

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

*Atherton Meadows Wildlife Management Area*  
Long Range Management Plan



Whitingham, Vermont

947.4 acres



Prepared by: *Springfield Stewardship Team*

August 4, 2014



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*8/6/14*  
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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 946-acre Atherton Meadows Wildlife Management Area (AMWMA) is located in Whitingham, Vermont in the Southern Green Mountains biophysical region, in southeastern Vermont. It is located in a rural area which features a primarily forested, undeveloped landscape.

### Natural Communities

There are 27 different occurrences of 9 natural communities on the WMA. Three natural communities are occurrences of statewide significance. No communities found were considered to be rare and all normally occur in this region.

<b>Natural Communities of Atherton Meadows WMA</b>				
<b>Natural Community</b>		<b>Acres</b>	<b>Vermont Distribution</b>	<b>Example of Statewide Significance?</b>
<b>Wetlands</b>	Beaver Wetland	26	very common	
	Hemlock-Balsam Fir-Black Ash Seepage Swamp	17	uncommon	yes
	Red Spruce-Cinnamon Fern Swamp	3	uncommon	
	Seep	2	common	yes
	Vernal Pool	0.4	uncommon	
<b>Uplands</b>	Hemlock-Northern Hardwood Forest	359	common	yes
	Hemlock Forest	7	common	
	Northern Hardwood Forest	505	very common	
	Northern Hardwood Talus Woodland	3	uncommon	
	Open Land	25	common	

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: <http://www.vtfishandwildlife.com/books.cfm?libbase=Wetland,Woodland,Wildland>

### Wildlife and Habitat

Deer wintering areas are the most common and widespread habitat feature on the WMA, occupying approximately 310 acres of Hemlock and Hemlock-Northern Hardwood natural community.

There are multiple wetland occurrences on the WMA which provide a variety of habitats beneficial to a variety of mammals, birds, amphibians, and insects. One of the key features on the WMA is a beaver wetland complex in the center of the main parcel (Atherton Lot). This area hosts a Great Blue Rookery. Other important habitats include a 31-acre beech stand important to bears for fall feeding, a 10-acre rocky outcrop which may be utilized by bobcats for denning sites, and two sites (~14 acres) of old apple orchards which are well maintained and are used by many wildlife species for feeding. In addition, there has been active management on the parcel throughout State ownership which has created early successional habitat through the periodic use of patch clearcuts dating back to 1964.

Two species of very rare plants have been located within the WMA; neither of these species is listed as “threatened” or “endangered” by the Vermont state endangered species statute (10 V.S.A. 123). In addition, one uncommon species is located within the WMA.

1. Pinxter-flower (*Rhododendron periclymenoides*) is a very rare (S1) species in Vermont.
2. Inflated Bladderwort (*Utricularia radiata*) is a very rare (S1) species.
3. Long Sedge (*Carex folliculata*), an uncommon (S3) species.

### **Timber Resource**

Forest stands are fully to overstocked stands of Northern Hardwood and Hemlock Hardwood poles and small sawtimber. Of the 947 acres, roughly 882 acres are appropriate for active management based on topography, wetlands, and sensitive areas. Evidence of timber harvesting is evident throughout the WMA. There has been active management on the original purchase (799.7 acres) since State ownership in 1964. The Bodenmiller parcel (147.69 acres), acquired in 2011, has no recent history of harvesting. Quality of timber is generally poor to fair with pockets of better stems where soils are richer and deeper. Access to southern portions of the Atherton Lot are good but will be more challenging on the northern sections and the Steam Mill Lot due to distance and stream crossings. Regeneration in previously thinned stands is primarily unacceptable growing stock, beech, and striped maple, with pockets of more desirable red spruce and northern hardwood species. Past and recent patch clearcuts regenerated adequately to northern hardwood. There is abundant evidence of insect, disease, and storm damage throughout northern hardwood stands, most commonly beech bark disease, caterpillar defoliations and snow and ice damage.

### **Fisheries and Water**

Aquatic habitats include No. 9 Brook, Tobey Brook, and two beaver wetland complexes. No. 9 Brook bisects the Steam Mill Lot, flowing north into Harriman Reservoir. It is a third order stream, within the Deerfield watershed, having a drainage area of 2.76 square miles. Within the Atherton Lot, Tobey Brook originates from a beaver flowage, and flows south and west into the Deerfield River. Tobey Brook is a first order stream and is part of the Deerfield Watershed. Situated in the center of the parcel at an elevation of 1,840 feet, is a 16-acre beaver pond.

Fish communities in these small headwater streams are generally characterized under Assemblages 1-3 described in A Classification of the Aquatic Communities of Vermont. These categories are comprised of one to three species, including any of the following: brook trout (*Salvelinus fontinalis*), blacknose dace (*Rhinichthys atratulus*), and slimy sculpin (*Cottus cognatus*). The beaver pond is primarily populated by brown bullhead (*Ameiurus nebulosus*).

Wetlands: There are five wetland communities mapped on AMWMA that comprise approximately 48 acres. These range in size from the smallest, a vernal pool less than 1/10<sup>th</sup> of an acre, to the largest a 16-acre beaver pond in the center of the Atherton Lot.

Riparian Zones: There are approximately 1.4 miles of linear streams within AMWMA and 1.2 miles of beaver pond shoreline. This results in approximately 30 acres of riparian forests that will be managed according to guidelines for riparian function, protection, and flood resiliency. Seeps, pools, swamps or other wetland features are also buffered during management.

### **Invasive Exotic Plant Species**

There are many non-native plant species at Atherton Meadows WMA. Most are not a threat to native vegetation, habitats, or wildlife; however, there are a number of notable exceptions. Small populations of invasive Eurasian honeysuckle (*Lonicera* spp.), Japanese barberry (*Berberis thunbergii*), common reed (*Phragmites australis*), and Japanese knotweed (*Fallopia japonica*) have all been located on the WMA. While their risk to native plants and habitats is currently low, they represent a long-term potential threat to the ecological integrity of the WMA.

### **Historic Resources**

Atherton Meadows WMA is located within close proximity to the Deerfield River. Prior to the creation of Harriman Reservoir in the 1920s and, before that, European settlement, the Deerfield would have provided many of the things native people and settlers needed to survive. However, no prehistoric resource sites were found within the Atherton Meadows WMA, though three areas of moderate sensitivity were identified using a GIS-based predictive model.

There are several cultural historic sites on the WMA. Many miles of stone walls are a testament to the early agricultural days of Vermont when sheep pasture was common. There are four old rock foundation complexes of presumably 19<sup>th</sup> century residential and agricultural remains. In addition, one mill/dam/bridge site has been located and one 1800s Schoolhouse is reported to be located on the WMA along Route 100.

### **Recreational Users**

The recreational experience in this WMA is characterized by a natural appearing setting with obvious modifications including constructed roads and trails, a wide power line corridor, and evidence of timber cutting. Most recreational use occurs during the fall hunting seasons and the winter snowmobile season. The WMA has approximately 0.75 miles of frontage on Route 100, one of Vermont's most scenic and popular foliage viewing roads. Most of the WMA is located within one mile of this busy paved road, though due to the steep hills adjacent to Route 100, most of the WMA is not visible from the state road.

### **Infrastructure and Access**

Access into the WMA is poor. In 1986 a ¾ mile gated truck road was constructed into the Atherton Lot which serves as the main access. Access to the Steam Mill Lot is difficult from Route 100 due to a large stream and wet soils. Management access will primarily occur from the east via a Class 4 Town Road. In 1969 a public parking area was constructed on the Atherton Lot on the North side of Route 100. In 2011 another public parking area was constructed on the Steam Mill Lot south of Route 100. In addition to public access, these parking areas also serve as management access.

## **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 Atherton Meadows WMA are Highly Sensitive Management (4%), Special Management (48%), General Management (48%), and Intensive Management (0%). 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 AMWMA.

Management goals for the AMWMA include strategies to:

- Promote dense softwood cover for deer wintering.
- Protect or enhance critical habitat features.
- Create early successional forest for wildlife species and release hard mast crop trees through commercial timber harvest.
- Provide soft mast such as apples, blueberry, serviceberry and rubus species, and maintain alder/aspen stands.
- Protect rare, threatened, and endangered species.
- Support wildlife-based recreational opportunities.
- Enhance flood resiliency.

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## **I. PARCEL DESCRIPTION**

### **A. Location and Parcel Information**

Atherton Meadows Wildlife Management Area is located in Whitingham, Vermont, in the Southern Green Mountains biophysical region. The 947.4-acre WMA is similar in topography and forest composition to nearby landscapes. Elevations range from 1400' to 2050', frequent hills and valleys, and several substantial streams and wetlands. It is comprised of two distinct parcels bisected by Route 100 approximately eight miles west of Jacksonville Village. The Town of Bennington is 30 minutes to the west and Brattleboro is 30 minutes to the east. Just to the north of the WMA is Harriman Reservoir, a hydroelectric project owned and managed by TransCanada which includes approximately 16,000 acres of forestland.

### **B. Purpose of Ownership**

Wildlife Management Areas are managed by the Vermont Fish & Wildlife Department to meet a variety of goals. Wildlife management objectives favor 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.

Primary Stewardship Goals for Atherton Meadows WMA are to:

- Enhance opportunities for wildlife-based recreation, public access, particularly hunting, trapping, and wildlife viewing;
- 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 and important infrastructure;
- Maintain or enhance the condition and resiliency of natural communities and important biological resources;
- Protect and enhance rare, threatened, and endangered species and their habitat;
- Protect and enhance wetland function to provide habitat and moderate flood and snowmelt events;
- Retain and recruit snags, den trees, and woody material to enhance habitat for nesting, roosting, denning, and feeding habitat as well as soil organic matter and nutrient enhancement.
- 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.

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

The State acquired 799.71 acres in 1964 from James W. and Grace Farrington of Tucson, Arizona. The father of James W., James A. Farrington spent years acquiring these lands, through five different transactions with four different parties. The first acquisition by Mr. Farrington was from George Kentfield in 1933. The next, and largest, acquisition was again from George

Kentfield who sold 800 acres to Mr. Farrington and Arthur Wheeler in 1935. Those lands contained what was known as the Atherton Lot (570 acres), and the Newell/Dix/Jillson Lots (230 acres, parts of which were not transferred to State ownership in 1964). In 1938 Mr. Farrington purchased Mr. Wheeler’s half interest in those lands. Other transactions included land from New England Power Engineering and Service Co. in 1936, Connecticut River Development Co. in 1940 and A. Bishop Perry in 1941. These lands include both the main parcel (Atherton Lot) West of Route 100 and the Steam Mill Lot East of Route 100.

The State acquired an additional 147.69 acres of land from Vermont Transco LLC as deer wintering mitigation lands during the southern loop transmission line expansion project. VT Transco purchased the land from Robert and Donna Bodenmiller of Suffolk Co. NY in 2009 and transferred to State ownership in 2011.

<b>YEAR</b>	<b># ACRES</b>	<b>SELLER</b>
1964	799.71	James and Grace Farrington
2011	147.69	VT Tranco LLC

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

Pre-European settlement, Atherton Meadows WMA most probably consisted of undisturbed forestland with beaver impoundments. Glaciers scoured the region and water carved the steep side hills. Early human activities probably did not impact these lands very much if at all for thousands of years after glaciations. Then, like much of the land in Vermont, early European settlements largely focused on agriculture and industry. The early settlement period in the mid to late 1700s focused on clearing forests for agricultural land. In time, industry made its way to Whitingham including saw mills, grist mills, maple sugar production, and wool. According to the previous LRMP and historical research, land comprising Atherton Meadows WMA was primarily sheep pasture and forestland although there seems to be some evidence of industrial use along Number Nine Brook, residential/agricultural use from four foundation sites found, and public use with Schoolhouse #15 referenced along Route 100.

