

State of Vermont  
Agency of Natural Resources  
Department of Forests, Parks and Recreation  
Fish & Wildlife Department

*Whipstock Hill Wildlife Management Area*  
Long Range Management Plan



Bennington, Vermont  
425 acres



*Prepared by: Rutland North Stewardship Team*



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## **Mission Statements**

### ***Vermont Agency of Natural Resources***

The mission of the Agency of Natural Resources is “to protect, sustain, and enhance Vermont’s natural resources, for the benefit of this and future generations.”

Four agency goals address the following:

- To promote the sustainable use of Vermont’s natural resources;
- To protect and improve the health of Vermont’s people and ecosystems;
- To promote sustainable outdoor recreation; and
- To operate efficiently and effectively to fulfill our mission.

### ***Departments***

#### **Vermont Department of Environmental Conservation Mission Statement**

To preserve, enhance, restore, and conserve Vermont’s natural resources, and protect human health, for the benefit of this and future generations.

#### **Vermont Fish & Wildlife Department Mission Statement**

The mission of the Vermont Fish & Wildlife Department is the conservation of all species of fish, wildlife, and plants and their habitats for the people of Vermont. To accomplish this mission, the integrity, diversity, and vitality of their natural systems must be protected.

#### **Vermont Department of Forests, Parks and Recreation Mission Statement**

The mission of the Department of Forests, Parks and Recreation is to practice and encourage high quality stewardship of Vermont’s environment by monitoring and maintaining the health, integrity, and diversity of important species, natural communities, and ecological processes; managing forests for sustainable use; providing and promoting opportunities for compatible outdoor recreation; and furnishing related information, education, and services.

## EXECUTIVE SUMMARY

The 425-acre Whipstock Hill Wildlife Management Area (WMA) is located in the Vermont Valley biophysical region in the southwestern Vermont town of Bennington adjacent to the New York state border. The WMA consists of two parcels physically divided by Whipstock Road. The main parcel is the western-most and largest and is located between Whipstock Road and Vermont Route 279. The smaller parcel is located east of Whipstock Road and is dominated by wetlands.

### Natural Communities

Twelve natural communities were identified on the Wildlife Management Area including three rare communities and three uncommon communities. Based on community quality and rarity, the Rich Fen is considered state significant. The Wet and Mesic Clayplain Forests will require further study to determine their significance on a state-wide basis.

**Table 1: Natural Communities of Whipstock Hill WMA**

Natural Communities of Whipstock Hill WMA				
Natural Community		Acres	Vermont Distribution	State significant
<i>Wetlands</i>	Beaver Wetland	15	Common	
	Calcareous Red Maple-Tamarack Swamp	1.5	Rare	
	Red Maple-Black Ash Seepage Swamp	2.9	Common	
	Rich Fen	1.1	Rare	Yes
	Seep	0.3	Common	
	Shallow Emergent Marsh	1.3	Common	
	Silver Maple-Sensitive Fern Riverine Floodplain Forest	0.4	Uncommon	
	Wet Clayplain Forest	7	Rare	TBD
<i>Uplands</i>	Dry Oak-Hickory-Hophornbeam Forest	17	Uncommon	
	Mesic Clayplain Forest	19	Rare	TBD
	Mesic Maple-Ash-Hickory-Oak Forest	333	Uncommon	
	Northern Hardwood Forest	26	Very common	

Some broad patterns emerged from this mapping effort. Whipstock Hill is forested with maple, ash, oaks and hickories, and has elements of both the northern and central hardwood forest regions. The upper slopes are primarily dominated by native species, but the lower slopes are highly disturbed from past land use and dominated by non-native species, many of which are highly invasive. A large wetland complex includes several calcareous wetland types, including a globally rare Rich Fen natural community. There are also patches of Mesic Clayplain Forest and Wet Clayplain Forest – two communities typically associated with the Champlain Valley. These are the first examples of these types that have been found in the Vermont Valley, and as such are of regional ecological importance. Maintaining the quality and condition of natural communities,

controlling invasive species, and allowing natural processes to occur to the extent possible will be part of the management of these rare and uncommon communities.

### **Wildlife and Habitat**

Several important habitats are found within the WMA. Deer winter habitat, as softwood plantations and south-facing hardwood forests, provide important protective habitat for deer and other species during harsh winters. The upland hardwood forests contain a significant component of mast species including oaks and hickories.

Thirty acres of wetland on the eastern side of the WMA contribute critical habitat to a number of species particularly reptiles and amphibians. However, the quality of the associated riparian upland forest is degraded due to the high density of invasive species. The proximity of the town road contributes to species mortality as amphibians and reptiles travel to reach their foraging habitat on the western portion of the WMA.

### **Timber Resource**

Upland forests within the WMA are dominated by a maple-oak-hickory forest type that hosts species typical of more northern hardwood forests as well as oak and hickories more commonly found in central forests to our south. The forest near the summit of Whipstock Hill is nearly free of invasive species and has a more developed mid and understory of native species. Lower on the slope invasive species become much more common and replace nearly all of the native understory vegetation. Softwood plantations of Norway spruce and red pine cover 79 acres.

Nearly all of the upland forests is accessible and operable for timber and wildlife habitat management. Forest management will focus on enhancing native and non-invasive species composition and softwood cover and managing invasive species.

### **Fisheries and Water**

Whipstock Hill WMA is within the Hudson River Basin. Three significant Vermont Rivers, including the Battenkill, Walloomsac and Hoosic Rivers and their tributaries contribute to this Basin. There are no significant fisheries resources on the WMA.

A 30-acre wetland complex, part of a larger 80-acre wetland that extends off state land, is comprised of 8 natural communities of which three are considered rare or uncommon. A 2005 Water Resources Board determination amended the Vermont Significant Wetland Inventory map to more accurately reflect the current boundaries of the Whipstock wetlands, both on and off state land, increasing the mapped acres from 8 to 80. Only a portion of the Whipstock wetlands are within the boundary of the WMA.

### **Invasive Exotic Species**

The biggest threat to forest health as well as the biggest management challenge on the WMA is the proliferation of invasive species posing a significant threat to native forests, habitats and wildlife. Primarily found at the lower elevations, these populations are well-established and have so greatly altered the natural succession patterns that a return to the expected natural community, dominated by native vegetation, is unlikely without substantial human intervention. The area impacted roughly corresponds with the land that was in agriculture or still in the early stages of reforestation during the early 1960s. The presence and proliferation of so many invasive species

has implications for the quality of forest habitat within the WMA. Management will focus on the expansion of native species and prioritizing invasive control in those areas where the greatest opportunity for success exists.

### **Climate Adaptation**

Sustainable management of the forest and habitat within the WMA will also work toward creating and maintaining a more resilient forest. Management strategies that protect soil; enhance age, species and structural diversity; encourage nutrient cycling; and retain coarse woody debris, den and snag trees not only maintains a healthy forest and diverse habitat but sets the stage for a forest that is better able to adapt to a changing climate.

### **Historic Resources**

An archeological sensitivity GIS-based predictive study was conducted in 2009 to evaluate landscapes for the potential for containing pre-contact sites. As expected the analysis illustrates that sensitivity is influenced by proximity to water including streams, lakes, ponds and wetlands. Consequently, the area near the wetland is considered sensitive and will need to be further evaluated.

Lands within and near the WMA were used for mining as early as the 1790s. The Burden Iron Works ca 1860s-1870s operated in the Orebed Road area of Vermont. Some remnants have been found in the WMA. Further study is needed to understand the extent of the operation that occurred on what is now part of the WMA.

### **Recreational Users**

Recreational uses of the WMA are dominated by dispersed, non-motorized, fish and wildlife-based activities including hunting, trapping, hiking, snowshoeing, and wildlife viewing. There are no designated trails within the WMA, however, there are existing skid (woods) roads on moderate terrain that provide non-motorized access within the WMA.

### **Infrastructure and Access**

Public access to Whipstock Hill WMA is from Whipstock Road. Vermont Route 279, on the western boundary of the WMA, is a limited access highway so while there is road frontage there is no access to the WMA from the highway. An internal network of old skid and woods roads facilitates access within the WMA, both forest management and public access. Development of a small, multi-car parking area with information kiosk and signage is needed to support public access of the WMA.

### **Management Classification**

After completion of inventories and assessments the lands, resources, and facilities held by the Vermont Agency of Natural Resources (ANR) are evaluated and assigned to appropriate Agency Land Management Classification categories based upon knowledge and understanding of resources and appropriate levels of management. The four categories as applied to Whipstock Hill WMA are Highly Sensitive (13%), Special Management (27%), General Management (59%), and Intensive Management (<1%). This enables land managers to allocate use and management by area minimizing conflicts between competing objectives and facilitating a common understanding of the overall use or type of management to occur in particular areas of the WMA.

**Management goals for the WMA include these strategies:**

- Maintain or enhance condition of natural communities.
- Protect and enhance wetland function.
- Protect and enhance rare, threatened and endangered species and their habitat.
- Protect and enhance wildlife habitat through management of all vegetative stages; creation of early successional growth; improvement of deer wintering areas; and protection of unique habitat.
- Provide sustainable, periodic timber harvesting in appropriate areas to promote wildlife habitat and forest productivity.
- Enhance opportunities for wildlife-based recreation, particularly hunting, trapping and wildlife viewing and public access.
- Promote native species and manage invasive species.

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## **I. PARCEL DESCRIPTION**

### **A. Purpose of Ownership**

Wildlife Management Areas (WMA) are managed by the Vermont Fish & Wildlife Department to meet a variety of goals. Wildlife management objectives include game species such as white-tailed deer, turkey, grouse, and beaver as well as nongame species such as songbirds, small mammals, amphibians, and birds of prey. Multiple objectives are accomplished by a combination of commercial and non-commercial vegetative management practices applied over time in a manner that protects unique habitats.

Use and management of Whipstock Hill WMA is designed to:

- Maintain or enhance the condition of natural communities.
- Protect and enhance wetland function and habitat value.
- Protect and enhance rare, threatened, and endangered species and their habitat.
- Protect and enhance wildlife habitat through management of all vegetative stages; creation of early successional growth; improvement of deer wintering areas; and protection of unique habitat.
- Demonstrate exemplary wildlife management practices so that practices applied here may find broader application on private lands.
- Provide sustainable, periodic timber harvesting in appropriate areas to promote wildlife habitat and forest productivity.
- Enhance opportunities for wildlife-based recreation, particularly hunting, trapping, and wildlife viewing.
- Protect and improve public access.

### **B. Location Information**

The 425-acre Whipstock Hill WMA (WHWMA) is located in the Vermont Valley biophysical region in the Town of Bennington within Bennington County adjacent to the New York State border. The WMA consists of two parcels physically divided by Whipstock Road (TH #24). The main parcel (350 acres) is the western-most of the two and is located between Whipstock Road and Vermont Route 279. The smaller (75 acres) parcel is located east of Whipstock Road and is dominated by wetlands. Road frontage and access to the WMA is from Whipstock Road. The William H. Morse Airport is located adjacent to the 75-acre parcel. The airport beacon is located at the summit of Whipstock Hill within the larger parcel.

### **C. History of Acquisition**

Whipstock Hill WMA was acquired in 2008 from the Vermont Agency of Transportation (VTrans) as mitigation for deer wintering habitat lost during the construction of the Bennington By-pass project. The Whipstock Hill Coalition participated in the process that transferred the lands that now make up the WMA from VTrans to the Fish and Wildlife Department. The group, formed in 2002, is a neighborhood conservation organization made up of landowners, neighbors and the Whipstock Hill Preservation Society, which helped to form the coalition. The lands that became the WMA are within the West End Conservation Initiative Area, a land conservation project in western Bennington County.

### **D. Land Use History**

Whipstock Hill WMA, like most forest land in Vermont, has evidence of its past land use. Remnant stone walls found throughout the property point to an early settlement and agricultural past. The lands within the WMA also have a history of iron mining associated with the Burden Iron Works believed to be in operation in the 1860s and 1870s. In the 1930s the William H. Morse airport was constructed east of the current WMA. An airport beacon, built in 1973 on top of Whipstock Hill to guide air traffic is still in service today. Aerial photography from the 1960s shows much of the area to have been in agriculture. The area surrounding the summit of Whipstock Hill is the only part of the WMA supporting forest at that time. The only plantation that was visible in those photos is the small red pine (stand 2). All others did not exist at that time.

### **E. Resource Highlights**

Whipstock Hill WMA is made up of upland hardwood forests, softwood plantations of red pine and Norway spruce and a complex of wetland natural communities. Elevations within the WMA range from 740-feet at the wetland to its high at the summit of Whipstock Hill which dominates the WMA at 1260 feet. The hardwood forests are mapped as Mesic Maple-Ash-Oak-Hickory Forest and are dominated by central hardwood tree species and cover the majority of the WMA. At its center, surrounding Whipstock Hill, the forest is relatively free of invasive species. At the lower elevations near the perimeter of the WMA these forests are heavily impacted by a variety of non-native invasive species that degrade the forest and its habitat. The softwood plantations provide important winter cover for many species of wildlife, most notably deer. Invasive species impact these plantations and without intervention will continue to degrade this important winter habitat over time.

The parcel east of Whipstock Road hosts a diverse wetland complex consists of eight natural community types including a dynamic 15-acre beaver wetland. This complex provides important habitat for a number of species of birds, mammals and amphibians.

The lands within the WMA are popular for hunting, trapping, and other dispersed, non-motorized recreational uses.

## **F. Relationship to Town, Regional, and Other Pertinent Planning Efforts**

### **Guiding the Management of WMAs:**

Various Vermont Fish & Wildlife Department (VFWD) and other wildlife conservation plans influence the administration and management of WMAs. The Vermont Agency of Natural Resources, through its departments, manages state lands in a sustainable manner by considering all aspects of the ecosystem and all uses of the natural resources [Agency Strategic Plan 2001-2005].

The VFWD Strategic Plan provides guidance, support, and direction for the acquisition and management of lands for fish and wildlife conservation and public use and enjoyment of those resources. Goals established within this plan that pertain to the Department's responsibilities for WMA management include: (1) Conserve, enhance, and restore Vermont's natural communities, habitats, and plant and wildlife species along with the ecological processes that sustain them; (2) Provide a diversity of safe and ethical fish and wildlife-based activities and opportunities; (3) Maintain safe fish and wildlife-based activities and limit harmful human encounters with fish and wildlife species, and provide general public service incidental to our primary fish and wildlife duties; and (4) Efficient operations and effective management of the VFWD.

Vermont's Wildlife Action Plan, adopted in 2005 and under revision in 2016, guides the Department's conservation projects including its land acquisition and management efforts. The plan is currently under revision. This plan is intended to conserve rare, threatened, and endangered species as well as keep common species common. Long range management plans developed by the VFWD with the assistance of other organizations, notably the Vermont Department of Forests, Parks and Recreation, set out conservation management goals and objectives that take into account all of the VFWD's responsibilities as set forth in the Department's Strategic Plan, Wildlife Action Plan, and others.

VFWD acquisition, administration, and management of WMA is also integral to achieving broad, regional, and national fish and wildlife management and conservation goals. The North American Waterfowl Management Plan, the Woodcock Initiative, recovery and delisting of federally endangered species like the bald eagle, Atlantic Coast and Brook Trout Joint Ventures, and numerous others are all tied to effective and strategic WMA acquisition and management. National, regional, and state-based climate change adaptation plans and strategies focused on fish and wildlife conservation are also important sources of information and guidance for WMA acquisition and management.

### **Relationship to Regional Plans**

The long-range management plan for Whipstock Hill WMA is consistent with the objectives and policies found in the Bennington Regional Plan adopted May 17, 2007.

It is the "fundamental goal of the Bennington County Regional Commission to sustain and enhance the integrity of the region's diverse natural resources". The Bennington Regional Plan recognizes the importance of the region's natural resources for:

- contributions to quality of life
- recreational opportunities
- scenic value

- as an important component of the local and regional economy – timber industry and forest-based recreation
- value of wildlife habitat and the importance of wildlife to people and the economy
- the implications of continuing to spread invasive species and the associated threat to the region’s forest and related economy

### **Town Plan**

The Bennington Town Plan was adopted October 11, 2010. Whipstock Hill WMA is included in the Town’s Forest District which recognizes:

- the importance and significance of “commercial forestry uses”
- the protection of timber and wildlife resources

The town plan has a stated goal of protecting forest resources and recognizes the important role forest land plays in preventing soil erosion as well as the importance of timber, wildlife habitat, recreational and scenic resources to the local community. The town plan further recognizes the importance of wetlands and seeks to identify and protect them. Some of the objectives of the plan developed for the town are addressed, either wholly or partially, by the Whipstock Hill WMA long-range management plan.

There are various wildlife conservation plans that influence the administration and management of WMA’s.

### *Vermont Department Fish and Wildlife (VFWD) Strategic Plan*

The Strategic Plan provides guidance, support and direction for the acquisition and management of lands for fish and wildlife conservation and public use and enjoyment of those resources. Plan goals strive to:

- conserve, enhance and restore Vermont’s natural communities, habitats, and plant and wildlife species along with the ecological processes that sustain them
- provide a diversity of safe and ethical fish and wildlife-based activities and opportunities that allow hunting, fishing, trapping, viewing, and the utilization of fish, plants and wildlife resources
- maintain safe fish and wildlife-based activities and limit harmful human encounters with fish and wildlife species
- efficient operations and effective management of the Fish and Wildlife Department

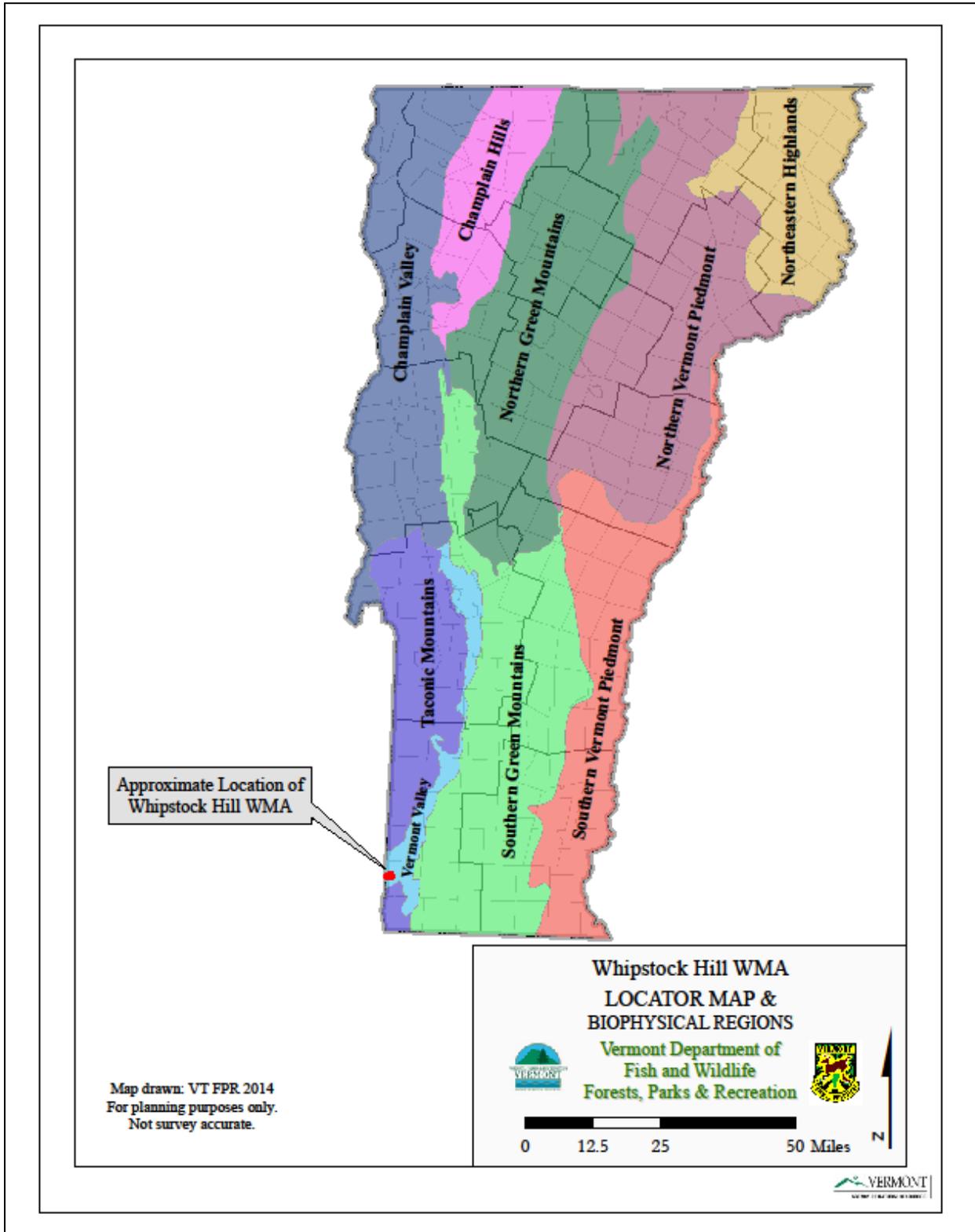
### **Vermont Wildlife Action Plan**

Adopted in 2005, this plan is intended to conserve rare, threatened and endangered species as well as keep common species common. The plan serves to guide conservation projects including land acquisition and management. Long-range management plans developed by the VFWD with the assistance of other organizations, notably the Vermont Department of Forests, Parks and Recreation, set out conservation management goals and objectives that take into account all of the VFWD’s responsibilities as set forth in the Department’s Strategic Plan, Wildlife Action Plan and others.

### **Regional and National Wildlife Conservation Plans**

Acquisition, administration and management of WMA's is also integral to achieving broad regional and national fish and wildlife management and conservation goals. The North American Waterfowl Management Plan, the Woodcock Initiative, recovery and delisting of federally endangered species like the bald eagle, Atlantic coast and Brook Trout Joint Ventures, and numerous others are all tied to effective and strategic WMA acquisition and management. Nation, regional and state-based climate change adaptation plans and strategies focused on fish and wildlife conservation are also important sources of information and guidance for WMA acquisition and management.

**Figure 1: Locator and Biophysical Region Map**





## II. PUBLIC INPUT

The citizen participation process for Whipstock Hill Wildlife Management long-range management plan was conducted in accordance with Agency of Natural Resources policies, procedures, and guidelines. Public involvement or citizen participation is a broad term for a variety of methods through which the general public has input into public land management decisions. The Agency of Natural Resources, including the Departments of Forests, Parks and Recreation and Fish & Wildlife, is committed to a planning process which offers the opportunity for all citizens and stakeholders to participate. These include letters, surveys, personal comments, telephone calls, e-mails, and more formal methods such as public meetings and workshops. All public input received concerning the future stewardship of Whipstock Hill WMA has been considered in the preparation of this plan.

A public scoping meeting was held on September 12, 2013 at the Community College of Vermont in Bennington to present inventory and assessment information and to receive comments. After a 30-day public comment period ending October 14, 2013, the comments were reviewed and analyzed by the district stewardship team and a draft long-range management plan was written.

Other public input opportunities included a focus meeting convened by interested neighbors on February 23, 2012 to discuss the WMA generally and the planning process specifically. And on October 13, 2012 Agency staff was invited to participate in a Whipstock Hill Preservation Society (WHIPS)-sponsored open house to provide updates on the planning process and visit the WMA with interested attendees.

The draft long-range management plan was presented to the public on August 23, 2016. A 30-day comment period followed.

A summary of the comments received during the public involvement process, a summary of the Department's response to comments, and additional information about the public involvement process are in the appendix.

### III. RESOURCE ANALYSIS

#### A. Legal Constraints Assessment

There are a number of legal constraints that affect the stewardship of Whipstock Hill WMA including deed and land use restrictions.

#### **Summary of Major Legal Constraints:**

##### Deed Restrictions or Obligations

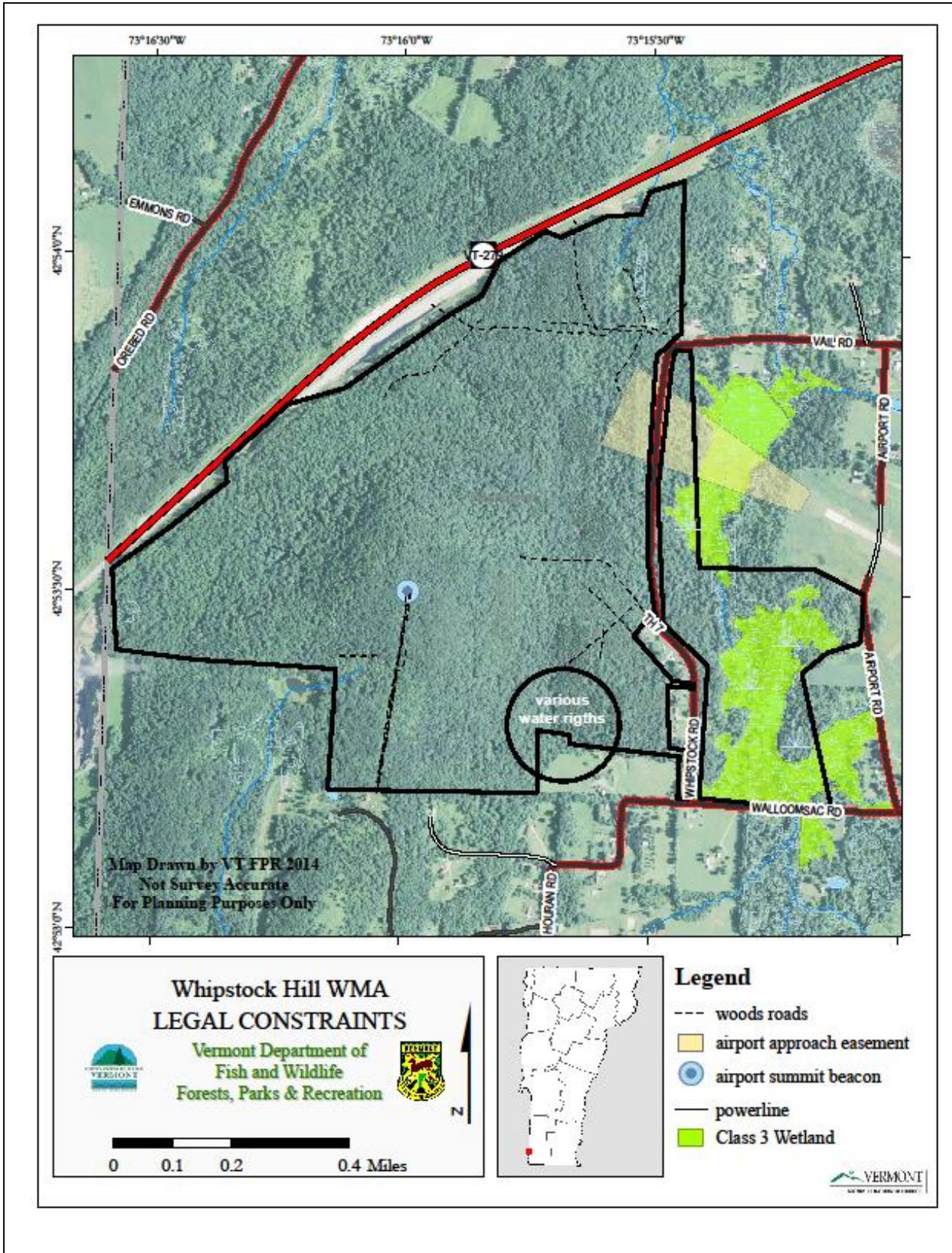
- Right-of-way across the southwest corner of the WMA dated October 24, 1929 and recorded in Book 0-24, page 115 of the Bennington Land Records.
- Water Rights:
  - Pipeline rights in the southern part of the WMA dated October 17, 1941 and recorded in Book 0-76, page 36
  - Spring and pipeline rights on WMA parcel 1B3, dated August 27, 1940 and recorded in Book 0-99, page 79
  - Water rights across the eastern portion of WMA parcel IIB3, dated February 11, 1967 and recorded in Book 0-178, page 75
- Vermont Agency of Transportation:
  - Retains the right to build, maintain, and replace the rotating air navigation beacon at the summit along with the right to maintain the right-of-way to the site. Dated March 8, 1973 and recorded Book 0-201, page 174
  - The right to limit access, air, view, and light including all rights of ingress, egress and regress between the WMA and Route 279
  - An easement held by the State of Vermont Aeronautical Board for air within the airport approach zones which may affect the WMA
  - The right to limit building of any structure over a maximum elevation above sea level of 840 feet
- A highway right-of-way held by the Town of Bennington dated July 11, 1968 and recorded in Book 0-183, page 126.
- Public Utility Easements:
  - Held by Central Vermont Public Service Corporation and New England Telephone and Telegraph Company dated September 1, 1946 and recorded in Book 0-97, page 98; June 28, 1968 recorded in Book 0-86; September 2, 1971 recorded in Book 0-95, page 29; September 22, 1977 recorded in Book 0-220, page 7
  - Held by Central Vermont Public Service Corporation dated April 30, 1947 recorded in Book 0-100, page 96

- Held by Vermont Electric Power Company dated September 14, 1957 recorded in Book 0-147, page 109

### **Funding Conditions or Restrictions**

On April 10, 2008, Governor Douglas signed Executive Order #02-08 to transfer 425 acres from the Vermont Agency of Transportation to the Vermont Fish and Wildlife Department. The Order states that in the event that this parcel of land is not used for the purposes of wildlife habitat and associated forested habitat buffer zone the property will revert to the control of the Agency of Transportation.

Figure 3: Legal Constraints Map



## **B. Natural Community Assessment**

The Agency of Natural Resources uses a “coarse filter/ fine filter” approach to the ecological inventory and assessment of state lands (Jenkins 1985; Noss 1987; Hunter et al. 1988; Hunter 1991; Noss and Cooperrider 1994; Haufler et al. 1996; Jenkins 1996; Poiani et al. 2000). Widely employed as a management tool on state, federal, and private lands (see for example: Leslie et al. 1996; Committee of Scientists 1999; Stein et al. 2000; USFS 2000, 2004), it is an aid to land managers who seek to protect most or all of the species that naturally occur on their lands, but who lack the resources to make exhaustive inventories of all taxonomic groups. Because many groups of organisms are cryptic or poorly understood (for example, fungi and soil invertebrates), it is not practical to make lists of all of them (Anderson et al. 1999; Willis and Whittaker 2002). Even if we could assemble such lists of species, it would be impossible to manage the land with all of them in mind. Instead, natural communities are treated as a proxy for the biological organisms of which they are composed. It is thought that if examples of all of Vermont’s natural communities are conserved at the scale at which they naturally occur, most of the species they contain, from the largest trees and mammals to the smallest insects, will also be conserved (NCASI 2004). Natural communities are thus a coarse filter for “catching” the majority of an area’s native organisms. Because conservation of habitats (in the form of natural communities) will not protect all species, we also employ a “fine filter” to catch the remaining species that are known to require very specific conditions for their growth, reproduction, wintering, etc. Examples of organisms benefiting from the fine filter inventories described below include breeding birds, deer on their wintering areas, and rare plants.

The coarse filter assessment begins by describing landscape and climatic factors that characterize Whipstock Hill WMA, such as bedrock geology and water resources. Details of the 12 distinct natural community types documented and mapped during inventories of the WMA can be found in the appendix. This is followed by a fine filter assessment describing rare species, invasive plants, and wildlife habitats found here.

