predicted
41	Snowshoe Hare	<i>Lepus americanus</i>	Confirmed & Predicted
42	Southern Bog Lemming	<i>Synaptomys cooperi</i>	Confirmed & Predicted
43	Southern Flying Squirrel	<i>Glaucomys volans</i>	Confirmed & Predicted
44	Southern Red-backed Vole	<i>Clethrionomys gapperi</i>	Confirmed & Predicted
45	Star-nosed Mole	<i>Condylura cristata</i>	Confirmed & Predicted
46	Striped Skunk	<i>Mephitis mephitis</i>	Confirmed & Predicted
47	Virginia Opossum	<i>Didelphis virginiana</i>	Confirmed & Predicted
48	White-footed Mouse	<i>Peromyscus leucopus</i>	Confirmed & Predicted
49	White-tailed Deer	<i>Odocoileus virginianus</i>	Confirmed & Predicted
50	Woodchuck	<i>Marmota monax</i>	Confirmed & Predicted
51	Woodland Jumping Mouse	<i>Napaeozapus insignis</i>	Confirmed & Predicted
52	Woodland Vole	<i>Microtus pinetorum</i>	Confirmed & Predicted

**A-6. Birds New York GAP Analysis Data - EMAP Hexagon 420**

No.	Common Name	Scientific Name	Model Status
1	Acadian Flycatcher	<i>Empidonax virescens</i>	Confirmed & Predicted
2	Alder Flycatcher	<i>Empidonax alnorum</i>	Confirmed & Predicted
3	American Bittern	<i>Botaurus lentiginosus</i>	Confirmed & Predicted
4	American Black Duck	<i>Anas rubripes</i>	Confirmed & Predicted
5	American Coot	<i>Fulica americana</i>	Confirmed & Predicted
6	American Crow	<i>Corvus brachyrhynchos</i>	Confirmed & Predicted
7	American Goldfinch	<i>Carduelis tristis</i>	Confirmed & Predicted
8	American Kestrel	<i>Falco sparverius</i>	Confirmed & Predicted

**A-6. Birds New York GAP Analysis Data - EMAP Hexagon 420**

<b>No.</b>	<b>Common Name</b>	<b>Scientific Name</b>	<b>Model Status</b>
9	American Redstart	<i>Setophaga ruticilla</i>	Confirmed & Predicted
10	American Robin	<i>Turdus migratorius</i>	Confirmed & Predicted
11	American Wigeon	<i>Anas americana</i>	Predicted
12	American Woodcock	<i>Scolopax minor</i>	Confirmed & Predicted
13	Bald Eagle	<i>Haliaeetus leucocephalus</i>	Predicted
14	Baltimore Oriole	<i>Icterus galbula</i>	Confirmed & Predicted
15	Bank Swallow	<i>Riparia riparia</i>	Confirmed & Predicted
16	Barn Swallow	<i>Hirundo rustica</i>	Confirmed & Predicted
17	Barred Owl	<i>Strix varia</i>	Confirmed & Predicted
18	Belted Kingfisher	<i>Ceryle alcyon</i>	Confirmed & Predicted
19	Black Tern	<i>Chlidonias niger</i>	Confirmed & Predicted
20	Black-and-white Warbler	<i>Mniotilta varia</i>	Confirmed & Predicted
21	Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	Confirmed & Predicted
22	Blackburnian Warbler	<i>Dendroica fusca</i>	Confirmed & Predicted
23	Black-capped Chickadee	<i>Parus atricapillus</i>	Confirmed & Predicted
24	Black-crowned Night-Heron	<i>Nycticorax nycticorax</i>	Confirmed & Predicted
25	Black-throated Blue Warbler	<i>Dendroica caerulescens</i>	Confirmed & Predicted
26	Black-throated Green Warbler	<i>Dendroica virens</i>	Confirmed & Predicted
27	Blue Jay	<i>Cyanocitta cristata</i>	Confirmed & Predicted
28	Blue-Gray Gnatcatcher	<i>Poliophtila caerulea</i>	Confirmed & Predicted
29	Blue-headed Vireo	<i>Vireo solitarius</i>	Confirmed & Predicted
30	Blue-winged Teal	<i>Anas discors</i>	Confirmed & Predicted
31	Blue-winged Warbler	<i>Vermivora pinus</i>	Confirmed & Predicted
32	Bobolink	<i>Dolichonyx oryzivorus</i>	Confirmed & Predicted
33	Broad-winged Hawk	<i>Buteo platypterus</i>	Confirmed & Predicted
34	Brown Creeper	<i>Certhia americana</i>	Confirmed & Predicted
35	Brown Thrasher	<i>Toxostoma rufum</i>	Confirmed & Predicted
36	Brown-headed Cowbird	<i>Molothrus ater</i>	Confirmed & Predicted
37	Canada Goose	<i>Branta canadensis</i>	Confirmed & Predicted
38	Canada Warbler	<i>Wilsonia canadensis</i>	Confirmed & Predicted
39	Carolina Wren	<i>Thryothorus ludovicianus</i>	Confirmed & Predicted
40	Cedar Waxwing	<i>Bombycilla cedrorum</i>	Confirmed & Predicted
41	Cerulean Warbler	<i>Dendroica cerulea</i>	Confirmed & Predicted
42	Chestnut-sided Warbler	<i>Dendroica pensylvanica</i>	Confirmed & Predicted
43	Chimney Swift	<i>Chaetura pelagica</i>	Confirmed & Predicted
44	Chipping Sparrow	<i>Spizella passerina</i>	Confirmed & Predicted
45	Cliff Swallow	<i>Hirundo pyrrhonota</i>	Confirmed & Predicted
46	Common Barn-Owl	<i>Tyto alba</i>	Confirmed & Predicted
47	Common Grackle	<i>Quiscalus quiscula</i>	Confirmed & Predicted
48	Common Merganser	<i>Mergus merganser</i>	Confirmed & Predicted
49	Common Moorhen	<i>Gallinula chloropus</i>	Confirmed & Predicted
50	Common Nighthawk	<i>Chordeiles minor</i>	Confirmed & Predicted
51	Common Raven	<i>Corvus corax</i>	Confirmed & Predicted
52	Common Snipe	<i>Gallinago gallinago</i>	Confirmed & Predicted
53	Common Yellowthroat	<i>Geothlypis trichas</i>	Confirmed & Predicted
54	Cooper's Hawk	<i>Accipiter cooperii</i>	Confirmed & Predicted
55	Dark-eyed Junco	<i>Junco hyemalis</i>	Confirmed & Predicted
56	Downy Woodpecker	<i>Picoides pubescens</i>	Confirmed & Predicted

**A-6. Birds New York GAP Analysis Data - EMAP Hexagon 420**

<b>No.</b>	<b>Common Name</b>	<b>Scientific Name</b>	<b>Model Status</b>
57	Eastern Bluebird	<i>Sialia sialis</i>	Confirmed & Predicted
58	Eastern Kingbird	<i>Tyrannus tyrannus</i>	Confirmed & Predicted
59	Eastern Meadowlark	<i>Sturnella magna</i>	Confirmed & Predicted
60	Eastern Phoebe	<i>Sayornis phoebe</i>	Confirmed & Predicted
61	Eastern Screech-Owl	<i>Otus asio</i>	Confirmed & Predicted
62	Eastern Towhee	<i>Pipilo erythrophthalmus</i>	Confirmed & Predicted
63	Eastern Wood-Pewee	<i>Contopus virens</i>	Confirmed & Predicted
64	European Starling	<i>Sturnus vulgaris</i>	Confirmed & Predicted
65	Evening Grosbeak	<i>Coccothraustes vespertinus</i>	Confirmed & Predicted
66	Field Sparrow	<i>Spizella pusilla</i>	Confirmed & Predicted
67	Fish Crow	<i>Corvus ossifragus</i>	Confirmed
68	Gadwall	<i>Anas strepera</i>	Confirmed & Predicted
69	Golden-crowned Kinglet	<i>Regulus satrapa</i>	Confirmed & Predicted
70	Golden-winged Warbler	<i>Vermivora chrysoptera</i>	Confirmed & Predicted
71	Grasshopper Sparrow	<i>Ammodramus savannarum</i>	Confirmed & Predicted
72	Gray Catbird	<i>Dumetella carolinensis</i>	Confirmed & Predicted
73	Great Blue Heron	<i>Ardea herodias</i>	Confirmed & Predicted
74	Great Crested Flycatcher	<i>Myiarchus crinitus</i>	Confirmed & Predicted
75	Great Horned Owl	<i>Bubo virginianus</i>	Confirmed & Predicted
76	Green Heron	<i>Butorides virescens</i>	Confirmed & Predicted
77	Green-winged Teal	<i>Anas crecca</i>	Predicted
78	Hairy Woodpecker	<i>Picoides villosus</i>	Confirmed & Predicted
79	Henslow's Sparrow	<i>Ammodramus henslowii</i>	Confirmed & Predicted
80	Hermit Thrush	<i>Catharus guttatus</i>	Confirmed & Predicted
81	Hooded Merganser	<i>Lophodytes cucullatus</i>	Confirmed & Predicted
82	Hooded Warbler	<i>Wilsonia citrina</i>	Confirmed & Predicted
83	Horned Lark	<i>Eremophila alpestris</i>	Confirmed & Predicted
84	House Finch	<i>Carpodacus mexicanus</i>	Confirmed
85	House Sparrow	<i>Passer domesticus</i>	Confirmed & Predicted
86	House Wren	<i>Troglodytes aedon</i>	Confirmed & Predicted
87	Indigo Bunting	<i>Passerina cyanea</i>	Confirmed & Predicted
88	Kentucky Warbler	<i>Oporornis formosus</i>	Confirmed
89	Killdeer	<i>Charadrius vociferus</i>	Confirmed & Predicted
90	King Rail	<i>Rallus elegans</i>	Confirmed & Predicted
91	Least Bittern	<i>Ixobrychus exilis</i>	Confirmed & Predicted
92	Least Flycatcher	<i>Empidonax minimus</i>	Confirmed & Predicted
93	Loggerhead Shrike	<i>Lanius ludovicianus</i>	Predicted
94	Long-eared Owl	<i>Asio otus</i>	Predicted
95	Louisiana Waterthrush	<i>Seiurus motacilla</i>	Confirmed & Predicted
96	Magnolia Warbler	<i>Dendroica magnolia</i>	Confirmed & Predicted
97	Mallard	<i>Anas platyrhynchos</i>	Confirmed & Predicted
98	Marsh Wren	<i>Cistothorus palustris</i>	Confirmed & Predicted
99	Mourning Dove	<i>Zenaida macroura</i>	Confirmed & Predicted
100	Mourning Warbler	<i>Oporornis philadelphia</i>	Confirmed & Predicted
101	N. Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	Confirmed & Predicted
102	Nashville Warbler	<i>Vermivora ruficapilla</i>	Confirmed & Predicted
103	Northern Bobwhite	<i>Colinus virginianus</i>	Confirmed
104	Northern Cardinal	<i>Cardinalis cardinalis</i>	Confirmed & Predicted