#### **E. Resource Highlights**

Atherton Meadows WMA is primarily managed for wildlife resources. These include early successional habitats, deer wintering areas, black bear mast production, and potential bobcat denning sites. Several beaver complexes comprise about 26 acres enhancing biodiversity. There are approximately 4.5 miles of VAST snowmobile trails which are very popular with the local club and “through riders” from Massachusetts. Several old foundations in good condition are on the WMA and two historic apple orchards have been maintained.

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

This LRMP reflects the values and goals recommended in the town and regional plans for this geographic area of Whitingham.

### ***Regional Plan***

The Windham Regional Planning Commission is in the process of updating the Windham Regional Plan (WRP) with a projected release date of 2014. The 2006 Windham Regional Plan was consulted for relevant information.

The Windham Regional Plan outlines broad goals for many areas from residential and business development to energy and land use. The WRP plan applies to Atherton Meadows WMA for natural resource and recreational values in Windham County and provides goals and guidelines for maintaining and enhancing these resources.

The Atherton Lot of Atherton Meadows WMA is classified as “Resource” land in the WRP, land that should be maintained in a natural condition based on the existing natural resources. The Steam Mill Lot, located South of Route 100, is classified as “Productive Rural” land, characterized by low density residential development. Because AMWMA is owned and managed by the Vermont Fish & Wildlife Department, the two parcels will be managed as “Resource” lands.

As outlined and recommended in the WRP plan, management at AMWMA will:

- Promote productive forestry and manage forestland for long-term sustained yield.
- Discourage forest fragmentation and protect “green space” especially along waterways and other resource valued lands.
- Protect important natural resources and encourage land conservation.
- Preserve and protect wildlife habitats and corridors.
- Maintain wetland and stream buffers for water quality and aquatic habitats.
- Provide variable and accessible opportunities for recreation.
- Encourage public land ownership and acquisition.

### ***Town Plan***

The Whitingham Town Plan was revised in 2010. It contains many of the same goals that the WRP plan contains but with more specific delineation of geographic areas within the Town. It also includes results of a public survey of Whitingham citizens in 2008. The survey and plan indicate support of the management outlined for the WMA.

- Over 70% of Whitingham residents agree with the continued management of productive forest and agricultural lands in their town.
- An overwhelming majority believe that destruction of wildlife resources is a major problem and that conservation of large tracts of land for wildlife was important.

The Town plan proposed land use section zones the AMWMA “Conservation Land.” Conservation areas are large, essentially undeveloped areas without access to an improved public road. They are predominantly forested, are important aquifer recharge areas and contain significant wildlife habitat. The land around Harriman Reservoir (adjacent to AMWMA) is also zoned conservation land and has a Vermont Land Trust easement on the property. The Western side of Whitingham is also within the Green Mountain National Forest Proclamation Boundary. Properties within this boundary can be purchased by the Federal Government for addition to the National Forest with permission from the Town. The Town in partnership with several State Agencies conducted a “Wildlife Habitat Suitability” analysis in which the lands on the western side of the town were identified as most suitable for continuous linkage of wildlife habitat. The Town Plan also suggests that an east/west wildlife travel corridor exists across Route 100 in the vicinity of the Steam Mill Lot of AMWMA.

Basin Plan and Basin: The Deerfield Basin Plan is in the process of being drafted by VT Department of Environmental Conservation at the time that this plan was written. Once the basin plan has been adopted, recommendations will be considered in the management of the WMA.

***Green Mountain National Forest Land and Resource Management Plan***

The Green Mountain National Forest (GMNF) established in 1932, encompasses more than 400,000 acres in southern and central Vermont forming the largest contiguous public land area in the state. In 2006, the Forest Service completed the Land and Resource Management Plan which describes the role of the GMNF in managing these lands for multiple use purposes by striving to emphasize the following uses to provide benefits for people today and with an eye towards maintaining options and opportunities for future generations: conducting management activities in a manner that perpetuates an abundance of clean water and the maintenance of productive soils; assuring lands are well suited to trail based activities in backcountry settings; enhancing wildlife and plant habitat conditions; focusing on producing high quality, high value forest products; actively contributing towards sustaining the character of Vermont's rural landscape and fostering vibrant local communities and economies and playing an educational role for the public.

Atherton Meadows Wildlife Management Area has the potential to be impacted by activities guided by the 2006 Forest Plan because it is located within the Proclamation Boundary of the GMNF. The traditional forest service role of managing the GMNF for multiple use compliments many of the purposes and objectives for land management by the Vermont Fish & Wildlife Department. The Fish & Wildlife Department worked closely with the GMNF staff to support plan development and will continue to partner with the Forest Service with plan implementation by: actively participating in environmental assessments for NEPA, cooperating with the Forest Service on land acquisition within the purchase boundary and occasionally assisting with management activities on national forest land when mutually beneficial to both organizations.

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

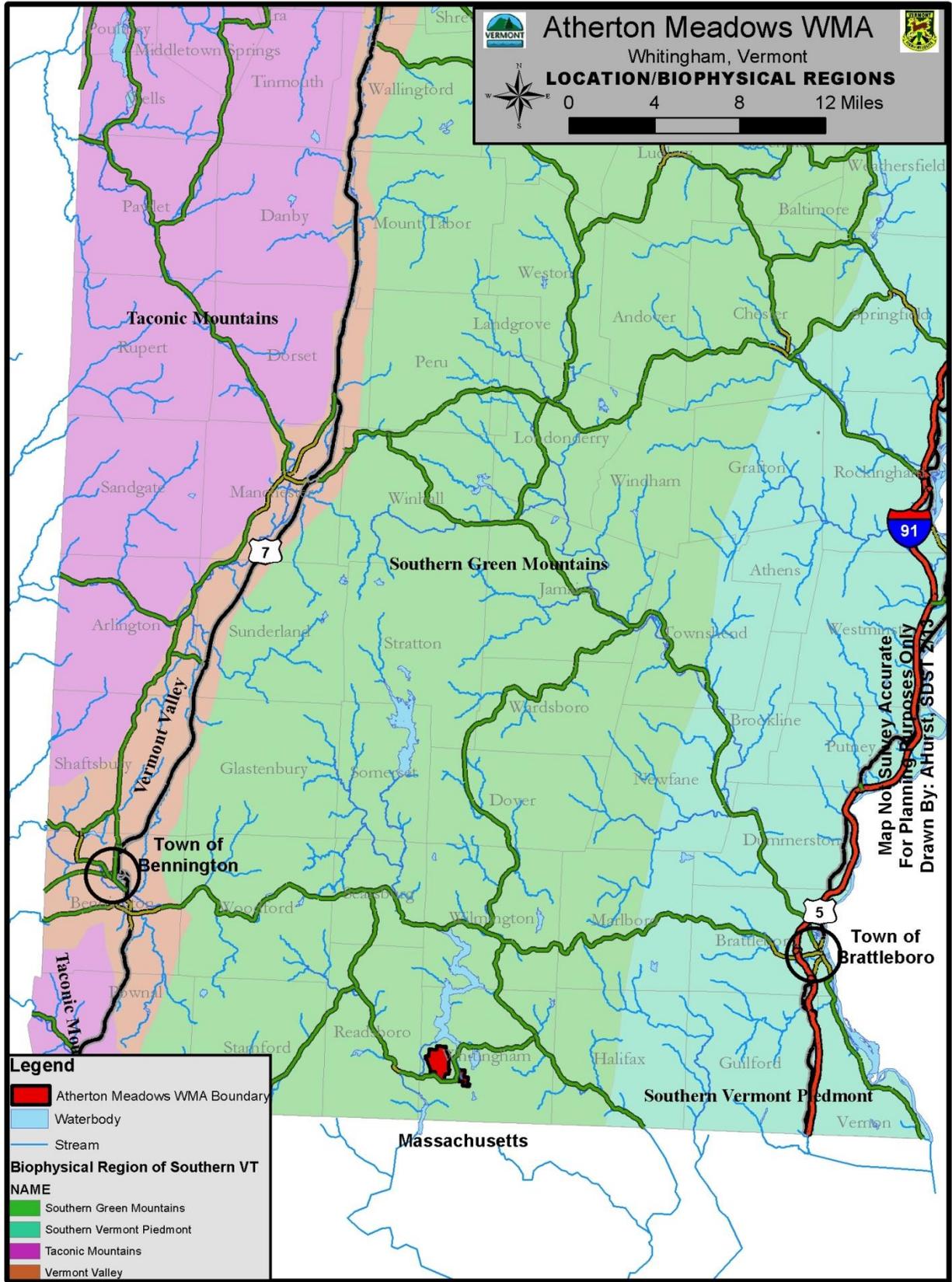
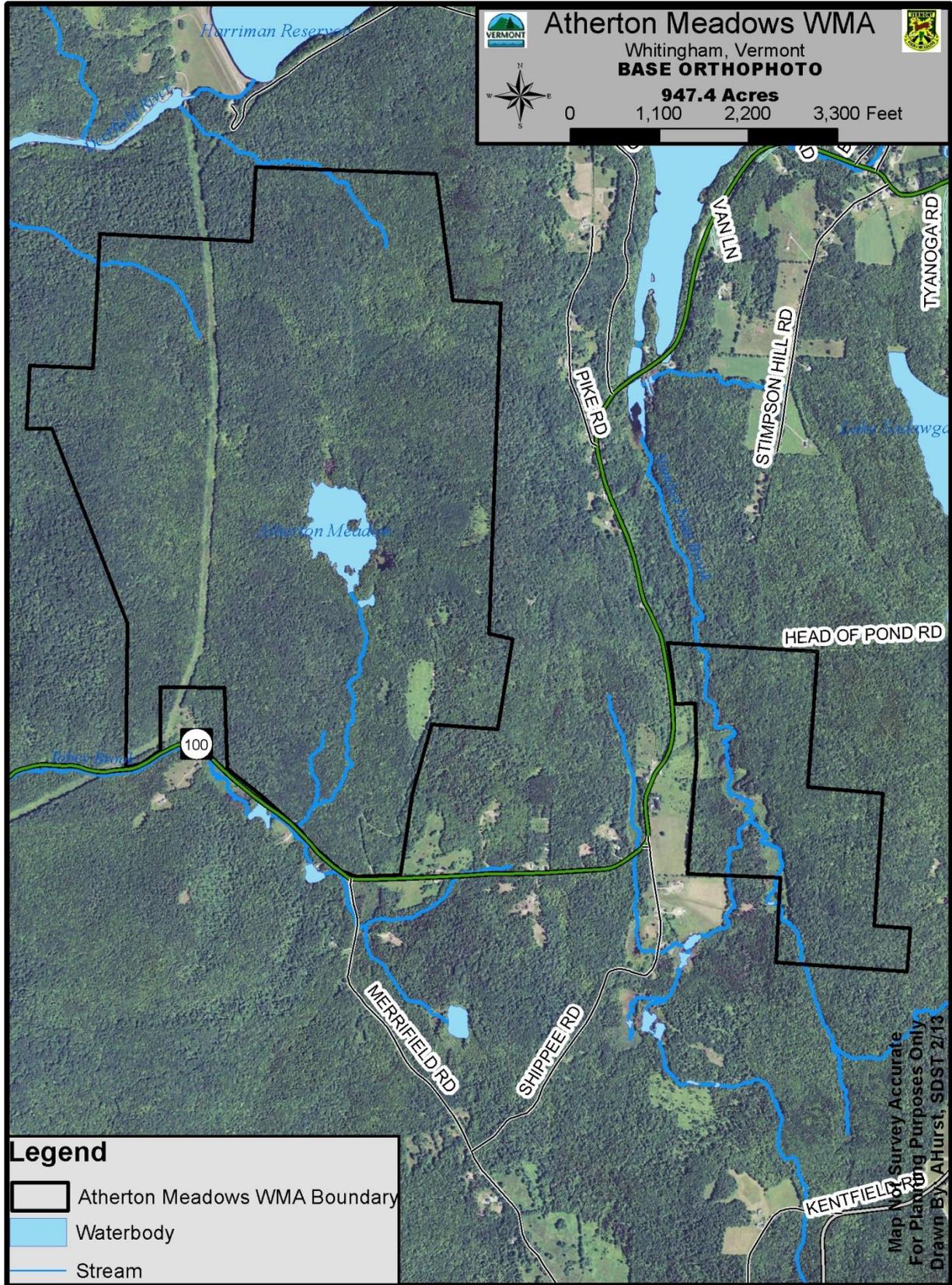


Figure 2: Parcel Base Map



## II. PUBLIC INPUT

The citizen participation process for Atherton Meadows WMA 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 Atherton Meadows WMA has been considered in the preparation of this plan.