### **Coarse Filter Assessment**

#### **Biophysical Region and Climate**

Vermont’s biological landscapes are divided into eight regions that share features of climate, topography, geology, human history, and natural communities. These regions are continuous in adjacent states, and are related to regional and national classifications of ecological systems in North America. WHWMA is located along the Vermont-New York border just west of the village of Bennington, and is within the Vermont Valley biophysical region, which stretches from Bennington, through Manchester, and up north to just beyond Rutland. While much of the Vermont Valley is very narrow and sharply defined by the Green Mountains and Taconic Mountains, near Bennington the valley is broader, with low rolling hills (such as Whipstock Hill) extending west into New York. Compared to the surrounding mountains, the Vermont Valley is a warm and dry place. The bedrock is calcium-rich limestones, dolostones, slates, and marbles, which contribute to producing nutrient-rich soils.

#### **Bedrock Geology, Surficial Geology, and Soils**

The geologic history of an area can have a strong influence on the distribution of natural communities. The bedrock underlying Whipstock Hill WMA is of the Bascom and Hortonville

formations. Both are Ordovician-era sedimentary rocks. The Bascom formation is primarily dolostone but also includes limestone beds. The Hortonville formation is black slate and phyllite. Both of these rocks weather easily and can contribute to soil enrichment when bedrock is close to the surface. A few bedrock exposures can be found in the WMA, but mostly the bedrock is buried by surficial materials deposited at the end of the last continental glaciation, some 15,000-12,000 years ago. As the glacier ice melted, rock fragments of all sizes, from boulders to clay, fell in an unsorted jumble known as glacial till. Till covers most of the terrain at WHWMA, but in places this till has been buried by subsequent depositions of sediments and organic matter. A significant geological feature known as a Wildflysch Conglomerate (rocks with a strong and often folded foliation in a slate or schist matrix surrounding blocks of varying size and rock type) is evident near the WMA. This formation demonstrates Taconic Mountain development.

The west side of the WMA may be part of a kame moraine, where running water deposited sandy sediments at the head of the melting glacier. Areas around the wetland complex east of Whipstock Road have areas of deep clay, which could either be the result of glacial lakes, or more recent flooding events. Finally, wetlands in WHWMA have post-glacial accumulations of peat, muck and alluvium. Peat and muck result from organic materials deposited in acidic and anaerobic environments, which consequently decay more slowly than they are produced. Alluvium is deposited by flowing water, such as sand and silt deposited during flooding events.

Soils at WHWMA are primarily the result of these surficial deposits. USDA soil mapping indicates that the most widespread soil types in the parcel are of the Macomber and Taconic series, covering 124 acres around the higher elevations of Whipstock Hill. These are shallow to moderately-deep, generally well-drained soils. The lower elevations are generally mapped as loam soils of the Dutchess, Georgia, Pittstown, and Stockbridge series. Alluvial soils of the Limerick series are mapped around the flowing stream in the parcel east of Whipstock Road, and the wetland complex includes about 6 acres mapped as Carlisle mucky peat.

### **Hydrology/Streams/Rivers/Ponds**

The Vermont Valley is a relatively dry part of the state, and WHWMA receives about 37 inches of precipitation per year. There are no major rivers or water bodies on the property, but several small streams flow through the WMA, and there are several small water bodies, some of which are the result of beaver activity. These waters are all part of the Hudson River basin, and most drain north into the Walloomsac River. The southwest corner of the property drains into Brown's Brook and the Hoosic River. The large wetland complex east of Whipstock Road is the most notable wetland, with open marshes, wet woods, and an example of the globally rare Rich Fen natural community type. A few other small wetlands can be found scattered around WHWMA. Near the New York border, there is a pool of water about 70 by 30 feet in size, within a 20-25-foot-deep closed depression. This pool was reportedly created as part of the Burden Iron Works that existed in the 19<sup>th</sup> century.

### **Natural Disturbance**

Natural disturbance in WHWMA is primarily limited to small-scale disturbances such as individual tree fall. Because WHWMA is located in a warm and dry part of the state, lightning-caused forest fires may have once been an infrequent larger-scale disturbance. Wetland disturbance regimes include hydrological changes resulting from large floods, which can

redistribute sediment and change surface flow, and from beaver activity, which can locally alter water levels and radically change a wetland's character.

### **Human Disturbance**

The Vermont Valley region has a long history of human land use, and WHWMA is no exception. Conifer plantations and old building structures are evidence that much of Whipstock Hill was once heavily used by people. Much of the lower hill was open land in the early 20<sup>th</sup> century. When it was abandoned, it was quickly colonized by many non-native, invasive species and so now these areas are not reverting to natural forest, but have instead developed a dense shrub growth of these invasive species. The legacy of human land use will remain part of the landscape for a long time, as there is little that can be practically done to alter the current state of these areas.

### **Natural Community Summary and Table**

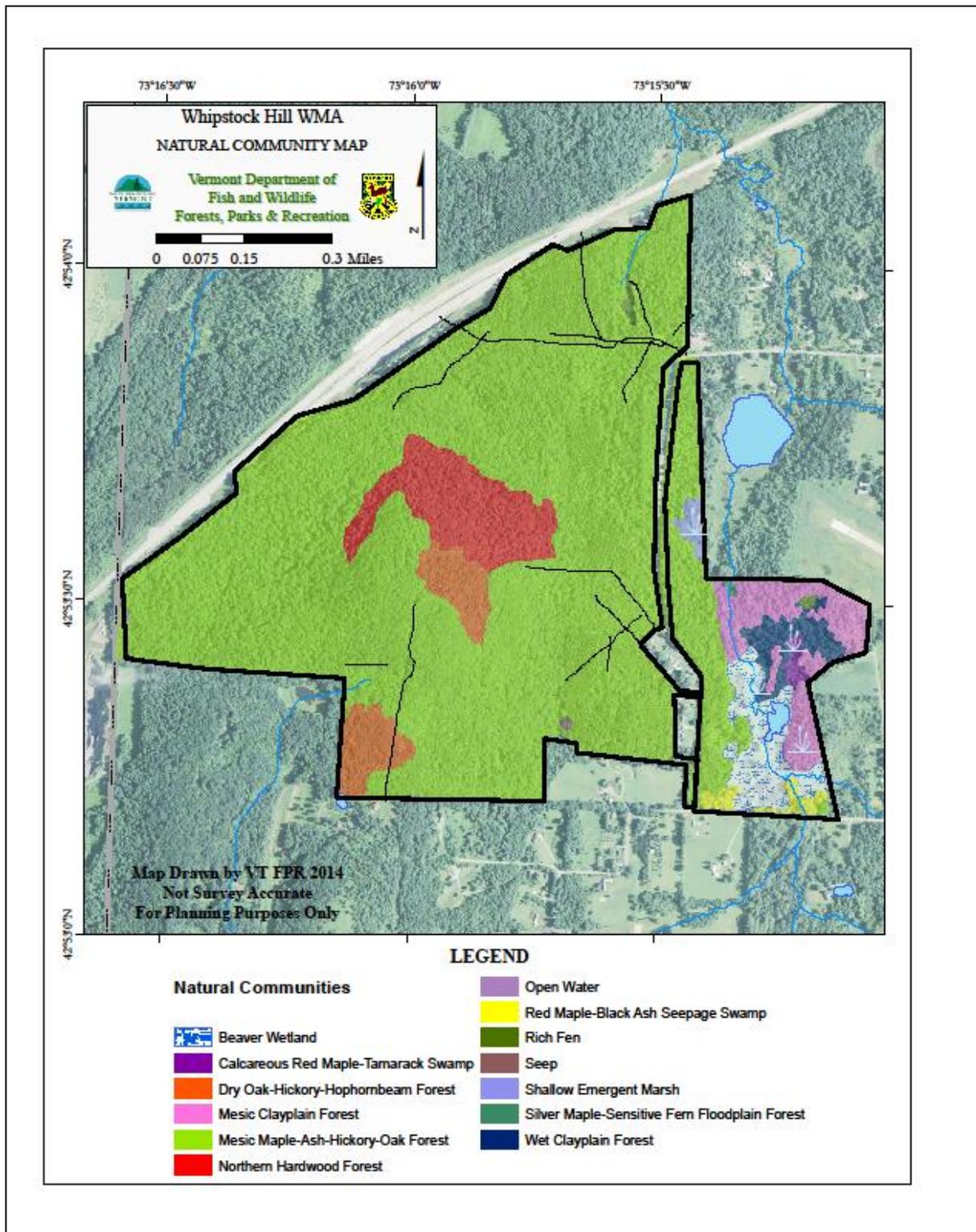
Twelve occurrences of 12 natural community types were identified and mapped in WHWMA (see table below). A total of 22 natural community polygons were mapped.

Some broad patterns emerged from this mapping effort. Whipstock Hill is forested with maple, ash, oaks and hickories, and has elements of both the northern and central hardwood forest regions. The upper slopes are primarily dominated by native species, but the lower slopes are highly disturbed from past land use and dominated by non-native species, many of which are highly invasive. To the east of Whipstock Road, a large wetland complex includes several calcareous wetland types, including the globally rare Rich Fen natural community. There are also patches of Mesic Clayplain Forest and Wet Clayplain Forest—two communities typically associated with the Champlain Valley. These are the first examples of these types that have been found in the Vermont Valley, and as such are of regional ecological importance.

**Table 2: Natural Communities of Whipstock Hill WMA**

<b>Natural Communities of Whipstock Hill WMA</b>				
<b>Natural Community</b>		<b>Acres</b>	<b>Vermont Distribution</b>	<b>Example of Statewide Significance?</b>
<b><i>Wetlands</i></b>	Beaver Wetland	15	Common	
	Calcareous Red Maple-Tamarack Swamp	1.5	Rare	
	Red Maple-Black Ash Seepage Swamp	2.9	Common	
	Rich Fen	1.1	Rare	Yes
	Seep	0.3	Common	
	Shallow Emergent Marsh	1.3	Common	
	Silver Maple-Sensitive Fern Riverine Floodplain Forest	0.4	Uncommon	
	Wet Clayplain Forest	7	Rare	TBD
<b><i>Uplands</i></b>	Dry Oak-Hickory-Hophornbeam Forest	17	Uncommon	
	Mesic Clayplain Forest	19	Rare	TBD
	Mesic Maple-Ash-Hickory-Oak Forest	333	Uncommon	
	Northern Hardwood Forest	26	Very common	
For more information on these and other natural communities, see <i>Wetland, Woodland, Wildland: a Guide to the Natural Communities of Vermont</i> , by Elizabeth Thompson and Eric Sorenson. Information may also be found online at: <a href="http://www.vtfishandwildlife.com/books.cfm?libbase=Wetland,Woodland,Wildland">http://www.vtfishandwildlife.com/books.cfm?libbase =Wetland,Woodland,Wildland</a>				

Figure 4: Natural Community Map



## Fine Filter Assessment

Vermont has an estimated 24,000 to 43,000 species of plants and animals statewide. A “fine filter” approach must accompany the “coarse filter” as part of the resource analysis to address specific species whose habitat needs are not fully met at the natural community level. Such species include:

- Rare, threatened and endangered species that often have very specific habitat needs;
- Species dependent upon particular critical habitats for survival or reproduction;
- Wide-ranging species such as bobcats, fisher and black bears;
- Species sensitive to habitat fragmentation;
- Species requiring other habitat conditions that are not adequately provided by natural community-based land management.

### Rare, Threatened, Endangered Species

Whipstock Hill WMA is or has the potential to be home to a number of rare and uncommon species of animals and plants. Conservation of each of these species will be best assured through the conservation of a particular natural community (coarse filter) associated with the species and/or in concert with specific management guidelines to maintain or enhance habitat for the species (fine filter). These species and their management needs are summarized below.

**Table 3: Rare, Threatened, and Endangered Plants of Whipstock Hill WMA**

Rare, Threatened and Endangered Plants of Whipstock Hill WMA				
Species Name	Common Name	State Rarity Rank*	Rarity*	Legal Status
<i>Carya glabra</i>	Pignut hickory	S2	Rare	
<p><u>Habitat</u>: Found on upper slopes of Mesic Maple-Ash-Hickory-Oak Forest and Dry Oak-Hickory-Hophornbeam Forest. Difficult to distinguish from shagbark hickory and bitternut hickory. At the northern end of its range in southern Vermont and is more common to the south.</p> <p><u>Threats</u>: spread of invasive species, deer browsing, misidentification during forest management activities</p> <p><u>Management Opportunities</u>: control invasive species, promote hunting, protect during management activities taking care to identify and protect all individuals of this species.</p>				
<i>Gentianopsis crinite</i>	Fringed gentian	S3	uncommon	
<p><u>Habitat</u>: open wetlands</p> <p><u>Threats</u>: changes in hydrology of open wetland habitat.</p> <p><u>Management Opportunities</u>: protect hydrology of wetlands and monitor for additional individuals of this species prior to management activities in other open areas.</p>				
<p>*For a full explanation of these rarity ranks, visit the Vermont Natural Heritage Information Project website: <a href="http://www.vtfishandwildlife.com/wildlife_nongame.cfm">http://www.vtfishandwildlife.com/wildlife_nongame.cfm</a></p>				

**Table 4: Rare, Threatened, and Endangered Animals of Whipstock Hill WMA**

Rare, Threatened and Endangered Animals of				
Species Name	Common Name	State Rarity Rank*	Rarity*	Legal Status
<i>Myotis leibii</i>	Eastern Small-footed bat	S1	rare	T
<p><u>Habitat:</u> winter in caves, summer in forests, roosts in rock ledges and cliffs</p> <p><u>Threats:</u> white-nose syndrome, habitat loss</p> <p><u>Management Opportunities:</u> maintain diversity of forest habitat and stand structure, maintain forest connectivity among roost sites, foraging habitat, &amp; aquatic features. Maintain adequate numbers of suitable maternity roost trees (loose bark, cavities, crevices, opportunity for solar radiation)</p>				
<i>Myotis lucifugus</i>	Little Brown bat	S1	Rare	E
<p><u>Habitat:</u> winters in caves, commonly found in houses in summer, roosts in dead or dying trees</p> <p><u>Threats:</u> white-nose syndrome, habitat loss</p> <p><u>Management Opportunities:</u> maintain diversity of forest habitat and stand structure. Maintain forest connectivity among roost sites, foraging habitat &amp; aquatic features. Maintain adequate number of suitable maternity roost trees (loose bark, cavities, crevices, opportunity for solar radiation)</p>				
<i>Perimyotis subflavus</i>	Tri-colored bat	S1	Rare	E
<p><u>Habitat:</u> winters in caves, summer in forests, roosts in live and dead foliage</p> <p><u>Threats:</u> white-nose syndrome, habitat loss</p> <p><u>Management Opportunities:</u> maintain diversity of forest habitat and stand structure. Maintain forest connectivity among roost sites, foraging habitat &amp; aquatic features. Maintain adequate number of suitable maternity roost trees (loose bark, cavities, crevices, opportunity for solar radiation).</p>				
<i>Myotis septentrionalis</i>	Northern long-eared bat	S1	Rare	E
<p><u>Habitat:</u> winters in caves, summer in forests, roosts in dead or dying trees</p> <p><u>Threats:</u> white-nose syndrome, habitat loss</p> <p><u>Management Opportunities:</u> maintain diversity of forest habitat and stand structure. Maintain forest connectivity among roost sites, foraging habitat &amp; aquatic features. Maintain adequate number of suitable maternity roost trees (loose bark, cavities, crevices, opportunity for solar radiation).</p>				
<p>*For a full explanation of these rarity ranks, visit the Vermont Natural Heritage Information Project website: <a href="http://www.vtfishandwildlife.com/wildlife_nongame.cfm">http://www.vtfishandwildlife.com/wildlife_nongame.cfm</a></p>				

## **C. Forest Health Assessment**

1. **General Forest Health:** The majority of the forest within Whipstock Hill consists of Mesic Maple-Ash-Hickory-Oak Forest. Its makeup is of species found in northern hardwood forests but also contains species commonly found in the central hardwood forests to the south. Much of the forest on the WMA is heavily disturbed due to past land use (agriculture, mining) particularly lower on the slopes of Whipstock Hill. Aerial photography from 1962 shows the lower elevations of what is now the WMA to be open fields or agricultural lands. The non-native invasive species that dominate the lower elevations of the WMA largely correspond with the open/agricultural area shown in these photos. The forests at the upper elevations were forested in 1962 and have relatively few invasive species.
2. **Site and Elevation, etc.:** Elevations within the WMA range from 740 feet to 1260 feet at the summit of Whipstock Hill; one of the higher points within the surrounding landscape.
3. **Browse Sensitivity Assessment:** Deer browse within the WMA is a concern with moderate impact to regeneration noted throughout much of the hardwood forest particularly in areas adjacent to softwood plantations.
4. **Invasive Exotic Species Assessment:**
  - a) *Plants* – The biggest threat to forest health on the WMA is the proliferation of invasive species. Invasive species harm the ecosystem by out competing and replacing native species, interrupting natural succession, decreasing successful native forest regeneration, disrupting the food chain, degrading habitat, hastening erosion and changing soil chemistry (Wilmot, et al 2013).

Invasive species dominate portions of the WMA impacting approximately 250 acres. The heaviest infestations are at the lowest elevations roughly corresponding with the land that was in agriculture or still in the early stages of reforestation during the early 1960s. The map of Prime Agricultural soils also corresponds with this area. The forest above that rather distinct line (roughly 960 feet in elevation) is relatively free of invasive plants; the only ones apparent are along the access road to the beacon on the summit. The lands surrounding the WMA are also impacted by relatively high populations of invasive plants. The presence and proliferation of so many invasive species has implications for the quality of the forest habitat within the WMA.

These populations are well-established and have so greatly altered the natural succession patterns that a return to the expected natural community, dominated by native vegetation, is unlikely without substantial human intervention. There are, however, some areas that are almost entirely free of invasive species, such as the upper slopes of Whipstock Hill and some portions of the wetland complex (such as the Rich Fens). Prioritizing these areas for invasive species control by eliminating small isolated infestations and preventing the reproduction and survival of outlier populations is probably the best way to protect native plants, animals and habitats within the WMA. In general, when invasions are at lower levels we can put in less effort (time and money) and obtain high

success. Conversely, when areas are highly infested, efforts increase and success decreases.

Along with that strategy, attempts to control the perimeter of the core infestation by focusing management at the edges will help to keep the infestation from expanding into invasive-free areas. Attempting control at the core of the infestation is expensive, labor intensive and will require a dedicated, long-term effort. However, those areas may present an opportunity to experiment with alternative control techniques (i.e. control fire, grazing, planting) to determine their effectiveness.

A special concern for management of the WMA is that any disturbance which opens the forest canopy may also facilitate the spread of invasive species. Any such management activity would almost certainly need to be accompanied by efforts at controlling invasive species. Large scale invasive control projects may also create the disturbance that actually favors the spread of invasive plants and so therefore should be considered carefully. Consideration should be given to replanting areas where invasive have been removed to limit disturbance and speed the re-vegetation process.

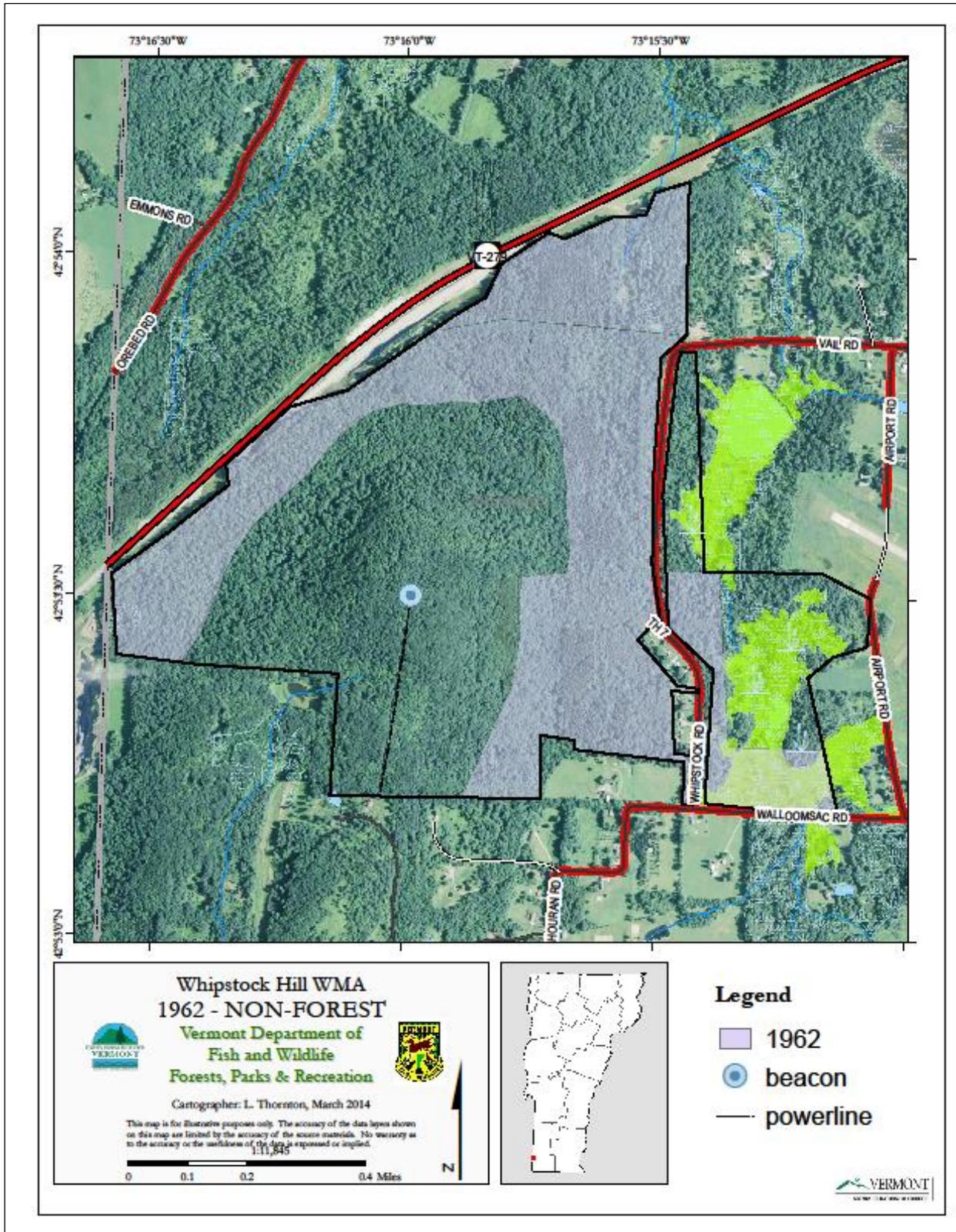
Climate change will likely worsen the proliferation of invasive species by giving them a competitive advantage. Warming temperatures will facilitate their northward expansion providing the opportunity for them to take advantage of weakened ecosystems and outcompete native species. The increased forest disturbance associated with climate change provides an optimal setting for these disturbance-loving species to spread.



The above aerial photo taken in 1962. The only plantation existing at the time is the small red pine plantation below the summit (arrow). The summit of Whipstock Hill and the surrounding area are forested. The remainder of the WMA and much of the surrounding landscape is open. Neither Whipstock Road nor Route 279 existed at the time.



Figure 4a: Non-Forest in 1962



**Table 5: Invasive Exotic Plants of Whipstock Hill WMA**

Invasive Plants of Whipstock Hill WMA				
Species Name	Common Name	Distribution	Sites Where Found	Present Threat to Native Plant Communities
<i>Alliara petiolata</i>	Garlic mustard	Low Along access	Woods, edges	Moderate
<i>Berberis thunbergii</i>	Japanese barberry	Widespread More in NW	Upland woods	Moderate
<i>Celastrus orbiculatus</i>	Asiatic bittersweet	Widespread plantations	Upland woods	Very high
<i>Lonicera, spp</i>	Non-native honeysuckles	Widespread Low slope	Upland woods	Very high
<i>Phragmites australis</i>	Common reed	Localized Wetlands	Open wetlands	High**
<i>Rhamnus cathartica</i>	Common buckthorn	Widespread	Uplands	Very high
<i>Rosa multiflora</i>	Multiflora rose	moderate	Uplands	Moderate/high
<i>Acer platanoides</i>	Norway maple	Localized	Uplands	moderate
<i>Euonymous alatus</i>	Burning bush	Low Northern boundary	Woods, edges	Low
<i>Hespreis matronalis</i>	Dame's rocket	Low	Woods, edges	low

\*\*A native strain of this species, *Phragmites australis*, ssp. *Americana* is ranked S1S2 by the VTNHIP. Occurrences of this native strain are not considered a threat to native species, and should be searched for prior to, and excluded from, any efforts to control this species. The plants at Whipstock Hill WMA do not appear to be the native strain.

- b) *Insects*- exotic insects are not known to have significant impact on these lands currently but they are continually being monitored across the state. This includes some insect pests that are not yet known to have reached Vermont but whose introduction could have devastating effects on our forests.

The Emerald Ash Borer has not been located within Vermont but has been found in Massachusetts and New York just south and west of Whipstock Hill WMA. Notable areas of declining ash have been identified along Route 279 including lands of the WMA. While the cause for this decline has not been determined, the Department of Forests, Parks and Recreation has increased monitoring efforts in the area. White ash is found throughout the WMA; some stands with as much as 47% of their basal area in ash.

**Table 5a: Invasive Insects**

Invasive Insects			
Species Name	Common Name	Distribution	Sites Where Found (Nearest to VT)
<i>Anoplophora glabripennis</i>	<u>Asian Longhorned Beetle</u> White & black 1-1 ½ “ long	New York, Chicago, Toronto, New Jersey, Boston	Worcester, MA (45 mi. south of VT)
<u>Species impacted:</u> many of Vermont’s native hardwoods – maple, birch, elm, poplar, ash, willow. Has the potential to impact 1/3 of Vermont’s native species.			
<i>Agrilus planipennis</i>	<u>Emerald Ash Borer</u> Metallic green, ½” long D-shaped exit holes	15 states & 2 Canadian provinces	Dalton, MA (20 miles south of VT)
<u>Species impacted:</u> native ash species. Ash is one of the top 10 most common trees in Vermont.			
<i>Adelges tsugae</i>	<u>Hemlock Woolly Adelgid</u> White woolly mass underneath hemlock needles	Georgia to Maine	Found in Windham, Windsor & Bennington counties in VT Pownal, VT
<u>Species impacted:</u> eastern hemlock. Vermont’s 7 <sup>th</sup> most common tree species. Could have devastating effect on deer wintering habitat.			
** Go to <a href="http://www.vtfpr.org">www.vtfpr.org</a> for up-to-date distribution information on these species.			

**5. Climate Adaptation Assessment:** If the most conservative current models of climate change are accurate (e.g. Iverson et al. 1999), Whipstock Hill Wildlife Management Area, like the rest of the region, will experience strong impacts over the next 50-100 years. These changes may have important consequences for forest nutrient cycling, timber productivity, forest pest ecology, wildlife habitat, and our enjoyment of the forest. With uncertainty surrounding how and when climate impacts will be realized and how the forests will be impacted the best strategy is to manage forests to be resilient and adaptable.

Implementing climate adaptation strategies can help to set the stage for forests that are more resilient and better able to adapt to changing climate conditions. Many of these strategies are already an integral part of sustainable forest management in Vermont. Six adaptive strategies have been identified (Wilmot et al. 2013).

- Sustain fundamental ecological functions - protect soil quality, nutrient cycling and hydrology: *retain species with high nutrient cycling capability; retain or enhance coarse and fine woody material for nutrient cycling and soil protection; and conduct forest management on frozen or snow covered ground.*
- Reduce impact of biological stressors – pests and pathogens, invasive species and herbivory: *Maintain or enhance native species diversity; manage invasive species as an*

*important part of northern hardwood silviculture; implement strategies that protect regeneration from browsing (i.e. fencing, leaving large tops)*

- Moderate impacts of severe disturbance: *Promote age class diversity and vigorous crown development.*
- Maintain or create refugia – increase ecosystem redundancy: *maintain site quality and existing species composition where they may be better buffered against climate change and short-term disturbance.*
- Maintain or enhance species and structural diversity: *Promote age and species diversity. Maintain species that naturally occur in a natural community and consider including species that may be better adapted to future conditions (i.e. oaks, hickories, white pine). Retain biological legacies.*
- Promote landscape connectivity: *Maintain or create forested corridors to help to promote movement of species – trees and wildlife.*

#### **6. Pertinent Issues:**

- Invasive species are the biggest threat to forest health on the WMA.
- Over time climate change is expected to significantly change forest composition and health.
- Deer browse is having moderate impact to forest regeneration.
- Emerald Ash Borer is located fairly close to the WMA in neighboring states.

#### **7. Assessment of Need:**

- Manage invasive species strategically to improve forest health, composition, and wildlife habitat. Apply resources where management is most likely to be successful.
- Employ climate change adaptation strategies to increase forest resiliency.
- Continue to monitor for the presence of Emerald Ash Borer and other invasive insects.

### **D. Wildlife and Habitat Assessment**

1. **Common Species:** In addition to the rare and uncommon species and Species of Special Concern described in the Fine Filter Assessment, the wildlife and habitat inventories and assessment documented a variety of more common species.

- a) **Mammals** - The mosaic of natural communities found on the WMA provide habitat for a number of species of wildlife. The majority of the WMA is comprised of Mesic Maple-Ash-Hickory-Oak Forest with smaller components of Northern Hardwood Forest and Dry Oak-Hickory-Hophornbeam Forest. Characteristic mammals of the dominant communities include white-footed (*Peromyscus leucopus*) and woodland jumping mouse (*Napaeozapus insignis*), chipmunk (*Tamias striatus*), gray squirrel (*Sciurus carolinensis*), northern (*Glaucomys sabrinus*) and southern flying squirrel (*G. Volans*), and white-tailed deer (*Odocoileus virginianus*). The hard and soft mast food sources found throughout these communities serve as an important food for mammals. The Norway spruce and red pine plantations provide important winter cover for deer and other species. Mammals that rely on components of the wetland communities include beaver (*Castor Canadensis*), mink (*Neovison vison*), muskrat (*Ondatra zibethicus*), meadow vole (*Microtus pennsylvanicus*)

and raccoon (*Procyon lotor*). Wide-ranging species that might use wetland habitat on the WMA during certain times of the year include black bear (*Ursus americanus*), white-tailed deer and bobcat (*Lynx rufus*).

- b) Bats - There are nine species of bats in Vermont. Four of them (small-footed, little brown, northern long-eared, and Tri-colored bat) are listed as “endangered” or “threatened” under a Vermont State endangered species statute (10 V.S.A 123). The northern long-eared bat is also federally listed. Vermont bats fall into two groups those that winter in caves and those that migrate to the southeastern United States to spend the winter. In the summer they forage in Vermont’s hardwood forests. Forest management that maintains a matrix of forest, openings, corridors to water sources, and an adequate supply of roost tree candidates (dead or dying with signs of cracks, crevices, loose bark or cavities) provide ideal habitat.