**A-6. Birds New York GAP Analysis Data - EMAP Hexagon 420**

<b>No.</b>	<b>Common Name</b>	<b>Scientific Name</b>	<b>Model Status</b>
105	Northern Flicker	<i>Colaptes auratus</i>	Confirmed & Predicted
106	Northern Goshawk	<i>Accipiter gentilis</i>	Confirmed & Predicted
107	Northern Harrier	<i>Circus cyaneus</i>	Confirmed & Predicted
108	Northern Mockingbird	<i>Mimus polyglottos</i>	Confirmed & Predicted
109	Northern Parula	<i>Parula americana</i>	Confirmed
110	Northern Pintail	<i>Anas acuta</i>	Predicted
111	Northern Saw-whet Owl	<i>Aegolius acadicus</i>	Confirmed & Predicted
112	Northern Shoveler	<i>Anas clypeata</i>	Predicted
113	Northern Waterthrush	<i>Seiurus noveboracensis</i>	Confirmed & Predicted
114	Orchard Oriole	<i>Icterus spurius</i>	Confirmed & Predicted
115	Osprey	<i>Pandion haliaetus</i>	Confirmed & Predicted
116	Ovenbird	<i>Seiurus aurocapilla</i>	Confirmed & Predicted
117	Pied-billed Grebe	<i>Podilymbus podiceps</i>	Confirmed & Predicted
118	Pileated Woodpecker	<i>Dryocopus pileatus</i>	Confirmed & Predicted
119	Pine Siskin	<i>Carduelis pinus</i>	Confirmed & Predicted
120	Pine Warbler	<i>Dendroica pinus</i>	Confirmed & Predicted
121	Prairie Warbler	<i>Dendroica discolor</i>	Confirmed & Predicted
122	Prothonotary Warbler	<i>Protonotaria citrea</i>	Predicted
123	Purple Finch	<i>Carpodacus purpureus</i>	Confirmed & Predicted
124	Purple Martin	<i>Progne subis</i>	Confirmed & Predicted
125	Red Crossbill	<i>Loxia curvirostra</i>	Confirmed & Predicted
126	Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	Confirmed & Predicted
127	Red-breasted Nuthatch	<i>Sitta canadensis</i>	Confirmed & Predicted
128	Red-eyed Vireo	<i>Vireo olivaceus</i>	Confirmed & Predicted
129	Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	Confirmed & Predicted
130	Red-shouldered Hawk	<i>Buteo lineatus</i>	Confirmed & Predicted
131	Red-tailed Hawk	<i>Buteo jamaicensis</i>	Confirmed & Predicted
132	Red-winged Blackbird	<i>Agelaius phoeniceus</i>	Confirmed & Predicted
133	Ring-necked Pheasant	<i>Phasianus colchicus</i>	Confirmed & Predicted
134	Rock Dove	<i>Columba livia</i>	Confirmed & Predicted
135	Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	Confirmed & Predicted
136	Ruby-throated Hummingbird	<i>Archilochus colubris</i>	Confirmed & Predicted
137	Ruffed Grouse	<i>Bonasa umbellus</i>	Confirmed & Predicted
138	Savannah Sparrow	<i>Passerculus sandwichensis</i>	Confirmed & Predicted
139	Scarlet Tanager	<i>Piranga olivacea</i>	Confirmed & Predicted
140	Sedge Wren	<i>Cistothorus platensis</i>	Predicted
141	Sharp-shinned Hawk	<i>Accipiter striatus</i>	Confirmed & Predicted
142	Short-eared Owl	<i>Asio flammeus</i>	Predicted
143	Song Sparrow	<i>Melospiza melodia</i>	Confirmed & Predicted
144	Sora	<i>Porzana carolina</i>	Confirmed & Predicted
145	Spotted Sandpiper	<i>Actitis macularia</i>	Confirmed & Predicted
146	Swainson's Thrush	<i>Catharus ustulatus</i>	Confirmed
147	Swamp Sparrow	<i>Melospiza georgiana</i>	Confirmed & Predicted
148	Tree Swallow	<i>Tachycineta bicolor</i>	Confirmed & Predicted
149	Tufted Titmouse	<i>Parus bicolor</i>	Confirmed & Predicted
150	Turkey Vulture	<i>Cathartes aura</i>	Confirmed & Predicted
151	Upland Sandpiper	<i>Bartramia longicauda</i>	Confirmed & Predicted
152	Veery	<i>Catharus fuscescens</i>	Confirmed & Predicted

**A-6. Birds New York GAP Analysis Data - EMAP Hexagon 420**

No.	Common Name	Scientific Name	Model Status
153	Vesper Sparrow	<i>Vesper Sparrow</i>	Confirmed & Predicted
154	Virginia Rail	<i>Rallus limicola</i>	Confirmed & Predicted
155	Warbling Vireo	<i>Vireo gilvus</i>	Confirmed & Predicted
156	Whip-poor-will	<i>Caprimulgus vociferus</i>	Confirmed & Predicted
157	White-breasted Nuthatch	<i>Sitta carolinensis</i>	Confirmed & Predicted
158	White-eyed Vireo	<i>Vireo griseus</i>	Confirmed & Predicted
159	White-throated Sparrow	<i>Zonotrichia albicollis</i>	Confirmed & Predicted
160	White-winged Crossbill	<i>Loxia leucop</i>	Confirmed
161	Wild Turkey	<i>Meleagris gallopavo</i>	Confirmed & Predicted
162	Willow Flycatcher	<i>Empidonax traillii</i>	Confirmed & Predicted
163	Winter Wren	<i>Troglodytes troglodytes</i>	Confirmed & Predicted
164	Wood Duck	<i>Aix sponsa</i>	Confirmed & Predicted
165	Wood Thrush	<i>Hylocichla mustelina</i>	Confirmed & Predicted
166	Worm-eating Warbler	<i>Helmitheros vermivorum</i>	Confirmed & Predicted
167	Yellow Warbler	<i>Dendroica petechia</i>	Confirmed & Predicted
168	Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	Confirmed & Predicted
169	Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	Confirmed & Predicted
170	Yellow-breasted Chat	<i>Icteria virens</i>	Confirmed & Predicted
171	Yellow-rumped Warbler	<i>Dendroica coronata</i>	Confirmed & Predicted
172	Yellow-throated Vireo	<i>Vireo flavifrons</i>	Confirmed & Predicted
173	Yellow-throated Warbler	<i>Dendroica dominica</i>	Predicted