An open-house style informational public meeting was held on April 30<sup>th</sup> 2014 at the Whitingham Town Offices in Whitingham, Vermont to present inventory and assessment information and to receive comments. After a 30-day public comment period ending May 30, 2014, the comments were reviewed and analyzed by the District Stewardship Team and a draft long range management plan was completed.

A summary of the comments received during the public involvement process, the Department's response to comments and additional information about the public involvement process are located in Appendix 2.

### III. RESOURCE ANALYSIS

#### A. Legal Constraints Assessment

A number of constraints apply to the stewardship of AMWMA. They include deed restrictions, funding constraints, rights-of-way, and long-term leases and licenses. In order to assess the effects these legal constraints have on implementation of the Long Range Management Plan (LRMP), it is important to understand the specific details of the legal constraints that apply to the Atherton Meadows WMA.

Atherton Meadows WMA is comprised of three individual land parcels that have been acquired by the State of Vermont since 1964. The first acquisition was in 1964 and included both the Atherton Lot and Steam Mill Lot comprising 799.71 acres purchased for \$18,000. Because this was a legislative appropriation, there were no legal restrictions placed on the parcel in this transfer, but it did come with some deed restrictions. The third parcel, 147.69 acre Bodenmiller, was acquired in 2011 and is subject to deed restrictions as well.

The following is a summary of the major legal constraints that impact management and public use of Atherton Meadows WMA. More detailed information for all of the properties regarding these specific rights is available at the Springfield ANR regional office.

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

##### Rights-of-Way

- TransCanada Corporation (formerly New England Power Company) – Parcel is subject to a right-of-way easement for a powerline corridor.(Atherton Lot, Bodenmiller Lot)
- TransCanada Corporation – Operates and maintains a 14-foot tunnel underneath the WMA for hydroelectric power generation in Rowe, MA. The tunnel is located at a depth that does not impact above ground management. (Atherton Lot, Bodenmiller Lot)
- State holds a right-of-way from Route 100 to the Steam Mill Lot along the old town road. (Steam Mill Lot)
- The extension of Head of Pond Road at the south end of Sadagwa Pond is considered a class 4 road by the Town of Whitingham. (Steam Mill Lot)

##### Deed Restrictions or Obligations

- Parcel subject to a deed restriction on structures within 150 feet of the highway. No buildings may be built within this zone. (Bodenmiller Lot)
- Project subject to a deed restriction which states: *“The said premises are conveyed subject to the following: Restrictions, covenants and easements, and to all building and zoning ordinances of the Town of Whitingham. Any state of facts which a personal inspection and an accurate survey map may show. Rights of utility companies.”* Further research into the exact intent of this language is required. (Bodenmiller Lot)

##### Regulatory

- Public use of wildlife management areas is subject to 10 V.S.A. App. 15, the Rule governing public use of Fish & Wildlife Department Lands (Appendix 5).

### **Funding Conditions or Restrictions**

- U.S. Fish and Wildlife Service Grant Agreement Number W-64-L-1 – The Parcel is subject to the terms and conditions described in the Notice of Grant Agreement. In summary, conditions on the Bodenmiller parcel are:
  - 1) Permanent protection of the land
  - 2) Management and enhancement of wildlife and their habitats.
  - 3) Compatible wildlife based recreational uses.

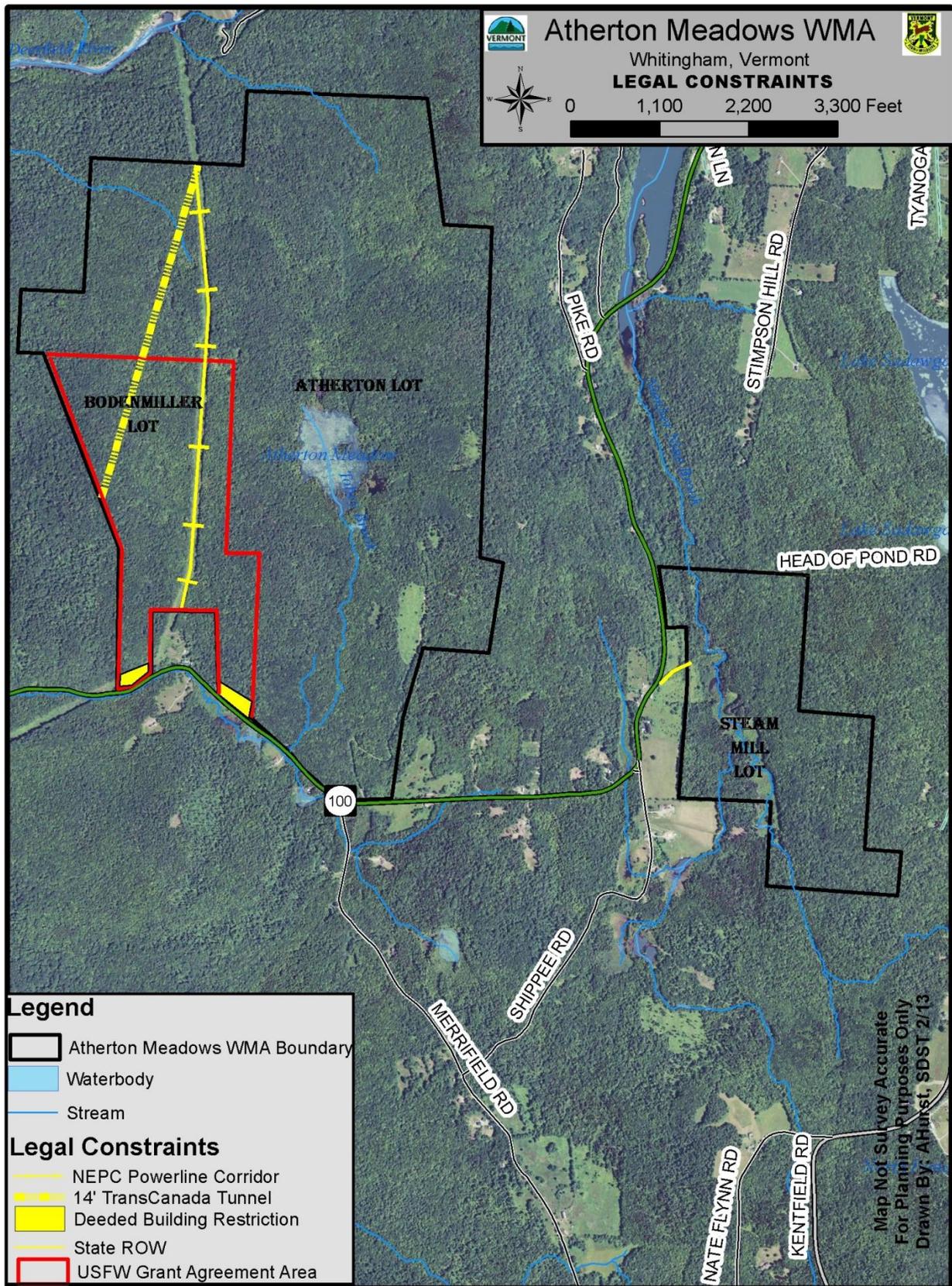
### **Pittmann-Robertson Funding**

- Federal Aid in Wildlife Restoration Act (PR) (Pittman-Robertson Act) – This Act, commonly called the Pittman-Robertson Wildlife Restoration Act, provides federal aid to states for the management and restoration of wildlife. The federal aid, funded through an excise tax on sporting arms and ammunition, may be used to support a variety of wildlife projects including the acquisition and improvement of wildlife habitat on Vermont's Wildlife Management Areas. To qualify for the funds, management activities and land uses on parcels owned by the Vermont Fish and Wildlife Department must be consistent with the objectives of protecting, restoring or improving habitat for wildlife. Recreational activities may be restricted to those activities which meets the stated objectives.

### **Long-term Leases and Licenses**

- None.

Figure 3: Legal Constraints Map



## **B. Natural Community Assessment**

### **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. Atherton Meadows WMA is located within the Southern Green Mountains biophysical region. This region is part of the Appalachian Mountain system that stretches across much of the eastern side of North America. As a result of the high elevations, it has increased levels of precipitation, low temperatures, and a short growing season. The terrain is frequently steep, though there are some large high-elevation plateaus. The metamorphic bedrock is acidic, but is much older than similar rocks found in the Northern Green Mountains. Glacial till covers much of the region, with glacial and river sediments present in the valleys.

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

The geologic history of an area can have a strong influence on the distribution of natural communities. Atherton Meadows WMA is underlain by several types of bedrock, all of which are very old rocks dating back to the Precambrian and Cambrian eras. These are primarily schist and gneiss of the Mount Holly complex and the Hoosac and Cavendish formations, and are slow-weathering, acidic rocks that do not contribute significantly to soil enrichment. Ratcliffe et al. (2011) mapped a band of marble that underlies part of the eastern parcel of the WMA, and while this bedrock has the potential to contribute substantially to soil enrichment, only minimal evidence of this was observed in the field. The degree to which any bedrock types affect growing conditions in the WMA is mediated by the depth of the 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. Most of Atherton Meadows WMA features a layer of this over the bedrock, but in some places the till is buried by recent alluvial deposits along flowing streams. In addition, many wetlands have post-glacial accumulations of muck and peat. These are organic materials deposited in very acidic and anaerobic environments, which consequently decay more slowly than they are produced. The soils of AMWMA are primarily the results of these surficial deposits. NRCS soil mapping indicates that till-derived fine sandy loams cover the vast majority of the WMA (approximately 900 acres). These soils include the Rawsonville, Hogback, Houghtonville, and Wilmington series. Worden loam is mapped on 77 acres. Muck is mapped on just 16 acres, but many of the small wetlands do not appear on NRCS soil maps. Additional details on soils can be found in the natural community descriptions below.