Bat surveys have not been conducted on the WMA, however big brown bat colonies have been located in many buildings throughout Bennington over the past four years. In addition, big brown bats have been found hibernating in buildings in Bennington over the winter. Males of this species often roost in trees in the area surrounding maternity colonies between mid-March and mid-November. The habitat within the WMA would provide roost trees and slope suitable for a variety of bat species that have been documented as widespread throughout the state, including northern long-eared bat, eastern red bat, silver-haired bat, and hoary bat. In addition, wetlands are great foraging habitat for a variety of species including little brown bat.

White-nose syndrome has decimated bat populations in the eastern United States. Some estimates have Vermont’s bat population at just 5% of what it was a few years ago. While it is not certain how many bats still use the forests of Whipstock Hill WMA, it is certain that their preferred habitat exists in that location. An evaluation of habitat conditions and presence of bats (including acoustic surveys) should be conducted prior to forest management.

- c) Birds: The natural communities found on the WMA also provide habitat for a diversity of birds. Characteristic birds of the Mesic Maple-Ash-Hickory-Oak Forest include eastern wood pewee, red-eyed vireo, ovenbird (*Seiurus aurocapilla*), black-throated blue warbler, and scarlet tanager (*Piranga olivacea*). The mast produced by oaks and hickories help support populations of wild turkey (*Meleagris gallopavo*). They also use the softwood plantations for roosting and adjacent fields and herbaceous openings for brooding. Sensitive fern spores, hophornbeam seeds and burdock provide important winter food. The wetland communities provide important habitat for a number of species including red-winged blackbird (*Agelaius phoeniceus*), great-crested flycatcher, brown creeper, northern water thrush, and red-shouldered hawk. Anecdotal sightings of both Bald (*Haliaeetus leucocephalus*) and Golden (*Acquila chysaetos*) eagles passing through the area have been noted. Ruffed grouse and woodcock are closely associated with early successional habitat. Ruffed grouse (*Bonasa umbellus*) use varying ages of aspen and white birch to meet their needs. Grassy openings, apple trees and patches of softwood forest also contribute to their habitat needs. Ideal habitat for woodcock (*Scolopax minor*) consists of young speckled alder or gray dogwood as well as

abandoned brushy fields and open fields for various stages of their life cycle. While some of this type of habitat exists on the WMA it is limited.

- d) Reptiles and Amphibians: The wetland complex consists of a number of natural communities including Beaver Wetland, Calcareous Red Maple-Tamarack Swamp, Red Maple-Black Ash Seepage Swamp, Shallow Emergent Marsh, Silver Maple-Sensitive Fern Floodplain Forest and Wet Clayplain Forest that provide habitat for a diversity of species of reptile and amphibian. Smaller wetland communities including Rich Fen and Seep are also found on the WMA. A number of species are characteristic of these communities including spring peeper, green frog, American toad, wood frog, and northern two-lined salamander.

A 2012 amphibian and reptile field survey found fourteen species of reptile and amphibians in these habitats on the WMA; all were common species within Vermont.

Water in stream and beaver pond has been warmed and had input of sediment over the years and as a result does not have water that is clean, cold and well oxygenated enough to support a population of spring salamanders. The value of amphibian habitat is limited by the proximity of the wetland to roads, the lack of good foraging habitat and availability of over-wintering habitat. The forests dominated by invasive shrubs lacks structure, coarse woody debris and leaf litter and as a result support very limited reptile and amphibian activity. The upland forest at the center of the WMA is more mature, has many of the elements important in reptile and amphibian habitat (i.e. coarse woody debris, well developed leaf litter) but requires animals to cross town roads to reach. Creating areas on the main parcel that could serve as breeding sites or moisture refugia could increase the herptile capacity of the WMA.

**Table 6: Reptiles and Amphibians of Whipstock Hill WMA**

Species		Habitat
Frogs		
American toad	<i>Axaxyrus americanus</i>	Moist areas - varied
Gray treefrog	<i>Hyla versicolor</i>	Moist, deciduous woods, near water
Spring peeper	<i>Pseudacris crucifer</i>	Moist woods, fields, near ponds and wetlands
American wood frog	<i>Lithobates sylvaticus</i>	Vernal pools
American bullfrog	<i>Lithobates catesbeianus</i>	Large permanent bodies of water
Green frog	<i>Lithobates clamintans</i>	Permanent still water
Salamanders		
Northern dusky salamander	<i>Desmognathus fuscus</i>	Saturated soil, near streams
Northern two-lined salamander	<i>Eurycea bislineata</i>	Wet soil along streams, seeps
Eastern newt	<i>Notophthalmus viridescens</i>	Juveniles –moist woods adults – permanent water
Eastern red-backed salamander	<i>Plethodon cinereus</i>	Damp hardwood forests
Snakes		
Common gatersnake	<i>Thamnophis sirtalis</i>	Widespread, often near water
Milksnake	<i>Lampropeltis triangulum</i>	Old fields, ledges
Turtles		
Snapping turtle	<i>Chelydra serpentine</i>	Still or slow moving water
Painted turtle	<i>Chrysemys picta</i>	Ponds, lakes

Portions of the WMA with thick populations of honeysuckle supported fewer reptiles and amphibians. Similarly, stands of young hardwood forests with thin leaf litter and little coarse woody debris (down and dead wood) also supported fewer reptiles and amphibians. The more mature and better developed hardwood forests nearer the summit of Whipstock Hill supported more of these species.

2. **Critical Habitats:** Some wildlife species have specific, critical habitat needs that are important for maintaining their populations. In general, such sites provide cover or food during critical time periods for species survival or reproduction. In many cases, wildlife may be concentrated at these habitats. The following critical wildlife habitats have been documented within the WMA.
  - a) **Wetlands, Streams, Ponds, and Riparian Habitat:** Thirty acres of wetland were mapped within the WMA contributing to critical habitat for a diversity of species that rely on wetlands for all or most of their life cycle requirements and for many others who use it to meet just some of their needs. Wetlands are important for a variety of species including amphibians, invertebrates, reptiles, birds and mammals. Many species use the water directly but many more depend on the associated riparian habitat. The area along streams

and wetlands provide corridors for wildlife movement, breeding and over-wintering habitat for amphibians, and as shade for moderating water temperatures. The riparian habitat adjacent to the wetland complex at Whipstock Hill WMA is in relatively poor condition. This highly disturbed forest is dominated by declining white ash, white pine and red pine. The overstory is of poor quality and understocked, the understory is dominated by invasive shrubs and vines. The presence of softwood species, the relative lack of coarse woody material, lack of a well-developed duff layer on the forest floor, and the proliferation of invasive species make this poor quality habitat.

- b) Amphibian Breeding Sites: Ideal amphibian breeding habitat includes clear, clean water with limited predation surrounded by hardwood forests with rich, thick duff layers creating moist conditions. These requirements are found in quality wetlands, streams, and vernal pools. Species including wood frogs and spotted salamanders, require temporary vernal pools to breed while others, such as green frog, eastern newt and pickerel frog breed in more permanent bodies of water. Much of the amphibian breeding habitat on the WMA is located east of Whipstock Road in the riparian forest surrounding the wetland. Managing this habitat to include a greater mix of hardwood species, a well-developed leaf litter, and greater component of coarse woody material will improve its quality and use as foraging habitat adjacent to the wetland. The wetland complex is surrounded by roads further limiting its suitability as amphibian habitat. With the current poor condition of the adjacent upland, amphibians are travelling across roads to reach suitable foraging habitat in the upland forest west of the town road. Improving the habitat adjacent to the wetland would allow species to persist without having to cross roads to meet their habitat needs.
- c) Deer Wintering Areas: There are nearly 79 acres of softwood plantations within the WMA that provide winter habitat for deer and other species. The quality of the softwood cover and the structural conditions of the habitat varies throughout the WMA. The Norway spruce plantations are generally in good condition, have better developed crowns and a denser canopy – all offering more protection from the effects of winter. These same conditions help keep invasive species from becoming established. The red pine plantations have less developed crowns and more dieback and mortality creating a much less dense canopy and subsequently lower quality winter cover. These same conditions have led to an increase of invasive species in the understory. There is a general lack of suitable browse within and adjacent to winter habitat.

### 3. Important Habitat Features:

- a) Core Forest: Core forest is a biological term used to refer to forested areas that are greater than 100 meters from human-created, non-forested openings. While edges and transitions between forested and non-forested areas can be habitat for some native plant and animal species, edges can negatively impact many forest habitat resources. Expansion of invasive species and increased predation on many native songbirds, and a decrease in use by wildlife that prefer large blocks of intact forest, are all associated with an increase in forest edge. Additionally, unbroken forest allows corridors for easy dispersal of plants and animals, without large barriers to this movement.

Whipstock Hill WMA overlaps a roughly 400-acre area of core forest that is found south of Route 279. Though this represents a relatively large patch of forest for the Vermont Valley, this is quite small compared to the extensive areas of core forest found in the Taconic Mountains and Southern Green Mountains. As a result, many of the ecological functions are compromised. In particular, evergreen (softwood) plantations and invasive species are abundant in about half of this forest patch, likely having negative impacts on food and shelter resources for native wildlife. In addition, the lack of connectivity limits many possibilities for wildlife movement and gene flow.

In a landscape characterized by rural and suburban development, however, even disturbed forest patches provide important landscape diversity, and can still provide suitable habitat for some core forest species, such as scarlet tanager or other songbirds that can more readily reach this forest patch.

- b) Habitat Block Size and Connectivity: All species require habitats of sufficient size to meet their life requirements. Wide-ranging species (e.g., fisher, bobcat) must travel throughout large areas to gather food. Even amphibian and reptiles require minimum acreages of suitable habitat but at a smaller scale. Habitat fragmentation (i.e., the breaking up of large habitat blocks into smaller, isolated patches) reduces habitat block sizes and may affect the ability of an area to support particular wildlife species. Negative effects of forest fragmentation on wildlife include an increase in predation by species such as skunks, crows, and cowbirds; alteration of habitat conditions for invasive exotic species (e.g., honeysuckle, buckthorn, purple loosestrife); and creating barriers to wildlife movement between habitats. Roads, power lines, development, and open fields are some examples of land uses that fragment Vermont forests.
- c) Hard Mast Stands: The dominant tree species of red oak, and bitternut and shagbark hickory provide an important source of mast for many species of wildlife.
- d) Soft Mast Trees and Shrubs: There some sources of soft mast present on the WMA. A few scattered apple trees and black cherry, especially at the lower elevations near the old field, provide an important food source. While there are a number of soft-mast producing invasive species, they do not provide the nutritional value needed for survival. Further, the proliferation of these species leads to habitat degradation.
- e) Open Lands: Old field habitat is extremely limited on the WMA. There is one small 1-acre field located off Whipstock road. Honeysuckle will dominate in time without a regular schedule of mowing.
- f) Wildlife Movement Corridors: Connections between wild lands can serve an important role in maintaining long-term health and viability of wildlife populations. Wildlife corridors not only allow individual animals (such as young individuals search for new habitat) to move throughout the landscape, but also allow for the transfer of genetic information across the region. Even the occasional travel of a few individual animals between otherwise isolated populations can substantially increase their long-term viability, because the genetic diversity within each group is effectively increased.

Wildlife corridors are often considered in the context of large mammals such as moose and bear. Bounded by Route 279, Route 9, an airport, and rural development, WHWMA is mostly an isolated forest patch. There are other forest blocks nearby, such as Mount Anthony, and areas to the west in New York, but vehicle-animal collision data suggests that wildlife movement across the roads to these areas is not common. While bear and moose may travel through WHWMA, such use is probably infrequent.

The true connectivity values of the WMA are likely for a different suite of wildlife species. Small mammals that use hedgerows or waterways to travel between patches, such as foxes, coyotes, and mink, could also find suitable corridors in and around WHWMA. Migrating songbirds looking for stopover patches may make heavy use of small forest patches within an agricultural and suburban landscape, and breeding and migrating waterfowl travelling north and south along the Atlantic flyway might make use of the open water of the beaver wetlands.

- g) Snags, Den Trees, and Downed, Dead Wood: Standing dead and dying trees and downed, dead trees are vital components of the forest that provide habitat for wildlife ranging from mammals to invertebrates and play an important role in nutrient cycling, soil protection and water availability, elements of a healthy, resilient forest. Variation in species, size and condition best accommodate the full range of wildlife. Within the WMA snags and den trees are more numerous in smaller diameter trees and less available as tree size increases. Ideally, adequate numbers would be 4-6/acre of both live and dead snags but with 1-2/acre of dead snags being 12” or greater in diameter. Adequate numbers of downed wood would be 50-80 pieces per acre. This provides important habitat for a number of species including the four bat species listed as “endangered” or “threatened” in Vermont: northern long-eared bat, tricolored bat, little brown bat and small-footed bat. The northern long-eared bat is federally listed as well.
- h) Habitat Diversity: The habitat found throughout the WMA supports, or has the potential to support, a variety of wildlife. The juxtaposition of softwood plantations, hardwood forests, wetlands and herbaceous openings contribute to a diverse habitat. The single-species plantations are dominated by either red pine or Norway spruce. The Norway spruce stands especially, are densely shaded and lack a developed understory. They provide quality winter cover. The red pine plantations generally have a less dense canopy and an increasing component of invasive species. These stands offer less effective winter cover.

Hardwood forests dominate the WMA. Areas lower on the slope near the town road are of poor quality, are younger, and are dominated by an understory of invasive species. The hardwood forest higher on the slope and at the summit of Whipstock Hill is of better quality and has a better developed understory, although there are portions of the forest without adequate regeneration. The species mix includes mast species (i.e. oaks, hickories).

The wetland complex on the east side of the WMA supports diverse habitat although the adjacent riparian forest offers limited habitat value for reptiles and amphibians due to its

degraded condition. Open fields, while limited within the WMA, provide habitat especially important for wildlife dependent on forbs, herbs, and shrub habitat.

- i) **Age Class Diversity:** The distribution of age classes related to forest and habitat varies within the WMA. The Norway spruce and red pine plantations are even-aged, most planted sometime after 1962. These consist of a single species with little to no native understory. The hardwood forests at the lower elevations are also even-aged and are similar in age to the plantations having begun reverting from agriculture to forest at about that same time. They are dominated by invasive shrubs and little to no understory. The hardwood forest at the higher elevations are older, uneven-aged and have more developed structure. Table 5 below, provides additional detail on habitat conditions on the WMA.

**Table 7: Structural Diversity in Whipstock Hill WMA**

<b>Habitat Diversity in Whipstock Hill WMA</b>			
<b>Habitat Condition</b>	<b>Description</b>	<b>Acres</b>	<b>Percent of Parcel</b>
<b>Wetlands (7% of the WMA)</b>			
	Open	16	4%
	Shrubland	1	>1%
	Forested	12	3%
<b>Permanent Openings</b>	Old fields	1	>1%
<b>Upland Forest: Uneven-aged (U) Maple-ash-hickory-oak forest</b>	Stands that contain trees of all size classes (e.g. 3 or more)	240	56%
<b>Upland Forest: Even-aged (18 % of the WMA)</b>	Softwood plantations – red pine and Norway spruce	155	36%
• Regeneration through seedlings (s)	<1” dbh and 1’ height		
• Sapling through poletimber (Sp)	Conifers 1-8.9” dbh Deciduous 1-10.9” dbh		
• Sawtimber (St)	Conifers 50% 9” dbh & > Deciduous 50% 11” dbh & >	155	36%
• Large sawtimber (L)	Conifers 50% 20” dbh & > Deciduous 50% 24” & >		

- S *Regeneration through seedlings:* Live trees and associated vegetation less than 1.0 inch dbh and at least 1 foot in height.
- Sp *Sapling through poletimber:* Saplings are live trees 1.0 to 4.9 inches dbh; poles are live trees 5.0 to 8.9 inches dbh for softwoods and 5.0 to 10.9 inches dbh for hardwoods. The matrix assumes that stands are fully stocked, that is, contain approximately 75 square feet of basal area per acre.
- St *Sawtimber:* A stand with at least half of the stocking in large sawtimber trees – at least 9.0 inches dbh for softwoods or 11.0 inches dbh for hardwoods.
- L *Large sawtimber:* A stand with at least half of the stocking in large sawtimber trees – at least 20 inches dbh for softwoods or 24 inches dbh for hardwoods.
- U *Uneven-aged:* Stands of northern hardwood cover types that contain trees of all size classes.

**Source:** DeGraaf, R., et.al. 2006. Technical Guide to Forest Wildlife Habitat Management in New England. University of Vermont Press, Burlington, Vermont.

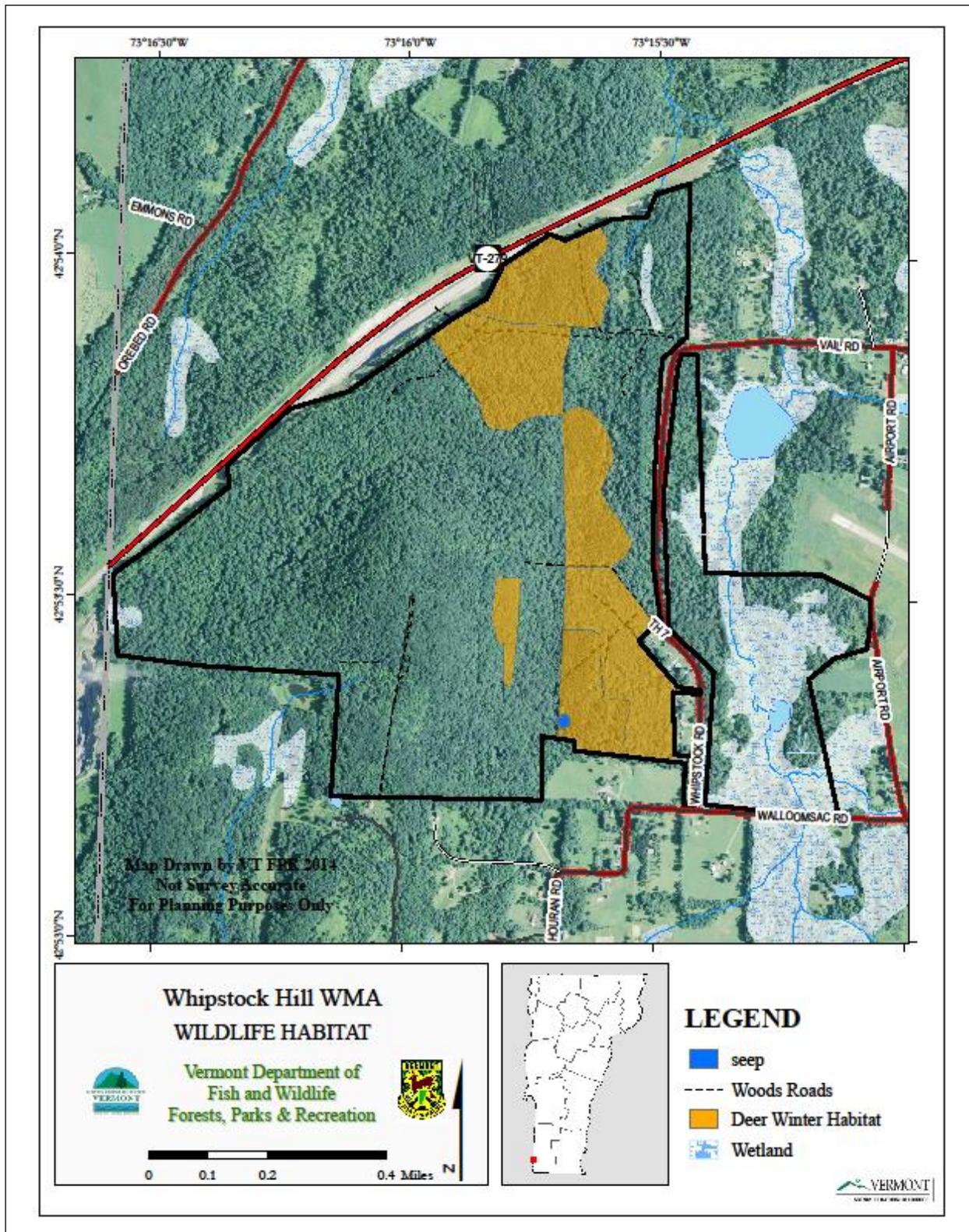
#### **4. Pertinent Issues:**

- The quality of habitat in much of the lower elevations of the WMA is degraded by the abundance and diversity of invasive species.
- Any forest or habitat management activity would first need to appropriately address the management of invasive species in order to be successful. Forest structure at the upper elevations could be enhanced but would fail without first addressing invasive species at lower elevations.
- Without strategic intervention, invasive species will continue to spread throughout the WMA, further degrading habitat.
- While there is currently some quality softwood cover, the quality of much of this habitat mapped on the WMA is degraded due to small crowns, thin canopy, and the resulting proliferation of invasive species. Oriental bittersweet vines are particularly prominent in some stands. Lack of thinning in the plantations will lead to continue decline in quality of winter cover.
- The degraded condition of the riparian forest adjacent to the wetland consisting of poor quality red pine plantation, dying white ash and an understory dominated by invasive shrubs and vines provides limited habitat value.
- Bat populations, particularly Northern Long-eared bats are unknown.

#### **5. Assessment of Need:**

- Manage to improve the quality and availability of winter cover in softwood plantations over time.
- Increase availability of quality browse as an available food source adjacent to or near winter cover.
- Work toward increasing diversity of age classes and improved forest structure over time throughout the WMA to promote a healthy, diverse and resilient forest habitat.
- Improve condition and health of riparian forest habitat with management toward native hardwood species, diversity of ages and structure, a deep leaf litter and suitable amount of coarse woody material.
- Monitor for presence of Northern Long-eared bat (NLEB) prior to implementing forest management activities. If found, follow current NLEB forest management guidance for state lands.

**Figure 5: Wildlife Habitat Map**



## **E. Timber Resource Assessment**

1. **History of Forest Management on Parcel**: Nearly all of the upland forest within the WMA is accessible and operable for timber and wildlife habitat management. Woods roads are evident throughout the parcel. The land use history of the upland is similar to that of much of Vermont. Initially the land was settled and cleared for agricultural uses. Most of the fields were subsequently abandoned and eventually reverted back to forest. Approximately 79 acres were planted to Norway spruce and red pine in the late 1960s. Exact management practices undertaken by previous owners are not known, however the forest has likely had some harvesting of wood products. No vegetation management activities have taken place since the state assumed ownership in 2008.
  
2. **Soil and Site Productivity**: Healthy soils are the foundation for healthy forests, sustainable forest and habitat management and climate adaptation. Soil organic matter is a critical source of nutrients and important for water holding capacity. Practices that help to promote healthy soil include maintaining woody debris including large trees, maintaining higher residual basal area to moderate soil temperatures and moisture fluctuations, and promoting native species regeneration. Primary soils include:
  - **Georgia Loam** – Very deep and moderately well-drained soils that are moderately productive soils for sugar maple. Strongly acid to neutral glacial till, 60 inches to bedrock.
  - **Stockbridge Loam** – Very deep, well-drained soils that are moderately productive for sugar maple. 60 inches to bedrock.
  - **Macomber-Taconic Complex** – an upland soil that consists of moderately deep, well drained soils formed in loamy glacial till. This soil has low productivity for sugar maple and currently supports hardwoods. Very strongly to moderately acid, 10 to 40 inches to slate bedrock.
  - **Dutchess-Channery Loam** is an upland soil that consists of very stony, very deep well-drained soils formed in loamy glacial till. It is moderately productive for sugar maple and high for white pine. Depth to bedrock is 60 inches or greater.
  - **Pittstown Loam** is a very stony upland soil formed in loamy glacial till. This soil is shallow to moderately deep to a dense basal till and very deep to bedrock (60 inches or greater). This soil is highly productive for sugar maple.
  
3. **Existing Conditions and Dominant Forest Types**: The current condition of the upland forest varies with site conditions such as soil productivity, aspect, elevation, and with past management practices and natural disturbance. On Whipstock Hill WMA, the upland forest stands are generally fully stocked to overstocked with pole to small saw timber size trees. There is an elevational division with intact forest near the summit and highly degraded forests at lower elevations. The lower elevation forests contain a significant component of invasive species. The demarcation correlates with field abandonment as depicted in the 1962 aerial photos.

- a) *Regeneration/Age Class Distribution/Tree Quality* – Regeneration is generally unacceptable throughout the WMA although varies significantly between areas with large invasive populations and those without. At elevations higher on the slope some native regeneration is present although it is highly variable. Lower elevation hardwood stands and softwood plantations have little to no native regeneration and are dominated by invasive species. While increased age class diversity is a desired goal, the establishment of forest regeneration will be challenging under these circumstances.

Timber management potential is good over much of the WMA based on site conditions however the presence of large numbers of invasive species poses a serious threat to successful regeneration of native tree species.

**Table 8: Site Class Management Potential**

Site Class	Potential Productivity (cubic feet of wood/acre/year)	Site Index (height at age 50)	Acres
Site Class I	>85 cubic feet	White Pine 70' Northern Hardwoods 60'	223
Site Class II	50 to 84 cubic feet	White Pine 60-69' Northern Hardwoods 53-59'	168
Site Class III	20 to 49 cubic feet	White Pine 50-59' Northern Hardwoods 45-52'	28
Site Class IV	<20 cubic feet	White Pine 50' Northern Hardwoods 45'	6

- b) *Dominant Forest Types* – upland forests within the WMA are dominated by a maple-oak-hickory forest type that hosts species typical of northern hardwood forests as well as oak and hickories more commonly found in central forests to our south. This type, nearer the summit of Whipstock Hill, is nearly free of invasive species and has a more developed mid and understory. Lower on the slope invasive species become much more common and replace nearly all of the native understory vegetation. Softwood plantations of Norway spruce and red pine cover 79 acres providing important deer winter habitat.

**Table 9: Dominant Forest Types**

Type	Major Species	Condition	Quality	Regeneration
Softwood plantation <i>60 acres</i>	Norway spruce	Sawtimber, overstocked	Variable	Inadequate
Softwood plantation <i>19 acres</i>	Red pine	Sawtimber, overstocked	Variable	Inadequate – dominated by invasive species
Oak-hardwood <i>316 acres</i>	Red oak Sugar maple Red maple	Pole-size to sawtimber Moderately stocked to overstocked	Variable	Often poor – beech, striped maple, sugar maple

- c) *Health/Vigor of Timber Resource* – Soils are productive for growing trees on most of the WMA. Tree quality within the softwood plantations is generally fair to poor. Plantations are impacted by the presence of invasive species. Oriental bittersweet, a climbing vine, is a problem in the plantations and the presence of large thickets of invasive shrub species, especially honeysuckle, are impacting the successful regeneration of native tree species. The quality of hardwood species at the lower elevations are also generally fair to poor whereas the quality of hardwoods at the upper elevations is fair to good. Tree health is best in areas where soils are deeper and more fertile.
- d) *Access/Operability* – Access to the WMA is from Whipstock Road (Town Highway #24). While the WMA has frontage on Route 279, it is a limited-access road and no management or public access is permitted to the WMA from that road. Management access along existing skid roads within the WMA is good although impacted by invasive species.

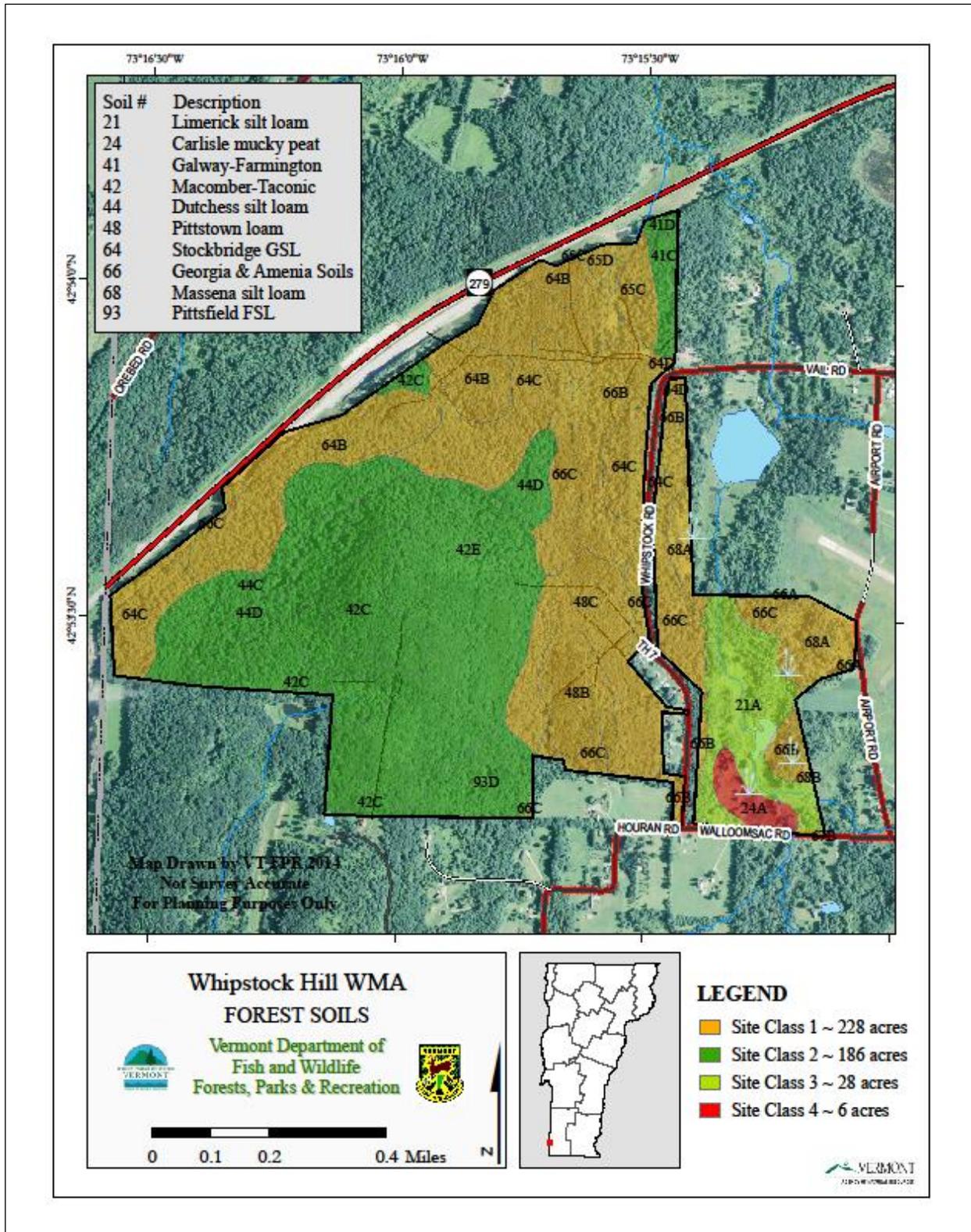
#### **4. Pertinent Issues:**

- The proliferation of invasive species, left unmanaged, are a growing impediment to successful regeneration of native forest species, negatively affecting forest composition and resiliency, natural community health, wildlife habitat quality and climate adaptability.
- Spread of invasive species is impacting access into the forest – roads are becoming choked with honeysuckle contributing to higher maintenance costs.
- The low timber quality and presence of invasive species in some stands makes them economically challenging to manage.
- The lack of age diversity and forest structure in some stands have implications for forest sustainability.
- The protection of potentially sensitive archeological resources (i.e. Burden Iron works, area adjacent to wetland) are important management considerations.