**A-7. Breeding Bird Atlas Data Blocks 3869A, 3869B, 3869D, 3870C and 3870D**

Common Name	Scientific Name	New York Status	Global Rank*	State Rank**
Acadian Flycatcher	<i>Empidonax virens</i>	Protected	G5	S3
Alder Flycatcher	<i>Empidonax alnorum</i>	Protected	G5	S5
American Black Duck	<i>Anas rubripes</i>	Game Sp.	G4	S4
American Crow	<i>Corvus brachyrhynchos</i>	Game Sp.	G5	S5
American Goldfinch	<i>Carduelis tristis</i>	Protected	G5	S5
American Kestrel	<i>Falco sparverius</i>	Protected	G5	S5
American Redstart	<i>Setophaga ruticilla</i>	Protected	G5	S5
American Robin	<i>Turdus migratorius</i>	Protected	G5	S5
American Woodcock	<i>Scolopax minor</i>	Game Sp.	G5	S5
Baltimore Oriole	<i>Icterus galbula</i>	Protected	G5	S5
Bank Swallow	<i>Riparia riparia</i>	Protected	G5	S5
Barn Swallow	<i>Hirundo rustica</i>	Protected	G5	S5
Barred Owl	<i>Strix varia</i>	Protected	G5	S5
Belted Kingfisher	<i>Ceryle alcyon</i>	Protected	G5	S5
Black-and-white Warbler	<i>Mniotilta varia</i>	Protected	G5	S5
Black-billed Cuckoo	<i>Coccyzus rethrophthalmus</i>	Protected	G5	S5
Black-capped Chickadee	<i>Poecile atricapillus</i>	Protected	G5	S5
Black-throated Blue Warbler	<i>Dendroica caerulescens</i>	Protected	G5	S5
Black-throated Green Warbler	<i>Dendroica virens</i>	Protected	G5	S5
Blackburnian Warbler	<i>Dendroica fusca</i>	Protected	G5	S5
Blue Jay	<i>Cyanocitta cristata</i>	Protected	G5	S5
Blue-gray Gnatcatcher	<i>Poliophtila caerulea</i>	Protected	G5	S5
Blue-headed Vireo	<i>Vireo solitarius</i>	Protected	G5	S5
Blue-winged Warbler	<i>Vermivora pinus</i>	Protected	G5	S5
Bobolink	<i>Dolichonyx oryzivorus</i>	Protected	G5	S5
Broad-winged Hawk	<i>Buteo platypterus</i>	Protected	G5	S5

**A-7. Breeding Bird Atlas Data Blocks 3869A, 3869B, 3869D, 3870C and 3870D**

Common Name	Scientific Name	New York Status	Global Rank*	State Rank**
Brown Creeper	<i>Certhia americana</i>	Protected	G5	S5
Brown-headed Cowbird	<i>Molothrus ater</i>	Protected	G5	S5
Brown Thrasher	<i>Toxostoma rufum</i>	Protected	G5	S5
Canada Goose	<i>Branta canadensis</i>	Game Sp.	G5	S5
Canada Warbler	<i>Wilsonia canadensis</i>	Protected	G5	S5
Carolina Wren	<i>Thryothorus ludovicianus</i>	Protected	G5	S5
Cedar Waxwing	<i>Bombycilla cedrorum</i>	Protected	G5	S5
Chestnut-sided Warbler	<i>Dendroica pensylvanica</i>	Protected	G5	S5
Chimney Swift	<i>Chaetura pelagica</i>	Protected	G5	S5
Chipping Sparrow	<i>Spizella passerina</i>	Protected	G5	S5
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	Protected		
Common Grackle	<i>Quiscalus quiscula</i>	Protected	G5	S5
Common Merganser	<i>Mergus merganser</i>	Game Sp.		
Common Raven	<i>Corvus corax</i>	Protected	G5	S4
Common Yellowthroat	<i>Geothlypis trichas</i>	Protected	G5	S5
Cooper's Hawk	<i>Accipiter cooperii</i>	Pro-S. C.	G4	S4
Dark-eyed Junco	<i>Junco hyemalis</i>	Protected	G5	S5
Downy Woodpecker	<i>Picoides pubescens</i>	Protected	G5	S5
Eastern Bluebird	<i>Sialia sialis</i>	Pro-S. C.	G5	S5
Eastern Kingbird	<i>Tyrannus tyrannus</i>	Protected	G5	S5
Eastern Meadowlark	<i>Sturnella magna</i>	Protected	G5	S5
Eastern Phoebe	<i>Sayornis phoebe</i>	Protected	G5	S5
Eastern Screech-Owl	<i>Megascops asio</i>	Protected	G5	S5
Eastern Towhee	<i>Pipilo erythrophthalmus</i>	Protected	G5	S5
Eastern Wood-Pewee	<i>Contopus virens</i>	Protected	G5	S5
European Starling	<i>Sturnus vulgaris</i>	Unprotect	G5	SE
Field Sparrow	<i>Spizella pusilla</i>	Protected	G5	S5
Golden-crowned Kinglet	<i>Regulus satrapa</i>	Protected	G5	S5
Golden-winged Warbler	<i>Vermivora chrysoptera</i>	Pro-S. C.	G4	S4
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	Pro-S. C.	G4	S4
Gray Catbird	<i>Dumetella carolinensis</i>	Protected	G5	S5
Great Blue Heron	<i>Ardea herodias</i>	Protected	G5	S5
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	Protected	G5	S5
Great Horned Owl	<i>Bubo virginianus</i>	Protected	G5	S5
Green Heron	<i>Butorides virescens</i>	Protected	G5	S5
Hairy Woodpecker	<i>Picoides villosus</i>	Protected	G5	S5
Henslow's Sparrow	<i>Ammodramus henslowii</i>	Threat	G4	S3
Hermit Thrush	<i>Catharus guttatus</i>	Protected	G5	S5
Hooded Merganser	<i>Lophodytes cullatus</i>	Game Sp.	G5	S4
Hooded Warbler	<i>Wilsonia citrina</i>	Protected	G5	S5
Horned Lark	<i>Eremophila alpestris</i>	Pro-S. C.	G5	S5
House Finch	<i>Carpodacus mexicanus</i>	Protected	G5	SE
House Sparrow	<i>Passer domesticus</i>	Unprotect	G5	SE
House Wren	<i>Troglodytes aedon</i>	Protected	G5	S5
Indigo Bunting	<i>Passerina cyanea</i>	Protected	G5	S5
Killdeer	<i>Charadrius vociferus</i>	Protected	G5	S5
Least Flycatcher	<i>Empidonax minimus</i>	Protected	G5	S5
Long-eared Owl	<i>Asio otus</i>	Protected	G5	S3
Louisiana Waterthrush	<i>Seiurus motacilla</i>	Protected	G5	S5
Magnolia Warbler	<i>Dendroica magnolia</i>	Protected	G5	S5
Mallard	<i>Anas platyrhynchos</i>	Game Sp.	G5	S5
Mourning Dove	<i>Zenaida macroura</i>	Protected	G5	S5
Mourning Warbler	<i>Oporornis philadelphia</i>	Protected	G5	S5

**A-7. Breeding Bird Atlas Data Blocks 3869A, 3869B, 3869D, 3870C and 3870D**

Common Name	Scientific Name	New York Status	Global Rank*	State Rank**
Nashville Warbler	<i>Vermivora ruficapilla</i>	Protected	G5	S5
Northern Bobwhite	<i>Colinus virginianus</i>	Game Sp.		
Northern Cardinal	<i>Cardinalis cardinalis</i>	Protected	G5	S5
Northern Flicker	<i>Colaptes auratus</i>	Protected	G5	S5
Northern Goshawk	<i>Accipiter gentilis</i>	Pro-S. C.	G4	S4
Northern Harrier	<i>Circus cyaneus</i>	Threat	G5	S3
Northern Mockingbird	<i>Mimus polyglottos</i>	Protected	G5	S5
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	Protected	G5	S5
Northern Waterthrush	<i>Seiurus noveboracensis</i>	Protected	G5	S5
Ovenbird	<i>Seiurus aurocapillus</i>	Protected	G5	S5
Pied-billed Grebe	<i>Podilymbus podiceps</i>	Threat	G5	S3
Pileated Woodpecker	<i>Dryocopus pileatus</i>	Protected	G5	S5
Pine Siskin	<i>Carduelis pinus</i>	Protected	G5	S5
Pine Warbler	<i>Dendrocia pinus</i>	Protected		
Prairie Warbler	<i>Dendroica discolor</i>	Protected	G5	S5
Purple Finch	<i>Carpodacus purpureus</i>	Protected	G5	S5
Red-bellied woodpecker	<i>Melanerpes carolinus</i>	Protected	G5	S5
Red-breasted Nuthatch	<i>Sitta canadensis</i>	Protected	G5	S5
Red-eyed Vireo	<i>Vireo olivaceus</i>	Protected	G5	S5
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	Pro-S. C.	G5	S4
Red-shouldered Hawk	<i>Buteo lineatus</i>	Threat	G5	S4
Red-tailed Hawk	<i>Buteo jamaicensis</i>	Protected	G5	S5
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	Protected	G5	S5
Ring-necked Pheasant	<i>Phasianus colchicus</i>	Game Sp.	G5	SE
Rock Pigeon	<i>Columba livia</i>	Unprotect	G5	SE
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	Protected	G5	S5
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	Protected	G5	S5
Ruffed Grouse	<i>Bonasa umbellus</i>	Game Sp.	G5	S5
Savannah Sparrow	<i>Passerculus sandwichensis</i>	Protected	G5	S5
Scarlet Tanager	<i>Piranga olivacea</i>	Protected	G5	S5
Sharp-shinned Hawk	<i>Accipiter striatus</i>	Protected	G5	S4
Song Sparrow	<i>Melospiza melodia</i>	Protected	G5	S5
Spotted Sandpiper	<i>Actitis macularia</i>	Protected	G5	S5
Swamp Sparrow	<i>Melospiza georgiana</i>	Protected	G5	S5
Tree Swallow	<i>Tachycineta bicolor</i>	Protected	G5	S5
Tufted Titmouse	<i>Baeolophus bicolor</i>	Protected	G5	S5
Turkey Vulture	<i>Cathartes aura</i>	Protected	G5	S4
Veery	<i>Catharus fuscescens</i>	Protected	G5	S5
Vesper Sparrow	<i>Poocetes gramineus</i>	Pro-S. C.	G5	S5
Virginia Rail	<i>Rallus limicola</i>	Game Sp.	G5	S5
Warbling Vireo	<i>Vireo gilvus</i>	Protected	G5	S5
Western Meadowlark	<i>Sturnella neglecta</i>	Protected		
White-breasted Nuthatch	<i>Sitta carolinensis</i>	Protected	G5	S5
White-throated Sparrow	<i>Zonotrichia albicollis</i>	Protected	G5	S5
Wild Turkey	<i>Meleagris gallopavo</i>	Game Sp.	G5	S5
Willow Flycatcher	<i>Empidonax traillii</i>	Protected	G5	S5
Wilson's Snipe	<i>Gallinago delicata</i>	Game Sp.		
Winter Wren	<i>Troglodytes troglodytes</i>	Protected	G5	S5
Wood Duck	<i>Aix sponsa</i>	Game Sp.	G5	S5
Wood Thrush	<i>Hylocichla mustelina</i>	Protected	G5	S5
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	Protected	G5	S5
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	Protected	G5	S5