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

Atherton Meadows WMA receives around 53" of precipitation annually, which is above average for the state but expected at sites where relatively higher elevations contribute to increased levels of precipitation. The WMA is contained within the upper Deerfield River watershed, which eventually drains into the Connecticut River. The large beaver pond on the main parcel, and Number Nine Brook on the smaller parcel, are the most prominent water features of the WMA, but there are numerous small streams, vernal pools, and areas of groundwater seepage as well.

### Natural Disturbance

Natural disturbance process, such as wind, fire, and flooding, continually shape landscapes and define their natural communities. As is typical of Vermont's forest natural communities, the most frequent upland disturbances at Atherton Meadows WMA are small-scale events, such as individual tree death and canopy gap dynamics. Moderate scale disturbances such as blowdown, ice storm, and insect defoliation events are expected less frequently, but have the potential for larger impacts. An ice storm in 2008, for example, resulted in heavy damage to the tree canopy in portions of AMWMA. Very large scale disturbances (events affecting many hundreds of acres or more) are expected to occur very rarely, but if an event does occur it would have the potential to create dramatic changes in natural communities. The small wetlands of the WMA are probably most influenced by disturbances to the surrounding upland forest, but the larger wetland and riparian natural communities can be influenced by beaver activity, floods, and ice scouring.

### Human Disturbance

Land use history can also influence the present-day distribution and condition of natural communities. Not surprisingly, the land has a history of agriculture and timber harvesting. The parcel was reported to have been used for sheep farming in the late 19<sup>th</sup> century, but then abandoned around the turn of the 20<sup>th</sup> century. Cellar holes and a few areas of young forest remain as fading evidence of the agricultural use. Timber harvesting (for wildlife habitat management) continues as an ongoing use of the land.

### Natural Community Summary and Table

Twenty-seven occurrences of 9 natural community types were identified and mapped in Atherton Meadows WMA (Table 1). A total of 53 natural community polygons were mapped. Some broad patterns emerged from this mapping effort. AMWMA is primarily a forested landscape, with a matrix of Northern Hardwood Forest and Hemlock-Northern Hardwood Forest. Within these two communities are many small wetland natural communities. The most prominent wetland on the WMA is the beaver wetland complex in the center of the main parcel, which provides diverse habitat and hosts rare plant species.

**Table 1: Natural Communities of Atherton Meadows Wildlife Management Area**

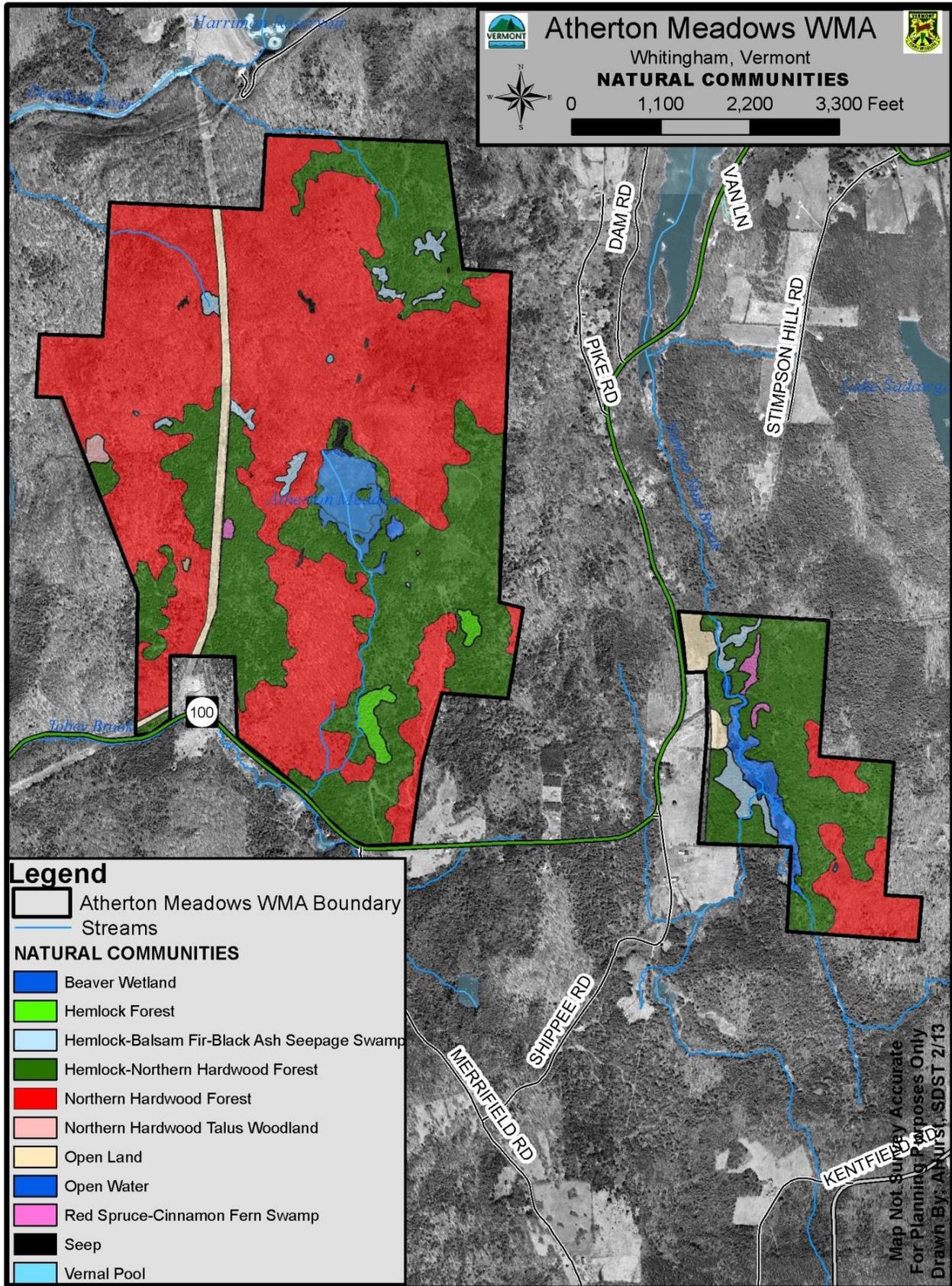
<b>Natural Communities of Atherton Meadows WMA</b>				
<b>Natural Community</b>		<b>Acres</b>	<b>Vermont Distribution</b>	<b>Example of Statewide Significance?</b>
<b><i>Wetlands</i></b>	Beaver Wetland	26	very common	
	Hemlock-Balsam Fir-Black Ash Seepage Swamp	17	uncommon	yes
	Red Spruce-Cinnamon Fern Swamp	3	uncommon	
	Seep	2	common	yes
	Vernal Pool	0.4	uncommon	
<b><i>Uplands</i></b>	Hemlock-Northern Hardwood Forest	370	common	yes
	Hemlock Forest	7	common	
	Northern Hardwood Forest	556	very common	
	Northern Hardwood Talus Woodland	3	uncommon	

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: [http://www.vtfishandwildlife.com/books.cfm?libbase\\_=Wetland,Woodland,Wildland](http://www.vtfishandwildlife.com/books.cfm?libbase_=Wetland,Woodland,Wildland)

***Definitions for Natural Community Table***

Very Rare	S1	Very rare in the state, generally with fewer than five high quality occurrences.
Rare	S2	Rare in the state, occurring at a small number of sites or occupying a small total area in the state.
Uncommon	S3	High quality examples are uncommon in the state, but not rare; the community is restricted in distribution for reasons of climate, geology, soils, or other physical factors, or many examples severely altered.
Common	S4	Widespread in the state, but the number of high quality examples is low or the total acreage occupied by the community type is relatively small.
Very Common	S5	Common and widespread in the state, with high quality examples easily found.

Figure 4: Natural Community Map



## Fine Filter Assessment

### Rare, Threatened, Endangered Species

No rare animal species are known to occur at AMWMA. However, two state-endangered bat species might be found on the WMA: the Northern Long-Eared Bat and the Tri-colored bat. Both species are in decline as a result of White Nose Syndrome. If these species are found on the WMA management recommendations will be considered.

Atherton Meadows WMA is also home to three rare and uncommon species of plants. These species and their management needs are summarized in the text below.

### PLANTS

Two species of very rare plants have been located within the WMA; neither of these species is listed as “threatened” or “endangered” by the Vermont state endangered species statute (10 V.S.A. 123). In addition, one uncommon species is located within the WMA (Table 2).

1. Pinxter-flower (*Rhododendron periclymenoides*) is a very rare (S1) species in Vermont known only from scattered locations in the southern portion of the state. All known populations are suffering damage from deer browsing, and none have been observed flowering. The occurrence at Atherton Meadows WMA is found along the shoreline of the central beaver pond/wetland complex, in Hemlock-Northern Hardwood Forest. In 2011, a small browse exclosure fence was set up around several stems, and will be monitored for evidence of flowering. This species could potentially be found in a wide range of habitats, thus additional field surveys would be needed to determine the full extent of this plant within the WMA.
2. Inflated Bladderwort (*Utricularia radiata*) is also a very rare (S1) species found growing in the beaver pond/wetland complex of the WMA. This species is known to occur in only three other sites in the state, all of which are in far southern Vermont. In the WMA, it is found growing in shallow open water of the beaver wetland, and the population appears large. Natural water-level fluctuation may change the location and extent of suitable habitat for this species.
3. Long Sedge (*Carex folliculata*), an uncommon (S3) species, is found in a Red Spruce-Cinnamon Fern Swamp in the eastern parcel of the WMA. Maintaining the hydrological and ecological integrity of this wetland should protect this occurrence.

**Table 2: Rare, Threatened, and Endangered Plants of Atherton Meadows WMA**

Rare, Threatened and Endangered Plants of Atherton Meadows WMA				
Species Name	Common Name	State Rarity Rank*	Rarity*	Legal Status
<i>Rhododendron periclymenoides</i>	Pinxter-flower	S1	Very Rare	
<u>Habitat:</u> Hemlock/NH Forest <u>Threats:</u> Deer Browse <u>Management Opportunities:</u> Continued monitoring and enclosure options.				
<i>Utricularia radiata</i>	Inflated Bladderwort	S1	Very Rare	
<u>Habitat:</u> Beaver Pond/Wetland Complex <u>Threats:</u> Water Level <u>Management Opportunities:</u> Manage beaver to increase likelihood of continued population.				
<i>Carex folliculata</i>	Long Sedge	S3	Uncommon	
<u>Habitat:</u> Swamps <u>Threats:</u> Water Level <u>Management Opportunities:</u> Maintaining hydraulic and ecological integrity around the occurrence.				
*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>				

***Definitions for Rare Plant Table***

Very Rare	S1	At very high risk of extinction or extirpation in Vermont due to extreme rarity (often 5 or fewer populations or occurrences), very steep declines, or other factors.
Rare	S2	At high risk of extinction or extirpation in Vermont due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.
Uncommon	S3	At moderate risk of extinction or extirpation in Vermont due to restricted range relatively few populations or occurrences (often 80 or fewer), recent and widespread declines, or other factors.

**C. Forest Health Assessment**

General Forest Health:

Forest health in regards to productivity and management at AMWMA is a result environmental conditions and human impacts.

*Human Factors*

The initial clearing and agricultural use undoubtedly compacted soils, caused erosion, and depleted soil nutrients. After re-forestation, harvesting the most desirable and largest trees resulted in further tree and site damage. This occurred on several occasions between the late 1800s and 1960s. Evidence of damage to trees and soils from poor harvest practices by previous owners can still be found throughout the parcel.