#### **5. Assessment of Need:**

- Strategize and prioritize management of invasive species to protect upper elevation hardwood forests from future spread and secure native regeneration throughout the WMA.
- Manage invasive species to ensure that forest management activities are successful in achieving forest and habitat goals.
- Increase age class diversity.
- Monitor for presence of Northern Long-eared bat (NLEB) prior to implementing forest management activities following ANR protocol. If found, follow current NLEB forest management guidance for state lands.

**Figure 6: Soils and Site Class Map**



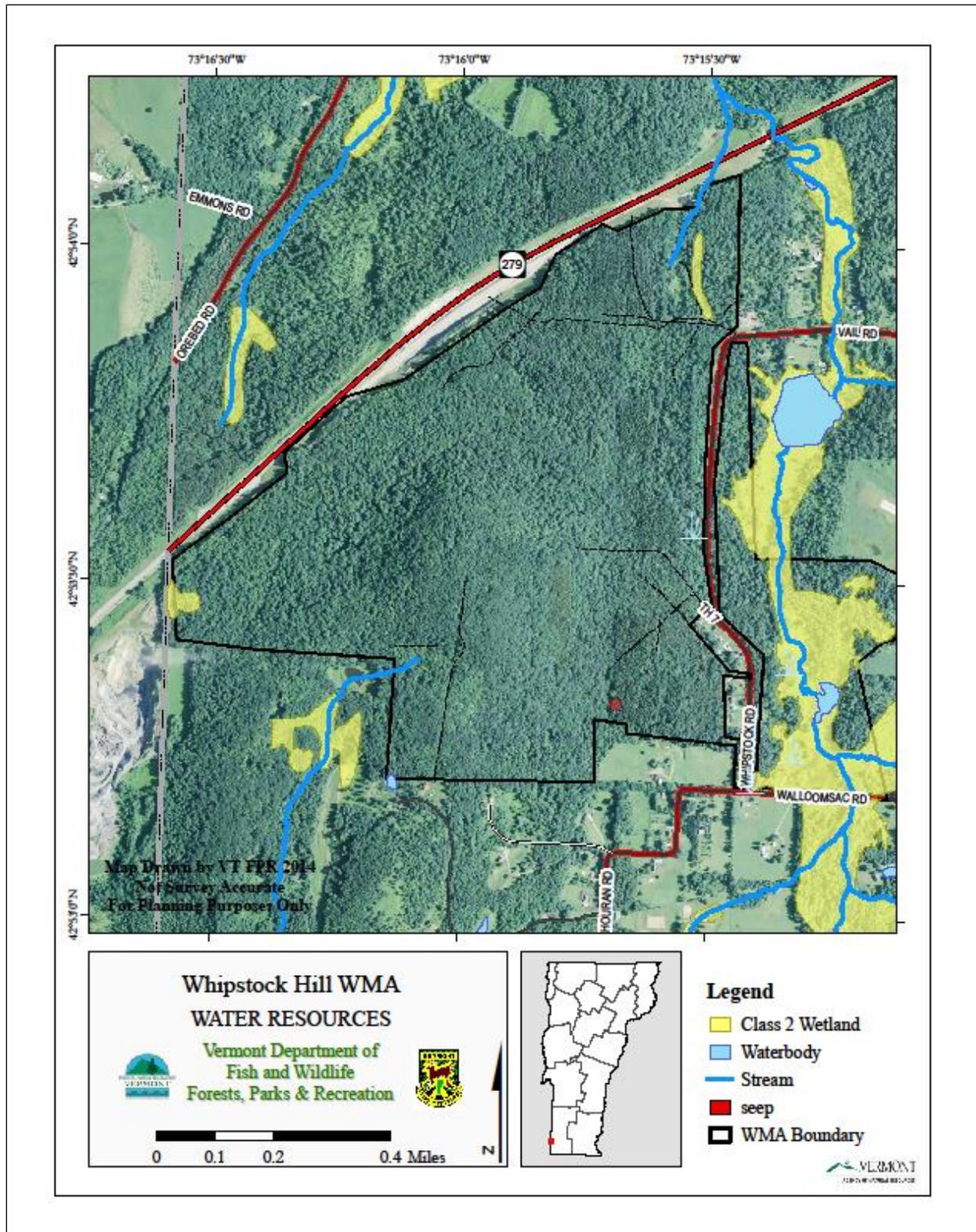
## **F. Water Resource Assessment**

- 1. Watershed Description:** Whipstock Hill WMA is within the 428-square mile Hudson River Drainage. Three significant Vermont Rivers – the Batten Kill, Walloomsac, and Hoosic Rivers, and their tributaries contribute to this drainage that is shaped by the Taconic Mountains, Vermont Valley and Green Mountains. It receives about 37” of precipitation per year. The Whipstock Hill WMA is drained by an unnamed tributary to the Walloomsac River just upstream from the New York border.
- 2. Wetland Description and Function:** The 30-acre wetland is a complex within the WMA is comprised of several natural communities including Beaver Wetland, Calcareous Red Maple-Tamarack Swamp, Red Maple-Black Ash Seepage Swamp, Rich Fen, Seep, Shallow Emergent marsh, Silver Maple-Sensitive Fern Riverine Floodplain Forest, and Wet Clayplain Forest. This clayplain forest is a rare community, not generally found outside of the Champlain Valley, and may be of state-wide significance.

A 2005 Water Resources Board determination amended the Vermont Significant Wetland Inventory map to more accurately reflect the current boundaries of the Whipstock wetlands increasing the mapped acreage from 8 to 80 acres. Only 30 acres of the Whipstock wetlands are within the boundary of the WMA. Hurricane Irene (2011) did not seem to have much effect on the wetlands within the WMA. Because of the minimal damaged sustained by 100-year flood events wetland and riparian function seem to be in working condition. Of larger concern is the spread of invasive species as a result of Tropical Storm Irene and climate change in general. Monitoring the wetlands will be critical to ensure that invasive species do not become the dominant vegetation.

- 3. Relationship to Basin Plan and Basin Plan Recommendations:** Vermont DEC has recently approved the Tactical Basin Plan for the Batten Kill, Walloomsac, and Hoosic Rivers and their tributaries. The Basin Plan actions will protect, maintain, and improve surface waters by managing the activities that result in surface water stressors, and address the attendant pollutants associated with them. These actions strategically target specific surface waters in those sub-basins where their implementation would achieve the greatest benefit to water quality and aquatic habitat. In general, the Batten Kill, Walloomsac, and Hoosic Rivers are targeted for protection and restoration strategies while various tributaries are targeted for additional water quality and aquatic habitat monitoring and assessment work. This and all Tactical Basin Plans benefit from biennial implementation table updates. For this Tactical Basin Plan, ongoing efforts to build flood resiliency will be a featured priority in the first biennial review, to implement priority actions related to ongoing restoration efforts due to Tropical Storm Irene. This recent iteration of the Tactical Basin Plan does not include priority actions specific to the Whipstock Hill WMA.
- 4. Pertinent Issues:**
  - The proliferation of invasive species threatens native natural community composition.
- 5. Assessment of Need:**
  - Assess and map invasive species.
  - Strategically manage invasive species where efforts can be most successful.

Figure 7: Water Resource and Fisheries Map



## **G. Fisheries Resource Assessment**

1. **Description**: Stream resources are limited on the WMA west of Whipstock Road. Two short segments of unnamed 1<sup>st</sup> order streams are found here. In the northeast part of the WMA, beginning in a small wetland, a stream flows north eventually reaching the Walloomsac River. Another 1<sup>st</sup> order stream in the southern portion of the WMA flows south from the forested side hill of Whipstock Hill eventually flowing into Browns Brook.
2. **Existing Conditions**: Neither stream supports significant fish populations but, as protected headwater streams, contribute to fisheries habitat downstream.
3. **Pertinent Issues**:
  - The proliferation of invasive plant species, both terrestrial and aquatic, impacts the health of the stream and wetland communities.
4. **Assessment of Need**:
  - Assess and map invasive species.
  - Strategically manage invasive species where efforts can be most successful.

## **H. Historic Resource Assessment**

1. **Description**: An archeological Sensitivity Study was prepared by the Consulting Archeology Program at the University of Vermont (January 2009). This analysis helps to evaluate landscapes for the potential for containing pre-contact (Native American) sites. The assessment was the product of a GIS-based predictive model based on environmental factors known to be important to Native Americans to determine the likelihood of use or settlement. As expected, the analysis illustrates that sensitivity is influenced by proximity to water including streams, confluences, lakes and ponds and the presence of springs and wetlands. Distance from kame terraces and edges of valleys are also considerations.

### *Native American and Pre-historic Sensitivity Analysis*

The UVM report identified no Native American sites within the WMA. However, based on the modeling and the increased potential for use associated with the stream and wetland complex east of Whipstock road, it is not unexpected to learn that much of the eastern side of the WMA has been mapped as sensitive. One shortcoming of this ecologically based predictive mode is its inability to incorporate human behavior. Inevitably potential sites will be missed and others misidentified.

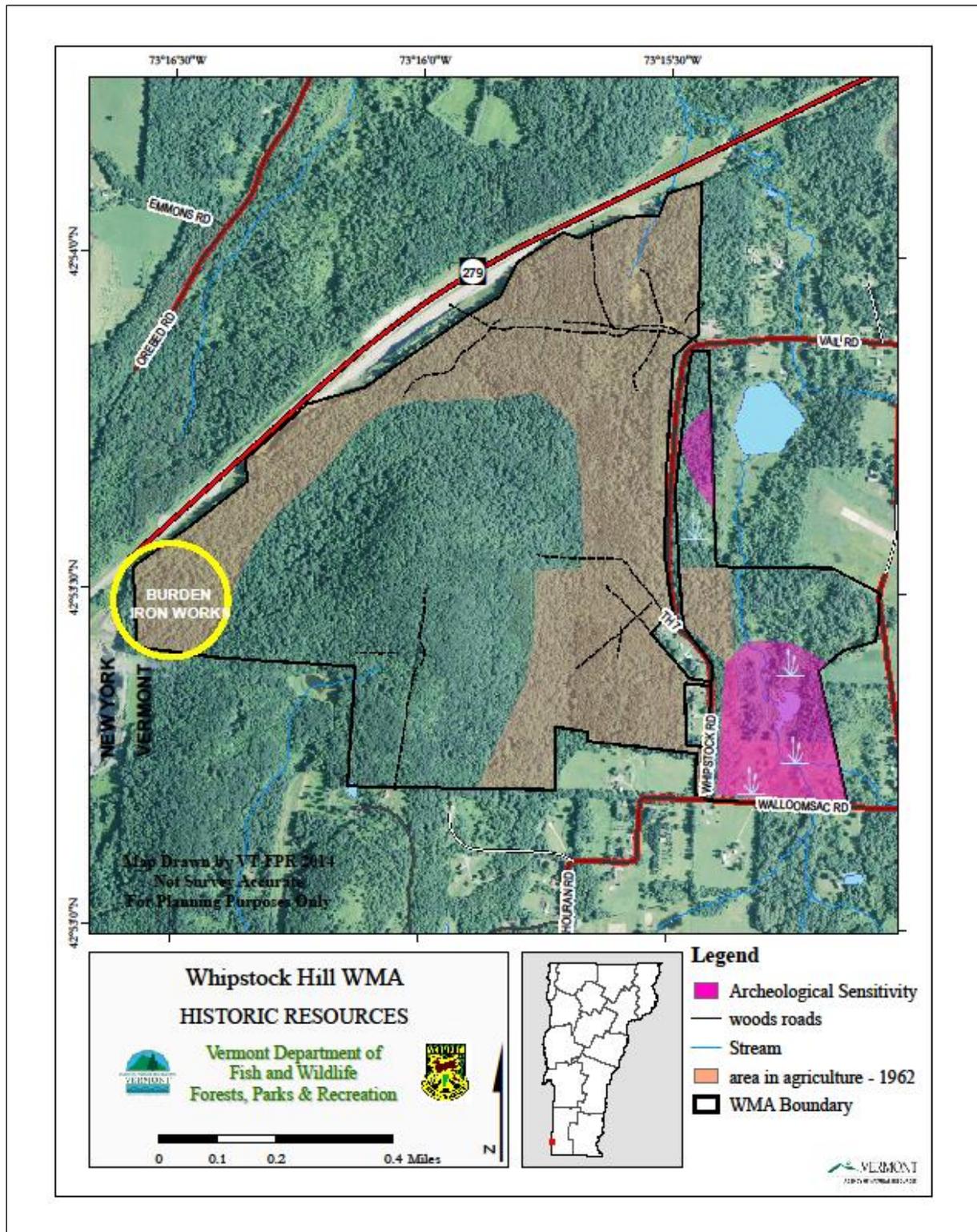
### *Early Settlement and Industrial History*

Lands within and near the WMA were used for mining as early as the 1790s. The Burden Iron Company ca 1860s-1870s operated in the Orebed Road area of Vermont. Field evidence found near the boundary between Vermont and New York appears to support the idea that the mining features were totally within Vermont. The Vermont acreage is identified as Burden Iron Mining Discontiguous District, VT-BE-222 (Rolando 2007:40-44). The Burden holdings in North Bennington, totaling 450 acres, were liquidated in 1940 and sold to Mr.

and Mrs. Ferdinand L. Mayer in 1942, who in turn acquired more land around Whipstock Hill until they had 800 acres. In 1988 the land was sold to Woodland Heights Realty, a New Jersey realty company. The land that is now Whipstock Hill WMA was part of that ownership.

2. **Existing Conditions:** Remains of historic features, primarily in the southwest portion of the WMA are likely associated with the Burden Iron Works. Early aerial photos indicate that most of the lower elevations of Whipstock Hill were used for agriculture as late as the 1960s. Stonewalls within WMA are likely associated with that land use. Modeling suggests increased archeological sensitivity adjacent to the wetland.
3. **Pertinent Issues:**
  - There is a need for protection of historic resources during implementation of management activities
4. **Assessment of Need:**
  - Conduct additional field search and documentation of features associated with the Burden Iron Works.
  - Map stonewalls within the WMA.
  - Perform additional assessment of potential resources adjacent to the wetland prior to ground disturbing activities.

Figure 8: Historic Resource Map



## **I. Recreation Resource Assessment**

1. **Description**: Whipstock Hill is a diverse parcel of state-owned land in the southwest region of Vermont, an area with little public land. Using the United States Forest Service (USFS) Recreational Opportunity Spectrum (ROS) as a guide, the character of the recreational experiences on the WMA can best be described as *semi-developed natural*, a term used to describe natural appearing landscapes with human-influenced modifications that are generally perceived as background by most people. (More, Bulmer, Henzel & Mates, 2003). Experiences are generally described as having low user interaction. Recreational uses of the WMA are dominated by dispersed, non-motorized fish and wildlife-based activities including hunting, fishing, trapping, hiking and wildlife viewing. There are no designated trails within the WMA although there are several old woods roads that provide opportunities for pedestrian access. There are currently no developed parking areas that serve the WMA.
2. **Existing Conditions**: The following activities have been identified as recreational uses of the land within the scope of the Whipstock Hill WMA LRMP planning process.

- a) **Hunting, Fishing, and Trapping** - Whipstock Hill WMA offers a wide range of small game, wild turkey, and white-tailed deer hunting opportunities. A mosaic of overgrown fields, forests and wetlands make this a diverse habitat for many species of wildlife. This area has a history of hunting and trapping activity. It is unknown how much fishing takes place in the stream that feeds the wetland.

Hunting, fishing and trapping are permitted on all state land unless otherwise designated. The actual pursuit of fish and wildlife is governed by rules and regulations established by the Vermont Fish and Wildlife Board. Fish and wildlife commercial uses are limited to those specified in the existing Fish and Wildlife Department regulations. The WMA is within Wildlife Management Unit (WMU) N. WMUs are administrative entities based on physiographic characteristics that help to shape species management in the state.

- b) **Birding, Wildlife Viewing, and Nature Appreciation** - Wildlife viewing and nature appreciation opportunities are plentiful throughout the WMA. There are opportunities to experience forested landscapes as well as overgrown fields and wetlands and the species associated with those habitats. Wildlife on the property includes songbirds, raptors, invertebrate species, small and large mammals, reptiles and amphibians. While a popular use of the WMA, no surveys have been conducted to determine actual levels of use.
- c) **Hiking and Hiking Trails** - There are currently no designated hiking trails within the WMA. There is a network of existing woods roads that are in relatively good condition on moderate terrain which provide hiking and walking access within the WMA. These are generally used as access for hunting, birding, wildlife viewing and nature appreciation.
- d) **Winter Recreation** - There are currently no designated winter use trails on the WMA. The level of winter use is unknown although some local use occurs. The same roads suited to hiking and walking are providing access for limited cross-country skiing and

snowshoeing. Depending upon the level of use there may be implications for wintering wildlife.

- e) Education and Outreach – Education and outreach efforts provide the public with information with which to better understand and appreciate the diversity of resources and opportunities offered by Whipstock Hill WMA and to have a safe and enjoyable recreational experience. This is accomplished by advancing public understanding about management activities and appropriate uses of the WMA through such means as providing information on kiosks and websites. It also includes maintaining cooperative relationships with a variety of partner organizations and keeping them informed about long-range management and annual stewardship plans.

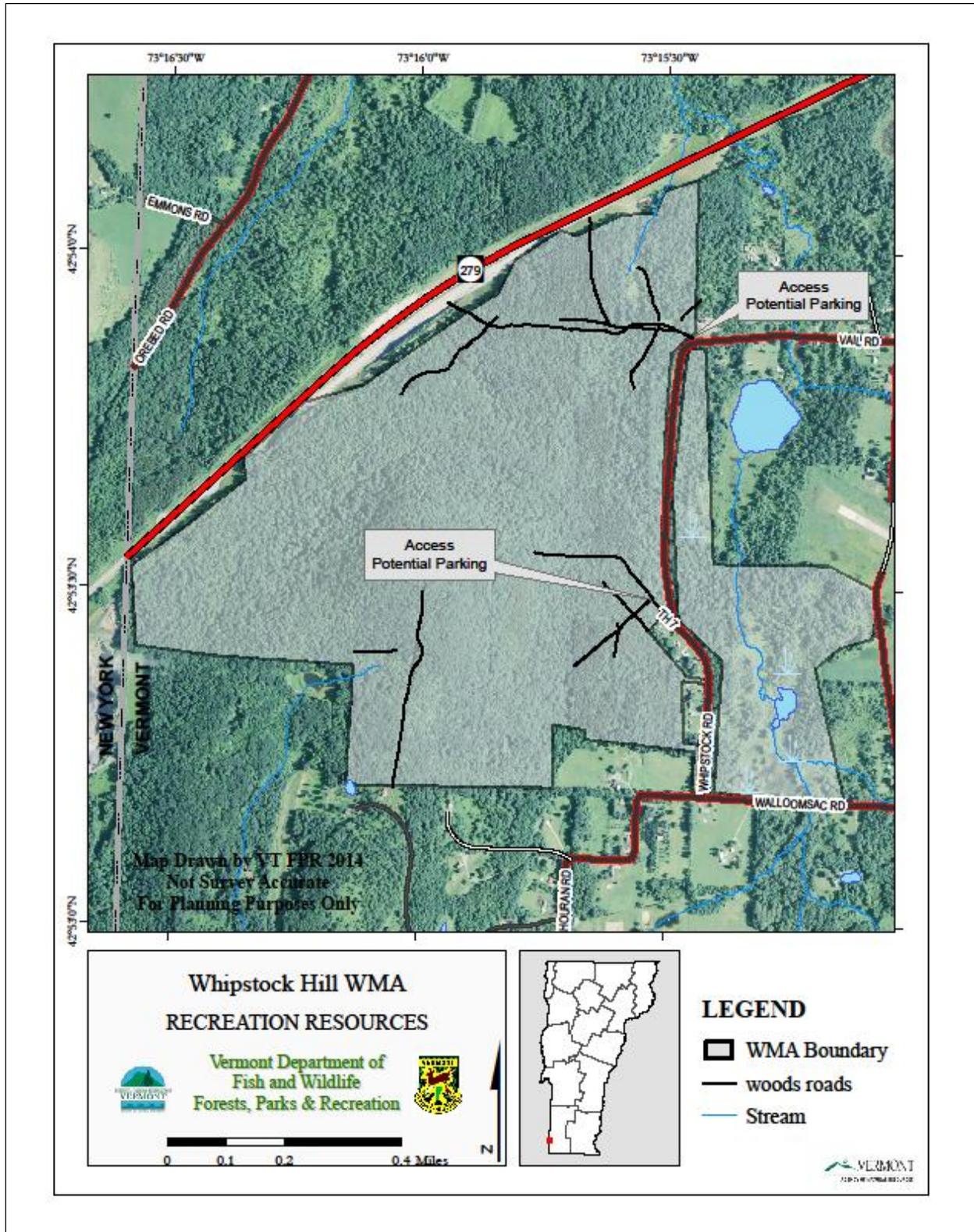
**3. Pertinent Issues:**

- The WMA lacks a suitable, developed and signed parking area to support public access.
- The proliferation of invasive species impacts the quality of the wildlife habitat present on the WMA. This, in turn, negatively affects the quality of the wildlife viewing, hunting and trapping experience available on the WMA.
- The high numbers of invasive species on the property also impacts access making travel through the WMA very difficult in places.
- The WMA is well known for its high tick populations related to the proliferation of invasive shrubs.

**4. Assessment of Need:**

- Develop a small multi-car parking area with information kiosk, parcel identification signage and gate to limit unauthorized access through the WMA are needed to support public access of Whipstock Hill WMA.
- Manage invasive species in a measured and deliberate manner to improve wildlife habitat and provide easier public access.

Figure 9: Recreation Resource Map



## **J. Infrastructure and Public Access Assessment**

1. **Description:** Whipstock Hill WMA is bounded on the west by Vermont Route 279 and on the east by Whipstock Road. There is no town road frontage on either the north or south side of the WMA. Public access is from Whipstock Road (TH 24) and TH 7. Route 279 is a limited-access highway and therefore, despite road frontage, the WMA is not accessible from the west.
2. **Existing Conditions:** While there is currently no parking area, there is the ability to park a car or two off the town highway (Whipstock Road) in this location walk onto the WMA either through the woods or along an old woods road. Public pedestrian access within the WMA can occur along a limited system of old woods roads or by walking through the forest off-road. The existing network of roads can support management access.
  - a) **Roads:** Roads within the WMA consist of undeveloped woods roads with no surfacing (gravel). Most are overgrown with honeysuckle and would need substantial clearing in order to provide suitable management or pedestrian access.
  - b) **Buildings/structures:** There are no buildings or structures within the WMA except for the Airport Beacon on the summit of Whipstock Hill managed by the Vermont Agency of Transportation.

**Table 10: Infrastructure at Whipstock Hill WMA**

### **Gates**

<b>Location</b>	<b>Condition</b>	<b>Status</b>	<b>Needs</b>
none	Na	None currently exist	Install at NE access to WMA

### **Kiosks**

<b>Location</b>	<b>Condition</b>	<b>Status</b>	<b>Needs</b>
none	Na	None currently exist	Construct at parking

### **Signs**

<b>Location</b>	<b>Condition</b>	<b>Status</b>	<b>Needs</b>
At sharp curve Whipstock road	Poor	Vandalized	Replace

- c) **Culverts and Bridges:** none
  - d) **Parking Areas:** There are currently no developed parking areas that support public access to the WMA. Plans to develop a parking area are part of this plan.
3. **Pertinent Issues:**
    - The WMA lacks a suitable, developed and signed parking area to support and facilitate public access.

- All woods roads are overgrown making even pedestrian travel difficult.

**4. Assessment of Need:**

- Develop a small multi-car parking area with informational kiosk, parcel identification signs and gate to limit unauthorized motorized access into the WMA are needed to support public access.

## **K. Scenic Resource Assessment**

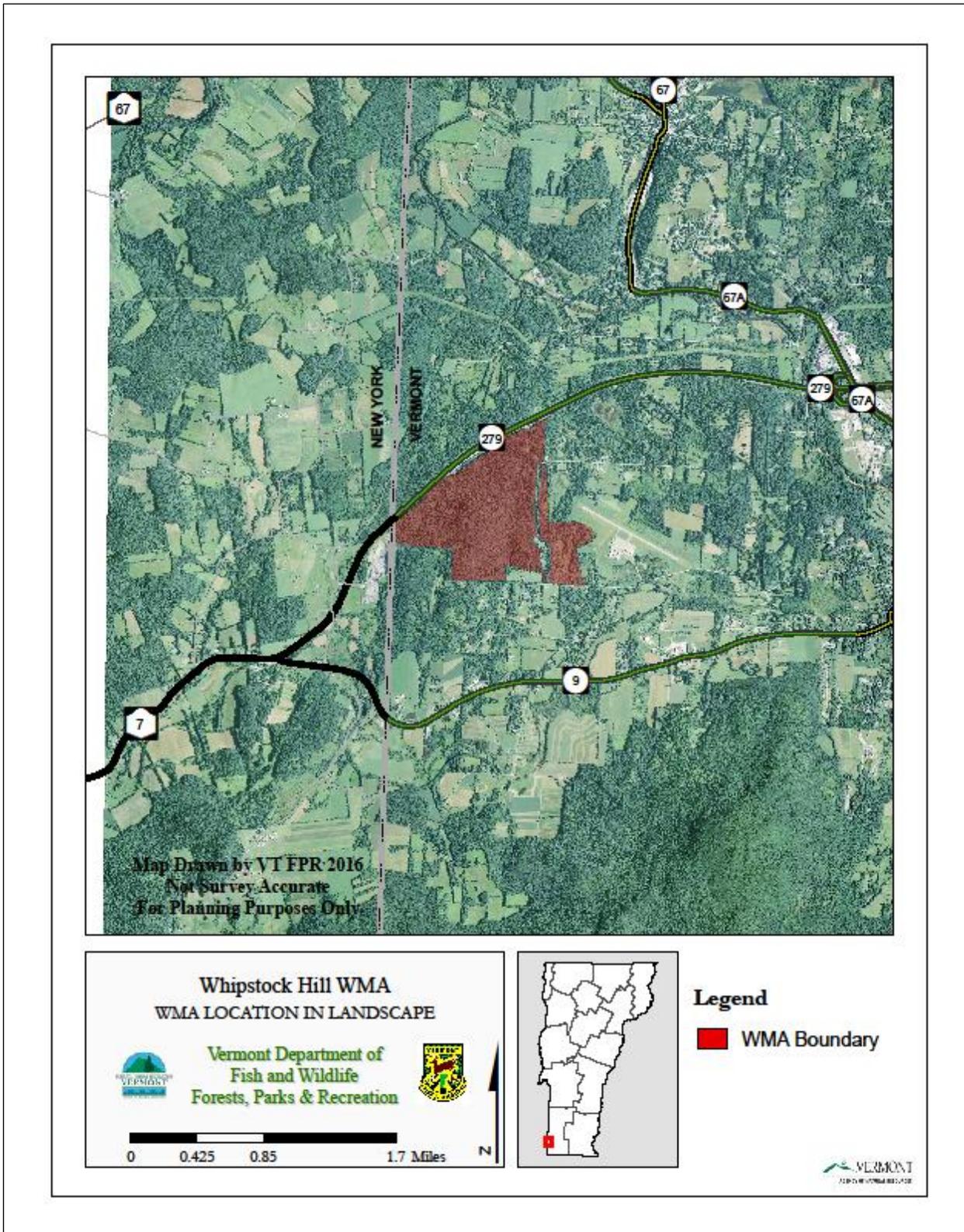
1. **Description:** The landscape of Vermont is part of the state’s unique identity and quality of life and serves as an important economic driver. Farmland, compact villages, mountains, forests, wetlands, lakes and streams are important components of important scenic resources. Scenery can be assessed at different scales (regional, local, parcel).
2. **Existing Conditions:** Whipstock Hill, at 1260 feet in elevation, is a prominent landscape feature in western Bennington County serving as an important focal point in the surrounding landscape. The Bennington Town Plan and the *Scenic Resource Inventory* prepared by the Bennington Regional Planning Commission (2004) emphasize the role of this forested landscape, and Whipstock Hill in particular, as a focal point in an important scenic gateway into Vermont. This predominantly forested parcel with its hardwood forests and softwood plantations offers an important scenic element. The scenic role of the WMA is enhanced when looked at in combination with the surrounding rural development pattern, open fields and wetlands (Figure 11).

**Table 11: Scenic Resources of Whipstock Hill WMA**

<b>Feature</b>	<b>Location</b>	<b>Vantage Point</b>	<b>Description</b>	<b>Visual Significance*</b>
Whipstock Hill	Center of WMA	Town roads	High point in landscape	regional
Wetland complex	East side of WMA	Town road, hill	Complex of wetlands	parcel
Upland forests	Throughout WMA	Town roads, adjacent lands	Dominant forest type of WMA	Local, parcel
Old field	Northeast	Woods road	Maintained meadow	parcel
<i>*Regional</i>	A significant scenic resource known and appreciated at a broad geographic scale (often geologic land form), typically unique, prominent and visible by a large number of people.			
<i>Local</i>	A scenic resource visible from off site that may be geologic but can also be subjectively attractive rural and/or forest vistas.			
<i>Parcel</i>	A scenic resource visible from only within or just adjacent to the parcel such as maintained meadows, historic sites, and unique geological features.			

3. **Pertinent Issues:**
  - The proliferation of invasive species, especially a thicket along the road and at major access points into the WMA,
  - Junk left in the field over time from previous ownerships and
  - The lack of an attractive point of public access including a sign, kiosk and parking area all detract from the visual quality of the WMA.
4. **Assessment of Need:**
  - Manage invasive species.
  - Discourage illegal dumping through installation of signs and gate.
  - Create an attractive point of public access into WMA.
  - Maintain old field through regular brush hogging.
  - Manage invasive species to improve sightlines into WMA and access points.
  - Improve pedestrian access and viewing opportunities to the wetland.
  - Keep forest road width will to a minimum.

Figure 11: Scenic Resource Map



## IV. MANAGEMENT STRATEGIES AND ACTIONS

### Land Management Classification

Vermont ANR lands are managed using four categories of use or types of management to be emphasized on the land. In this section of the plan, the recommended levels of use or types of management will be shown for all the land area in this parcel. This section also describes generally how the land will be managed so that the activities occurring on the land are compatible with the category assigned. The four categories are: (1) *Highly Sensitive Management*; (2) *Special Management*; (3) *General Management*; and (4) *Intensive Management*.

As part of the planning process, the lands, resources, and facilities held by the ANR are evaluated and assigned to the appropriate land management category. Assignment of management categories for Whipstock Hill WMA is based on a thorough understanding of the resources identified and the application of over-arching lands management standards. The resources include natural communities, plants, and wildlife as well as recreation, historic, timber, and water resources.