<b>A-7. Breeding Bird Atlas Data Blocks 3869A, 3869B, 3869D, 3870C and 3870D</b>				
<b>Common Name</b>	<b>Scientific Name</b>	<b>New York Status</b>	<b>Global Rank*</b>	<b>State Rank**</b>
Yellow-rumped Warbler	<i>Dendroica coronata</i>	Protected	G5	S5
Yellow-throated Vireo	<i>Vireo flavifrons</i>	Protected	G5	S5
Yellow Warbler	<i>Dendroica petechia</i>	Protected	G5	S5

#### **Key to Breeding Bird Atlas Field Codes**

**Protection Status (State of New York)** - New York State legal status as of January 1994.

**Endangered** - Any **native species** in imminent danger of extirpation or extinction in New York State.

**Game Sp.** = Game Species - (defined in ECL section 11-0103): any of a variety of big game or small game species as stated in the ECL; many normally have an open season for at least part of the year, and are protected at other times.

**Protected** - (defined in ECL section 11-0103): wild game, protected wild birds & endangered species of wildlife.

**Pro-S. C.** = Protected Special Concern - those species which are not yet recognized as endangered or threatened, but for which documented concern exists for their continued welfare in New York. Unlike the first two categories, species of special concern receive no additional legal protection under ECL section 11-0535.

**Threat** = Threatened - any native species likely to become an endangered species within the foreseeable future in New York State.

**Unprotect** = Unprotected

#### **Global and State Ranks**

Each element has a global and state rank as determined by the New York Natural Heritage Program. These ranks carry no legal weight. The global rank reflects the rarity of the element throughout the world and the state rank reflects the rarity within New York State. Intraspecific taxa are also assigned a taxon rank to reflect the infraspecific taxon's rank throughout the world.

**Global Rank** - New York Natural Heritage program global rank as of January 1994.

**G4**: Uncommon but not rare; apparently secure, but with cause for some long-term concern; usually more than 100 occurrences or 10,000 individuals

**G5**: Common; demonstrably widespread, abundant and secure.

**State Rank** - The state rank reflects the rarity of the animal within New York State

**S3**: Typically 21 to 100 occurrences, limited acreage, or miles of stream in New York State.

**S4**: Apparently secure in New York State.

**S5**: Demonstrably secure in New York State.

**SE**: Exotic, not native to New York State.

<b>A-8. Possible Sites for Vernal Pool Creation</b>					
<b>State Forest</b>	<b>Site #</b>	<b>Acres</b>	<b>Soil type</b>	<b>Long. (X)</b>	<b>Lat. (Y)</b>
Hammond Hill	1	0.9	Alluvial land	-76.3139746668	42.4395998293
Hammond Hill	2	2.3	Wayland & Papakating soils	-76.3198020984	42.4355691474
Hammond Hill	3	4.9	Middlebury & Tioga silt loam	-76.317442507	42.4340765526
Hammond Hill	4	3.1	Volusia channery silt loam	-76.2904512774	42.4382047219
<b>Total</b>		<b>11.2</b>			

Notes: Project **Forest Type** Codes are the same as the treatment table.

<b>A-9. Streams in the Twin Sheds Unit</b>			
<b>State Forest</b>	<b>Fisheries Index Number</b>	<b>Stream Name</b>	<b>Length (Miles)</b>
Yellow Barn	ONT-66-12-P296-74-15A	No Name	0.2
Hammond Hill	ONT-66-12-P296-75-5	Sixmile Creek	0.3
Yellow Barn	ONT-66-12-P296-75-5	Sixmile Creek	0.2
Hammond Hill	ONT-66-12-P296-75-5-44	No Name	0.7
Hammond Hill	ONT-66-12-P296-75-5-46	No Name	0.1
Yellow Barn	ONT-66-12-P296-75-5-48	No Name	1.0
Yellow Barn	ONT-66-12-P296-75-5-49	No Name	0.4
Hammond Hill	ONT-66-12-P296-75-5-51	No Name	0.7
Hammond Hill	ONT-66-12-P296-75-5-53	No Name	1.3
Hammond Hill	ONT-66-12-P296-75-5-53-1	No Name	0.5
Yellow Barn	ONT-66-12-P296-75-5-57	No Name	0.1
Yellow Barn	ONT-66-12-P296-75-5-57-1	No Name	0.2
Hammond Hill	ONT-66-12-P296-75-5-P345A-1	No Name	0.2
Hammond Hill	SR-16-7	West Branch of Owego Creek	1.2
Hammond Hill	SR-16-7-24-1	No Name	1.8
Hammond Hill	SR-16-7-26	No Name	1.2
Hammond Hill	SR-16-7-26-2	No Name	0.2
Hammond Hill	SR-16-7-27	No Name	0.2
Hammond Hill	SR-16-7-28	No Name	0.3
Hammond Hill	SR-16-7-29	No Name	0.6
Hammond Hill	SR-16-7-31	No Name	0.6
<b>Unit Total</b>			<b>12</b>

<b>A-10. Taxes Paid on the Unit's State Forests (2009 Tax Roll)</b>							
<b>Town</b>	<b>State Forest</b>	<b>Acres</b>	<b>Assessment</b>	<b>Town Taxes (Jan 10)</b>	<b>School Taxes (Sept 09)</b>	<b>Special District Taxes (Jan 10)</b>	<b>Total Taxes</b>
Caroline	Tomp 2	231.71	\$431,100.00	\$2,552.00	\$8,738.00	\$595.00	\$11,885.00
Dryden	Tomp 2	3,466.68	\$5,827,900.00	\$8,355.00	\$118,128.00	\$8,988.00	\$135,471.00
	Tomp 5	45.74	\$77,500.00	\$111.00	\$1,571.00	\$119.00	\$1,801.00
<b>Total</b>	<b>Unit</b>	<b>3,744.13</b>	<b>\$7,505,781.00</b>	<b>\$11,018.00</b>	<b>\$128,437.00</b>	<b>\$9,702.00</b>	<b>\$149,157.00</b>

<b>A-11. Previous Owners of the Hammond Hill State Forest</b>			
<b>Date Acquired</b>	<b>Acres</b>	<b>Former Owner(s)</b>	<b>Town</b>
6/18/1934	310.13	Van Horn	Dryden
6/18/1934	50.89	Shurter	Dryden
6/18/1934	78.82	Stanton	Dryden
6/18/1934	70.26	Druley	Dryden
7/10/1934	31.48	Hutchings	Dryden
7/10/1934	67.96	Depew	Dryden
7/10/1934	190.34	Meier	Caroline-25.88 & Dryden-164.46
7/10/1934	190.19	Hunt	Caroline-80.06& Dryden-110.13
7/10/1934	74.29	Bates	Caroline
10/2/1934	128.63	Tompkins County	Dryden
12/29/1937	18.98	Goodrich	Dryden
10/17/1950	100.60	Baker	Dryden
1/24/1956	55.60	Federal Land – Kelsey	Dryden
1/24/1956	165.09	Federal Land – Reynolds	Dryden