### *Insect and Disease*

The first documented insect and disease occurrence in 1980 and 1981 was a saddled prominent outbreak. This defoliating caterpillar caused severe dieback and mortality of hardwood on the WMA. In 1988 pear thrips defoliated hardwood foliage throughout the region though in most cases trees made a full recovery. Saddled prominent defoliation also occurred in the growing season that followed pear thrips defoliation. Birch leaf miner and other insects caused defoliation on birch in 2002 and again in 2009. In 2004 balsam fir was documented to be in decline on the Steam Mill Lot from balsam woolly adelgid. Forest tent caterpillar defoliated hardwoods in successive years in 2006 and 2007. Beech bark disease, a fungus, is common on the WMA as well as ash decline of an undetermined cause. Black cherry knot, also a fungal pathogen, is widespread and has damaged tree stems but has not caused appreciable mortality.

### Site and Elevation, etc.:

Due to moderate to high elevation, winter injury from heavy snow and ice storms has been a continuing problem for portions of AMWMA. The first major documented widespread damage was in 1997. Hardwood stands sustained heavy damage to tops which lead to crown dieback, uprooting, and some mortality. Major ice events occurred in 2003 and December 2008 with the same effect. It is likely ice and snow events have damaged trees at other times as well.

### Browse Sensitivity Assessment:

Deer and moose populations in the area of AMWMA are not a major concern to forest regeneration. Recent overstory removal harvests have yielded good northern hardwood recruitment and browse pressures do not seem to be hampering stem growth in most areas.

### Invasive Exotic Species Assessment:

#### a. *Plants*

There are many non-native plant species at Atherton Meadows WMA. Most are not a threat to native vegetation, habitats, or wildlife; however, there are a number of notable exceptions (Table 3). Invasive Eurasian honeysuckle (*Lonicera* spp.) and Japanese barberry (*Berberis thunbergii*) are found scattered throughout both the Atherton and Steam Mill Lots. There is one isolated patch of common reed (*Phragmites australis*) in the beaver pond on the Atherton Lot. Japanese knotweed (*Fallopia japonica*) has been located within the Route 100 ROW on the Steam Mill Lot. While at present these species are widely scattered on the parcel and resulting in minimal impacts, they have the potential to rapidly spread, resulting in the displacement of native plant species and a reduction in wildlife habitat values. Since these are relatively small populations of invasive plants, it is likely that effective control of these species on the parcel is possible.

**Table 3: Invasive Exotic Plants of Atherton Meadows WMA**

Invasive Exotic Plants of Atherton Meadows WMA					
Species Name	Common Name	Distribution	Estimated % Cover	Sites Where Found	Present Threat to Native Plant Communities
<i>Phragmites australis</i>	Common Reed	Low	N/A	Beaver Pond	Local threat to native species
<i>Berberis thunbergii</i>	Japanese Barberry	Low	N/A	Throughout	Local threat to native species
<i>Lonicera spp.</i>	Eurasian Honeysuckle	Low	N/A	Throughout	Local threat to native species
<i>Fallopia japonica</i>	Japanese Knotweed	Low	N/A	Steam Mill Lot along Route 100	Local threat to native species and riparian functions

*b. Insects*

There have not been any sightings of invasive insects on AMWMA. There are three potential damaging exotic insects currently of regional concern (Table 4).

**Table 4: Invasive Exotic Insect Species that will be Monitored over Time at Atherton Meadows WMA**

Invasive Exotic Insect Species that will be Monitored over Time at Atherton Meadows WMA			
Name	Description	Species	Nearest Location
Asian Longhorned Beetle	White and black 1-1 ½” long	Maple and other hardwoods	Worcester, MA ~ 60 miles
Emerald Ash Borer	Metallic green ½” long D-shaped exit holes	All species of ash	Dalton, MA ~ 20 miles
Hemlock Woolly Adelgid	White woolly mass underneath hemlock needles	Hemlock	Halifax, VT ~ 15 miles

**D. Wildlife and Habitat Assessment**

In addition to the rare, threatened and endangered species described in the Natural Community Fine Filter Assessment, a wide array of more common species are expected to exist on the WMA. The diverse habitats found on this WMA fulfill part or all of the life cycle requirements for many common wildlife species. Although specific surveys to document the presence of wildlife on the WMA have been limited, such surveys conducted on other properties containing similar natural communities are relied upon to provide baseline information as to what species would be expected to exist within the AMWMA.

- a. Mammals: The Southern Green Mountains biophysical region provides some of the most extensive and wild habitat remaining in Vermont and offers a diversity of natural communities upon which many common species of mammals depend. Habitat conditions within the WMA indicate the species likely to be present. The majority of the WMA is comprised of two upland natural community types; Hemlock-Northern Hardwood Forest and Northern Hardwood Forest. Characteristic mammals of these communities include masked shrew, eastern cottontail, red squirrel, northern flying squirrel, southern flying squirrel, white-footed mouse, woodland jumping mouse, deer mouse, chipmunk, porcupine, black bear, and white-tailed deer. The hard and soft mast food sources interspersed amongst these community types further provide important foraging opportunities for black bear, deer, fox, coyote, and fisher. Previous early successional management strategies within the upland forests have created important browse sources for moose, deer, and snowshoe hare. Although only a small portion of the WMA, the three acres of Northern Hardwood Talus Woodland community type found along the western boundary of the WMA offer denning habitat for porcupine and bobcat as well as foraging habitat for fisher. The Hemlock and Hemlock-Northern Hardwood Forest serve as critical winter cover for deer. The Beaver Wetland and other wetland community types found on the WMA provide essential habitat for numerous species. Not only are these wetland communities vital to the existence of several furbearers such as beaver, muskrat, mink and otter, but they provide important habitat during certain times of the year for bear, deer, and moose as well. During routine field work on the WMA, common species observed include black bear, white-tailed deer, moose, bobcat, mink, beaver, muskrat, and various small mammals.
- b. Birds: Similar to mammals, the diversity and abundance of birds expected to exist within the WMA is indicated by the natural community types present. Characteristic birds of the northern hardwood forest communities include the hermit thrush, rose-breasted grosbeak, ovenbird, red-eyed vireo, eastern wood pewee, black and white warbler, black-throated blue warbler, veery, and scarlet tanager. The ruffed grouse and eastern turkey undoubtedly make use of the hard and soft mast sources found throughout this forest type as well as the early successional habitats created by previous forest management practices. The northern saw-whet owl, red-breasted nuthatch, blackburnian warbler, and solitary vireo are known to nest within the Hemlock Forest natural community. Brown creepers and winter wrens are likely inhabitants of the 17 acres of Hemlock Swamp. The beaver wetlands found within the WMA provide essential habitat for a variety of birds. The dense vegetation surrounding these wetlands provides a variety of food and nesting sites that are relatively safe from predators. Species such as the Canada goose, wood duck, and great blue heron are wetland dependent. Game species such as ruffed grouse, eastern turkey, and American woodcock as well as various ducks and Canada geese have been sited on the WMA during routine field work. A variety of neo-tropical migrant songbirds and more residential species such as barred owls, black-capped chickadees, and blue jays have also been observed. Additional common species are expected.
- c. Reptiles and Amphibians: There are an abundance of good habitats for reptiles and amphibians on the WMA. Surveys indicate that at least two vernal pools function as suitable amphibian breeding areas. Common species found on the WMA include red-backed salamanders, spotted salamanders, wood frogs, snapping turtles, and garter snakes. It is also expected that spring salamanders, dusky salamanders and northern two-lined salamanders make use of the numerous seeps and headwater streams found throughout the WMA. The

northern hardwood dominated forests which comprise the majority of the WMA provide habitat for spotted salamanders, eastern newts, and northern redbelly snakes. Additional common species are expected.

- d. Fish: Fish species include brook trout, brown bullhead, pumpkinseed, blacknosed dace, creek chub, and slimy sculpin.

### **Critical Habitats**

Wetlands, Streams, Ponds, and Riparian Habitat: Water features on the WMA are numerous and varied. There is 26 acres of open water associated with beaver dams. In addition, 23 acres were mapped in other wetland categories such as vernal pools, seeps, and swamps. There are 1.5 miles of stream bank frontage on Number 9 Brook and a tributary to Tobey Brook. Several other smaller streams exist as well.

Heron Rookery: A great blue heron nesting site is present in the northeast corner of the beaver wetland. Two active nests were identified in June of 2013. Great blue herons typically nest in the crowns of trees in or near water but sometimes on hillsides. Wetlands and the surrounding uplands provide important feeding and nesting habitats.

Amphibian Breeding Sites: Two vernal pools have been found to be amphibian breeding sites to date. There are several additional areas that need further evaluation. Additional breeding areas are expected.

Deer Wintering Areas: Hemlock-Northern Hardwood forest is a dominant forest type on the WMA. Hemlock forest is a smaller proportion. Approximately 310 acres of deer wintering area are mapped within these two forest types. These areas are characterized by concentrations of softwoods with high crown closure which provides numerous thermal and microclimatic advantages to deer such as reduced snow depths, less wind, increased daily mean temperatures, and increased relative humidity. South and southwest facing slopes are often preferred wintering areas because of the increased solar radiation they receive. The proximity of mixed hardwood browse sources to the core wintering areas is also an important consideration for delineating and managing deer wintering areas.

Black Bear Feeding Areas (wetlands and/or bear-scarred beech): One approximately 31- acre bear feeding area was identified during the forest inventory. This area is characterized by an abundance of bear-scarred beech trees, although scattered bear-scarred beech can be found throughout the unit. In 2009 10 acres of patch clear cuts were completed which have regenerated to raspberry and blackberry providing soft mast for bear and other wildlife. One apple orchard by the beaver pond in the center of the Atherton Lot provides soft mast during the late summer and early fall. An orchard on the Steam Mill Lot next to Route 100 may be utilized by bears but is probably less valuable to bears due to its proximity to houses and Route 100. The 23 acres of wetlands provide a critical food source in early spring when bears emerge from winter dens.

Bobcat Den Sites: Although no actual den sites have been found on the WMA, a rocky area has been identified as having reasonable potential for bobcat denning sites. This area is comprised of various sized boulders on steep slopes in the western region of the WMA. A bobcat was seen in this area during forest inventory.

## **Important Habitat Features**

### Core Forest and Habitat Blocks

Core forest is a biological term used to refer to any forested areas that are greater than 100 meters from human-created, non-forested opening. While edges and transition zones are excellent habitat for some native plant and animal species, edges also negatively impact many forest resources. Increases in invasive species and in predation on many native songbirds, and a decrease in wildlife that prefer to use large blocks of intact forest, are all associated with an increase in forest edge. Additionally, unbroken forest allows for easy dispersal of plants and animals, without large barriers to this movement.

Atherton Meadows WMA is located in a mostly forested landscape with areas of agricultural land and moderate-density human development. Route 100, which runs between the two parcels of the WMA, is the primary fragmenting feature in the local landscape. The western, larger parcel of the WMA is within a 21,000-acre habitat block that is roughly bounded by Routes 100, 8, and 9. Harriman Reservoir is an important feature in the eastern portion of the block, while the northwestern portion is within the Green Mountain National Forest. Excepting the reservoir, most of this block has been mapped as core forest. To the east of Route 100, the smaller WMA parcel is within a much smaller 1,300-acre habitat block, bounded by Route 100, Kentfield Road, and several other local roads. This block contains Sadawga Lake, and approximately half the block is considered core forest.