- 1.0) **Highly Sensitive Management Areas** – Areas designated as Highly Sensitive Management are described as *“areas with uncommon or outstanding biological, ecological, geological, scenic, cultural, or historical significance...”* Acres managed under this category will have no timber management, salvage harvest, or active wildlife habitat management. However, trees and other vegetation may be cut to restore natural community species composition and structure in limited locations; manage specific habitat conditions for rare, threatened, and endangered species; and to maintain safe and enjoyable recreational conditions.
- 2.0) **Special Management Areas** – Areas designated as Special Management include areas *“...where protection and/or enhancement of those resources is an important consideration for management.”* Timber harvesting and wildlife habitat management as well as recreation are considered to be complementary uses within this classification to the extent that they do not impact special features.
- 3.0) **General Management Areas** – The General Management category includes areas where *“dominant uses include vegetation management for timber and wildlife habitat, concentrated trail networks, and dispersed recreation...”* A primary consideration for management is minimizing conflict between activities. Sensitive resources that occur within these areas may require special attention.
- 4.0) **Intensive Management** – The Intensive Management category is characterized by a *“high level of human activity and high intensity development on/or adjacent to State land.”* Aesthetics and safety are the primary management considerations in these areas. However, more sensitive resources that occur within these areas may require special attention.

## **Management Goals and Objectives for Whipstock Hill Wildlife Management Area**

**Ecological Goals and Objectives:** *Protect and maintain water quality, wetland habitat and ecological function.*

- Protect wetland hydrology and sensitive vegetation including the rare Rich Fen community.
- Allow natural processes to occur including cyclical beaver activity where it does not impact rare, threatened and endangered species or rare and uncommon natural communities or infrastructure.
- Protect seeps and intermittent drainages.
- Manage areas associated with stream and wetland for riparian functions and values. Follow Agency Riparian Management guidance.
- Manage invasive species.

**Rare Species Conservation Goals and Objectives:** *Protect rare, threatened and endangered species and their habitat.*

- Support survey efforts to identify and map the extent of rare, threatened and endangered species on the WMA.
- Conduct bat acoustic surveys to determine species presence.
- Prevent encroachments by ATVs and other motorized vehicles through education, enforcement and barriers, as appropriate.
- Control invasive species particularly those that pose a threat to native rare, threatened or endangered species.
- Enhance habitat for rare, threatened and endangered species where appropriate.

**Natural Community Goals and Objectives:** *Maintain or enhance natural community quality and native species composition.*

- Maintain high quality state significant examples of natural communities by promoting a natural diversity of native species.
- Maintain or enhance quality and condition of natural communities through management of invasive species.

**Forest Health Goals and Objectives:** *Promote a healthy, diverse and resilient forest.*

- Support efforts to monitor and detect presence of Emerald Ash Borer (EAB) in southwestern Vermont and on or near the WMA. Place traps at locations of ash decline.
- Engage volunteers, as available, in a citizen-science monitoring program to monitor the success of invasive species management and for the presence of EAB.
- Monitor and manage white ash according to Department of Forests, Parks & Recreation guidance for EAB.
- Prioritize invasive species management by density of infestation and quality of surrounding forest. Monitor and manage invasive species along primary access roads into the WMA especially into the interior forest.

- Prevent or limit the introduction and establishment of invasive species by monitoring and managing activity that promotes spread, washing equipment used in projects on the WMA and by minimizing access points to the WMA.
- Evaluate and implement innovative methods to manage invasive species. Support credible research that expands our knowledge of invasive species management.

**Forest Management Goals and Objectives:** *Create or maintain healthy, diverse upland forests with increased adaptation for climate change.*

- Maintain or enhance forest age, species and structural diversity.
- Maintain or enhance presence of species found more commonly to the south (i.e. oaks, hickories).
- Reduce the impact of stressors. Manage invasive species to control existing populations, prevent new introductions, limit their spread into undisturbed areas and allow for the establishment of native regeneration.
- Protect soils. Maintain or enhance coarse woody debris to replenish organic matter, moderate temperatures and recycle nutrients. Minimize soil disturbance.
- Promote native species composition in hardwood forests, expand by managing invasive species.

**Wildlife Habitat Goals and Objectives:** *Protect and enhance significant and unique wildlife habitat.*

- Maintain or enhance mosaic of forest stands and natural communities for their contribution to wildlife habitat including softwood cover and mast. Retain or enhance areas of high quality softwood cover in plantations.
- Maintain or enhance deer winter habitat including softwood cover and browse as well as hardwood stands on south-facing slopes.
- Promote a diversity of native species.
- Maintain or enhance hard and soft mast component by harvesting to promote crown development.
- Maintain den and snag trees for use by cavity nesting species, roost trees for bats and as future source of large material on the forest floor for wildlife habitat, nutrient cycling and as an adaptive strategy for climate change.
- Maintain or enhance amphibian and reptile habitat including basking and nesting sites and travel corridors between wetlands.
- Manage riparian areas to protect water quality and to protect and enhance habitat for amphibians, reptiles and mammals.
- Manage invasive species.

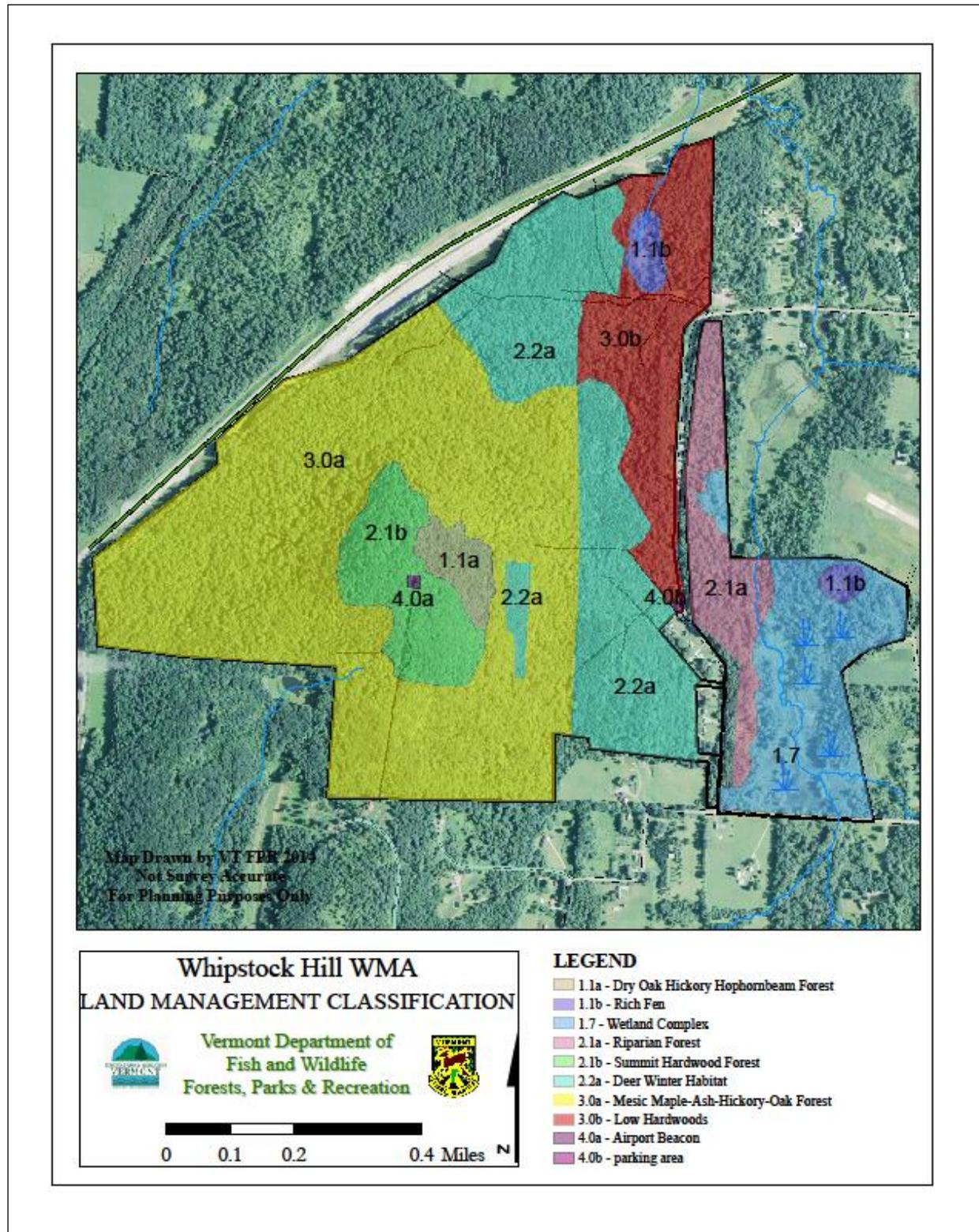
**Historic Resources Goals and Objectives:** *Protect historic resources*

- Identify and document historic resources within the WMA.
- Follow *ANR Timber Harvest Archeology Protocol* for the protection of archeological resources during harvesting operations.
- Conduct archeological review prior to any ground disturbing activities including uplands and wetlands.

**Recreation and Scenic Resource Goals and Objectives:** *Provide opportunities for dispersed fish and wildlife-based recreation including hunting, fishing, trapping, walking, and wildlife viewing.*

- Develop and maintain parking area for public access and kiosks to provide information.
- Consider requests for recreational uses. Evaluate compatibility with wildlife habitat conservation objectives.
- Manage interior road system for management and public access according to Acceptable Management Practices (AMPs).
- Manage invasive species that impede pedestrian access.

Figure 12: Land Management Classification Map



## *Land Management Classification on Whipstock Hill WMA*

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### **1.0 HIGHLY SENSITIVE MANAGEMENT — 54 acres**

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Highly Sensitive Management (HSMA) areas represent approximately 54 acres or 13% of the WMA.

HSMA include a complex of wetland communities and a dry oak-hickory forest:

- Two examples of Rich Fen – uncommon and state significant
- Dry Oak-Hickory-Hophornbeam Forest
- Wetland complex including:
  - Calcareous Red Maple-Tamarack Swamp - rare
  - Red Maple-Black Ash Seepage Swamp - common
  - Silver Maple-Sensitive Fern Riverine Floodplain Forest - uncommon
  - Wet Clayplain Forest - rare

A diversity of wildlife is supported by these communities including those associated with wetland habitat (i.e. beaver, muskrat, bats, water fowl, and amphibians) as well as a variety of species (songbirds, turkey and deer) in the oak forest. Widely dispersed, non-motorized, non-mechanized recreational uses may be accommodated. These areas offer opportunities for hunting, fishing, trapping, walking and wildlife viewing.

Archeological sensitivity is, in part, based on proximity to wetland and adjacent landscape features indicating that the area adjacent to the wetland complex may be highly sensitive from an archeological perspective. Further study is needed to make a definitive determination.

Management here is focused on protection of community characteristics and maintenance or enhancement of wetland function and habitat.

#### ***HSM 1.1a – Dry Oak-Hickory-Hophornbeam Forest (7 Acres)***

An occurrence of an uncommon natural community, Dry Oak-Hickory-Hophornbeam Forest (DOHHF), found near the summit of Whipstock Hill, includes a rare tree and several species that are more common in southern forests including red and white oak and shagbark and pignut hickory. It is also relatively free of invasive species making it an exception within the WMA and the surrounding landscape.

Management will focus on maintaining native species composition and monitoring for introduction of invasive species.

#### ***Management Actions:***

- Conduct regular monitoring for presence or introduction of invasive species. If found, manage invasive species with goal of eliminating them from this community.
- Evaluate management strategies and actions for potential impacts to this natural community.

- Manage invasive species in adjacent areas, at lower elevations and along beacon access road to restrict their spread to this area.
- Management of native vegetation will be considered if lack of management results in lower natural community condition rank. Management focus will be on maintaining or enhancing natural community composition and process not on timber or wildlife habitat management.

**HSM 1.1b – Rich Fen (6 Acres)**

Rich Fens are small, mineral rich wetlands with continuous seepage of groundwater. This rare, natural community type is isolated on the landscape consisting of just 1.1 acres in two separate locations within the WMA. A 100-foot management buffer surrounds these occurrences to protect their hydrology. They are considered to be of statewide significance.

The northern-most Rich Fen is surrounded by Mesic Maple-Ash-Hickory-Oak Forest and is within a more disturbed landscape. The smaller example is within the area designated as Wetland Complex (HSM 1.7) and is surrounded by Mesic Clayplain Forest and Wet Clayplain Forest. Both examples likely have a history of human disturbance, and were probably grazed by sheep or cattle in the past.

These communities are botanically rich, often containing rare or uncommon plants. Protection of their diversity and hydrology are important goals for these communities.

***Management Actions:***

- Establish a 100-foot no-harvesting/no-machinery buffer (mapped), and an additional 200-foot winter-only limited-harvesting (75% canopy retention) buffer around fens to protect hydrologic function.
- Monitor and control beaver activity that negatively impacts Rich Fens.
- Monitor fens to determine if additional management actions are needed to maintain or enhance condition.
- Monitor and manage invasive species with the goal of eliminating them from these areas.

**HSM 1.7 – Wetland Complex (40 Acres)**

A complex of wetland communities on the eastern side of the WMA includes:

- Beaver Wetland
- Calcareous Red Maple-Tamarack Swamp - uncommon
- Red Maple-Black Ash Seepage Swamp
- Seep
- Shallow Emergent Marsh
- Silver Maple-Sensitive Fern Riverine Floodplain Forest - uncommon
- Mesic Clayplain Forest - rare
- Wet Clayplain Forest - rare

The ecological and habitat values of the wetland complex are significant and extensive. These communities fulfill the critical functions of flood water storage, surface and ground water discharge and recharge, and protect water quality by trapping sediments and filtering

nutrients and pollutants. They also provide critical habitat for a diversity of species that rely on wetland habitat for all or part of their life cycle requirements. Adjacent roads and invasive species impact this wetland complex.

The Clayplain forests found on the WMA represent rare examples of these communities outside of the Champlain Valley. These are the first examples of Mesic Clayplain and Wet Clayplain forests in the Vermont Valley and as such are of regional ecological importance.

Management that focuses on the ecological processes that maintain the aquatic system and wetland function within the complex will help to conserve these values.

***Management Actions:***

- Identify and manage for riparian area functions following the *Riparian Management Guidelines for Agency of Natural Resources Lands* (December 2015).
- Allow beaver activity and ponding to persist where it does not impact Rich Fen communities or infrastructure in order to support amphibian breeding sites.
- Manage invasive species to enhance wetland function and native species composition.
- Continue to provide opportunities for dispersed fish and wildlife-based recreation.
- Assess archeological sensitivity prior to any ground disturbing management activity.

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## **2.0 SPECIAL MANAGEMENT — 118 acres**

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Special Management Areas (SMA) represent approximately 118 acres or 27% of the Wildlife Management Area.

SMA includes:

- deer winter habitat
- riparian forest
- high quality, uncommon hardwood forest

Primary uses and management of these areas will be to provide critical wildlife habitat and wetland protection and conserve uncommon forest communities.

Fish and wildlife-based recreation including hunting, fishing, trapping and hiking are compatible with the goals of this designation. Conflicts between human use and winter wildlife use can occur. While there are no trails near the areas of winter habitat, there are woods roads into these locations and winter recreation uses will need to be carefully monitored and evaluated for its impact on the value of winter habitat.

### **SM 2.1a – Riparian Forest (19 Acres)**

A narrow band of riparian forest comprised of Mesic Maple-Ash-Hickory-Oak Forest provides wildlife habitat and buffering between Whipstock Road and the wetland to the east. Forests in these locations on the landscape fill both wetland protection and wildlife habitat roles.

This forest is highly disturbed and dominated by white ash and white pine with a component of aspen. A small, poor quality red pine plantation is at the southern end. The overstory is generally poor quality and understocked; the understory is dominated by invasive species.

White ash within the WMA is declining. To rule out Emerald Ash Borer (EAB) traps were set in spring 2015 and monitored throughout the season by the VT Department of Forests, Parks & Recreation. Some trees were sampled and bark peeled to determine if EAB was present. Neither traps nor peeled trees showed presence of EAB. Monitoring efforts will continue.

Despite proximity to the wetland complex, this area of forest currently provides limited quality habitat for amphibians. Management that moves this forest to a mature, hardwood-dominated condition with deep leaf litter and abundant coarse woody debris will improve its ability to function as riparian forest for a suite of values including improved suitability as upland foraging habitat for those species of amphibians that breed in the wetland allowing them to persist without having to cross roads to meet their habitat needs.

This area is suitable for fish and wildlife-based recreation including hunting, trapping, hiking, nature appreciation and wildlife viewing.

***Management Actions:***

- Manage this area to enhance riparian forest health and function following *Riparian Management Guidelines for Agency of Natural Resources Lands*, (December 2015).
- Focus management activities on expanding areas of native species and management of competing invasive species.
- Manage Red pine at southern end of this area (stand 6) to transition to natural community composition (hardwood) with uneven-age structure. Manage invasive species prior to and following harvest, as needed, to facilitate establishment of native or non-invasive species. Cut red pine in patches focused on retention of quality trees as stand is transitioned. Log in winter to limit ground disturbance and spread of invasive species. Consider planting as necessary to meet goals.
- Allow coarse woody debris to accumulate to support reptile and amphibian habitat and to support riparian function.
- If opportunity arises, employ similar strategies of managing invasive species in and around better quality areas of the stand. The north end of this area is of poorer quality and is a lower priority for management.
- Explore the feasibility of constructing a short hiking/walking loop trail with a viewing platform or area suitable for wetland/wildlife viewing.

**SM 2.1b – *Summit Hardwood Forest (20 Acres)***

The hardwood forest at the summit of Whipstock Hill is comprised of a high quality example of the uncommon Mesic Maple-Hickory-Oak Forest. While similar in composition to the surrounding forest, it is of higher quality and has characteristics of Transition Hardwoods Limestone Forest, a variant of Mesic Maple-Hickory-Oak Forest. Management here will focus on maintaining or enhancing natural community composition.

The access road and powerline that support operation of the airport beacon are located within this area. While invasive species are all but absent from the rest of this area they are making their way up the access road and are found at the beacon site.

***Management Actions:***

- Manage forest to promote diversity of age, structure and native species composition. Maintain snag and den trees as quality habitat elements, as an element of sustainable forest management and as a climate change adaptation strategy.
- Maintain or enhance mast production (i.e. hickories, oaks).
- Manage invasive species in order to promote native understory. Focus control along access right-of-way. Monitor.

***SM 2.2a – Deer Winter Habitat - Plantations (79 Acres; Figure 12 reference 2.2b)***

Deer winter habitat management is a primary goal of ownership for Whipstock Hill WMA. Red pine and Norway spruce plantations established in the 1960s or later provide important winter cover for deer and other species. The quality of the softwood cover and structural condition of the habitat varies and is generally better in the Norway spruce stands.

The biggest threat to this habitat is the proliferation of invasive species, particularly oriental bittersweet and honeysuckle. Bittersweet has impacted crowns and even girdled trees in some locations. Managing invasive species in these areas will be the key to perpetuating quality winter habitat and promoting native regeneration. There is a general lack of suitable browse for wintering deer within and adjacent to winter cover.

Due to the poor condition of some of these stands, the expense of chemical treatment of invasive species, and the cost associated with planting it is unlikely that a commercial timber sale will cover the cost of management. Rather it will likely require a separate funding source to accomplish this management.

***Management Actions:***

- Thin better quality plantations (or portions of plantations) to promote crown development and improve stand vigor. Manage invasive species (primarily honeysuckle, oriental bittersweet, Norway maple) using herbicide (stump application) in higher quality areas of the plantation.
- In poor quality pockets within plantations (gaps in cover) manage invasive species, harvest in groups centered on worst quality and replant with suitable softwood species to improve chances of out-competing and successfully achieving/retaining softwood cover over the long term. Experiment with softwood species to determine best opportunity for success.
- Prioritize management in areas where expansion of existing quality cover can be most successful.
- In area of transition between softwood plantation and hardwood forest manage invasive species to increase opportunity for successful regeneration of native species.

- In areas with aspen clones look for opportunities to manage invasive species and harvest aspen to successfully establish new age class. Evaluate methods and rate of success.
- Buffer springs associated with water rights held by adjacent landowners.

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### **3.0 GENERAL MANAGEMENT** — 252 acres

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General Management Areas (GMA) represent approximately 252 acres or 59% of the WMA.

GMA includes:

- Mesic Maple-Ash-Hickory-Oak Forest
- Northern Hardwood Forest
- Low quality hardwoods

The areas classified as General Management are dominated by hardwood forests of varying quality. The forests higher on the slope of Whipstock Hill are of better quality and have a much smaller component of invasive species. The line at which invasive species stop is related to the land that was in agriculture as shown in the 1962 aerial photographs.

Most of the forest land within this area is Mesic Maple-Ash-Hickory-Oak Forest, a natural community similar to Northern Hardwood Forest but with species more common to the south (i.e. hickories, oaks).

Management will focus on maintaining and enhancing wildlife habitat, the production of quality forest products, and supporting dispersed recreation. In order to be successful all activities must consider and manage invasive species.

Invasive species management will be prioritized by density of population with the primary goal of eliminating small, isolated infestations in the area with the lowest density of invasive species and where impacts to rare, threatened and endangered species and communities are high. This strategy requires the lowest level of commitment and resources and protects the greatest acreage. Secondary focus will be on expanding areas of quality forest where opportunities for securing native regeneration can be realized. Control efforts at the core of the infestation are the costliest and require the greatest commitment. These areas may be the target of experimental treatments including burning and grazing.

An established network of skid roads is in place for both public and management access. Management will focus on maintenance of quality wildlife habitat, production of quality forest products, supporting fish and wildlife-based recreation and strategic management of invasive species.

### **GM 3.0a – Mesic Maple-Ash-Hickory-Oak Forest & Northern Hardwoods (213 Acres)**

The forest surrounding the summit of Whipstock Hill is of the highest quality within the WMA. These generally undisturbed areas have a canopy of sugar maple, white ash, oaks and hickories with drier sites favoring oaks and hickories and the more mesic sites favoring maple and ash. Southern slopes may be occasionally used by wintering deer. At the lower elevations the forest is more disturbed and more heavily impacted by invasive species, correlating heavily with past agricultural use.

#### ***Management Actions:***

- Manage forest to promote diversity of age, native species and structure. Maintain snag and den trees as quality habitat elements, as an element of sustainable forest management and as a climate change adaptation strategy.
- Silvicultural treatments should focus on single tree and group selection favoring southern species – oaks and hickories – as a source of mast, habitat, and as a climate change adaptation strategy.
- Manage invasive species before (if necessary) and after any management activity.
- Monitor and evaluate populations of invasive species and effectiveness of management.
- Evaluate and monitor the health of ash (white and black) given proximity to known infestations in New York and Massachusetts following management guidelines from the department of Forests, Parks & Recreation.
- Identify and map historic resources associated with the Burden Iron Works generally located in the southwest corner of the WMA. Buffer historic resources from road and trail management. Consider careful interpretation of historic resources.
- Follow ANR Timber Harvest Archeology Protocol for the protection of archeological resources during harvesting operations in sensitive areas

### **GM 3.0b – Low Hardwoods (40 Acres)**

This hardwood forest is a more disturbed and lower quality example of the Mesic Maple-Ash-Oak-Hickory Forest community and is located lower on the slope and adjacent to Whipstock Road. Stocking is variable but it is generally characterized by an understocked stand of poor quality hardwoods dominated by an understory of invasive shrub species, predominantly honeysuckle. There are pockets of pole-sized hardwoods that have potential for management. Expanding these areas of native species by managing invasive species may have some success.

A small field provides early successional habitat if mowed regularly to control invasive species. Wet areas within the stand may provide opportunities to construct wetland features to improve amphibian breeding habitat in proximity to upland foraging habitat.

Town road frontage and an interior system of woods roads make this the most logical and convenient location for public and management access to the WMA. Lack of parking and the proliferation of invasive honeysuckle on the interior roads are impediments to access.

***Management Actions:***

- Install gate and sign at northern end on the forest access road at the sharp bend on the Whipstock Road.
- Manage invasive species in order to facilitate public access from parking area and from access road off corner of Whipstock Road at northern end.
- Maintain road as suitable pedestrian and management access according to Acceptable Management Practices (AMPs)
- Expand old field by managing honeysuckle at its edges using either chemical or mechanical control methods. Mow regularly to control invasive shrubs and to maintain habitat component.
- Explore opportunities to experiment with invasive species management including goat grazing, controlled fire, etc. Support credible research projects that focus on invasive species control within the context of the long-range management plan.
- Explore potential and suitability of creating a wetland feature to augment amphibian breeding habitat and lessen incidence of mortality associated with crossing the road (from wetland complex) to reach foraging habitat.
- Maintain pockets of native hardwood that have already overtopped honeysuckle. Manage invasive species within and at edges of these pockets to expand native hardwoods.
- Seek funding sources to support non-commercial management activities within the WMA.

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**4.0 INTENSIVE MANAGEMENT — 0.50 acres**

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Intensive Management Areas represent only 0.50 acres or less than 1% of the WMA.

IMA includes:

- The airport beacon site
- Developed parking area

The only areas within the WMA that are classified as Intensive Management are the airport beacon at the summit of Whipstock Hill and the proposed parking area at Whipstock Road and TH #7. The Vermont Agency of Transportation has the deeded right to build, maintain and replace the rotating air navigation beacon at the summit along with the right to maintain the right-of-way to the site.

***Management Actions:***

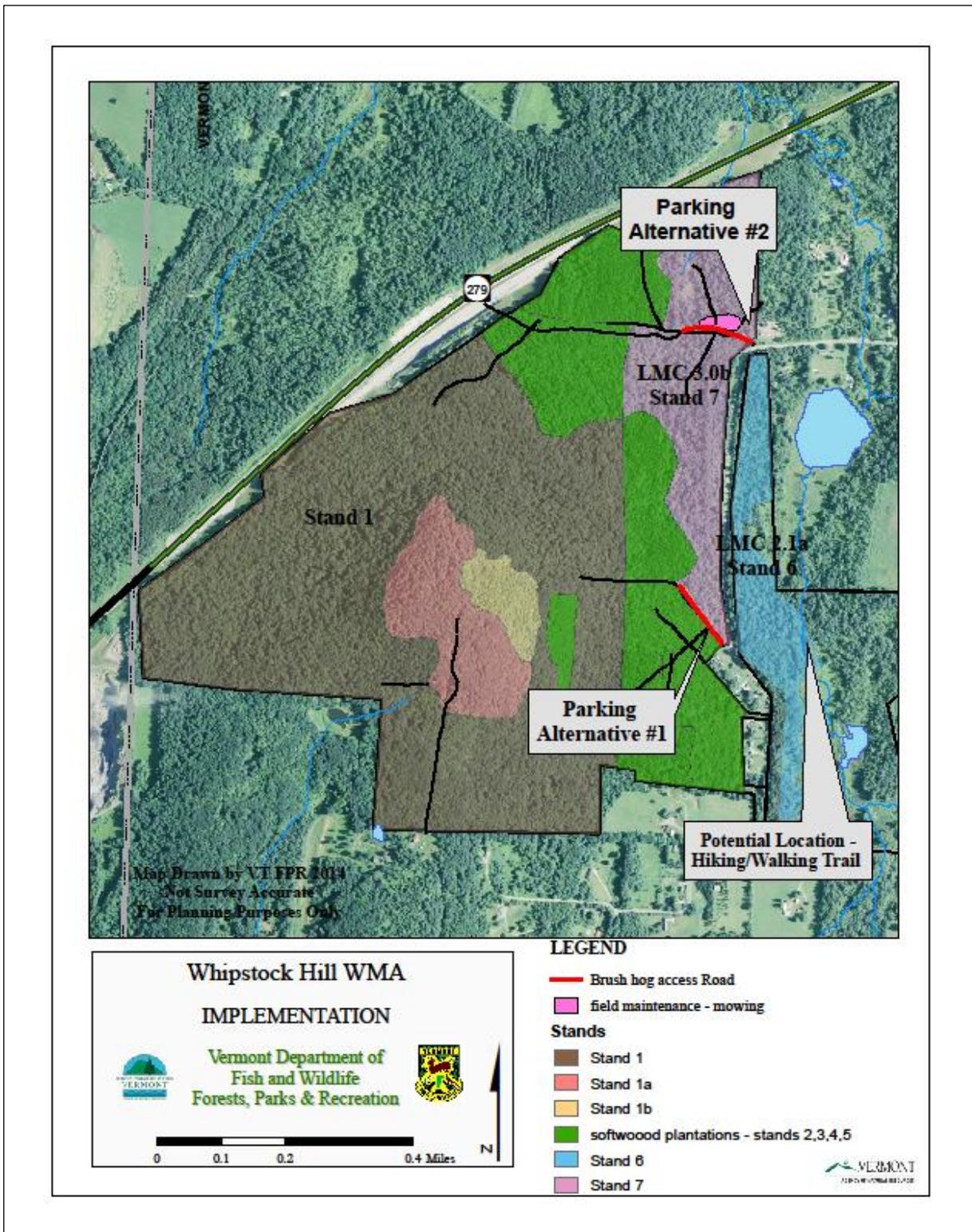
- Work with the VT Agency of Transportation to limit the introduction and spread of invasive species.
- Protect rare, threatened and endangered plant and animal species and natural communities.
- Construct small (3-5 car) parking area adjacent to TH 7 and Whipstock Road. Seek permits as needed. Install kiosk.
- Minimize the influence of management activities associated with this site on adjacent areas.
- Minimize soil erosion on road by employing Acceptable Management Practices.

**Table 12: Implementation Schedule**

<b>Activity</b>	<b>Location</b>	<b>Acres</b>	<b>Goal</b>	<b>Year</b>	<b>Outcome</b>
Brush hog field – fall	NE corner LMC – 3.0b	1	Maintain early successional habitat	annual	Wildlife habitat. Invasive species control.
Brush hog access – fall	NE corner & eastern side LMC – 3.0b	1000’	Manage invasive species along access road.	annual	Public and management access.
Develop parking	At end of TH 7 P-1 (on map) preferred location; P-2 alternate	1	Create 3-5 car parking area.	2017	Public access.
Install sign, kiosk	Parking area	--	Install sign and informational kiosk	2017	Public access. Public information.
Install gate – management access	Management access at north end Near P-2 on map	--	Install gate on access roads	2016	Limit unauthorized access and spread of invasive species
Develop accessible trail with wetland viewing platform	Stand 6 LMC – 2.1a	1 mile	Create hiking trail access & wetland viewing.	2018	Recreation – wildlife viewing. Accessibility
Mark boundaries	All	—	Paint property boundaries on 15 year schedule	—	Protection of public investment.
Create vernal pools or small wetland features	Stand 7 LMC – 3.0b		Control invasive species. Construct wetland feature.	2018	Enhanced wildlife habitat. Reduced road mortality.
Management in softwood Plantations:	Stand 2,3,4,5	79	expand quality winter habitat	2017+	Quality deer winter habitat.
<b>Step 1:</b> Cut patches (commercially or non)	Focus on expanding areas of highest quality. Cut patches of poor		<ul style="list-style-type: none"> <li>• Manage invasive species</li> <li>• Promote softwood habitat</li> </ul>		Improve deer winter habitat

<b>Activity</b>	<b>Location</b>	<b>Acres</b>	<b>Goal</b>	<b>Year</b>	<b>Outcome</b>
<p><b>Step 2:</b> Treat invasive species – chemical or mechanical</p> <p><b>Step 3:</b> plant with softwood</p> <p><b>Step 4:</b> monitor</p> <p><b>Step 5:</b> repeat planting and invasive control as needed.</p>	quality, manage invasive species, & plant. Prioritize expansion of highest quality areas within plantations.		<ul style="list-style-type: none"> <li>Promote native species</li> </ul>		
Management in Hardwood forest	Stand 1, 7, 6	289 Stand acres	Expand native species composition	2019	Healthy and resilient forests
Focus on areas of highest quality and potential for native regeneration and aspen clones. Control invasive species. Monitor and evaluate. Focus resources on areas of greatest potential for success.					
Invasive species control. Monitor effectiveness. Repeat as necessary.	Along beacon access road and at beacon		Eliminate invasive species from interior upland forest & access	2016+	Healthy and resilient forest.
Invasive management research	Throughout		Support credible research on invasive species management		Native species
Monitor condition of significant natural communities, wetlands, rare, threatened & endangered species to evaluate the impacts of public use and management.	Throughout	—	Maintain natural community quality and native species composition.	Every 5 years (approx.)	Healthy, diverse and resilient forest and habitat structure.