<b>A-11. Previous Owners of the Hammond Hill State Forest</b>			
<b>Date Acquired</b>	<b>Acres</b>	<b>Former Owner(s)</b>	<b>Town</b>
1/24/1956	25.50	Federal Land – Van Pelt	Dryden
1/24/1956	162.00	Federal Land – Myers	Dryden
1/24/1956	51.48	Federal Land – Crispell	Caroline
1/24/1956	45.19	Federal Land – Johnson	Caroline
1/24/1956	156.10	Federal Land – Meyers	Dryden
1/24/1956	48.93	Federal Land – Edsall	Dryden
1/24/1956	52.01	Federal Land – Roth	Dryden
1/24/1956	34.50	Federal Land – Hunt	Dryden
1/24/1956	194.74	Federal Land – Beatty	Dryden
1/24/1956	119.18	Federal Land – Beatty	Caroline
1/24/1956	51.85	Federal Land – Detrick	Dryden
1/24/1956	43.70	Federal Land – Crispell	Dryden
1/24/1956	50.00	Federal Land – Williams	Dryden
1/24/1956	93.22	Federal Land – Needham	Caroline
1/24/1956	182.26	Federal Land – Holl	Caroline
1/24/1956	10.00	Federal Land – Johnson	Caroline
1/24/1956	61.60	Federal Land – Gallagher	Caroline
1/24/1956	200.00	Federal Land – Gallagher	Caroline
5/25/1961	23.52	Sherman	Dryden
11/13/1962	407.42	Smith Brothers	Caroline-103.10& Dryden-304.32
6/12/1980	18.07	Gallager	Dryden
10/11/1984	57.80	Gutchess	Dryden
1/14/2008	60.00	Ritz-Roth Estate	Dryden
1/24/2009	33.48	Wagner Lumber Co.	Dryden
	-3.25	Resurvey	Dryden
<b>Total Acres</b>	<b>3,712.56</b>	<b>Hammond Hill State Forest</b>	

<b>A-12. Previous Owners of the Yellow Barn State Forest</b>			
<b>Date Acquired</b>	<b>Acres</b>	<b>Former Owner(s)</b>	<b>Town</b>
1/24/1956	69.74	Federal Land – Mix	Dryden
1/24/1956	82.96	Federal Land – Ross	Dryden
1/24/1956	130.00	Federal Land – Tehan	Dryden
1/24/1956	198.77	Federal Land – Van Auke	Dryden
1/24/1956	69.50	Federal Land – Cole	Dryden
1/24/1956	108.31	Federal Land – Edsall	Dryden
1/24/1956	173.90	Federal Land – Uhl	Dryden
1/24/1956	84.80	Federal Land - Armstrong	Dryden
1/24/1956	163.00	Federal Land – Slater	Dryden
1/24/1956	161.85	Federal Land – Van Pelt	Dryden
3/25/1976	8.21	Little	Dryden
5/21/1976	20.03	Town of Dryden	Dryden
6/9/1976	4.00	Havington	Dryden

A-12. Previous Owners of the Yellow Barn State Forest			
Date Acquired	Acres	Former Owner(s)	Town
2/6/2002	13.50	Tompkins County	Dryden
<b>Total Acres</b>	<b>1,288.57</b>	<b>Yellow Barn State Forest</b>	

A-13. Stratigraphic Profile of Southwestern New York (Modified after Van Tyne & Copley)					
PERIOD		GROUP	UNIT	LITHOLOGY	
Pennsylvanian		Pottsville	Olean		quartz pebble conglomerate & sandstone, quartz pebble, conglomerate, sandstone & minor shale
Mississippian		Pocono	Knapp		
Devonian	Upper	Conewango			shale & sandstone scattered conglomerates
		Conneaut	Chadakon		shale & sandstone scattered conglomerates
		Canadaway	Undifferentiated	oil/gas	shale & siltstone
			Perrysburg	oil/gas	minor sandstone
		West Falls	Java, Nunda, Rhinestreet		shale & siltstone apollaceous limestone
		Sonyea	Middlesex	gas	shale and siltstone
	Genesee			shale with minor siltstone & limestone	
	Middle		Tully	gas	limestone with minor siltstone & sandstone
		Hamilton	Moscow, Ludlowville Skaneateles, Marcellus	gas	shale with minor sandstone & conglomerate
			Onondaga	oil/gas	limestone
	Lower	Tristates	Oriskany	gas	sandstone
		Helderberg	Manlius Rondout		limestone & dolostone
Silurian	Upper		Akron	oil/gas	dolostone
		Salina	Camilus, Syracuse, Vernon		shale, siltstone, anhydrite & ahlite
		Lockport	Lockport	gas	limestone & dolostone
		Clinton	Rochester Irondequoit		Shale & sandstone
	Sodus Reynales Thorold			Limestone & dolostone	
	Lower	Medina	Grimsby, Whirlpool	gas	sandstone & shale quartz sandstone
Ordovician	Upper		Queenston, Oswego, Lorraine, Utica	gas gas	shale & siltstone with minor sandstone
	Middle	Trenton-Black River	Trenton Black River	gas	limestone & minor dolostone
Cambrian	Upper		Little Falls, Galway, (Theresa), Potsdam	gas gas	quartz sandstone & dolostone; sandstone

A-13. Stratigraphic Profile of Southwestern New York (Modified after Van Tyne & Copley)				
PERIOD		GROUP	UNIT	LITHOLOGY
				& sandy dolostone; conglomerate base
Precambrian			Gneiss, Marble, Quartzite	Metamorphic & igneous rocks

A-14. Tree Planting Summary by Species - Twin Sheds Unit				
HARDWOODS		SOFTWOODS		
Species	Number	Species	Number	
Black locust	119,450	Norway spruce	386,700	
Northern red oak	43,050	Red pine	344,100	
White ash	13,450	Scotch pine	132,600	
Black cherry	4,800	White spruce	127,500	
Sugar maple	3,450	Japanese larch	94,300	
<b>Total</b>	<b>184,200</b>	White pine	91,100	
<b>Percentage</b>	<b>13.0</b>	European larch	32,550	
TOP TEN SPECIES		Jack pine	10,000	
Species	Rank	White cedar	9,000	
Norway spruce	1	Austrian pine	5,000	
Red pine	2	Pitch pine	4,100	
Scotch pine	3	<b>Total</b>	<b>1,236,950</b>	
White spruce	4	<b>Percentage</b>	<b>87.0</b>	
Black locust	5			
Japanese larch	6			
White pine	7			
Northern red oak	8	Total Softwoods	1,236,950	87.0
European larch	9	Total Hardwoods	184,200	13.0
White ash	10	<b>Unit Totals</b>	<b>1,421,150</b>	<b>100</b>

A-15. Roads Open to Public Use in the Unit			
State Forest	Road Name	Road Jurisdiction and Type	Miles
Hammond Hill	Canaan Rd.	DEC - Public Forest Access Road	1.5
Yellow Barn	Card Rd.	Town - Public Road (Plowed)	0.1
Hammond Hill	Hammond Hill Rd.	Town - Public Road (Plowed)	0.8
Hammond Hill	Hammond Hill Rd.	Town - Public Road (Seasonal)	2.2
Hammond Hill	Harford-Slaterville Rd.	County - Public Road (Plowed)	1.4
Hammond Hill	Irish Settlement Rd.	County - Public Road (Plowed)	0.2
Yellow Barn	Irish Settlement Rd.	County - Public Road (Plowed)	0.7
Hammond Hill	Red Man Run	DEC - Public Forest Access Road	1.1
Yellow Barn	Signal Tower Rd.	Town - Public Road (Plowed)	0.1
Yellow Barn	Signal Tower Rd.	Town - Public Road (Seasonal)	0.1
Hammond Hill	Star Stanton Hill Rd.	Town - Public Road (Plowed)	0.6
Hammond Hill	Star Stanton Hill Rd.	Town - Public Road (Seasonal)	0.4
Yellow Barn	Tehan Rd.	Town - Public Road (Plowed)	0.1
Yellow Barn	Yellow Barn Rd.	Town - Public Road (Plowed)	1.9

<b>A-15. Roads Open to Public Use in the Unit</b>			
<b>State Forest</b>	<b>Road Name</b>	<b>Road Jurisdiction and Type</b>	<b>Miles</b>
<b>Unit</b>	<b>Total</b>		<b>11.2</b>

**A-16. Special Management Zones (SMZ's) DEC Division of Lands and Forests Management Rules for Establishment of Special Management Zones on State Forests Version: June 2008.**

The Strategic Plan for State Forest Management (SPSFM) provides specific details. For more information, please refer to page 93 of the SPSFM available at <http://www.dec.ny.gov/lands/64567.html>.