### 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 increased.

Atherton Meadows WMA is on the edge of a wide swath of land, extending along the higher elevations of the southern Green Mountains, and south into Massachusetts, that offers excellent wildlife movement potential. This corridor may facilitate dispersal of some wide-ranging mammal species into source populations in the Green Mountains. It could allow some plant and animal species long-term opportunities to expand or move their ranges in response to climatic changes. On a more local scale, the western parcel of the WMA, along with undeveloped lands to the south, likely creates favorable conditions for wildlife crossing Route 100. A wildlife travel corridor was identified across Route 100 on the Steam Mill Lot in the Whitingham Town Plan. The West half of this corridor is in private ownership.

Tobey Brook (~0.85 mi.) and Number Nine Brook (~1.0 mi.) traverse the Atherton and Stream Mill lots respectively. There are no dams or known impediments to aquatic organism passage on Number Nine Brook which provides aquatic organism passage and wildlife corridor travel between Harriman Reservoir, North Pond and down to the Massachusetts line.

Tobey Brook is known to hold wild Brook Trout. A natural waterfall prevents upstream fish passage. Consequently no fish were found above the falls.

Hard Mast Stands: Although American beech is a common species throughout the WMA, approximately 31 acres were identified as an important hard mast stand. Beaked hazelnut is present in some wetlands. No oaks or hickories were found during the forest inventory.

Soft Mast Trees and Shrubs: There is an abundance of soft mast species present. Two apple orchards have been maintained comprising about 14 acres. Black cherry is a common forest species throughout. Serviceberry and highbush blueberry are present in the fields on the Steam Mill Lot. In and around some wetlands are lowbush blueberry and winterberry. Hobblebush is a common species throughout. In the powerline corridor and in harvest areas raspberry, blackberry and elderberry are common.

Cliff or Talus Slopes: A single small patch of talus slope is found on the western boundary of the Atherton Lot, where there is a steep slope with boulders that are 2-6 feet on their longest side. Little soil is present other than a layer of leaf litter. Though the patch is small, the jumbled rocks in this community can provide habitat for many wildlife species including porcupine, bobcat, as well as other small mammals such as voles.

Snags, Den Trees, and Down Woody Material: These features provide nesting habitat, roosting habitat, and cover for a wide variety of bird, mammal, and amphibian species. In particular, the state-endangered northern long-eared bat (*Myotis septentrionalis*) and tricolored bat (*Perimyotis subflavus*) may roost in snags and cavity trees. Down woody material retained in patch clearcuts has been used by black bears for feeding (insects and larvae).

Past insect defoliations and storm damage has increased the amount and type of this material on the WMA. In addition during harvest activities snags and den trees have been retained or added through girdling of cull trees.

No assessment has been done to survey the quantity of large woody debris (LWD) in the brooks or pond.

Habitat Diversity: The most common habitat type on the WMA is even-aged Hemlock-Northern Hardwood Forest. Management activities have focused on creating an increased proportion of early successional habitat within this forest type. Red spruce and balsam fir stands occupy most of the northeast corner of the Atherton Lot and the southwest corner of the Steam Mill Lot. Wetland habitats such as ponds, streams, and swamps provide important habitat features and are more common and disbursed here than on the typical upland forest of this region. Two old apple orchards have been maintained by the State over the years, one on each parcel. The Steam Mill Lot orchard also includes blueberry, serviceberry, and small stands of aspen and alder.

Open Lands: The only permanent opening on the WMA is the transmission line which encompasses about 15 acres of the WMA and is maintained by the TransCanada Corp. There are another 14 acres of management related openings, such as landings, roadsides, and periodically maintained fields. Currently there are approximately 29 total acres of “open land” on the WMA.

**Aquatic Habitat Diversity:** Fish use large woody debris (LWD) for refuge during high flows, cover from predation, and feeding locations where macroinvertebrates are typically abundant (McMahon and Hartman, 1989; Shirvell, 1990). LWD serves as substrate for an array of invertebrates that feed directly on the woody debris or that use the wood structure to build retreats for filtering the water column. Some research has shown a link between increased fish diversity and LWD abundance (Bond and Lake, 2003). LWD also serves as important winter rearing grounds for fish (Solazzi et al., 2000). LWD also contributes to bed roughness in streams (Gregory et al., 1991). Several studies on riparian areas have indicated that LWD is a good indicator of lateral connectivity and that LWD not only helps retention of organic material in a stream but also serves as retentive substrate for increased heterogeneity in the riparian vegetation (Pettit and Naiman, 2005).

**Age Class Diversity:** The majority of the WMA is even-aged and of small to medium sawtimber size. Stand age is between 80 and 100 years with larger and older individual trees scattered throughout. Small pockets of managed early successional regeneration range from 1 to 20 years.

**Table 5: Structural Diversity in Atherton Meadows WMA**

<b>Habitat Diversity in Atherton Meadows WMA</b>			
<b>Habitat Condition</b>	<b>Description</b>	<b>Acres</b>	<b>Percent of Parcel</b>
Wetlands (5% of the 947.4 acres)	Open Water and Streams	26	3%
	Forested Wetlands and Riparian	23	2%
Permanent Openings	Fields, landings, orchards, powerline corridor	29	3%
Upland Forest Spruce-Fir: Even-aged Sawtimber (St)	Red Spruce and Balsam Fir Habitat	62	7%
Upland Forest: Even-aged (87 % of the 947.4 acres)	Northern Hardwood & Hemlock Northern Hardwood		
• Regeneration through seedlings (S)		10	1%
• Sapling through poletimber (Sp)		27	3%
• Sawtimber (St)		763	80%
Upland Forest Uneven Age		0%	0%

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 sawtimber-size trees – at least 9.0 inches dbh for softwoods or 11.0 inches 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 and 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.

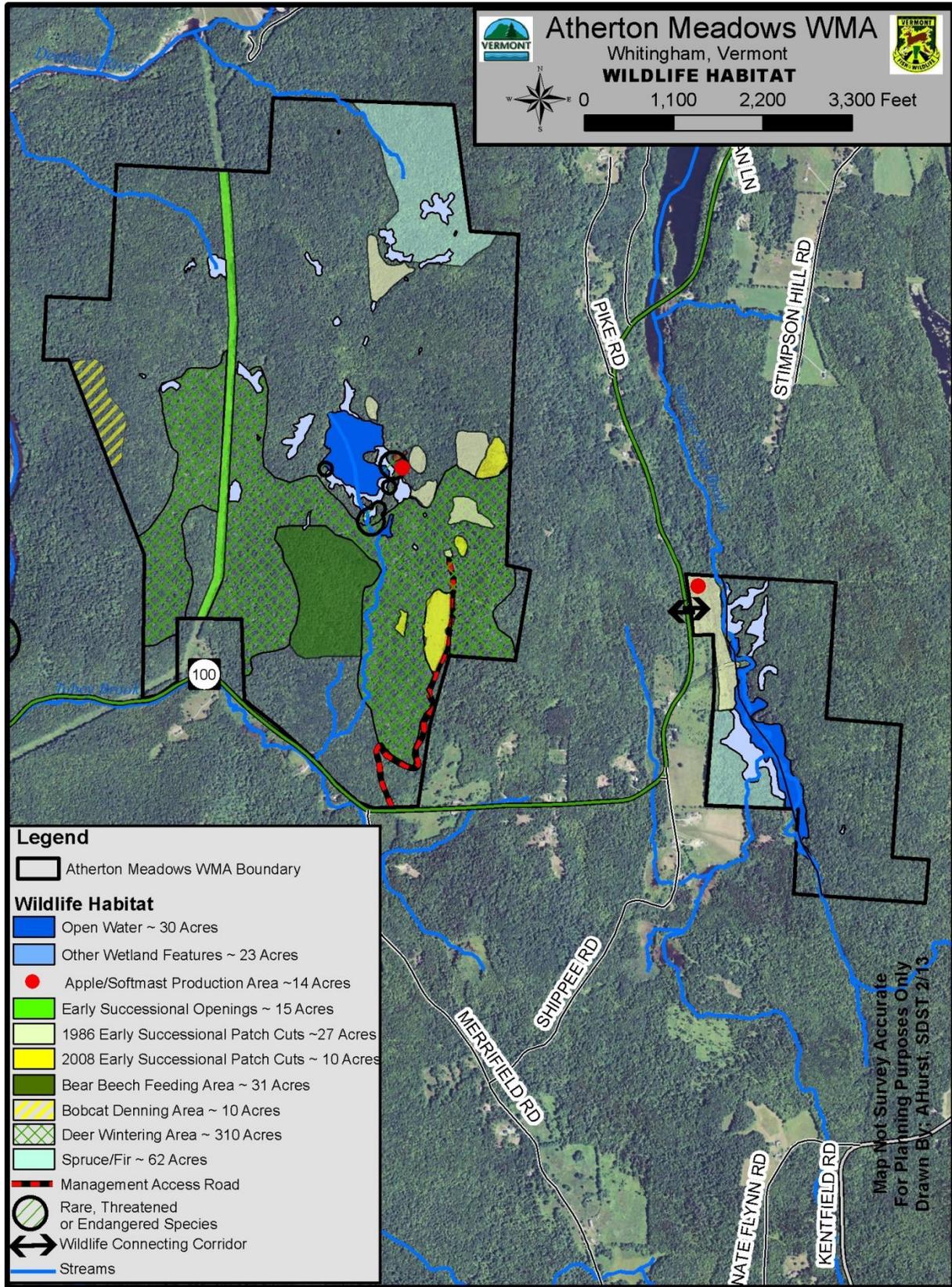
Pertinent Issues:

- Invasive plant and animal species impacting wildlife habitats and complicating management activities and options, i.e. honeysuckle and hemlock wooly adelgid.
- Lack of markets for low quality wood products limiting habitat management options.
- Limited access to lands suitable for forest/habitat management.

Assessment of Need:

- Comprehensive wildlife species assessments.

Figure 5: Wildlife Habitat Map



## **E. Timber Resource Assessment**

History of Forest Management: Most of Atherton Meadows WMA is accessible for management although there are multiple water features to avoid and some potentially inoperable slopes. Of the 947 acres, roughly 882 acres are suitable for timber management. Evidence of timber harvest operations are common throughout. There has been active management on the original parcels (799.7 acres) since State ownership in 1964. The Bodenmiller parcel (147.69 acres), acquired in 2011, has no recent history of management.

Most of the valuable trees were harvested before State acquisition. Noncommercial timber stand improvement (TSI) activities were completed by a Fish and Wildlife Department work crew during the 1970s. Additional F&W noncommercial activities were completed by the department's Wildlife Forester in the early 1980s. This included small group openings, hemlock regeneration release and apple tree release. The first commercial timber sale was conducted in 1980 on the Steam Mill Lot. In 1985 a firewood permit was issued to clear the area where the access road was to be built on the Atherton Lot. That same year a timber sale was marked along the new roughed in access road but not sold due to lack of buyer interest. In 1986 a commercial harvest was sold on the western side of the WMA. The 1987 plan emphasized wildlife habitat management for prescription of vegetation management. There were eight timber sales scheduled from 1987-1997, some of which were completed and some were not, primarily due to poor local markets for low quality wood. However, the treatments accomplished were quite successful in completing a variety of wildlife habitat goals and thinning stands to improve tree quality and growth potential. Conducting commercial harvests has been difficult on the WMA due to access, terrain, abundance of low value timber, and distance from markets. In 1989 a large timber sale was sold and, with difficulty, operated until 1992. In 2008 a commercial timber sale was marked, sold and operated but not completed. Recent habitat management includes apple tree release, field maintenance, road maintenance, boundary maintenance, and bluebird bird nesting boxes.