Figure 12: Implementation Map



## V. MONITORING AND EVALUATION

During the life of the Long Range Management Plan (LRMP) for Whipstock Hill WMA, periodic monitoring and evaluation will be conducted to ensure that the resources are protected from fire, insect and disease, encroachments, or unforeseen problems that may occur within the WMA. Management activities will be evaluated to determine how closely the results matched those projected within the plan. Minor adjustments in management may be made to reflect changed conditions or unanticipated results.

As long-term management for Whipstock Hill WMA continues, inventory, monitoring, assessment, and research are necessary to evaluate the status of the resource; assess progress toward achieving stated goals; and determine the effectiveness of management actions and activities.

- Were proposed strategies and actions carried out?
- Did the strategies and actions have the intended effect?
- Were the results consistent with expectations and predictive models?
- Do we have the necessary information to understand and evaluate actions taken on Whipstock Hill WMA?

Obtaining quality information is critical to making informed decisions and conducting sound, thoughtful management actions. Research projects on Whipstock Hill WMA are directed by the District Stewardship Team to ensure that they do not conflict with the goals and objectives for the WMA as set forth in the LRMP. It is important that individual research projects be assessed for their effects on the resource, potential conflicts with other uses or users, and consist of quality proposals from credible institutions and individuals. All data from private research will be shared with the Agency of Natural Resources.

### **Ecological/Wildlife**

Maintaining the biological diversity of Whipstock Hill WMA requires long-term research and monitoring projects in a number of areas. Some of the efforts at meeting these goals include:

#### ***Strategies and Actions:***

- Continue ongoing inventory and assessment projects promoting the collection and documentation of quality long-term information critical to the assessment and evaluation of management on the WMA (including forest inventory, aerial insect and disease surveys, and amphibian and reptile surveys).
- Monitor rare, threatened, and endangered species and natural communities.
- Consider and support appropriate, credible research project proposals which further understanding of ecological elements and wildlife habitat on the WMA and the impacts of management activities.

### **Timber and Wildlife Habitat**

Timber management and harvest is an important tool used to achieve wildlife habitat and forest management objectives. An effective monitoring and assessment program is essential for ensuring the long-term sustainability of a quality timber management program. Careful analysis

of the forest, its resource capabilities, potential impacts on other important management goals, protection of rare and/or threatened endangered species, water quality, management or protection of rare and/or state significant natural communities, and the documentation of the occurrence of natural processes (i.e., insect and disease outbreaks, blowdown events) is important in the execution and understanding of the effects of timber management actions.

Timber harvests and wildlife management activities completion within the WMA will be periodically reviewed by the stewardship forester and the District Stewardship Team to determine how well management objectives are being met. If monitoring results indicate that there is a significant difference between the outcomes predicted by the plan and actual conditions, changes to the plan may be recommended.

***Strategies and Actions:***

- Continue to support ongoing assessment and mapping efforts (e.g., forest inventory, aerial insect and disease surveys).
- Continue to monitor for the presence of Emerald Ash Borer in populations of declining ash within the WMA.
- Conduct periodic, standardized post-practice assessments to assess effectiveness of management activities.
- Support proposals for appropriate research addressing long-term evaluation of forest management activities. Gather baseline data as necessary and practical to support assessment of management effectiveness and impacts.

**Recreation**

Public recreation will be periodically monitored across the property by the District Stewardship Team to identify where recreational uses are in conflict with or may be damaging natural resources. Changes in recreational uses may be implemented including new management strategies designed to minimize or eliminate conflicts. State game wardens will be utilized to assist with maintaining compliance with state laws where specific and/or ongoing problems are occurring.

***Strategies and Actions:***

- Document illegal use and damage of resources.
- Support appropriate research projects including the collection of baseline data to expand knowledge of recreational carrying capacity, resource impacts, and user conflicts.

**Historic**

There are both historic and suspected pre-contact resources within the WMA. Current understanding and documentation of these resources varies by site. Detailed documentation and study of field evidence is an important component to the understanding, protection, and interpretation of the individual sites and the greater historic context of Whipstock Hill WMA and surrounding areas.

***Strategies and Actions:***

- Continue to inventory, map, and document historic features.

- Monitor and document condition of known historic features using standardized forms and photo documentation.
- Support efforts to research the history of Whipstock Hill WMA.

### **Invasive Exotic Species**

Invasive exotic species are known to be a problem in many areas of the state negatively impacting wildlife habitat, timber management, natural community composition, recreation, and economics and are of particular problem on Whipstock Hill WMA. The District Stewardship Team will implement management of invasive exotic species and work with cooperating partner organizations to develop a monitoring protocol.

#### ***Strategies and Actions:***

- Identify invasive species when populations are small. Develop control goals and implement.
- Assess and document levels of introduction of invasive exotic plants by species and location.
- Monitor timber harvest areas before and after timber sale activities. Control invasive species as necessary and practical.
- Evaluate invasive species control projects for effectiveness.
- Develop partnerships to monitor plant and insect invasive species.

### **Climate Change**

If the most conservative current models of climate change are accurate (Iverson, Prasad, Hale, & Sutherland), Whipstock Hill WMA, like the rest of the region, will experience strong impacts over the next 50-100 years. These changes may have important consequences for forest nutrient cycling, timber productivity, forest pest ecology, wildlife habitat, and our enjoyment of the forest.

#### ***Strategies and Actions:***

- Monitor ground conditions, results of management, research, and adaptations of silvicultural guides to inform management decisions and adapt treatment prescriptions as appropriate.
- Support appropriate research project proposals which further understanding of climate change on Whipstock Hill WMA.

## **VI. NEW USES AND PLAN AMENDMENT PROCESS**

The long range management plan provides guidance for the long-term management and development of a parcel of state land. However, the future cannot be fully determined at the time of plan development. The departments of Fish & Wildlife and Forests, Parks and Recreation undertake an amendment or plan update process when significant changes to the current long range management plan are proposed. These may include:

- Substantial changes to any goals, management objectives, and implementation actions contained in the current plan
- Major change in land use, land classification, or species management direction
- Designation of non-developed camping sites (via statute regarding camping on state lands)
- Permanent closure of existing trails and/or permanent creation of new recreation corridors not identified in the current plan
- Major rerouting, reclassification, permanent closing or creation of new roads (not including forest management access roads not meant for normal vehicle traffic) within state land boundaries not identified in current plan
- Major land acquisitions added to the existing parcel
- Major capital expenditures for new projects
- Facility closures
- Transfers in fee ownership
- Leasing of new acreage (e.g., ski resort)
- Renaming of natural features (prior to recommendation to Department of Libraries) or lands

When the amendment process is triggered, a public involvement process begins. The type of process is determined at the time and is dependent upon the extent and type of amendment. If applicable, the easement holders are notified to discuss the proposed amendment.

There may be times when the public input and comments are sought regarding plan changes that are less significant than those triggering the plan amendment process. This is left to the discretion of the District Stewardship Team.

## VII. FUTURE ACQUISITION/DISPOSITION

Through its October 1999 *Vermont Agency of Natural Resources Lands Conservation Plan*, the Agency outlined priorities for acquiring new lands as well as for acquiring additions to existing ANR lands. It is the State's policy to acquire additions to ANR state lands parcels that are:

- 1) necessary for maintaining or enhancing the integrity of existing state holdings,
- 2) lands, such as inholdings and other parcels that serve to consolidate or connect existing state holdings and contain important public values and/or facilitate more efficient ANR land management
- 3) parcels that enhance or facilitate public access to ANR lands, and/or
- 4) parcels that serve an identified facility, infrastructure, or program need.

All new acquisitions of land to Whipstock Hill WMA will be guided by this plan and must have a willing seller, as the Agency does not have the authority to exercise eminent domain. They will also be done in consultation with the regional planning commissions and the town(s) in which the parcel is located.

Cooperative conservation efforts with land trusts and landowners could solidify a strong local base of undeveloped lands surrounding the WMA. The experience of the State has been that development of parcels interior to, or adjoining, WMA's leads to conflicts with management and pressures on non-wildlife related recreational use of the property. Conflicts commonly arise between hunting on WMA's, nearby landowners, and non-hunting users of the property. Conservation of interior and adjacent undeveloped lands that limit residential and commercial development creates opportunities for complementary management and far fewer conflicts between users of state lands and owners of adjacent lands.

Any future disposition of land from Whipstock Hill WMA will be approved by the Agency of Natural Resources Land Acquisition Review Committee (LARC) and the Secretary of the ANR after consultation with the regional planning commission and the town(s) in which the parcel is located.

## **APPENDICES**

- APPENDIX 1: Natural Community Assessment
- APPENDIX 2: Forest Inventory Data and Stand Map(s)
- APPENDIX 3: Reptile and Amphibian Data
- APPENDIX 4: Public Comment Summary
- APPENDIX 5: Works Cited
- APPENDIX 6: Rules Governing Use of Fish and Wildlife Department Land
- APPENDIX 7: Glossary

# APPENDIX 1: Natural Community Assessment

## Ecological Assessment of Whipstock Hill WMA

October 27, 2011

The Agency of Natural Resources uses the “coarse filter/ fine filter” approach to the ecological inventory and assessment of state lands (Jenkins 1985; Noss 1987; Hunter et al. 1988; Hunter 1991; Noss and Cooperrider 1994; Haufler et al. 1996; Jenkins 1996; Poiani et al. 2000). Widely employed as a management tool on state, federal, and private lands (see for example: Leslie et al. 1996; Committee of Scientists 1999; Stein et al. 2000; USFS 2000, 2004), it is an aid to land managers who seek to protect most or all of the species that naturally occur on their lands, but who lack the resources to make exhaustive inventories of all taxonomic groups. Because many groups of organisms are cryptic or poorly understood (for example, fungi and soil invertebrates), it is not practical to make lists of all of them (Anderson et al. 1999; Willis and Whittaker 2002). Even if we could assemble such lists of species, it would be impossible to manage the land with all of them in mind. Instead, natural communities are treated as a proxy for the biological organisms of which they are composed. It is thought that if examples of all of Vermont’s natural communities are conserved at the scale at which they naturally occur, most of the species they contain, from the largest trees and mammals to the smallest insects, will also be conserved (NCASI 2004). Natural communities are thus a coarse filter for “catching” the majority of an area’s native organisms. Because conservation of habitats (in the form of natural communities) will not protect all species, we also employ a “fine filter” to catch the remaining species that are known to require very specific conditions for their growth, reproduction, wintering, etc. Examples of organisms benefiting from the fine filter inventories described below include breeding birds, deer on their wintering areas, and rare plants.

The coarse filter assessment begins by describing landscape and climatic factors that characterize Whipstock Hill Wildlife Management Area (WHWMA), such as bedrock geology and water resources. It then details the 12 distinct natural community types documented and mapped during inventories of WHWMA. This is followed by a fine filter assessment describing rare species, invasive plants, and wildlife habitats found here.

### **Coarse Filter Assessment**

#### Biophysical Region and Climate

Vermont’s biological landscapes are divided into eight regions that share features of climate, topography, geology, human history, and natural communities. These regions are continuous in adjacent states, and are related to regional and national classifications of ecological systems in North America. WHWMA is located along the Vermont-New York border just west of the village of Bennington, and is within the Vermont Valley biophysical region, which stretches from Bennington, through Manchester, and up north to just beyond Rutland. While much of the Vermont Valley is very narrow and sharply defined by the Green Mountains and Taconic Mountains, near Bennington the valley is broader, with low rolling hills (such as Whipstock Hill) extending west into New York. Compared to the surrounding mountains, the Vermont Valley is a warm and dry place. The bedrock is calcium-rich limestones, dolostones, slates, and marbles, which contribute to producing nutrient-rich soils.

## Bedrock Geology, Surficial Geology, and Soils

The geologic history of an area can have a strong influence on the distribution of natural communities. The bedrock underlying WHWMA is of the Bascom and Hortonville formations. Both are Ordovician-era sedimentary rocks. The Bascom formation is primarily dolostone but also includes limestone beds. The Hortonville formation is black slate and phyllite. Both of these rocks weather easily and can contribute to soil enrichment when bedrock is close to the surface. A few bedrock exposures can be found in WHWMA, but mostly the bedrock is buried by surficial materials deposited at the end of the last continental glaciation, some 15,000-12,000 years ago. As the glacier ice melted, rock fragments of all sizes, from boulders to clay, fell in an unsorted jumble known as glacial till. Till covers most of the terrain at WHWMA, but in places this till has been buried by subsequent depositions of sediments and organic matter.

The west side of the WMA may be part of a kame moraine, where running water deposited sandy sediments at the head of the melting glacier. Areas around the wetland complex east of Whipstock Road have areas of deep clay, which could either be the result of glacial lakes, or more recent flooding events. Finally, wetlands in WHWMA have post-glacial accumulations of peat, muck and alluvium. Peat and muck result from organic materials deposited in acidic and anaerobic environments, which consequently decay more slowly than they are produced. Alluvium is deposited by flowing water, such as sand and silt deposited during flooding events.

Soils at WHWMA are primarily the result of these surficial deposits. USDA soil mapping indicates that the most widespread soil types in the parcel are of the Macomber and Taconic series, covering 124 acres around the higher elevations of Whipstock Hill. These are shallow to moderately-deep, generally well-drained soils. The lower elevations are generally mapped as loam soils of the Dutchess, Georgia, Pittstown, and Stockbridge series. Alluvial soils of the Limerick series are mapped around the flowing stream in the parcel east of Whipstock Road, and the wetland complex includes about 6 acres mapped as Carlisle mucky peat.

## Hydrology

The Vermont Valley is a relatively dry part of the state, and WHWMA receives about 37 inches of precipitation per year. There are no major rivers or water bodies on the property, but several small streams flow through the WMA, and there are several small water bodies, some of which are the result of beaver activity. These waters are all part of the Hudson River basin, and most drain north into the Walloomsac River. The southwest corner of the property drains into Brown's Brook and the Hoosic River. The large wetland complex east of Whipstock Road is the most notable wetland, with open marshes, wet woods, and an example of the globally rare Rich Fen natural community type. A few other small wetlands can be found scattered around WHWMA. Near the New York border, there is a pool of water about 70 by 30 feet in size, within a 20-25 foot deep closed depression. This pool was reportedly created as part of the Burden Iron Works that existed in the 19<sup>th</sup> century.

## Natural and Human Disturbance

Natural disturbance in WHWMA is primarily limited to small-scale disturbances such as individual tree fall. Because WHWMA is located in a warm and dry part of the state, lightning-caused forest fires may have once been an infrequent larger-scale disturbance. Wetland disturbance regimes include hydrological changes resulting from large floods, which can

redistribute sediment and change surface flow, and from beaver activity, which can locally alter water levels and radically change a wetland's character.

The Vermont Valley region has a long history of human land use, and WHWMA is no exception. Conifer plantations and old building structures are evidence that much of Whipstock Hill was once heavily used by people. Much of the lower hill was open land in the early 20<sup>th</sup> century. When it was abandoned, it was quickly colonized by many non-native, invasive species and so now these areas are not reverting to natural forest, but have instead developed a dense shrub growth of these invasive species. The legacy of human land use will remain part of the landscape for a long time, as there is little that can be practically done to alter the current state of these areas.

### **Natural Communities**

A natural community is an assemblage of biological organisms, their physical environment (e.g., geology, hydrology, climate, natural disturbance regime, etc.), and the interactions between them (Thompson and Sorenson 2000). More than a simple collection of species, a natural community is characterized by complex webs of mutualism, predation, and other forms of interaction. The 89 natural community types described in Vermont repeat across the landscape in patches (or “polygons”) of various sizes. These patches (or groups of patches in close proximity to each other) are referred to as natural community occurrences, and are to be distinguished from broad descriptions of community types. Natural community occurrences vary greatly in their size. Matrix communities, such as Northern Hardwood Forests, occur in broad expanses across the landscape, and form the context in which other, smaller communities are found. Large patch communities, such as Mesic Red Oak-Northern Hardwood Forest, typically occur at scales of 10-100 acres. Small patch communities such as Seeps or Boreal Outcrops are usually less than 10 acres in size, and owe their existence to highly localized site and disturbance characteristics.

Natural communities in WHWMA were identified through aerial photograph interpretation and field surveys. Field data were collected using a Trimble GeoXM global positioning system (G.P.S.) unit, clinometer, compass, binoculars, soil augur, Cornell pH kit, and a variety of reference manuals for identification of plants, animals, fungi, etc. Many plant specimens were collected for identification in the lab. A Geographic Information System (G.I.S.) map of natural communities was produced using ArcView software from ESRI, Inc. Because some natural communities occur at very small scales (e.g., less than ¼ acre), this mapping effort is probably incomplete. Natural community mapping is an iterative process, and our knowledge improves with each mapping effort. Thus, the map presented here should not be viewed as a final statement on community distribution in WHWMA; instead, it should be treated as a first attempt at describing natural communities in this area. Land managers and members of the public should be aware that additional examples of small patch natural communities (e.g., vernal pools and seeps) probably occur on the management unit. As subsequent inventories and site visits are conducted, this map will be improved.

Natural community occurrences are assigned a quality rank, a statement of their overall ecological value which helps guide management. An “A”-ranked occurrence is of high quality relative to others of its type in the state, while a D-ranked example is of comparatively low quality. Quality ranks are objectively assigned on the basis of three factors: occurrence size, current condition, and landscape context. The three factors vary in the degree to which they

influence overall quality in different communities. For example, size and landscape quality are more important factors than current condition in the quality ranking of Northern Hardwood Forests, while current condition and landscape context receive greater attention in the ranking of Rich Fen. It is important to recognize that assignment of low quality ranks may be due to small size rather than poor current condition. When community occurrences are either rare or of high quality (or a combination of these factors), they may be designated as being of “statewide significance”. This designation is applied according to objective guidelines established by the Vermont Department of Fish and Wildlife which are available upon request. It is recommended that state-significant natural communities be afforded a higher level of protection than other areas of the management unit.

12 occurrences of 12 natural community types were identified and mapped in WHWMA (see table below). A total of 22 natural community polygons were mapped.

Some broad patterns emerged from this mapping effort. Whipstock Hill is forested with maple, ash, oaks and hickories, and has elements of both the northern and central hardwood forest regions. The upper slopes are primarily dominated by native species, but the lower slopes are highly disturbed from past land use and dominated by non-native species, many of which are highly invasive. To the east of Whipstock Road, a large wetland complex includes several calcareous wetland types, including the globally rare Rich Fen natural community. There are also patches of Mesic Clayplain Forest and Wet Clayplain Forest—two communities typically associated with the Champlain Valley. These are the first examples of these types that have been found in the Vermont Valley, and as such are of regional ecological importance.

The topography, soils, vegetation, and wildlife associations of each natural community in WHWMA are described below. The scientific names of plants and some uncommon animals are given the first time a species is mentioned in each description below.

<b>Natural Communities of Whipstock Hill WMA</b>				
<b>Natural Community</b>		<b>Acres</b>	<b>Vermont Distribution</b>	<b>Example of Statewide Significance ?</b>
<b><i>Wetlands</i></b>	Beaver Wetland	15	Common	
	Calcareous Red Maple-Tamarack Swamp	1.5	Rare	
	Red Maple-Black Ash Seepage Swamp	2.9	Common	
	Rich Fen	1.1	Rare	Yes
	Seep	0.3	Common	
	Shallow Emergent Marsh	1.3	Common	
	Silver Maple-Sensitive Fern Riverine Floodplain Forest	0.4	Uncommon	
	Wet Clayplain Forest	7	Rare	Yes?
<b><i>Uplands</i></b>	Dry Oak-Hickory-Hophornbeam Forest	17	Uncommon	
	Mesic Clayplain Forest	19	Rare	Yes?
	Mesic Maple-Ash-Hickory-Oak Forest	347	Uncommon	
	Northern Hardwood Forest	27	Very Common	
<p>For more information on these and other natural communities, see Wetland, Woodland, Wildland: a Guide to the Natural Communities of Vermont, by Elizabeth Thompson and Eric Sorenson. Information may also be found online at:  <a href="http://www.vtfishandwildlife.com/books.cfm?libbase=Wetland,Woodland,Wildland">http://www.vtfishandwildlife.com/books.cfm?libbase=Wetland,Woodland,Wildland</a></p>				

### **Beaver Wetland**

A 15-acre beaver wetland is found in the southeast portion of WHWMA. Aerial photographs from the past ten years indicate that these wetlands have not been static, and that beaver activity has repeatedly resulted in a changing water level. In some years areas of open water were present, and in other years the marsh did not appear to be flooded. It is expected that these dynamic processes will continue, and so beaver wetlands are not ranked or assigned significance as is done with natural communities. In general, however, these wetlands serve as important plant and animal habitat, and are of local significance.

In the summer of 2010, this wetland was characterized by tussock sedge (*Carex stricta*) and cattail (*Typha latifolia*). Scattered trees and shrubs include white pine (*Pinus strobus*), red maple (*Acer rubrum*), buckthorn (*Rhamnus cathartica*), non-native honeysuckles (*Lonicera* sp.) and red-osier dogwood (*Cornus sericea*). Other herbs noted were sensitive fern (*Onoclea sensibilis*), blue-flag iris (*Iris versicolor*), hardstem bulrush (*Schoenoplectus acutus*), green bulrush (*Scirpus atrovirens*), common rush (*Juncus effusus*), Joe-pye weed (*Eupatorium maculatum*), and swamp milkweed (*Asclepias incarnata*). Soils are saturated organics.

Beaver wetlands can provide habitat for many species of birds, mammals, and amphibians. Species likely present in this example include muskrat, mink, meadow vole, white-tailed deer, red-winged blackbird, green frog, and spring peeper. Many species of bats will forage around beaver wetlands because of the high concentration of insects. It is also possible that uncommon species of Odonates (dragonflies or damselflies) could be found in this wetland.

### **Calcareous Red Maple-Tamarack Swamp**

This wetland community has much in common with the Rich Fen community type (see below) but generally features a more developed woodland canopy. It has been mapped on 1.5 acres within the larger wetland complex east of Whipstock Road. Calcareous Red Maple-Tamarack Swamps are a rare community type in Vermont, but not enough data could be collected during surveys to determine if this example is one of statewide significance. It is, however, of local significance as part of the wetland complex.

This patch was identified during a winter visit, so vegetation data could not be thoroughly collected. It is likely that many of the species found in the Rich Fen are found in this swamp. Tamarack (*Larix laricina*), red maple (*Acer rubrum*), and poison sumac (*Toxicodendron vernix*) form a patchy canopy. Aspens (*Populus* spp.) and white birch (*Betula papyrifera*) are abundant in the vicinity of this community, suggesting that much of the wetland was cleared or logged in the past. Shrubs and herbs likely include alder-leaf buckthorn (*Rhamnus alnifolia*), shrubby cinquefoil (*Potentilla fruticosa*), red-osier dogwood (*Cornus sericea*), bog goldenrod (*Solidago uliginosa*), cattail (*Typha latifolia*), and marsh fern (*Thelypteris palustris*). The uncommon species fringed gentian (*Gentianopsis crinita*) could be present in sunny openings in this community; it is known to occur nearby in the Rich Fen.

### **Dry Oak-Hickory-Hophornbeam Forest**

Two patches of Dry Oak-Hickory-Hophornbeam Forest are found in WHWMA, and together form one ecological occurrence. This occurrence is not an example of statewide significance.

This community is probably on slightly drier sites than the similar Mesic Maple-Ash-Hickory-Oak Forest, but the two communities share many species and characteristics. Dry Oak-Hickory-Hophornbeam Forest has a 50-foot tall, 60% closed canopy of red oak (*Quercus rubra*), white oak (*Quercus alba*), shagbark hickory (*Carya ovata*), the rare pignut hickory (*Carya glabra*), and sugar maple (*Acer saccharum*). A thin subcanopy (10% cover) has sugar maple, hophornbeam (*Ostrya virginiana*), white ash (*Fraxinus americana*), and a shadbush (*Amelanchier* sp.). There is 15% cover of the low shrub maple-leaf viburnum (*Viburnum acerifolium*). Herbs include a woodland sedge (*Carex* c.f. *lucorum*), rough-leaved ricegrass (*Oryzopsis asperifolia*), marginal wood fern (*Dryopteris marginalis*), silverrod (*Solidago bicolor*), sharp-lobed hepatica (*Hepatica acutiloba*) and Christmas fern (*Polystichum achrostichoides*). A soil sample at one location found 18 inches of channery loam over bedrock, but other spots had much shallower soil.

This community like supports wildlife similar to the surrounding Mesic Maple-Ash-Hickory-Oak Forest, with likely species including ovenbird, scarlet tanager, turkey, and grey squirrel. This open, sunny forest serves as deer winter habitat.

### **Mesic Clayplain Forest**

Mesic Clayplain Forest (like Wet Clayplain Forest, see below) is closely associated with Vermont's Champlain Valley, where post-glacial lakes left clay deposits across much of the valley. However, these landscape processes resulting in clay soils are not unique to the Champlain Valley, and so clayplain forests can develop in other settings as well. The area around the wetland complex east of Whipstock Hill Road has dense, nearly pure clay soils (though they appear incorrectly mapped on the NRCS soil map). It is not known, if these clay deposits are the result of glacial lakes (possibly one that extended up the Walloomsac River valley) or more recent flood depositions. Either way, though, these areas appear to support clayplain forest communities. At present, one site with clayplain forests is known from the Connecticut River Valley, making this 19-acre occurrence at Whipstock Hill WMA the second to be documented outside of the Champlain Valley.

This is a young forest disturbed by past land use. It is on soils mapped by the USDA as silt loams of the Limerick, Georgia, and Massena series; however, field sampling found what appeared to be a plow layer over very dense and pure clay. The canopy is composed of quaking aspen (*Populus tremuloides*), white birch (*Betula papyrifera*), white ash (*Fraxinus americana*), white oak (*Quercus alba*), white pine (*Pinus strobus*), American elm (*Ulmus americana*), and occasional red oak (*Quercus rubra*) and shagbark hickory (*Carya ovata*). Musclewood (*Carpinus caroliniana*) and hophornbeam (*Ostrya virginiana*) are common understory trees, and invasive honeysuckle (*Lonicera* sp.) and buckthorn (*Rhamnus cathartica*) are abundant in the shrub layer. Herbs in this community include lady fern (*Athyrium filix-femina*), blue-stem goldenrod (*Solidago caesia*), enchanter's nightshade (*Circea lutetiana*), and an agrimony (*Agrimonia* sp.).

Although this forest is small and highly disturbed, it is considered to be an example of statewide significance because it is possible that the ecological condition could improve over time, and because it is an example of a rare natural community type found outside of its normal range. For the same reasons, it is also worthy of further ecological study.

### **Mesic Maple-Ash-Hickory-Oak Forest**

This community type is mapped on 347 acres in Whipstock Hill WMA. Much is heavily disturbed as a result of past land uses, but portions near the summit are good-quality examples of this community type. All patches mapped as this type at WHWMA are part of one ecological occurrence, which is not considered to be an example of statewide significance.

The generally undisturbed patches of this community type have a canopy of sugar maple (*Acer saccharum*), white ash (*Fraxinus americana*), red oak (*Quercus rubra*), white oak (*Quercus alba*), shagbark hickory (*Carya ovata*), bitternut hickory (*Carya cordiformis*), and the rare species pignut hickory (*Carya glabra*). The relative abundance of species depends on the microsite: drier sites favor oaks and hickories, and more rich mesic sites favor maple, ash, and also basswood (*Tilia americana*). This community also usually features a sub-canopy of sugar maple, beech (*Fagus grandifolia*), hophornbeam (*Ostrya virginiana*), and hickory species. Striped maple (*Acer pensylvanicum*), witch hazel (*Hamamelis virginiana*) and maple-leaf viburnum (*Viburnum acerifolium*) are frequent tall shrubs. Herbs on drier sites include marginal wood fern (*Dryopteris marginalis*), lance-leaf wild licorice (*Galium lanceolatum*), zig-zag goldenrod (*Solidago flexicaulis*), and wild oats (*Uvularia sessilifolia*). More mesic sites had lady fern (*Athyrium filix-femina*), along with indicators of enrichment, such as maidenhair fern (*Adiantum pedatum*) and blue cohosh (*Caulophyllum thalictroides*). In general, soils are shallow channery loams. (Channery soils contain many small flat fragments of the sedimentary bedrock.)

Though not currently mapped as deer wintering area, much of this forest—particularly on the southeast side of Whipstock Hill—may serve as important deer wintering area. This site had abundant deer sign when visited in January 2011. Other wildlife likely found in this community would include chipmunk, grey squirrel, turkey, ovenbird, and scarlet tanager.

The heavily disturbed portions of this forest are either conifer plantations, or dominated by invasive species including non-native honeysuckles (*Lonicera* spp.), buckthorn (*Rhamnus cathartica*), and multiflora rose (*Rosa multiflora*). These sites are so thoroughly colonized by non-native species that recovery or return to a mature Mesic Maple-Ash-Hickory-Oak Forest characterized by native species is unlikely.

### **Northern Hardwood Forest**

A relatively small patch of this community is found on the north-facing upper slope of Whipstock Hill. Overall, it is not dramatically different from the Mesic Maple-Ash-Hickory-Oak Forest surrounding it, but it appears that the northerly aspect seems to limit the hickory and oak component. This occurrence is not considered to be an example of statewide significance.

This community has a canopy of sugar maple (*Acer saccharum*), white ash (*Fraxinus americana*), and beech (*Fagus grandifolia*). Red oak (*Quercus rubra*) and basswood (*Tilia americana*) are also occasional. Striped maple (*Acer pensylvanicum*) and witch hazel (*Hamamelis virginiana*) are present as shrubs. Blue cohosh (*Caulophyllum thalictroides*), early meadow rue (*Thalictrum dioicum*), and sarsaparilla (*Aralia nudicaulis*) were noted in the herb layer. This community occurs on channery loam soils, which have many small rock fragments, and is somewhat enriched from the calcareous bedrock.

At WHWMA, the Northern Hardwood Forest probably hosts similar wildlife species as the surrounding Mesic Maple-Ash-Hickory-Oak Forest. Likely species include many songbirds, such as hermit thrush, ovenbird, and red-eyed vireo; along with other species including redback salamander, chipmunk, and white-tailed deer. Since this community is north-facing, it probably does not function as suitable deer wintering habitat.