The Bureau of State Land Management's buffer guidelines can be found at: [http://www.dec.ny.gov/docs/lands\\_forests\\_pdf/sfsmzbuffers.pdf](http://www.dec.ny.gov/docs/lands_forests_pdf/sfsmzbuffers.pdf)

<b>A-17. Examples of Activities that Require a Temporary Revocable Permit (TRP)</b>			
<b>Activity</b>	<b>TRP Type</b>		
	<b>Expedited (* See note)</b>	<b>Routine</b>	<b>Non-Routine</b>
Non-competitive event or activity when the group size involves 21 to 50 (no permit is required for non-competitive events or activities of 20 individuals or less).	Yes		
Use of metal detectors by an individual for the limited purpose of retrieving personal property recently lost on State land by that individual or by utility companies to locate underground utilities.	Yes		
Observational research project or falconry-eyes raptor take in accordance with the required DEC Special License.	Yes		
Non-competitive event or activity when the group size involves 51 to 100 individuals.		Yes	
Competitive event or activity.			Yes
Group activities when the group size more than 100 individuals.			Yes
Fishing tournaments when the group size involves 21 to 50 individuals (no permit is required for fishing tournament of 20 individuals or less).	Yes		
Fishing tournaments with over 50 individuals.		Yes	
An activity for which a Regional Office previously issued a TRP for the same activity at the same location within the past two years and where (1) there is no appreciable difference between the proposed activity described in the new TRP application; (2) the prior activity was conducted in compliance with all terms and conditions of the TRP issued for that activity; (3) the prior activity did not cause or create an adverse impact on natural resources or create a conflict with another user group; and (4) the previously issued TRP did not contain a condition prohibiting it from being considered a "Routine TRP" in the future.	Yes		
Routine maintenance of utility lines across State Land not involving vegetation management.		Yes	
Military training and exercises where (1) firearms will not be discharged, (2) motor vehicles or aircraft will not be used, and (3) no adverse environmental impact or user conflict is likely to occur.		Yes	
Any activity involving motorized equipment, all-terrain vehicle use (ATVs and ORVs), except for motorized equipment allowed under an Adopt-A-Natural Resource (AANR) Policy.			Yes
Public road disturbance outside a road right of way where such disturbance temporary in nature.			Yes
Collection of materials, including scientific specimens, historic artifacts, living materials, minerals, or wildlife on State Land, and projects requiring State Museum approval under State Education Law §233.			Yes
Oil and gas development projects (with required lease agreement).			Yes
Surveying State Land for exploration purposes, including seismic (with required lease agreement), geodetic and mineral exploration.			Yes
An activity that may impact rare or endangered or threatened species or			Yes

<b>A-17. Examples of Activities that Require a Temporary Revocable Permit (TRP)</b>			
<b>Activity</b>	<b>TRP Type</b>		
	<b>Expedited (* See note)</b>	<b>Routine</b>	<b>Non-Routine</b>
species of special concern.			
"Contact" research on involving (1) a sensitive site such as sites near known populations of endangered or threatened species or a species of special concern, (2) trapping, (3) leaving traps or equipment unattended, (4) digging soil pits or taking core samples, or (5) physical contact with any fish, crustacean, shellfish or wildlife species including handling, tagging or collecting.			Yes
Short-term access across State Land to private property not to exceed two-weeks for seasonal opening & closing of camps using existing roadways where road maintenance or heavy equipment is involved.			Yes
<b>Notes</b> * All activities authorized under an <b>expedited TRP</b> must meet all of the following conditions: no alcohol will be served; events shall be non-competitive; no trees will be cut; <u>all</u> motor vehicles shall remain on highways open for such public motor vehicle use; no discharge of firearms will take place during the event. There is no fee for an expedited permit or for educational institutions. Federal, state, county and local governments are exempt from the application fee.			

### **A-18. Environmental Impact Statement**

This Unit Management Plan (UMP) does not propose any clearcuts of 40 acres or larger, pesticide applications of more than 40 acres, or prescribed burns in excess of 100 acres. Therefore the actions in the plan do not exceed the thresholds set forth in the Strategic Plan/Generic Environmental Impact Statement for State Forest Management.

#### **This Unit Management Plan also does not include any of the following:**

1. Forest management activities occurring on acreage occupied by protected species ranked S1, S2, G1, G2 or G3.
2. Pesticide applications adjacent to plants ranked S1, S2, G1, G2 or G3.
3. Aerial pesticide spraying by airplane or helicopter.
4. Development of facilities with potable water supplies, septic system supported restrooms, camping areas with more than 10 sites or development in excess of other limits established in this plan.
5. Well drilling plans.
6. Well pad densities of greater than one well pad in 320 acres or non-compliance with limitations identified through a tract assessment.
7. Carbon injection and storage or waste water disposal.

**Therefore the actions proposed in this UMP do not require any separate site specific environmental review.**

#### ***Actions not covered by the Strategic Plan/Generic Environmental Impact Statement***

Any action taken by the Department on this Unit that is not addressed in this Unit Management Plan and is not addressed in the Strategic Plan/Generic Environmental Impact Statement may need a separate site specific environmental review.

### **UNIT MANAGEMENT PLAN GLOSSARY OF TERMS**

**Access trails**-temporary, unpaved roads which do not provide all weather access within the Unit. They are not designed for long term and repeated use by heavy equipment. These corridors were originally constructed for the seasonal removal of forest products by skidding to log landings or other staging areas. Constructed according to best management practices, these trails may be used to support other management objectives such as recreational access corridors. Maintenance is limited to activities which minimally support seasonal access objectives. (L)

**Adaptive management**-a dynamic approach to forest management in which the effects of treatments and decisions are continually monitored and used, along with research results, to modify management on a continuing basis to ensure that objectives are being met. (E)

**Aesthetics**-forest value, rooted in beauty and visual appreciation and providing a distinct visual quality. (G)

**Age class**-trees of a similar size and/or age originating from a single natural event or regeneration activity. see **cohort**. (D)

**Apple tree release**-a management action; the act of removing an overstory of trees and/or competing vegetation that are shading and potentially inhibiting apple tree growth and fruit production. (G)

**Ash decline**-the progressive loss of vigor and health causing the death of ash trees by a combination of factors. Some factors may include diseases, poor soil/sites, cankers, insects, winter injury, or drought. (G)

**Basal area**-the cross sectional area, measured in square feet, of a single stem, including the bark, measured at breast height (4.5 ft above the ground). (E)

**Beech bark disease**-a insect and disease pathogen complex involving a scale insect (*Cryptococcus fagi*) and a nectria fungus (*Nectria coccinea* var. *faginata*). The insect pierces the bark to feed, allowing a place for the fungus to enter the tree. Fungal activity interrupts the tree's normal physiological processes and a severely infected tree will most likely die. (G)

**Best Management Practices (BMP)**-a practice or a combination of practices that are designed for the protection of water quality of water bodies and riparian areas, and determined to be the most effective and practicable means of controlling water pollutants. (E)

**Biological diversity (Biodiversity)**-the variety, abundance and interactions of life forms found in areas ranging in size from local through regional to global. Biodiversity also encompasses processes - both ecological and evolutionary that allow organisms to keep adapting and evolving. Genetic diversity (unique combinations of genes found within and among organisms), species diversity (number of species in an area), ecological diversity (organization of species into natural communities and the interplay of these communities with the physical environment - interactions among organisms and between organisms and their environment is the key here). Landscape diversity (refers to the geography of different ecosystems across large areas and the connections between them). (M)

**Biological legacy**-an organism, living or dead, inherited from a previous ecosystem; biological legacies often include large trees, snags and down logs left after timber harvesting. (E)

**Blowdown**-tree or trees felled or broken off by wind. (E)

**Browse**-portions of woody plants including twigs, shoots and leaves consumed by animals such as deer. (G)

**Buffer zone(s)/buffer strip**-a vegetation strip or management zone of varying size, shape, and character maintained along a stream, lake, road, recreation site or other vegetative zone to mitigate the impacts of actions on adjacent lands, to enhance aesthetic values or as a best management practice. (E)

**Butternut canker**-a disease of butternut trees caused by a fungus (*Sirococcus clavigignenti-juglandacearum*) that most often kills the tree. (G)

**Clast**-A fragment of a pre-existing rock or fossil embedded within another rock. (T)

**Coarse filter approach**-a strategy for conserving biodiversity that involves maintaining a variety of native ecosystems within a landscape context. A coarse filter approach would ensure the availability of grasslands, shrublands, open wetlands, forest wetlands, riparian zones, northern hardwood forest and mixed northern hardwood/conifer forest in various stages of successional development. This approach assumes that a representative array of native ecosystems will contain the vast majority of species in a region. (G)

**Coarse Woody Material (CWM)**-any piece(s) of dead woody material on the ground in forest stands or in streams. (E)

**Cohort**-a population of trees that originate after some type of disturbance. (G)

**Community**-1) an assemblage of plants and animals interacting with one another, occupying a habitat and often modifying the habitat; a variable assemblage of plant and animal populations sharing a common environment and occurring repeatedly in the landscape. 2) A group of people living in a particular local area. (H)(T)

**Competitive Events or Activities** - Any event or activity on public land in which two or more contestants compete and at least one of the following apply: **a.** Participants register, enter, or complete an application for the event, **b.** A predetermined course or area is designated. (G)

**Conifer**-a cone-bearing tree, also referred to as softwood belonging to the botanical group gymnosperms. (E)

**Conversion**-a change from one silvicultural system to another or from one tree species to another. (E)

**Coppice**-to cut the main stem (particularly of broadleaved species) at the base or to injure the roots to stimulate the production of new shoots for regeneration. (E)

**Corridor**-a linear strip of land identified for the present or future location of a designed use within its boundaries. *Examples:* recreational trails, transportation or utility rights-of-way. When referring to wildlife, a corridor may be a defined tract of land connecting two or more areas of similar management or habitat type through which a species can travel from one area to another to fulfill any variety of life-sustaining needs. (E)

**Cover type(s)**-the plant species forming a majority of composition across a given area. (E)

**Crown**-the part of a tree or woody plant bearing live branches and foliage. (E)

**Crown class**-a category of tree based on its crown position relative to those of adjacent trees. Examples:

*Dominant*-a tree whose crown extends above the general level of the main canopy and receives full light from above and partial to full light from the sides.