### Existing Conditions:

- a) Regeneration/Age Class Distribution/Tree quality – Most stands are stocked with pole to small sawtimber size trees. Stem quality ranges from poor in areas cut over by previous owners to moderate in pockets of better soils. Tree density is high over much of the WMA. Regeneration is unacceptable in many areas with moderate to high densities of American beech and striped maple. Beech and striped maple will create low productivity monocultures over the long term. Several areas with dense red spruce regeneration are present. Regeneration in previous patch clearcuts is primarily aspen, white ash, sugar maple, and white birch with some striped maple and beech.

Tree Species composition is well suited to the goals of wildlife habitat management. Continuation of the practice of 1 to 10 acre patch clearcuts and smaller size group selection, which have worked well in the past, will provide early successional habitat and tree species and age diversity. In addition, the dominance of beech and striped maple regeneration in partial harvests on this WMA indicates the benefit of small to medium size patch clearcuts, which allow other species to compete. Invasive plant species do not pose a concern for this parcel currently. Future management activities may need to address this issue if the situation changes.

**Table 6: 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'	463
Site Class II	50 to 84 cubic feet	White Pine 60-69' Northern Hardwoods 53-59'	427
Site Class III	20 to 49 cubic feet	White Pine 50-59' Northern Hardwoods 45-52'	35
Site Class IV	<20 cubic feet	White Pine 50' Northern Hardwoods 45'	22

b) Soil and Site Conditions – Timber management potential is good over much of Atherton Meadows WMA. Primary soils include:

Rawsonville-Hogback Fine Sandy Loam: Moderately productive soils for deciduous trees such as sugar maple. Parent Material: Extremely to very strongly acidic glacial till, 10 to 40 inches to bedrock.

Houghtonville-Rawsonville Fine Sandy Loam: Very productive loamy soils for northern hardwood. Parent Material: Extremely to moderately acidic glacial till, 20 to 60 inches to bedrock.

c) Dominant Forest Types – The most common forest types are Hemlock Northern Hardwood Forest and Northern Hardwood Forest. Spruce Fir forest types are present but in low abundance. A small area of early successional hardwood forests is present due to patch clearcut harvests in the 1980s and 2000s.

**Table 7: Dominant Forest Types**

Type	Major Species	Condition	Quality	Regeneration
Northern Hardwood <i>310 acres*</i>	Sugar Maple American Beech Red Maple Hemlock	Pole-size to sawtimber. Moderately stocked to overstocked.	Variable	Often poor – American Beech and Striped Maple.
Hemlock-Northern Hardwood <i>572 acres</i>	Hemlock Red Maple	Pole-size to sawtimber. Moderately stocked to overstocked.	Variable	Mixed, often poor as above. Occasional dense pockets of Red Spruce and NH regeneration.

*\*managed acres*

- d) Health/Vigor of Timber Resource – Soils are moderately productive for growing trees on most of the WMA. Tree health is best in pockets where soils are deeper and fertile. Most of the stands were harvested before state ownership and have a history of insect, disease, and storm damage.
- e) Access/Operability – On the Atherton Lot (Compartment 1), portions have excellent access from the main access road off Route 100 and broader skid trail network. The main access road was built in 1986 to facilitate timber harvesting and habitat management. Several areas on steep side slopes on western portions may prove to be inoperable but for now are projected to be accessible. Interior roads are in reasonably good shape. Access to the northern areas may be difficult due to the long skid distance to the main landing or likely difficulty in getting permission for access from private landowners to the north. Access was granted by both a private landowner and New England Power for temporary access in 1989. In 2008 another temporary access was unsuccessfully sought for a timber sale over the previously used access. TransCanada is the current owner of the Harriman Reservoir Lands and ownership on the second private parcel has also changed. No agreement could be made with either party at that time.

The Steam Mill Lot (Compartment 2) is accessed by a class 4 town road which is utilized by off-road motor vehicles and snowmobiles. This road will require significant repair to access the WMA for management.

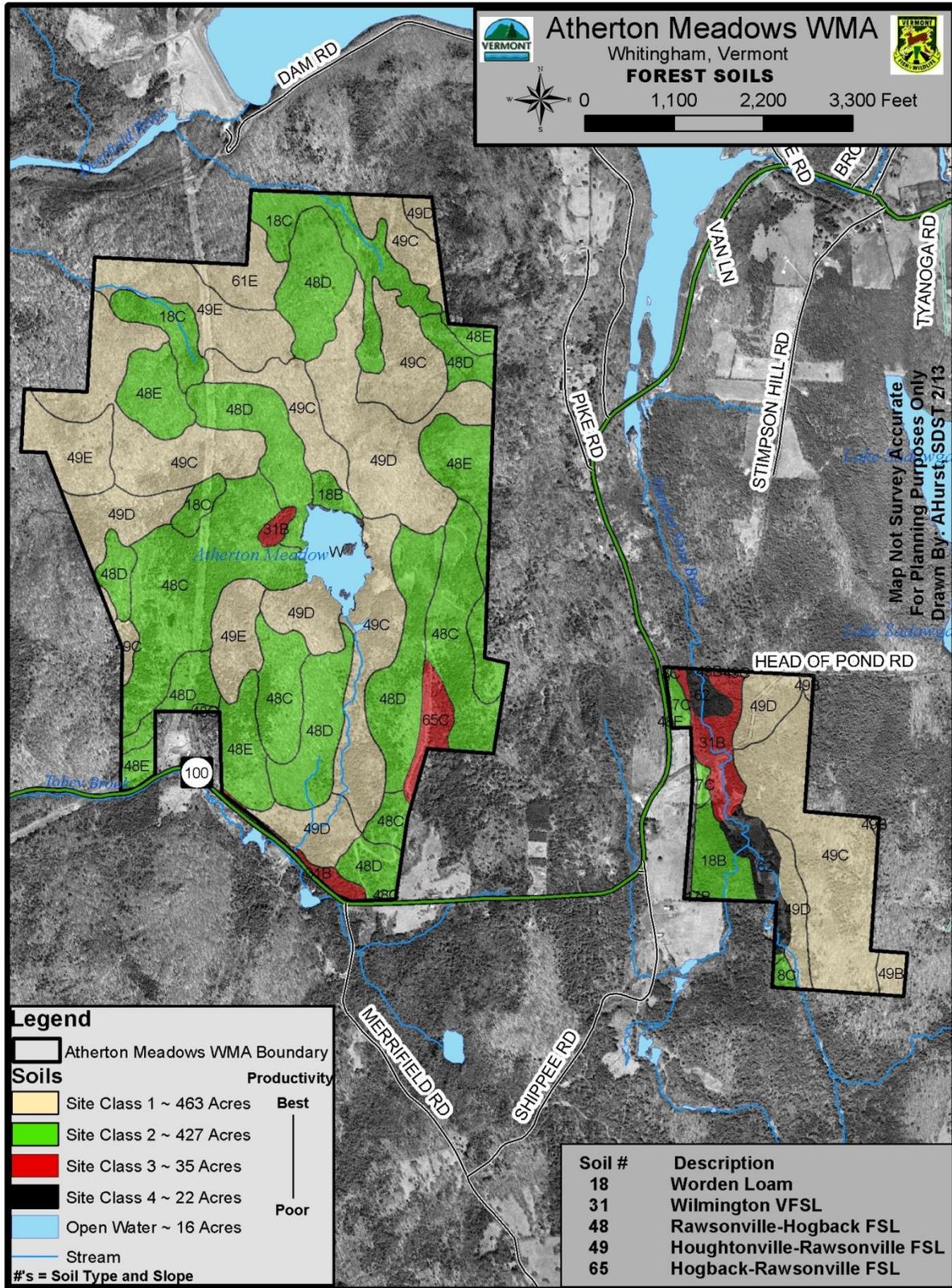
#### Pertinent Issues for Forest Management:

- Archeological/cultural historic sensitive areas on both parcels.
- Ongoing maintenance and preservation of the main access road requires additional resources.
- Damage to road networks by unauthorized off-roading.
- Low quality of existing timber stands. Management of beech stands with heavy decline by beech bark disease for mast will be difficult.
- History of storm and insect damage resulting in stem decay and decline.
- Potential conflict with the extensive VAST trail network and management activities.
- Access and operability on a portion of the WMA.
- Abundance of aquatic habitats and wet soils.
- Water quality impacts from illegal use of road during the summer.

#### Assessment of Need: Major factors affecting management of AMWMA are:

- 1) Better access to northern portions of the Atherton Lot and the entire Steam Mill Lot is needed.
- 2) Markets for low quality wood in that region are lacking.