### **Red Maple-Black Ash Seepage Swamp**

Two patches of Red Maple-Black Ash Seepage Swamp have been mapped along the southern edge of the wetland complex. Together these total just less than 3 acres, and appear to have substantial hydrologic disturbance from Whipstock Road and Walloomsac Road. Tree cover is primarily very large black willows (*Salix nigra*). While these patches probably serve an important role in mediating the flow of ground and surface water into the larger wetland complex, they are not expected to recover as typical examples of this community type.

### **Rich Fen**

Two patches of this globally rare community type are found at WHWMA. Both are considered to be examples of statewide significance.

One of these fens was visited after the growing season ended, and so vegetation data come from a single example. There are scattered 15-foot tall white pine (*Pinus strobus*), red maple (*Acer rubrum*), tamarack (*Larix laricina*), and poison sumac (*Toxicodendron vernix*). In general, however, this community is characterized by shrubs and herbs. Low shrubs include alder-leaf buckthorn (*Rhamnus alnifolia*), shrubby cinquefoil (*Potentilla fruticosa*), red-osier dogwood (*Cornus sericea*), poison sumac (*Toxicodendron vernix*), and a willow (*Salix* sp.). Herbs are diverse, and those noted in late September include bog goldenrod (*Solidago uliginosa*), grass of Parnassus (*Parnassia glauca*), cattail (*Typha latifolia*), marsh fern (*Thelypteris palustris*), round-leaved sundew (*Drosera rotundifolia*), turtlehead (*Chelone glabra*), and a beak rush (*Rhynchospora* sp.). The uncommon species fringed gentian (*Gentianopsis crinita*) is found in this community, and it is possible that further inventory in different times of the year may discover additional rare or uncommon species. Moss cover (non-*Sphagnum* species) is high, and soil sampling found 18 inches of peat over at least 12 inches of clay. The pH of the peat was measured as 6.4 and the clay was measured at 6.8.

Though both these rich fens likely have a history of human disturbance, and were probably grazed by sheep or cattle in the past, the one surveyed appeared to be in very good ecological condition. The condition of the other occurrence needs to be assessed during the growing season.

### **Seep**

A quarter-acre seep is found on the eastern slope of Whipstock Hill, on the edge of a conifer plantation. It is not considered to be an example of statewide-significance. This seep has 4 inches of silt soil, over 8 inches of coarse gravelly loam, over rock. Species include American elm (*Ulmus americana*), white ash (*Fraxinus americana*), buckthorn (*Rhamnus cathartica*), Morrow's honeysuckles (*Lonicera morrowii*), sensitive fern (*Onoclea sensibilis*), fringed sedge (*Carex crinita*), a second sedge (*Carex* c.f. *lurida*), a manna grass (*Glyceria* sp.), and a grape (*Vitis* sp.). Moss cover is abundant on the ground. Seeps are important habitat for a wide variety of wildlife, including deer and turkey. The northern dusky salamander, and possibly other amphibians, also might be found in this community.

### **Shallow Emergent Marsh**

Just over one acre of Shallow Emergent Marsh is found on the eastern side of WHWMA. It is part of a larger wetland complex that extends off state-owned land. The portion of this community within WHWMA is not in itself an example of statewide significance.

This marsh was visited in winter; so only limited vegetation information could be collected. Species noted include cattail (*Typha latifolia*), red-osier dogwood (*Cornus sericea*), speckled alder (*Alnus incanca*), winterberry holly (*Ilex verticillata*), sensitive fern (*Onoclea sensibilis*), Clinton's wood fern (*Dryopteris clintoniana*), a willow (*Salix* sp.), a goldenrod (*Solidago* sp.), and a willow herb (*Epilobium* sp.). The soil appeared to be saturated organic soil, with evidence of seepage and flowing water even in winter. This marsh is probably enriched by the calcareous bedrock, and probably contains a more diverse suite of species than the typical Shallow Emergent Marsh.

Wildlife species that might be expected in this community type include beaver, muskrat, mink and red-winged blackbird. Amphibians including green frog and spring peeper are probably also present.

### **Silver Maple-Sensitive Fern Riverine Floodplain Forest**

A very small patch (0.4 acres) is found as part of the wetland complex between Whipstock Road and the airport. It did not appear that this community extends substantially off state land, though only state-owned land was part of inventory efforts. The patch of this community type is too small to be considered an example of statewide significance.

This floodplain was inventoried during winter, and so detailed vegetation data could not be collected. Further study is recommended during the growing season. Species noted include black willow (*Salix nigra*), which formed a tall canopy. American elm (*Ulmus americana*), red maple (*Acer rubrum*), basswood (*Tilia americana*), and white ash (*Fraxinus americana*) are also present. Musclewood (*Carpinus caroliniana*) is an abundant understory tree. Herbs could not be surveyed, but it is expected that sensitive fern (*Onoclea sensibilis*) is abundant. Soils are mapped by the USDA as part of the alluvial Limerick series. Beaver, muskrat, mink, and many songbirds likely use this community, along with the larger wetland complex.

### **Wet Clayplain Forest**

Wet Clayplain Forest (like Mesic Clayplain Forest, see above) is closely associated with Vermont's Champlain Valley, but can also occur in other biophysical regions. This occurrence, covering 7 acres, is at the upper edges of a larger wetland complex that includes multiple natural community types. Though the soils are mapped by the USDA as silt loams, field sampling found very dense clay (often with a plow layer above) in these areas. This is a disturbed wetland, and the canopy appears young. Species include American elm (*Ulmus americana*), white ash (*Fraxinus americana*) and burr oak (*Quercus macrocarpa*) in the canopy; musclewood (*Carpinus caroliniana*) is common in the understory. Invasive honeysuckle (*Lonicera* sp.) and buckthorn (*Rhamnus cathartica*) are abundant shrubs. Herbs include sensitive fern (*Onoclea sensibilis*), marsh fern (*Thelypteris palustris*), and lady fern (*Athyrium filix-femina*).

Despite being a small and disturbed occurrence, this is a state-significant example of a rare community type. Since it also represents a rare example of clayplain forest outside of the Champlain Valley, it is worthy of further study.

## **Fine Filter Assessment**

### Rare, Threatened, and Endangered Species

WHWMA is home to a number of rare and uncommon species of animals and plants. These species and their management needs are summarized below.

#### **PLANTS**

Two species of rare or uncommon plants have been located within WHWMA:

1. Pignut Hickory (*Carya glabra*) – Rare (S2)

This species appears to be present in much of the Mesic Maple-Ash-Hickory-Oak Forest and Dry Oak-Hickory-Hophornbeam Forest on Whipstock Hill, though it is most common on the upper eastern slopes. Pignut Hickory can be difficult to distinguish from shagbark hickory (*Carya ovata*) and bitternut hickory (*Carya cordiformis*) because the bark appears somewhat intermediate between the two. This tree is at the northern extent of its range in southern Vermont, and is more common to the south. Protecting this occurrence would likely preclude silvicultural activities or require extreme care to identify and protect all individuals of this species.

2. Fringed gentian (*Gentianopsis crinita*) – Uncommon (S3)

Found in the Rich Fen near the airport (and also at several nearby sites outside of WHWMA), this striking flower can grow in a variety of open habitats. Within the WMA, protecting the hydrologic and ecologic integrity of the Rich Fen and other natural wetland openings, as well as monitoring for additional individuals of this species prior to management activities in other open areas (roadsides, etc.) should protect this occurrence.

### Non-Native Species

There are many non-native plant species in WHWMA, and many are posing threats to native vegetation, habitats and wildlife. In many places, non-native species are well-established and have so greatly altered the natural succession patterns that a return to the expected natural community, dominated by native vegetation, is unlikely without substantial human intervention. There are, however, areas that are almost entirely free of invasive species, such as the upper elevations of Whipstock Hill, and some portions of the wetland complex (such as one of the Rich Fens). Prioritizing these areas for invasive species control, and removing any existing invasive plants and preventing further colonization, is probably the best way to protect native plants, animals and habitats within WHWMA.

A special concern for management of WHWMA is that any disturbance which opens the forest canopy will facilitate the spread of the invasive species. Thus, if any silvicultural activities are undertaken, they would almost certainly need to be accompanied by very aggressive efforts at controlling invasive species.

A list of non-native invasive species found at WHWMA can be found in the table below.

<b>Invasive Plants of Whipstock Hill WMA</b>			
<b>Species Name</b>	<b>Common Name</b>	<b>Sites Where Found</b>	<b>Present threat to native plant communities</b>
<i>Alliaria petiolata</i>	garlic mustard	woods, edges	moderate
<i>Berberis thunbergii</i>	Japanese barberry	upland woods	moderate
<i>Celastrus orbiculatus</i>	Asiatic bittersweet	upland woods	very high
<i>Lonicera spp.</i>	non-native honeysuckles	upland woods	very high
<i>Phragmites australis</i>	common reed	open wetlands	high**
<i>Rhamnus cathartica</i>	common buckthorn	uplands	very high
<i>Rosa multiflora</i>	multiflora rose	uplands	moderate/high
**A native strain of this species, <i>Phragmites australis</i> ssp. <i>americana</i> is ranked S1S2 by the VTNHIP. Occurrences of this native strain are not considered a threat to native species, and should be searched for prior to, and excluded from, any efforts to control this species. The plants at WHWMA did not appear to be the native strain.			

### Core Forest

Core forest is a biological term that refers to any forested areas that are greater than 100 meters from a permanent human-created disturbance zone, such as a road, farm field, or residential area. Although these cultural landscapes create habitat for some native plant and animal species, they also negatively impact forest resources.

WHWMA overlaps a roughly 400-acre area of core forest that is found south of Route 279. Though this represents a relatively large patch of forest for the Vermont Valley, this is quite small compared to the extensive areas of core forest found in the Taconic Mountains and Southern Green Mountains. As a result, many of the ecological functions are compromised. In particular, evergreen plantations and invasive species are abundant in about half of this forest patch, likely having negative impacts on food and shelter resources for native wildlife. In addition, the lack of connectivity (see below) limits many possibilities for wildlife movement and gene flow.

In a landscape characterized by rural and suburban development, however, even disturbed forest patches provide important landscape diversity, and can still provide suitable habitat for some core forest species, such as scarlet tanager or other songbird species that can more readily reach this forest patch.

### Wildlife Movement Corridors

Connections between wild lands can serve an important role in maintaining the long-term health and viability of wildlife populations. Wildlife corridors not only allow individual animals (such as young individuals searching for new habitat) to move throughout the landscape, but also allow for the transfer of genetic information across the region. Even the occasional travel of a few individual animals between otherwise isolated populations can substantially increase their long-term viability, because the genetic diversity within each group is effectively increased.

Wildlife corridors are often considered in the context of large mammals such as moose and bear. Bounded by Route 279, Route 9, an airport, and rural development, WHWMA is a mostly isolated forest patch. There are other forest blocks nearby, such as Mount Anthony, and areas to the west in New York, but vehicle-animal collision data suggests that wildlife movement across the roads to these areas is not common. While bear and moose may travel through WHWMA, such use is probably infrequent.

The true connectivity values of the WMA are likely for a different suite of wildlife species. Small mammals that use hedgerows or waterways to travel between patches, such as foxes, coyotes, and mink, could also find suitable corridors in and around WHWMA. Migrating songbirds looking for stopover patches may make heavy use of small forest patches within an agricultural and suburban landscape, and breeding and migrating waterfowl travelling north and south along the Atlantic flyway might make use of the open water of the beaver wetlands.

## LITERATURE CITED

- Anderson, M., D. Grossman, C. Groves, K. Poiani, M. Reid, R. Schneider, B. Vickery, and A. Weakley. 1999. Guidelines for representing ecological communities in ecoregional conservation plans. The Nature Conservancy. Arlington, VA.
- Committee of Scientists 1999. Sustaining the people's lands. Recommendations for stewardship of the national forests and grasslands into the next century. U.S. Department of Agriculture. Washington, D.C. Accessed March 26, 2007 at:  
[http://www.fs.fed.us/news/news\\_archived/science/cosfrnt.pdf](http://www.fs.fed.us/news/news_archived/science/cosfrnt.pdf)
- Doll, C.G., W.M. Cady, J.B. Thompson, and M.P. Billings. 1961. Centennial geologic map of Vermont. Miscellaneous Map MISCMAP-01. Vermont Geological Survey. Waterbury, VT.
- Doll, C.G., D.P. Stewart, and P. MacClintock. 1970. Surficial geologic map of Vermont. . Miscellaneous Map MISCMAP-02. Vermont Geological Survey. Waterbury, VT.
- Grossman, D., K.L Goodin, X. Li, C. Wisnewski, D. Faber-Langendoen, M. Anderson, L. Sneddon, D. Allard, M. Gallyoun, and A. Weakley. 1994. Standardized national vegetation classification system. Report by the Nature Conservancy and Environmental Systems Research Institute for the NBS/NPS Vegetation Mapping Program. National Biological Service. Denver, CO.
- Haufler, J.B., C.A Mehl, and G.J Roloff. 1996. Using a coarse-filter approach with species assessment for ecosystem management. *Wildlife Society Bulletin* 24: 200-208.
- Hunter, M. L. 1991. Coping with ignorance: The coarse filter strategy for maintaining biodiversity. Pages 266-281 in K.A. Kohm, ed. *Balancing on the Brink of Extinction*. Island Press. Washington, D.C.
- Hunter, M.L., G.L. Jacobson, Jr., and T. Webb. 1988. Paleoecology and the coarse-filter approach to maintaining biological diversity. *Conservation Biology* 2(4): 375-385.
- Jenkins, R.E. 1985. The identification, acquisition, and preservation of land as a species conservation strategy. Pages 129-145 in R.J. Hoage ed. *Animal extinctions*. Smithsonian Institution Press. Washington, DC.
- Jenkins, R.E. 1996. Natural heritage data center network: managing information for managing biodiversity. Pages 176-192 in R.C. Szaro and D.W. Johnston eds. *Biodiversity in managed landscapes: theory and practice*. Oxford University Press. New York.
- Leslie, M., G.K. Meffe, J.L. Hardesty, and D.L. Adams. 1996. *Conserving biodiversity on military lands: A handbook for natural resources managers*. The Nature Conservancy. Arlington, VA.
- National Council for Air and Stream Improvement, Inc. (NCASI). 2004. *Managing elements of biodiversity in sustainable forestry programs: Status and utility of NatureServe's information*

resources to forest managers. Technical Bulletin No. 885. Research Triangle Park, N.C.: National Council for Air and Stream Improvement, Inc. Accessed March 26, 2007 at: [http://www.natureserve.org/library/ncasi\\_report.pdf](http://www.natureserve.org/library/ncasi_report.pdf)

Noss, R. F. 1987. From plant communities to landscapes in conservation inventories: a look at the Nature Conservancy (USA). *Biological conservation* 41:11-37.

Noss, R.F. and A.Y. Cooperrider. 1994. Saving nature's legacy. *Defenders of Wildlife*. Island Press. Washington, D.C.

Poiani, K.A., B.D. Richter, M.G. Anderson, and H.E. Richter 2000. Biodiversity conservation at multiple scales: functional sites, landscapes, and networks. *BioScience* 50(2): 133-146.

Stein, B.A., L.S. Kutner, and J.S. Adams. 2000. Precious heritage: the status of biodiversity in the United States. The Nature Conservancy and the Association for Biodiversity Information. Oxford University Press. New York.

Thompson, E.H., and E.R. Sorenson. 2000. Wetland, woodland, wildland. A guide to the natural communities of Vermont. University Press of New England. Hanover, NH.

United States Forest Service, USDA. 2000. National forest management act 2000 planning rule. National Forest System Land and Resource Management Planning. Federal Register Vol. 65, No. 218.

United States Forest Service, USDA. 2004. Coarse filter/ fine filter planning approaches to the conservation of biological diversity. Accessed March 26, 2007 at: <http://www.fs.fed.us/emc/nfma/includes/coursefilter.pdf>

United States Army Corps of Engineers. 2007. Narrows of NY and VT maintenance fact sheet. Accessed March 26, 2007 at: <http://www.nan.usace.army.mil/project/newyork/factsh/pdf/NLCOM.pdf>

Van Diver, B.B. 1987. Roadside geology of Vermont and New Hampshire. Mountain Press Publishing Company. Missoula, MT.

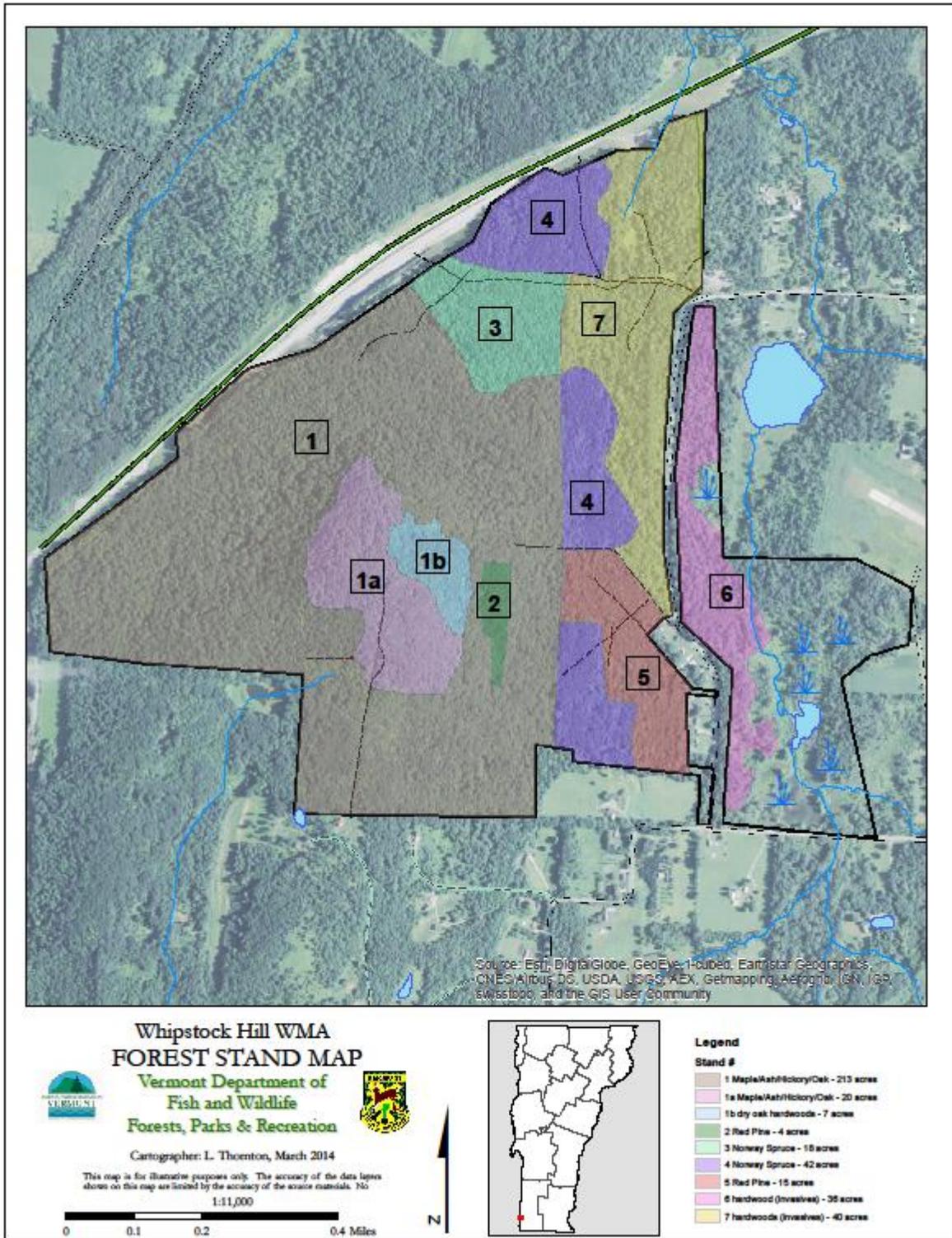
Willis, K.J., and R.J. Whittaker. 2002. Species diversity – scale matters. *Science* 295: 1245–1248.

## APPENDIX 2: Forest Inventory Data

### *Whipstock Hill WMA – Forest Inventory Data Summary (FOREX)*

Comp.	Stand	Size Acres	MSD	BA/A Total	AGS BA/A	UGS BA/A	Timber Type	Species %BA	Recommended Treatment
1	1	243	8.1	190	129	61	Oak hardwood (Mesic Maple-Ash-Hickory-Oak Forest)	r. maple – 12% r. oak – 23% s. maple – 17%	Uneven-age treatment. Maintain or enhance natural community quality and mast. Control invasive species.
1	2	4	8.9	226	206	20	Red Pine (Mesic Maple-Ash-Hickory-Oak Forest)	r. pine – 97% w. ash – 3%	Deer yard. Planted prior to 1962. Control invasive species. Softwood cover v conversion to hardwood?
1	3	19	10.9	200	110	90	Norway Spruce (Mesic Maple-Ash-Hickory-Oak Forest)	N. spruce – 75% w. pine – 10% a. elm – 10%	Deer yard. Maintain softwood component. No regeneration.
1	4	45	10.1	220	146	74	Norway Spruce (Mesic Maple-Ash-Hickory-Oak Forest)	N. spruce – 88% Aspen – 6%	Deer yard. Planted after 1962. No regeneration.
1	5	17	9.9	190	170	20	Red Pine (Mesic Maple-Ash-Hickory-Oak Forest)	r. pine – 84% w. ash – 16%	Deer winter habitat. Planted after 1962. No regeneration.
2	6	36	19.2	126	20	106	Northern hardwood (Mesic Maple-Ash-Hickory-Oak forest)	w. ash – 47% b. cherry – 53% w. pine – 26%	Hardwood overstory with pine component. High UGS. Understory dominated by honeysuckle.
1	7	48	10.2	126	53	73	Northern hardwood (Mesic Maple-Ash-Hickory-Oak forest)	w. ash – 47% American elm – 16% Aspen – 16%	Hardwood overstory. High UGS. Understory dominated by honeysuckle.

# WHIPSTOCK HILL WMA: Forest Stand Map



## APPENDIX 3: Reptile and Amphibian Data

**Table 1.** Reptiles and amphibians found or suspected in Whipstock Hill WMA as a result of the 2012 reptile and amphibian survey. The site was visited on four different days in 2012: June 21 & 22, and July 2 & 3. We used three survey methods: active search, turtle trapping, and nighttime road searches.

### Species Found

Common name	Scientific name	State Rank & Status
<b>Amphibians</b>		
Frogs		
American Toad	<i>Anaxyrus americanus</i>	S5
Gray Treefrog	<i>Hyla versicolor</i>	S5
American Bullfrog	<i>Lithobates catesbeianus</i>	S5
Green Frog	<i>Lithobates clamitans</i>	S5
Wood Frog	<i>Lithobates sylvaticus</i>	S5
Spring Peeper	<i>Pseudacris crucifer</i>	S5
Salamanders		
Northern Dusky Salamander	<i>Desmognathus fuscus</i>	S5
Northern Two-lined Salamander	<i>Eurycea bislineata</i>	S5
Eastern Newt	<i>Notophthalmus viridescens</i>	S5
Eastern Red-backed Salamander	<i>Plethodon cinereus</i>	S5
<b>Reptiles</b>		
Snakes		
Milksnake	<i>Lampropeltis triangulum</i>	S5
Common Gartersnake	<i>Thamnophis sirtalis</i>	S5
Turtles		
Snapping Turtle	<i>Chelydra serpentina</i>	S5
Painted Turtle	<i>Chrysemys picta</i>	S5
<b><u>Other Possible Species</u></b> based on habitat observed and other records from Bennington.		
<b>Amphibians</b>		
Frogs		
Pickerel Frog (possible)	<i>Lithobates palustris</i>	S5
Salamanders		
Spotted Salamander (probable)	<i>Ambystoma maculatum</i>	S5
<b>Reptiles</b>		
Snakes		
DeKay's Brownsnake (possible)	<i>Storeria dekayi</i>	S4
Ring-necked Snake (possible)	<i>Diadophis punctatus</i>	S4
Northern Watersnake (possible)	<i>Nerodia sipedon</i>	S3

## APPENDIX 4: Public Comment Summary

A public scoping meeting was held on September 12, 2013 at the Community College of Vermont in Bennington to present inventory and assessment information and to receive comments. Five people attended the meeting. Comments are summarized below.

Comments received at meeting:

- Important to consider planning and management in landscape context
- Important uses for property include education and demonstration
- Consider building a boardwalk or observation platform in or near wetland
- Consider walking trails within the WMA
- Goats may be useful for controlling invasive species – consider local goat herders for license to see if this would work
- Consider creating a wetland in the lower section (invasives) adjacent to Whipstock Road
  - Use expertise and labor of volunteers
- WHIPS (Whipstock Hill Preservation Trust) is interested in partnerships and have a source of potential funding for conservation projects
- An informative/interpretive brochure about the WMA would be nice
- Is there a role for a local “friends” group?
- Advertise for future events in the “penny saver”

A total of 17 people attended the scheduled and publicized public involvement meeting for the presentation of the draft LRMP for Whipstock Hill WMA. The program consisted of a slide presentation outlining the plan assessments, natural resource highlights, management activities and proposed schedule of stewardship projects. Comments were taken and questions answered following the presentation. Below is a summary of the questions and comments received, italics indicate abridged responses from ANR staff. Eight comments were received after this meeting during the 30-day comment period.

### Public Input Response to Comments: Draft Plan

Public comment listed below. Responses are in bold.

#### Concerning Public Access to the WMA

- Consider making parking area larger to accommodate school buses, GMC and more cars. **The size of the parking area will be limited by the site but will likely be able to accommodate up to 10 cars at the southern proposed location. There is no opportunity to expand parking opportunities at the northern location and still keep it visible from the town road.**
- Keep current small pull-off at northern end for additional access. **The northern end of the property will be gated at a location further in from the town road to allow for some room at that location.**

- Challenge is providing access on small property adjacent to residential neighborhood and avoiding conflict. **Educational signage will be placed at the parking lot kiosk and other entry locations regarding the availability and use of the WMA for hunting and trapping and the proximity of private land surrounding the WMA.**

#### Concerning Recreational Trails

- Town of Bennington is interested in pursuing trail networks throughout the town including the WMA including the development and maintenance of trail system on WMA. Include public opportunity to assist in the development of trail system, possibly using local organizations and volunteers. Focus on non-motorized recreation trails to best accommodate public access and protect wildlife habitat.
- Opportunity to emphasize the existing road network for access and walking.
- Focusing on a trail network would concentrate people and lessen interaction between hunting and walking.
- Avoid including roads that funnel people onto adjacent private land.  
**While there is not a designated and managed hiking trail system on the WMA, there is an existing network of woods roads that can be used for access for pedestrian access for hunting, trapping, wildlife viewing, nature appreciation. Including educational signage at entry points and on roads that lead to private land can be used to inform hunters, trappers and other recreationists of the proximity of private land as well as the potential presence of hunters and trappers during seasons.**
- Trails should not exclude sporting uses of these areas. Some areas listed as compatible with hiking and wildlife viewing but no mention of hunting or trapping. **The entire WMA is available for hunting and trapping along with wildlife viewing and other dispersed, wildlife-based recreation.**

#### Concerning Management Demonstration

- Use parcel for demonstration of management including varying options for managing invasive species. **Whipstock Hill WMA, as with all parcels of state land, offers a great opportunity to demonstrate management. The management at Whipstock Hill WMA can demonstrate habitat management in the presence of extensive populations of invasive species. Lessons learned here will be quite valuable to other landowners and other state holdings.**

#### Concerning Management of Invasive Species

- There is volunteer interest in helping to manage invasive species including potential to engage Vermont Career Development Center. **Great idea. We've already set up one educational workshop regarding management of invasive species based on this interest. September 29, 2016. There is interest in hosting another event in the spring.**
- Maintenance of woods roads will be challenging considering the invasive species problem; brush hogging could be the solution as is proposed for the meadow. **Keeping the access into the WMA free of invasive will be an ongoing challenge that will be addressed using a number of methods including brush hogging, and chemical and mechanical removal of invasive species along the woods roads.**

## Habitat Management

- Good that plan includes Vermont Tradition goals.
- Would like to see recreation and wildlife be the two top priorities. **The primary purpose of ownership is mitigation for deer wintering area and management of the WMA for wildlife habitat and uses. The WMA is available for fish and wildlife-based dispersed recreation including hunting, trapping, wildlife viewing, and nature appreciation.**
- Opposed to designation of “ecological core area”. **None are proposed in this LRMP for this WMA.**
- Important to place dates on planned improvements. **The implementation table has been updated.**

## APPENDIX 5: Reference Documents

- Agency of Natural Resources, October 2004. Protocol to Protect Historic and Archeological Resources During Timber Harvesting Activities on ANR Lands.
- Anderson, M., D. Grossman, C. Groves, K. Poiani, M. Reid, R. Schneider, B. Vickery, and A. Weakley. 1999. Guidelines for Representing Ecological Communities in Ecoregional Conservation Plans. The Nature Conservancy. Arlington, VA.
- Committee of Scientists 1999. Sustaining the people's lands. Recommendations for stewardship of the national forests and grasslands into the next century. U.S. Department of Agriculture. Washington, D.C. Accessed March 26, 2007 at: [http://www.fs.fed.us/news/news\\_archived/science/cosfrnt.pdf](http://www.fs.fed.us/news/news_archived/science/cosfrnt.pdf)
- Doll, C.G., W.M. Cady, J.B. Thompson, and M.P. Billings. 1961. Centennial geologic map of Vermont. Miscellaneous Map MISCMAP-01. Vermont Geological Survey. Waterbury, VT.
- VIII. Doll, C.G., D.P. Stewart, and P. MacClintock. 1970. [Surficial geologic map of Vermont](#). . Miscellaneous Map MISCMAP-02. Vermont Geological Survey. Waterbury, VT.
- DeGraaf, R.M., M. Yamasaki. 2001. New England Wildlife, Habitat, Natural History, and Distribution. University Press of New England, Hanover, NH 03755.
- Gleason, H.A. 1926. The Individualistic Concept of Plant Association. Bulletin of the Torrey Botanical Club 53: 7-26.
- Grossman, D., K.L. Goodin, X. Li, C. Wisniewski, D. Faber-Langendoen, M. Anderson, L. Sneddon, D. Allard, M. Gallyoun, and A. Weakley. 1994. Standardized national vegetation classification system. Report by The Nature Conservancy and Environmental Systems Research Institute for the NBS/NPS Vegetation Mapping Program. National Biological Service. Denver, CO.
- Governor's Commission on Climate Change, 2007. Final Report and Recommendations. Accessed October 31, 2007 at: <http://www.anr.state.vt.us/imaging/ANRdocs/secoffice/climatechange/2007OctGCCCCFinalRpt.pdf>
- Haufler, J.B., C.A. Mehl, and G.J. Roloff. 1996. Using a coarse-filter approach with species assessment for ecosystem management. Wildlife Society Bulletin 24: 200-208.
- Hunter, M. L. 1991. Coping with ignorance: The coarse filter strategy for maintaining biodiversity. Pages 266-281 in K.A. Kohm, ed. Balancing on the Brink of Extinction. Island Press. Washington, D.C.
- Hunter, M.L., G.L. Jacobson, Jr., and T. Webb. 1988. Paleoecology and the coarse-filter approach to maintaining biological diversity. Conservation Biology 2(4): 375-385.
- Iverson, L.R., A.M. Prasad, B.J. Hale, and e. K. Sutherland. 1999. Atlas of Current and Potential Future Distributions of Common Trees of the Eastern United States. United States Department of Agriculture, Forest Service. Northeastern Research Station. General Technical Report NE-265. Radnor, PA.
- Jenkins, R.E. 1985. The identification, acquisition, and preservation of land as a species conservation strategy. Pages 129-145 in R.J. Hoage ed. Animal extinctions. Smithsonian Institution Press. Washington, DC.
- Jenkins, R.E. 1996. Natural heritage data center network: managing information for managing biodiversity. Pages 176-192 in R.C. Szaro and D.W. Johnston eds. Biodiversity in managed landscapes: theory and practice. Oxford University Press. New York.
- Johnson, C.W. 1998. The nature of Vermont. University Press of New England. Hanover, NH.
- Leslie, M., G.K. Meffe, J.L. Hardesty, and D.L. Adams. 1996. Conserving biodiversity on military lands: A handbook for natural resources managers. The Nature Conservancy. Arlington, VA.