*Co-dominant*-a tree whose crown helps to form the general level of the main canopy and receives full light from above and comparatively little from the sides.

*Intermediate*-a tree whose crown extends into the lower portion of the main canopy and receives little direct light from above and none from the sides.

*Suppressed/overtopped*-a tree whose crown is completely overtopped by the crowns of one or more neighboring trees and receives little or no direct sunlight. (E)

**Cultural resources**-significant historical or archaeological assets on sites as a result of past human activity which are distinguishable from natural resources. (G)

**Cutting interval**-the number of years between harvest or regeneration cuts in a stand. (G)

**Deciduous**-tree and shrub species that lose their leaves or needles in autumn. (G)

**Den tree**-a tree containing an excavation sufficiently large for nesting, dens or shelter; tree may be alive or dead. (G)

**Designated recreational trail(s)**-a Department authorized recreational trail that is signed and/or mapped. (G)

**Diameter (at) Breast Height (DBH)**-the diameter of the stem of a tree (outside bark) measured at breast height (4.5 ft) from the ground. (E)

**Disturbance**-a natural or human-induced environmental change that alters one or more of the floral, faunal, and microbial communities within an ecosystem. Timber harvesting is the most common human disturbance. Wind or ice storms are examples of natural disturbance. (A)

**Early successional wildlife habitat**-wildlife habitats which have early vegetative stages such as grass, shrubs or aspen. (G)

**Ecosystem(s)**-a spatially explicit, relatively homogeneous unit of the earth that includes all interacting organisms and components of the abiotic environment within its boundaries - *note*: an ecosystem can be of any size, e.g., a log, pond, field, forest or the earth's biosphere. (E)

**Ecosystem management**-the appropriate integration of ecological, economic and social factors in order to maintain and enhance the quality of the environment to best meet our present and future needs. Involves management at the landscape level, prompting the biodiversity of natural communities of plants, animals and seeking to maintain healthy and productive environments. (D)

**Edge**-the more or less well-defined boundary between two or more elements of the environment, e.g., a field adjacent to a woodland or the boundary of different silvicultural treatments. (E)

**Endangered species**-any species of plant or animal defined through the Endangered Species Act of 1976 as being in danger of extinction throughout all or a significant portion of its range, and published in the Federal Register. (E)

**Even-aged**-a class of forest or stand composed of trees of about the same age. The maximum age difference is generally 10-20 years. (J)

**Even-aged (silviculture)**-a program of forest management directed to the establishment and maintenance of stands of trees having relatively little (10-20 yrs) variation in ages. The guidelines to be applied in using this system at all stages of tree development are uniquely different from the uneven-aged system. (G)

**Exotic**-any species introduced from another country or geographic region outside its natural range. (E)

**Flood plain**-the level or nearly level land with alluvial soils on either or both sides of a stream or river that is subject to overflow flooding during periods of high water level. (E)

**Focused fire**-using propane fired torches to burn undesirable plants and an alternative to pesticide use. Also called flame weeding.

**Forestry**-the profession embracing the science, art and practice of creating, managing, using and conserving forests and associated resources for human benefit and in a sustainable manner to meet desired goals, needs and values. (E)

**Forest/Stand development stages**-the various stages of forest stand growth and development ranging from a stand initiation (seedling establishment) stage to an old-growth stage. (I)

**Forest type(s)**-a community of trees defined by its vegetation, particularly its dominant vegetation as based on percentage cover of trees. (E)

**Forested wetland**-an area characterized by woody vegetation where soil is periodically saturated with or covered by water. (G)

**Fragipan**-a dense and brittle layer of soil. Its hardness results mainly from extreme density or compactness rather than from high clay content. The material may be dense enough to restrict root, nutrient and water penetration. (G)

**Fragmentation** - 1) the condition by which a landscape is broken into small islands of forest within a mosaic of other forms of land use or ownership. 2) islands of a particular age class that remain in areas of younger-aged forest. (E)

**Gaps**-communities, habitats, successional stages or organisms which have been identified as lacking in the landscape. (G)

**Gap Analysis**-a methodology for prioritizing land protection needs by identifying biologically valuable lands that are threatened by development or degradation. (U)

**Geocaching**-a high-tech, hide and seek, outdoor activity for utilizing the Global Positioning System (GPS). (G)

**Geographic Information System (GIS)** - an organized collection of computer hardware, software, geographic and descriptive data, personnel, knowledge and procedures designed to efficiently capture, store, update, manipulate, analyze, report and display the forms of geographically referenced information and descriptive information. (E)

**Grassland**-land on which the vegetation is dominated by grasses, grasslike plants or forbs. (E)

**Group selection**-type of uneven-aged forest management used to create openings in the forest canopy to promote future stand diversity and the establishment of shade intolerant species. New age classes are established in place of the small groups of trees that were removed. (G)

**Habitat**-the geographically defined area where environmental conditions (e.g., climate, topography, etc.) meet the life needs (e.g., food, shelter, etc.) of an organism, population, or community. (A)

**Hardwoods**-broad-leafed, deciduous trees belonging to the botanical group Angiospermae. (E)

**Haul road**-permanent, unpaved roads which are not designed for all-weather travel, but may have hardened or improved surfaces with artificial drainage. They are constructed according to best management practices primarily for the removal of forest products, providing limited access within the Unit by log trucks and other heavy equipment. These roads may or may not be open for public motor vehicle use, depending on management priorities and objectives. They may serve as recreational access corridors, but are not maintained according to specific standards or schedules. (N)

**Herbicide** -a chemical used for killing or controlling the growth of plants. (E)

**Improvement thinning**-the removal of less desirable trees of any species in a stand of poles or larger trees, primarily to improve composition and quality. (E)

**Indicator species**-species with such specialized ecological needs that they can be used for assessing the quality, condition or extent of an ecosystem on the basis of their presence and density or the accumulation and effect of materials in their tissues. (A)

**Invasive species**-species that have become established outside their natural range which spread prolifically, displacing other species and sometimes causing environmental damage. (G)

**Keystone species**-a plant or animal species that strongly influences that functioning of an entire ecosystem. For example, the way beaver influence wetlands. (G)

**Landscape Matrix**-the most extensive and connected landscape element type present, which plays the dominant role in landscape functioning. For example, New York's South-Central Highlands (Central Appalachian) landscape is dominantly forest cover; thus, the landscape matrix is forest cover. (Q)

**Late successional forest**-a forest beyond the age of economic maturity, generally beyond 100 years of age; typically contain some trees 100 to 200 years old. They may exhibit evidence of past human or natural disturbances. These forests may exist as entire stands or as smaller patches within younger stands. Late successional forest implies a forest that is nearing one of potentially several old stages of forest condition after a relatively long period without a stand-replacing disturbance (either by humans or natural causes). (P)

**Log landing/Log deck**-a cleared area to which logs are skidded and are temporarily stored before being loaded onto trucks for transport. (G)

**Long-lived conifers** - conifers that are capable of living 135 years or more on forest sites in Central New York. Tree species typically include eastern hemlock, eastern white pine, Norway spruce and northern white cedar. (G)

**MAPPWD (Motorized Access Permit for People with Disabilities)**-a temporary revocable permit (TRP) that provides a qualified person with a certified disability access to State land by a suitable motor vehicle, where either the desired location is closed to motor vehicles or is open to certain motor vehicles, but not the type of motor vehicle desired to be used by that person. By DEC policy, the MAPPWD permit allows individuals to operate a motor vehicle as designated in the permit on all roads, trails and geographical areas designated by the Department for such use and elsewhere as specifically approved, consistent with present law and rules and regulations. (G)

**Mast**-all fruits of trees and shrubs used as food for wildlife. Hard mast includes nut-like fruits such as acorns, beechnuts and chestnuts. Soft mast includes the fleshy fruits of black cherry, dogwood and serviceberry. (A)

**Mature forest cover**-pertaining to an even-aged stand that has attained most of its potential height growth, or has reached merchantability standards. Within uneven-aged stands, individual trees may become mature but the stand itself consists of trees of diverse ages and stages of development. (E)

**Mesic**-of sites or habitats characterized by intermediate moisture conditions, i.e., neither decidedly wet nor dry. (E)

**Multiple use**-a strategy of land management fulfilling two or more objectives, e.g. forest products removal and recreation. (G)

**Native species**-indigenous species that is normally found as part of a particular ecosystem. (E)

**Natural area**-an area left in a natural condition, usually without direct human intervention, to attain and sustain a climax condition, the final stage of succession. By management direction, these areas are not managed for the production of wood products or mineral resources. (G)

**Natural regeneration** - the establishment of a forest stand from natural seeding, sprouting, suckering or layering. (E)

**Neotropical migratory birds**-birds that breed in Canada and the United States and spend our winter in Mexico, Central America, South America or the Caribbean islands. These species represent more than 50% (340 of the 600 species) of North American birds. (G)

**Nonpoint Source** - pollution that arises from an ill-defined and diffuse source, such as runoff from cultivated fields, agricultural lands, urban areas or forests and wildlands. (E)