- Lorimer, C. & A. White. A Scale and Frequency of Natural Disturbance in Northeastern United States: Implications for Early Successional Forest Habitat and Regional Age Distribution. *Forest Ecology Management* (185), 41-64.
- MacMartin, J.M. 1962. Statewide Steam Survey by Watersheds. Vermont Fish and Game Department, Federal Aid to Fisheries Project F-2-R, Final Report, Montpelier, Vermont.
- More, Thomas A., Susan Bulmer, Linda Henzel, Ann E. Mates. USDA Forest Service, Newtown Square, PA, 2003. Extending the Recreation Opportunity Spectrum to Nonfederal Lands in the Northeast: An Implementation Guide.
- National Council for Air and Stream Improvement, Inc. (NCASI). 2004. Managing elements of biodiversity in sustainable forestry programs: Status and utility of NatureServe's information resources to forest managers. Technical Bulletin No. 885. Research Triangle Park, N.C.: National Council for Air and Stream Improvement, Inc. Accessed March 26, 2007 at: [http://www.natureserve.org/library/ncasi\\_report.pdf](http://www.natureserve.org/library/ncasi_report.pdf)
- Noss, R. F. 1987. From Plant Communities to Landscapes in Conservation Inventories: a Look at the Nature Conservancy (USA). *Biological conservation* 41:11-37.
- Noss, R.F. and A.Y. Cooperrider. 1994. Saving nature's legacy. *Defenders of Wildlife*. Island Press. Washington, D.C.
- Oxford University Press. New York. *Biodiversity in Managed Landscapes*.
- Poiani, K.A., B.D. Richter, M.G. Anderson, and H.E. Richter 2000. Biodiversity conservation at multiple scales: functional sites, landscapes, and networks. *BioScience* 50(2): 133-146.
- Rolando, V.R., The Industrial Archeology of Henry Burden & Sons Ironworks in Southwestern Vermont, *The Journal of Vermont Archeology*, 8/2007 pp. 26-51, updated 7-30-2016.
- Stein, B.A., L.S. Kutner, and J.S. Adams. 2000. Precious heritage: the status of biodiversity in the United States. The Nature Conservancy and the Association for Biodiversity Information. Oxford University Press. New York.
- Thompson, E.H., and E.R. Sorenson. 2000. Wetland, woodland, wildland. A guide to the natural communities of Vermont. University Press of New England. Hanover, NH.
- Thompson, E.H. 2002. Vermont's Natural Heritage: Conserving Biodiversity in the Green Mountain state. A Report from the Vermont Biodiversity Project. 48 pp.
- United States Forest Service, USDA. 1976. Uneven-aged Silviculture and Management in the United States.
- United States Forest Service, USDA, 1987. A Silvicultural Guide for Northern Hardwoods in the Northeast. Technical Report NE-603.
- United States Forest Service, USDA. 1975. Uneven-aged Management of Northern Hardwoods in New England. Research Paper NE-332.
- United States Forest Service, USDA. 2000. National forest management act 2000 planning rule. National Forest System Land and Resource Management Planning. Federal Register Vol. 65, No. 218.
- United States Forest Service, USDA. 2004. Coarse filter/ fine filter planning approaches to the conservation of biological diversity. Accessed March 26, 2007 at: <http://www.fs.fed.us/emc/nfma/includes/coursefilter.pdf>
- United State Forest Service, USDA. 1977. Manager's Handbook for Oaks in the North Central States. North Central Experiment Station, General Technical Report NC-33.

- Van Diver, B.B. 1987. Roadside geology of Vermont and New Hampshire. Mountain Press Publishing Company. Missoula, MT.
- University of Vermont, Consulting Archeology Program. January 2009. Archaeological Precontact Site Sensitivity Analysis and GIS Mapping for the Vermont Agency of Natural Resources.
- Vermont Wildlife Action Plan, November 22, 2005: Appendix A5 Reptile and Amphibian Species of Greatest Conservation Need
- Vermont Department of Forests, Parks and Recreation and Department of Fish and Wildlife, 1990. Management Guide for Deer Wintering Areas in Vermont.
- Vermont Department of Forests, Parks and Recreation. 2015. Creating and Maintaining Resilient Forests in Vermont: Adapting Forests to Climate Change.
- Vermont Fish and Wildlife Department. 1986. Model Habitat Management Guidelines for Deer, Bear, Hare, Grouse, Turkey, Woodcock and Non-game Wildlife. The Leahy Press.
- Vermont Fish and Wildlife Department. (2009). Regulation: Public Activities at Wildlife Management Areas, Riparian Lands, Conservation Camps, and Fish Culture Stations of the Vermont Fish and Wildlife Department.
- Vermont Water Resources Board. 2001. Administrative Determination. Docket No. WET-01-07
- Whittaker, R.H. 1962. Classification of Natural Communities. *Botanical Review* 28: 1-239.
- Whittaker, R.H. 1978. Classification of Plant Communities. W. Junk, The Hague, The Netherlands.
- Willis, K.J., and R.J. Whittaker. 2002. Species diversity – scale matters. *Science* 295: 1245–1248.

## **APPENDIX 6: 10 V.S.A. App. § 15 Rule Governing Public Use of Vermont Fish and Wildlife Department Lands**

### **1.0 Authority**

- 1.1 This rule is adopted pursuant to 10 V.S.A. §4145(a) which authorizes the Board to adopt rules to “regulate the use by the public of access areas, landing areas, parking areas or other lands or waters acquired or maintained pursuant to 10 V.S.A. § 4144.”

### **2.0 Purpose**

- 2.1 The purposes of this rule is to regulate public activities and use at Wildlife Management Areas, Riparian Lands, Conservation Camps, and Fish Culture Stations in order to protect, manage, and conserve the fish, wildlife, vegetation, and other natural and cultural resources of the state, to provide for the safe and efficient operation of the developed facilities of the Department and to protect the health, safety, and welfare of the public.
- 2.2 To foster quality hunting, fishing, trapping, and other fish-based and wildlife-based activities at these lands and facilities.
- 2.3 This rule does not apply to Fishing Access Areas governed by 10 V.S.A. § 4145.
- 2.4 This rule is not intended to interfere with deed restrictions, easements, rights-of-way or other applicable legal agreements.

### **3.0 Definitions**

- 3.1 “Board” means the Vermont Fish and Wildlife Board as defined in 10 V.S.A. § 4041.
- 3.2 “Department” means Vermont Fish and Wildlife Department.
- 3.3 “Commissioner” means Commissioner of the Vermont Fish and Wildlife Department.
- 3.4 “Wildlife Management Area” or “WMA” means any lands or portions of lands of the Department so designated by the Department.
- 3.5 “Riparian Land” means any lands or portions of lands of the Department other than WMAs, Fish Culture Stations, Fishing Access Areas, and Conservation Camps so designated by the Department, such as but not limited to stream bank parcels, dams, and pond sites.
- 3.6 “Conservation Camp” means any facilities, lands or portions of lands of the Department so designated by the Department.
- 3.7 “Fish Culture Station” means any facilities, lands or portions of lands of the Department so designated by the Department.

- 3.8 “Designated Site” means a delineated area at a WMA, Riparian Land, Conservation Camp or Fish Culture Station that the Department has designated for a particular activity or prohibition on an activity, and so identified and demarcated with signage or identified on a Department-issued map.
- 3.9 “Designated Corridor” means a road, trail, path or other linear travel route at a WMA, Riparian Land, Conservation Camp or Fish Culture Station that the Department has designated for travel by a particular means or vehicle, and so identified with signage or identified on a Department-issued map.
- 3.10 “Authorized Activity” means an activity for which a person does not need prior permission to engage in, and can engage in at a WMA, Riparian Land, Conservation Camp or Fish Culture Station, or at a Designated Site or on a Designated Corridor within a WMA, Riparian Land, Conservation Camp or Fish Culture Station.
- 3.11 “Prohibited Activity” means an activity that no person, group, business or entity shall be allowed to engage in under any circumstances, and for which no Permit, License or Lease shall be authorized, except as provided for in Sections 6.0 of this regulation.
- 3.12 “Commercial Activity” means any activity or service that produces income for any person, group, business or entity, including any activity or service by any non-profit entity where a fee is required or requested.
- 3.13 “Special Use Permit” means a written authorization issued by the Department or its designee issued to a person, group, business or entity to undertake an activity.
- 3.14 “Group” means ten (10) or more persons.
- 3.15 “Primitive Camping” means temporary overnight occupancy in a natural environment with no developed facilities leaving the site in its original condition so there is no or minimal evidence of human visitation.
- 3.16 “Self-contained Camping” means camping with a portable shelter equipped with a self-contained, portable, sanitary toilet.
- 3.17 “Artifact” means an object produced or shaped by human craft, especially a tool, weapon, or ornament or archaeological or historical interest.
- 3.18 “Emergency situation” means an unintended or unforeseen situation that poses a risk to health or life of a person or animal.
- 3.19 “Field processing” means the gutting or dressing or other removal of non-consumptive parts of an animal for the preservation of the carcass to include the boning and quartering.
- 3.20 “Tree stand” means a platform or structure (placed for any period of time) which is fastened to a tree by nails, bolts, wire, or other fasteners that intrude through the bark into

the wood of the tree, or around the tree.

- 3.20.1 “Ground blind” means a structure or manufactured enclosure made of natural or manmade materials placed on the ground to assist in concealing or disguising the user or occupant. This does not apply to blinds constructed for purposes of hunting waterfowl which are governed by 10 V.S.A. App. § 23.
- 3.22 “Bait” means any animal, vegetable, fruit or mineral matter placed with the intention of attracting wildlife.
- 3.23 “All-terrain vehicle” or “ATV” means any non-highway recreational vehicle, except snowmobiles, having no less than two low pressure tires (10 pounds per square inch, or less) or tracks, not wider than 60 inches with two-wheel ATVs having permanent, fulltime power to both wheels, and having a dry weight of less than 1,700 pounds, when used for cross-country travel on trails or on any one of the following or a combination thereof: land, water, snow, ice, marsh, swampland, and natural terrain.
- 3.24 “Utility task vehicle” means a side-by-side four-wheel drive off-road vehicle that has four wheels, or tracks, and is propelled by an internal combustion engine with a piston displacement capacity of 1,200 cubic centimeters or less, and has a total dry weight of 1,200 to 2,600 pounds.
- 3.25 “Waterbody” means any lake, pond, river, or stream.

#### **4.0 Authorized Activities**

- 4.1 The following activities are authorized on all lands under this rule:
- a) Hunting, fishing, trapping, and target shooting at designated shooting ranges, as well as all other activities authorized under 10 V.S.A. Part 4;
  - b) Fish and wildlife viewing and photography;
  - c) Boating, including launching and landing, for fish-based and wildlife-based activities where not otherwise prohibited by any other relevant regulations or statutes;
  - d) Dispersed, wildlife-based pedestrian activities including walking, snowshoeing, swimming, cross-country skiing, and collection of shed antlers;
  - e) Non-commercial picking of berries, nuts, fungi, and other wild edibles except ginseng;
  - f) Camping for purposes of hunting, fishing or trapping:
    - i. Primitive camping on WMAs designated by the Department for no more than 3 consecutive nights. Camp sites must be at least 200 feet from any waterbody, property line, or road; Self-contained camping on sites designated by the Department for this purpose, for no more than 16 days during the periods of May 1-31, September 1 through December 15. No individual parcel will have more than three designated sites for self-

contained camping unless that site's use has been demonstrated to have preceded January 1, 2007.

- ii. Fish-based and wildlife-based commercial activities limited to those specified in 4.a-4.c of this subsection when conducted by a person. This shall include guiding for purposes of fishing, hunting, and trapping.

## 5.0 Prohibited Activities

5.1 The following activities are strictly prohibited, unless otherwise authorized in accordance with Section 6:

- a) The operation of any ATV, UTV, or any wheeled or tracked motorized vehicle not registered for public highway use, except as noted as provided for under this subsection and section 6.0 of this regulation:
  - i. Pursuant to 23 V.S.A. § 3506 (b) (4), ATV use is prohibited on, “any public land, body of public water...unless the secretary has designated the area for use by all-terrain vehicles pursuant to rules promulgated under provisions of 3V.S.A., chapter 25.”
  - ii. If the Secretary has previously designated an area of state land for use by ATVs pursuant to 23 V.S.A. § 3506 (b) (4), the Commissioner shall authorize a designated corridor on Department lands for under section 6.0 of this rule subject to the terms and conditions the Commissioner deems appropriate.
- b) Use of motorized vehicles except on roads specifically designated for such use;
- c) Snowmobiling except as approved by the Department and on designated corridors;
- d) Horseback riding, dog sledding, non-motorized cycle riding, or use of motorized vehicles except on designated corridors;
- e) Draft and pack animals except for retrieval of legally harvested moose, deer, and black bear during the respective hunting season(s);
- f) Commercial Activities except those allowed under 4.1(a-c);
- g) Artifact or fossil collection;
- h) Fires except in emergency situations, or for non-primitive and primitive camping in accordance with 4.1(f);
- i) Abandoning, or disposing of any animal carcass, or their parts, except that portions of fish or game legally harvested on the property may be deposited on site during routine field processing for preservation and transport, or parts used in conjunction with legal trapping;

- j) Construction or placement of temporary or permanent structures, except as provided under Section 7 of this rule or for primitive and non-primitive camping in accordance with Section 4.1(f);
- k) Collection of plants, trees, evergreen brush or limbs, except wild edibles as allowed under Section 4.1(e) of this rule;
- l) Use of any fireworks or pyrotechnic devices except signal flares in an emergency situation;
- m) Feeding or baiting of wildlife except if otherwise authorized by law;
- n) Taking of fish from a fish culture station except during special events established by the Department, including but not limited to fishing derbies, clinics, and educational events;
- o) Entering within 500 feet of any building or other associated infrastructure that is associated with a Department Fish Culture Station or Conservation Camp during times of the day other than those times posted for public use;
- p) Parking of vehicles except while engaged in an Authorized Activity;
- q) All other activities not specifically authorized by this rule, or authorized in writing by the Commissioner including, but not limited to: para-sailing, hang-gliding, recreational rock climbing, and geocaching.

## **6.0 Special Use Activities and Designated Sites on Vermont Fish and Wildlife Department Lands**

- 6.1 The Commissioner may grant a Special Use Permit, Lease or License for any activity under this rule, subject to Section 5.1(a), so long as the Commissioner has determined that there will be no adverse impact on Authorized Activities or other adverse impacts on Authorized Activities or other adverse impacts on the primary purposes of ownership.
- 6.2 The Commissioner may designate a site, by means of signage, or being identified on a Department-issued map, for any activity under this rule, subject to Section 5.1(a), so long as the Commissioner has determined that there will be no adverse impact on Authorized Activities or other adverse impacts on the primary purposes of ownership.
- 6.3 The Commissioner may permit accommodations to persons with a qualified disability pursuant to the Americans with Disabilities Act.

## **7.0 Use of Tree Stands and Ground Blinds on WMAs**

- 7.1 Permanent tree stands and ground blinds are prohibited on state-owned WMAs.
- 7.2 Temporary tree stands and ground blinds are permitted on state-owned WMAs under the

following conditions:

a) Tree stands and ground blinds may be erected and used without written permission from the Department during the time period from the third Sunday in August through the third Saturday in December annually, May 1 through May 31, all dates inclusive, or during any Youth Hunting Day or Weekend. This does not include blinds constructed for purposes of hunting waterfowl pursuant to 10 V.S.A. App. § 23.

b) Tree stands and ground blinds may be erected and used at other times of the year with advance notice to, and written permission from, the Department's District office staff responsible for managing and administering state land in the District in which the land is located.

c) Tree stands and ground blinds used on WMAs must be constructed and erected in such a way that:

i. No damage is done to any living tree in erecting, maintaining, using, or accessing the stand or blind except that:

a) Dead limbs, trees or shrubs may be removed as needed to erect and use the stand or blind, and;

b) No live limbs, trees or shrubs may be cut for any purpose except those one inch or less in diameter at either ground level or from the main stem or branch of the tree where the stand or blind is located as appropriate (for guidance, a United States quarter is .9 inch in diameter), and;

c) No nails, bolts, screws (including access steps), wire, chain or other material that penetrates through the bark and into the wood of live trees shall be used in erecting any stand or blind, and;

d) All tree stands or ground blinds used on WMAs must be clearly and legibly marked with the owner's name and address. Marking shall be legible and placed in a manner that enables a person to conveniently and easily read it.

7.3 Tree stands and ground blinds that do not conform to this regulation are prohibited and may be confiscated and/or destroyed by the Department. Building, erecting, maintaining, using or occupying a non-conforming tree stand or ground blind is prohibited. Construction of any tree stand or ground blind does not confer exclusive use of its Location to the person who built it. Any person may use that location for purposes consistent with this rule.

## APPENDIX 7: Glossary

**Acceptable management practices (AMPs).** In this plan, a series of erosion control measures for timber harvesting operations, as identified in state statutes. The AMPs are the proper method for the control and dispersal of water collecting on logging roads, skid trails, and log landings to minimize erosion and reduce sediment and temperature changes in streams.

**All-aged (Uneven-aged) system.** Timber management which produces a stand or forest composed of a variety of ages and sizes. Regeneration cutting methods in this system include single tree selection and group selection.

**Basal area.** A measure of the density of trees on an area. It is determined by estimating the total cross-sectional area of all trees measured at breast height (4.5 feet) expressed in square feet per acre.

**Best management practices.** A practice or combination of practices determined to be the most effective and practicable means of preventing negative impacts of silvicultural activities.

**Biodiversity.** The variety of plants and animals, their genetic variability, their interrelationships, and the biological and physical systems, communities, and landscapes in which they exist.

**Biophysical region.** A region with shared characteristics of climate, geology, soils, and natural vegetation. There are currently eight biophysical regions recognized in Vermont.

**Block.** A land management planning unit.

**Browse.** The part of leaf and twig growth of shrubs, vines, and trees available for animal consumption.

**Buffer (Riparian Buffer Zone).** The width of land adjacent to streams or lakes between the top of the bank or top of slope or mean water level and the edge of other land uses. Riparian buffer zones are typically undisturbed areas, consisting of trees, shrubs, groundcover plants, duff layer, and a naturally vegetated uneven ground surface, that protect the water body and the adjacent riparian corridor ecosystem from the impact of these land uses.

**Canopy.** The more or less continuous cover of branches and foliage formed collectively by the crowns of adjacent trees and other woody growth.

**Capability.** The potential of an area to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices and at a given level of management intensity. Capability depends on current conditions and site conditions such as climate, slope, landform, soils, and geology as well as the application of management practices such as silvicultural protection from fire, insects, and disease.

**Cleaning (Weeding).** Regulating the composition of a young stand by eliminating some trees and encouraging others, and also freeing seedlings or saplings from competition with ground vegetation, vines, and shrubs.

**Clearcutting.** A cut which removes all trees from a designated area at one time, for the purpose of creating a new, even-aged stand.

**Commercial forest land.** Land declared suitable for producing timber crops and not withdrawn from timber production by statute or administrative regulation.

**Conservation.** The careful protection, planned management, and use of natural resources to prevent their depletion, destruction, or waste.

**Conservation easement.** Acquisition of some rights on a parcel of land designed to keep the property undeveloped in perpetuity.

**Cover.** Vegetation which provides concealment and protection to wild animals.

**Cultural operation.** The manipulation of vegetation to control stand composition or structure, such as site improvement, forest tree improvement, increased regeneration, increased growth, or measures to control insects or disease. Examples of methods used are timber stand improvement, cleaning or weeding, release, and site preparation.

**DBH (diameter at breast height).** The diameter of the stem of the tree measured at breast height (4.5 feet or 1.37 meters) from the ground.

**Deer wintering area.** Forest area with at least 70 percent conifer that provides suitable, stable habitat to meet deer needs during the winter.

**Den tree.** A live tree at least 15 inches DBH (diameter at breast height) containing a natural cavity used by wildlife for nesting, brood rearing, hibernating, daily or seasonal shelter, and escape from predators.

**Developed (or intensive) recreation.** Activities associated with man-made structures and facilities that result in concentrated use of an area. Examples are campgrounds and ski areas.

**Diameter at breast height (DBH).** The diameter of the stem of the tree measured at breast height (4.5 feet or 1.37 meters) from the ground.

**Dispersed recreation.** Outdoor recreation activities requiring few, if any, support facilities.

**Ecological processes.** The relationships between living organisms and their environment. Among these processes are natural disturbances such as periodic fire, flooding, or beaver activity; natural stresses such as disease or insects; catastrophic weather-related events such as severe storms or lightning strikes; or more subtle ongoing processes such as succession, hydrology, and nutrient cycling.

**Ecological reserve.** An area of land managed primarily for long-term conservation of biodiversity.

**Ecosystem.** A complex array of organisms, their natural environment, the interactions between them, the home of all living things, including humans, and the ecological processes that sustain the system.

**Ecosystem management.** The careful and skillful use of ecological, economic, social, and managerial principles in managing ecosystems to produce, restore, or sustain ecosystem integrity, uses, products, and services over the long-term.

**Endangered species.** A species listed on the current state or Federal endangered species list (VSA Title 10, chapter 123). Endangered species are those which are in danger of becoming extinct within the foreseeable future throughout all or a significant portion of their range.

**Even-aged system.** Timber management that produces a forest or stand composed of trees having relatively small differences in age. Regeneration cutting methods in this system include clearcutting, seed tree (seed cut) method, and shelterwood method.

**Forest health.** Condition in which forest ecosystems sustain their complexity, diversity, resiliency, and productivity.

**Forest type.** A natural group or association of different species of trees which commonly occur together over a large area. Forest types are defined and named after the one or more dominant species of trees, such as the spruce-fir and the birch-beech-maple types.

**Forestry.** The art and science of growing and managing forests and forest lands for the continuing use of their resources.

**Fragmentation.** Division of a large forested area into smaller patches separated by areas converted to a different land use.

**Game species.** Animals habitually hunted for food, particular products, sport, or trophies.

**Geographic Information Systems.** A computer-based means of mapping lands and resources and communicating values associated with them (GIS).

**Green certification.** A process, sponsored by several international organizations, that promotes sustainable forest management practices, providing a marketplace identify for forest products certified to have been grown and manufactured in a sustainable manner.

**Group Selection.** Removal of small groups of trees to meet a predetermined goal of size, distribution, & species.

**Habitat.** A place that provides seasonal or year round food, water, shelter, or other environmental conditions for an organism, community, or population of plants or animals.

**Hardwood.** A broad leaved, flowering tree, as distinguished from a conifer. Trees belonging to the botanical group of angiospermae.

**Healthy ecosystem.** An ecosystem in which structure and functions allow the maintenance of the desired conditions of biological diversity, biotic integrity, and ecological processes over time.

**Heritage Sites.** Sites identified by the Vermont Nongame and Natural Heritage Program of the Department of Fish and Wildlife, which have rare, threatened, or endangered species of plants or animals. Heritage sites are identified using a common standards-based methodology, which provides a scientific and universally applicable set of procedures for identifying, inventorying, and mapping these species.

**Intensive (or developed) recreation.** Outdoor recreation activities requiring major structures & facilities.

**Interior dependent species.** Those wildlife species that depend on large unbroken tracts of forest land for breeding and long term survival. The term is also often used in conjunction with neotropical migratory bird species requiring large patches of fairly homogeneous habitat for population viability.

**Intermediate treatment.** Any treatment or tending designed to enhance growth, quality vigor, and composition of the stand after its establishment or regeneration and prior to the final harvest.

**Land conservation.** The acquisition or protection through easements of land for wildlife habitat, developed state parks, and working forests.

**Landscape.** A heterogeneous area of land containing groups of natural communities and clusters of interacting ecosystems. These can be of widely varying scales but normally include a range of elevations, bedrock, and soils.

**Mast.** The fruit (including nuts) of such plants as oaks, beech, hickories, dogwood, blueberry, and grape, used for food by certain wildlife species.

**Motorized use.** Land uses requiring or largely dependent on motor vehicles and roads.

**Multiple-use forestry.** Any practice of forestry fulfilling two or more objectives of management, more particularly in forest utilization (e.g. production of both wood products and deer browse).

**Multiple-use management.** An onsite management strategy that encourages a complementary mix of several uses on a parcel of land or water within a larger geographic area.

**Native (species).** A plant or animal indigenous to a particular locality.

**Natural Area.** Limited areas of land, designated by Vermont statute, which have retained their wilderness character, although not necessarily completely natural and undisturbed, or have rare or vanishing species of plant or animal life or similar features of interest which are worthy of preservation for the use of present and future residents of the state. They may include unique ecological, geological, scenic, and contemplative recreational areas on state lands.

**Natural community.** An assemblage of plants and animals that is found recurring across the landscape under similar environmental conditions, where natural processes, rather than human disturbances, prevail.

**Nongame species.** Animal species that are not hunted, fished, or trapped in this state. This classification is determined by the state legislature.

**Northern hardwood.** Primarily sugar maple, yellow birch, and beech. May include red maple, white ash, white birch, black cherry, red spruce, and hemlock.

**Old growth forest.** A forest stand in which natural processes and succession have occurred over a long period of time relatively undisturbed by human intervention.

**Outdoor recreation.** Leisure time activities that occur outdoors or utilize an outdoor area or facility.

**Overstory.** That portion of the trees, in a forest of more than one story, forming the upper or upper-most canopy layer.

**Pole.** A tree of a size between a sapling and a mature tree.

**Pole timber.** As used in timber survey, a size class definition; trees 5.0 to 8.9 inches (varies by species) at DBH. As used in logging operations, trees from which pole products are produced, such as telephone poles, pilings, etc.

**Regeneration treatment (harvest cut).** Trees are removed from the stand to create conditions that will allow the forest to renew or reproduce itself. This is accomplished under either an even-aged management system or an uneven-aged management system.

The four basic methods used to regenerate a forest are clearcutting, seed-tree, shelterwood, and selection (group selection or single tree selection).

**Regeneration methods.** Timber management practices employed to either regenerate a new stand (regeneration cutting) or to improve the composition and increase the growth of the existing forest (intermediate treatment).

**Regulated Hunting/Fishing/Trapping.** The harvest of wildlife under regulations stipulating setting of seasons, time frame of lawful harvest, open and closed zones, methods of take, bag limits, possession limits, and reporting or tagging of species.

**Release (release operation).** The freeing of well-established cover trees, usually large seedlings or saplings, from closely surrounding growth.

**Removal cut.** The final cut of the shelterwood system that removes the remaining mature trees, completely releasing the young stand. An even-aged stand results.

**Salvage Cutting.** The removal of dead, dying, and damaged trees after a natural disaster such as fire, insect or disease attack, or wind or ice storm to utilize the wood before it rots.

**Sanitation cutting.** The removal of dead, damaged, or susceptible trees to improve stand health by stopping or reducing the spread of insects or disease.

**Sapling.** As used in timber surveys, a size class definition. A usually young tree larger than seedling but smaller than pole, often 1.0 to 4.9 inches at DBH.

**Seedling.** A very young plant that grew from a seed.

**Seed-Tree (Seed Cut) method.** The removal of most of the trees in one cut, leaving a few scattered trees of desired species to serve as a seed source to reforest the area.

**Shelterwood method.** A series of two or three cuttings which open the stand and stimulate natural reproduction. A two cutting series has a seed cut and a removal cut, while a three cutting series has a preparatory cut, a seed cut, and a removal cut.

**Silvicultural systems.** A management process whereby forests are tended, harvested, and replaced, resulting in a forest of distinctive form. Systems are classified according to the method of carrying out the

fellings that remove the mature crop and provide for regeneration and according to the type of forest thereby produced.

**Single tree selection method.** Individual trees of all size classes are removed more or less uniformly throughout the stand to promote growth of remaining trees and to provide space for regeneration.

**Site Preparation.** Hand or mechanical manipulation of a site, designed to enhance the success of regeneration.

**Snag.** Includes standing dead or partially dead trees that are at least 6 inches in diameter at breast height (DBH) and 20 feet tall.

**Softwood.** A coniferous tree. Softwood trees belong to the botanical group gymnospermae, including balsam fir, red spruce, and hemlock.

**Stand improvement.** An intermediate treatment made to improve the composition, structure, condition, health, and growth of even or uneven-aged stands.

**Stewardship.** Caring for land and associated resources with consideration to future generations.

**Sustainability.** The production and use of resources to meet the needs of present generations without compromising the ability of future generations to meet their needs.

**Sustained yield.** The yield that a forest can produce continuously at a given intensity of management.

**Thinning.** Removing some of the trees in a dense immature stand primarily to improve the growth rate and form of the remaining trees and enhance forest health.

**Threatened species.** A species listed on the state or Federal threatened species list. Threatened species are those likely to become endangered within the foreseeable future throughout all or a significant portion of their range.

**Timber lands.** Properties that are managed primarily for the maximum production of forest products.

**Timber Stand Improvement.** Activities conducted in young stands of timber to improve growth rate and form of the remaining trees.

**Traditional uses.** Those uses of the forest that have characterized the general area in the recent past and present, including an integrated mix of timber and forest products harvesting, outdoor recreation, and recreation camps or residences.

**Uneven-aged (All-aged) system.** Timber management which produces a stand or forest composed of a variety of ages and sizes. Regeneration cutting methods in this system include single tree selection and group selection.

**Watershed.** The geographic area within which water drains into a particular river, stream, or body of water. A watershed includes both the land and the body of water into which the land drains.

**Weeding (cleaning).** Regulating the composition of a young stand by eliminating some trees and encouraging others, and also freeing seedlings or saplings from competition with ground vegetation, vines, and shrubs.

**Wilderness.** Areas having pristine and natural characteristics, typically roadless and often with some limits on uses. (This is not the federal definition of wilderness.)

**Wildlife habitat.** Lands supplying a critical habitat need for any species of wildlife, especially that which requires specific treatment and is of limited acreage.

**Working forest.** Land primarily used for forestry purposes but also available for recreation, usually where both managed land and land not presently being managed is present.

**Working landscape.** A landscape dominated by land used for agricultural and/or forestry purposes.