**Northern hardwood forest**-a **forest type** usually made up of sugar and red maple, American beech, yellow birch, and to a lesser extent black cherry and white ash. This type represents about 70 percent of all forests in New York State. (A)

**Old growth**-an abundance of late successional tree species, at least 180 - 200 years of age in a contiguous forested landscape that has evolved and reproduced itself naturally, with the capacity for self perpetuation, arranged in a stratified forest structure consisting of multiple growth layers throughout the canopy and forest floor, featuring canopy gaps formed by natural disturbances creating an uneven canopy, and a conspicuous absence of multiple stemmed trees. Old growth forest sites typically are characterized by an irregular forest floor containing an abundance of coarse woody materials which are often covered by mosses and lichens; show limited signs of artificial disturbance and have distinct soil horizons. The understory displays well developed and diverse surface herbaceous layers. Single, isolated trees may be considered as old growth if they meet some of the above criteria. (G)

**Overstory**-that portion of the trees in a forest forming the upper or uppermost canopy layer. (E)

**Patch retention**-an approach to harvesting based on the retention of structural elements or biological legacies (trees, snags, logs, etc.) from the harvested stand for integration into the new stand to achieve various ecological objectives. (E)

**Pioneer Hardwood**-a plant capable of invading bare sites (newly exposed soil) and persisting there or colonizing them until supplanted by successional species. (E)

**Plantation**-a stand composed primarily of trees established by planting or artificial seeding - a plantation may have tree or understory components that have resulted from natural regeneration. (E)

**Poletimber**-trees that are generally 6-11 inches diameter at breast height. (G)

**Protection area**-land excluded from most active management to protect sensitive sites. Exclusions may include: wood product management, oil and gas exploration and development and some recreational activities. These sites most often include steep slopes, wet woodlands and riparian zones along stream corridors. (G)

**Public Forest Access Roads (PFAR)**-permanent, unpaved roads which may be designed for all-weather use depending upon their location, surfacing and drainage. These roads provide primary access for administration and public use within the Unit. The design standards for these roads are those of the Class A and Class B access roads as provided in the Unpaved Forest Road Handbook (8/74). As a general guideline, sufficient access is typically achieved when 1 mile of PFAR is developed for each 500 acres of state land, and no position within the Unit lies more than 1 half mile from a PFAR or public highway. (L) (N)

**Pulpwood**-low grade or small diameter logs used to make paper products, wood chips, etc. (G)

**Quality Deer Management (QDM)** - is a management philosophy/practice that unites landowners, hunters and managers in a common goal of producing biologically and socially balanced deer herds within existing environmental, social and legal constraints. This approach typically involves the protection of young bucks, (yearlings & some 2.5 year-old), combined with an adequate harvest of female deer to maintain a healthy population in balance with existing habitat conditions and landowner desires. This level of deer management involves the production of quality deer (bucks, does & fawns), quality habitat, quality hunting experiences and most importantly quality hunters. (L)

**Reforestation** - the re-establishment of forest cover by natural or artificial means. (A)

**Regeneration**-seedlings or saplings of any origin. (J)

**Release**-1) a treatment designed to free trees from undesirable, usually overtopping, competing vegetation. (E) 2) a treatment designed to free young trees not past the sapling stage from undesirable competing vegetation that overtops or closely surrounds them. (F)

**Riparian buffer (zones)**-areas of transition between terrestrial and aquatic ecological systems. They are characterized as having soils and vegetation analogous to floodplains, or areas transitional to upland zones. These areas help protect the water by removing or buffering the effects of excessive nutrients, sediments, organic matter, pesticides, or pollutants. (A)

**Salvage**-the removal of dead trees or trees damaged or dying because of injurious agents other than competition, to recover economic value that would otherwise be lost. (E)

**Sapling**-a small tree, defined as being between 1 and 5 inches diameter at breast height. (G)

**Sawtimber**-trees that are generally 12 inches and larger diameter at breast height. (G)

**Secondary forest (second growth forest)**-a relatively young forest that has been regenerated naturally or artificially after some drastic interference such as extensive cutting, wildlife, insect or disease attack or blowdown. (E)

**Seedling**-a young tree originating from seed that is less than 1 inch in diameter. (A)

**Seedling/sapling**-trees less than 6 inches diameter at breast height. (G)

**Seed tree cut**-the removal of the mature timber in one cutting, except for a small number of trees left singly, or in small groups, as a source of seed for natural regeneration. (I)

**Shade tolerant**-the ability of a tree species to germinate and grow at various levels of shade.  
*Shade tolerant*: having the capacity to compete for survival under shaded conditions  
*Shade intolerant*: having the capacity to compete for survival only under direct sunlight conditions; light demanding species. (E) (G)

**Shelterwood cut/method**-a regeneration action designed to stimulate reproduction by implementing a series of cuts over several years that will gradually remove the overstory trees. Gradual reduction of stand density protects understory trees and provides a seed source for stand regeneration. (A)

**Silviculture**-the art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis. (E)

**Site** - the area in which a plant or forest stand grows, considered in terms of its environment, particularly as this determines the type and quality of the vegetation the area can support. (E)

**Skid trail(s)**-a temporary or permanent trail used to skid or forward felled trees from the stumps to the log landing. (G)

**Snags**-standing, dead trees, with or without cavities; function as perches, foraging sites and/or a source of cavities for dens, roosting and/or nesting for wildlife. (G)

**Softwoods**-generally refers to needle and/or cone bearing trees (conifers) belonging to the botanical group Gymnospermae. (G)

**Spatial analysis**-an examination of data in the context of where it occurs geographically or “on the ground”. This is usually accomplished by tying database information to GIS based maps.(G)

**Species**-the main category of taxonomic classification into which genera are subdivided, comprising a group of similar interbreeding individuals sharing a common morphology, physiology and reproductive process. (E)

**Species richness**-the number of different species present within a defined area. (A)

**Stand**-a contiguous group of trees sufficiently uniform in age-class distribution, composition and structure and growing on a site of sufficiently uniform quality, to be a distinguishable unit.(E)

**Stand structure**-the horizontal and vertical distribution of components of a forest stand including the height, diameter, crown layers and stems of trees, shrubs, herbaceous understory, snags and down woody materials. (E)

**State Forest/State Reforestation Area**-lands owned by the State of New York, administered by the Department of Environmental Conservation Division of Lands & Forests, and authorized by Environmental Conservation Law to be devoted to the establishment and maintenance of forests for watershed protection, the production of timber and other forest products, and for recreation and kindred purposes. These forests shall be forever devoted to the planting, growth, and harvesting of such trees (Title 3 Article 9-0303 ECL). (G)

**Stemwood**-the wood of the stem(s) of a tree, i.e., of its main axis (or axes) as distinct from the branches (branchwood), stump (stumpwood), or roots. (E).

**Stocking**-the activity of supplying a stock of something; "he supervised the stocking of the stream with trout". (T)

**Succession**-the natural series of replacements of one plant community (and the associated fauna) by another over time and in the absence of disturbance. (A)

**Suite**-species similar in their habitat needs which may respond similarly to habitat changes.(A)

**Sustainable forest management**-management that maintains and enhances the long-term health of forest ecosystems for the benefit of all living things, while providing environmental, economic, social and cultural opportunities for present and future generations. (A)

**Temporary revocable permits (TRPs)**-a Department permit which authorizes the use of State land for a specific purpose for a prescribed length of time. (G)

**Thinning**-a silvicultural treatment made to reduce stand density of trees primarily to improve growth of remaining trees, enhance forest health, or recover potential mortality. (E)

**Threatened species**-a species likely to become endangered in the foreseeable future, throughout all or a significant portion of its range, unless protected. (A)

**Timber Stand Improvement (TSI)** - pre-commercial silvicultural treatments, intended to regulate stand density and species composition, while improving wood product quality and fostering individual tree health and vigor through the removal of undesirable trees. (G)

**Understory**-the smaller vegetation (shrubs, seedlings, saplings, small trees) within a forest stand, occupying the vertical zone between the overstory and the herbaceous plants of the forest floor. (A)

**Uneven-aged system(s)**-a planned sequence of treatments designed to maintain and regenerate a stand with three or more age classes. (E)

**Uneven-aged stand/forest**-a stand with trees of three or more distinct age classes, either intimately mixed or in small groups. (E)

**Universal Design**-Universal design is the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design. For additional information, see [http://www.design.ncsu.edu/cud/about\\_ud/about\\_ud.htm](http://www.design.ncsu.edu/cud/about_ud/about_ud.htm) (S)

**Watershed**-a region or area defined by a network of stream drainage. A watershed includes all the land from which a particular stream or river is supplied. (G)

**Wetland(s)**-a transitional area between aquatic and terrestrial ecosystems that is inundated or saturated for periods long enough to produce hydric soils & support hydrophytic vegetation. (E)

**Variable Density Thinning(s)**-a type of thinning used by forest managers to increase the variation in tree spacing across the stand to promote the development of multiple canopy layers. Such thinnings usually maintain large numbers of tree in some areas and reduce stand density or create gaps in other areas.

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## MAPS