Figure 6: Soils and Site Class Map

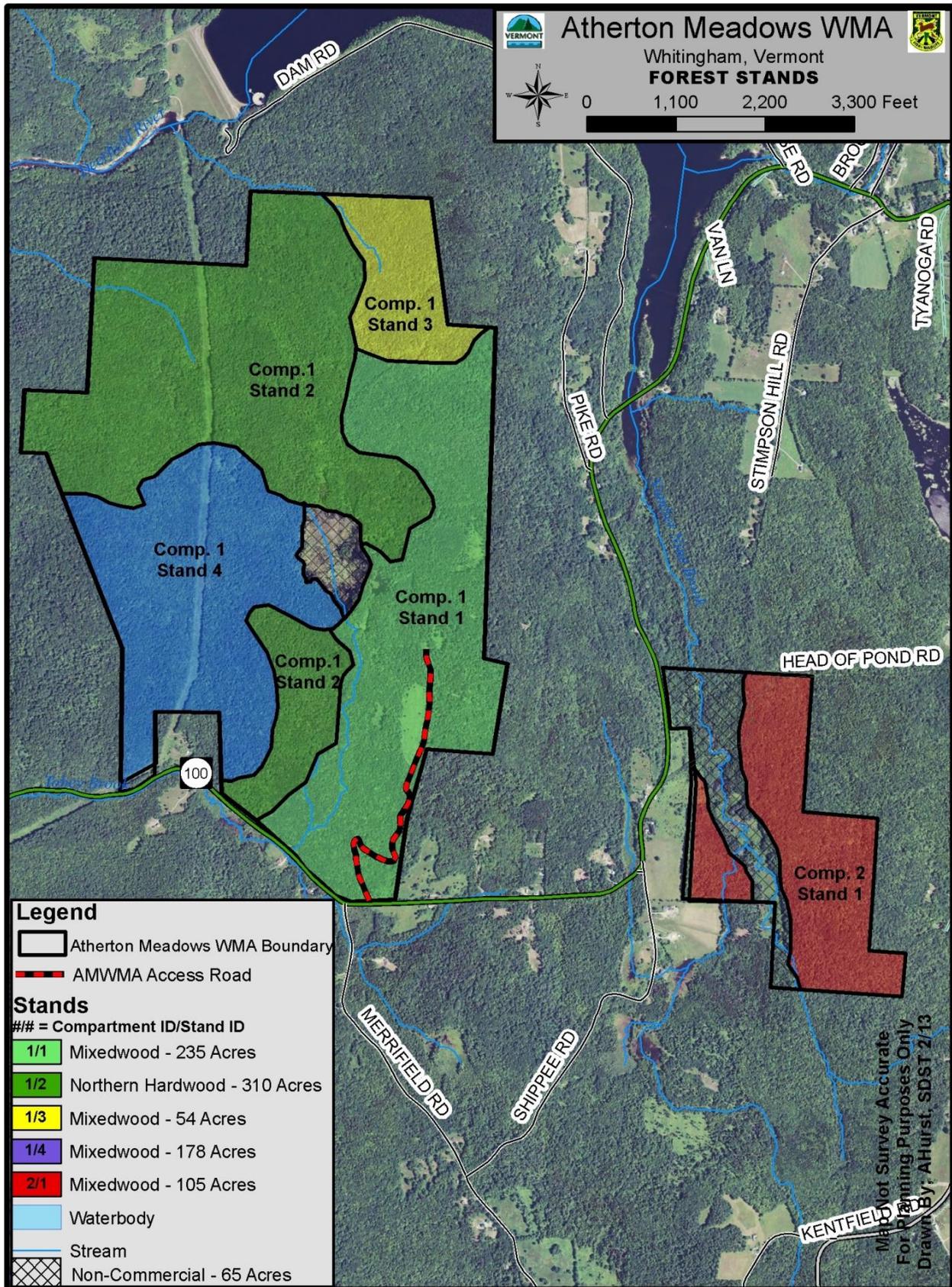


**Table 8: Forest Inventory Data**

Comp/ Stand	Acres	MSD	BA A Total/ Dom-codom	Acc. BA/A	Unacc. BA/A	Cull BA/A	Site	Timber Type	Species % BA	Regeneration – Understory Condition	Recommended Treatment at time of inventory	Volume/Acre
1/1	235	8.8	124	58	66	0	2	Mixed	MS 21 HE 19 MR 16	Good Regeneration in previous clearcuts. Poor understory throughout dominated by beech.	Crop tree release poles in richer sites. Continue with progressive clearcuts. Apple tree release.	5.9 MBF  23.7 Cords
1/2	310	9.0	150	78	72	0	2	27 Sugar Maple	MS 40.6 AW 18.5 BE 11.2 MR 11.2	Pockets of AW and sugar maple. Lots of beech and striped maple.	Lots of previous storm damage and poor access. Western side steep/rocky. Overstory removal in patches recommended.	8.3 MBF  15 Cords
1/3	54	8.1	144	73	71	0	2	25 Beech –Birch- Maple	MR 22.8 BY 14.9 MS11.9	Pockets of good red spruce/ balsam fir regeneration.	Release spruce/fir in groups. Overstory removal in poor quality northern hardwood.	2.1 MBF  17.5 Cords
1/4	178	8.8	155	64	91	0	2	23 Hemlock	MR 24.8 HE 22.4 BE 16.1	Poor – striped maple/beech dense in places.	Manage for Deer wintering area.	4.1 MBF  20.1 Cords
2/1	153	10.5	146	47	99	0	1	108 – Red Maple	MR 23.2 PW 21.8	Patches of good BF regeneration. Good regeneration in old clearcuts.	Continue progressive clearcuts where feasible. Apple tree release and alder management.	3.5 MBF  17 Cords

Inventory Date 2011

Figure 7. Forest Stands Map



## **F. Water Resource Assessment**

**Watershed Description:** Atherton Meadows Wildlife Management Area (WMA) is located in the town of Whitingham approximately 8 miles west of the village of Jacksonville. The WMA is located in the upper Deerfield River watershed and in the Sherman Dam-Deerfield River sub-watershed. It receives about 53” of precipitation per year which is above average for the state.

**Significant Feature(s):** Aquatic habitats include No. 9 Brook, Tobey Brook, and an old beaver pond. No. 9 Brook bisects the smaller parcel, flowing south to north into Harriman Reservoir. It is a third order stream, within the Deerfield watershed, having a drainage area of 2.76 square miles. Within the larger parcel, Tobey Brook originates from an old beaver pond, and flows north to south and then west into the Deerfield River. Tobey Brook is a first order stream and is part of the Deerfield watershed. Situated in the center of the parcel at an elevation of 1,840 feet, is a 16-acre beaver pond.

**Wetland Description and Function:** The namesake feature of Atherton Meadows WMA is a 16-acre beaver-influenced pond and wetland complex. USGS topographic maps indicate that this wetland has changed over time. The 1954 Wilmington, VT 15’ quad indicates a wetland feature, while the more recent 7.5’ quad shows only open water. The extent of natural and human disturbance on this feature is not fully understood. At present, the wetland is a mix of open water and floating vegetation mats that could not be fully inventoried.

In addition to this beaver pond, there are approximately 32 acres of wetland features mapped on the WMA: 9 vernal pools, 7 seeps, 7 swamps of two different types and another extended beaver wetland complex.

Hurricanes Irene (2011) and Sandy (2012) did not seem to have much effect on these wetlands and drainages within the WMA. Because of the minimal damage sustained by 100 year flood events wetland and riparian function seem to be in working condition.

**Relationship to Basin Plan and Basin Plan Recommendations:** The Deerfield Basin Plan was in the process of being drafted by VT Department of Environmental Conservation at the time that this plan was written. In the Department of Environmental Conservation’s draft tactical basin plan for the Deerfield River watershed, several surface waters were identified as wetlands to study for Class 1 potential. The Atherton Meadows beaver wetland is recommended for this study. As part of the implementation of this tactical basin plan, the Department will evaluate the consistency of this wetland with the features and values associated with Class 1 wetlands. If the wetland satisfies the Class 1 criteria, it will be proposed for such designation through Department designation, consistent with the Vermont Wetland Rules. Once the basin plan has been adopted additional recommendations will be considered in the management of the WMA.

### **Pertinent Issues**

- Approaches and bridge at snowmobile stream crossing need reconstruction.
- Bridge sits low in stream channel.
- Maintaining -riparian corridors.
- Erosion impacts from off-road uses.

### **Assessment of Need:**

- Invasive species monitoring.
- Additional wetlands assessments as needed.
- Evaluation of Phragmites for potential control.
- Evaluate old bridge abutments at north end of Steam Mill Lot for stream constriction and habitat blockage.



## **G. Fisheries Resource Assessment**

Fish sampling was conducted in August of 2012 in order to characterize the fish community structure in No. 9 Brook, Tobey Brook, and the beaver pond.

No. 9 Brook was sampled on August 7, 2012. A total of 443 fish were collected, representing four species: brook trout (*Salvelinus fontinalis*), creek chub (*Semotilus atromaculatus*), pumpkinseed (*Lepomis gibbosus*), and blacknose dace (*Rhinichthys atratulus*). Only one pumpkinseed was observed, and was likely a stray from Harriman Reservoir.

Tobey Brook was sampled on August 8, 2012, and was broken up into two sections. Section 1 was approximately 250 linear feet long and ended up at a natural waterfall barrier. Section 2 continued above the waterfall barrier for approximately 900 linear feet. A total of 59 fish were collected, representing three species: brook trout (*Salvelinus fontinalis*), creek chub (*Semotilus atromaculatus*), and blacknose dace (*Rhinichthys altratulus*). All fish collected were within Section 1; no fish were observed upstream of the natural barrier waterfall.

The beaver pond was sampled on August 13, 2012. A total of 43 brown bullhead (*Ameiurus nebulosus*) were collected via electrofishing and gillnetting, with only two being collected via electrofishing. No other species were represented in the beaver pond. However, it should be noted that due to location and habitat type, sampling the beaver pond was limited. It is possible that other species occurred in the beaver pond, but were not collected.

Pertinent Issue:

- Influence from the impoundment of Harriman Dam.

Assessment of Need:

- Evaluate old bridge abutments at north end of Steam Mill Lot for stream constriction and habitat blockage.

## **H. Historic Resource Assessment**

A detailed historical assessment of the Atherton Meadows WMA was prepared by staff from the Consulting Archeology Program from the University of Vermont in 2009. This 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.

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

The UVM report identified no Native American sites within the WMA. In total, three areas of archeological sensitivity were identified in the two portions of the WMA. Two of the sensitive areas are associated with brooks; the western sensitive area is associated with Toby Brook, while the eastern sensitive area is associated with the No. 9 Brook. In addition, a sensitive area is associated with the high altitude Atherton Meadow Pond. Beyond these areas, there are no archeologically sensitive areas detected by the predictive model within either portion of the Atherton Meadows WMA. In addition, two historic period sites (VT-WD-90 and VT-BE-220) are associated with Toby Brook within 400m east and west of this archeologically sensitive

portion of the WMA. One shortcoming of this ecologically based predictive model is its inability to incorporate human behavior. Inevitably potential sites will be missed and other areas misidentified.

Within the Atherton Meadows WMA, sensitive areas border brooks and may contain small residential camps and kill sites. Large base camps may have been located on the floodplain of the Deerfield River to the north and west of the WMA, especially at the confluence of the Deerfield River and the No. 9 Brook. However, these portions of the Deerfield River are currently under water due to damming of the Deerfield River by the Harriman Dam since late 1920s. As a result, large base camps are not expected within the Atherton Meadows WMA. It is also unlikely that burial sites will be recovered within the Atherton Meadows WMA. The GIS model does not factor in areas with outcrops of high quality quartzite, which may have been visited by Precontact era Native Americans for tool stone. Bedrock quarried and the quarry workshops associated with them would be likely if there are sources of high quality quartzite or cherts within the Atherton Meadows WMA. As a result, small level landforms adjacent to drainages, wetlands, and water bodies, as well as areas near quartzite outcrops that do not appear as sensitive on the GIS predictive model could be considered as potential locations of archeological sensitivity by district managers.

### Early Settlement and Industrial History

The earliest European settlement in Vermont is believed to have occurred in this southeastern corner of the state in 1724 as settlers pushed northward from Massachusetts along the Connecticut River and its tributaries. Settlement expanded rapidly after the conclusion of the French and Indian wars in the early 1760s. However, because Whitingham was a remote wilderness of steep terrain, human population didn't expand at the same rate as towns along the Connecticut River. The first settlers to Whitingham were reported to have cleared three to four acres in 1765 and 1766, but returned to Massachusetts.

The name of Atherton Meadows WMA originated with sheep farmer John Atherton born in 1832. His father, Ebar, was from Rowe, MA and his mother Abigail Wheeler was from Whitingham. His first marriage was to Harriet Kentfield in 1856 who died in 1863. He then served in the 8<sup>th</sup> VT Infantry Company B during the Civil War. Enlisting as a Private on 12/26/1863, he was promoted to Corporal on 11/1/1864. After surviving as POW in February and March of 1865, he was "Mustered Out" of service on 5/24/1865. When his service was over, he returned to Whitingham. From the 1870s to around 1903, Mr. Atherton managed to acquire almost a thousand acres of land in the general area of the WMA and lived on the northeast side of the beaver pond in the center of the Atherton Lot. He had six wives over his lifetime and 18 children. He died on February 18, 1909 at the age of 76 and is buried in the Green Cemetery in Whitingham, VT.

Existing Conditions: No historic properties are listed on either the National or State Registers of Historic Places, nor are there any known prehistoric Native American or Euroamerican historic sites within the Atherton Meadows WMA. The closest state registered historic resource is the spillway at the Harriman Dam. No historic resources within this township are listed on the National Register. However, several structures are depicted within the Atherton Meadows WMA on the historic 1899 USGS map of the region. These structures may be historic in nature and/or associated with outbuildings, cellar holes, rock walls, house foundations, and charcoal and lime

kilns. To date, four 19<sup>th</sup> century stone foundation complexes (house, barn, outbuildings) and one dam/mill site have been found on Atherton Meadows WMA. According to historic maps, school #15 is also likely to have been located on the WMA although no traces of it have been found to date. There are also many miles of stone walls and two old apple orchards.

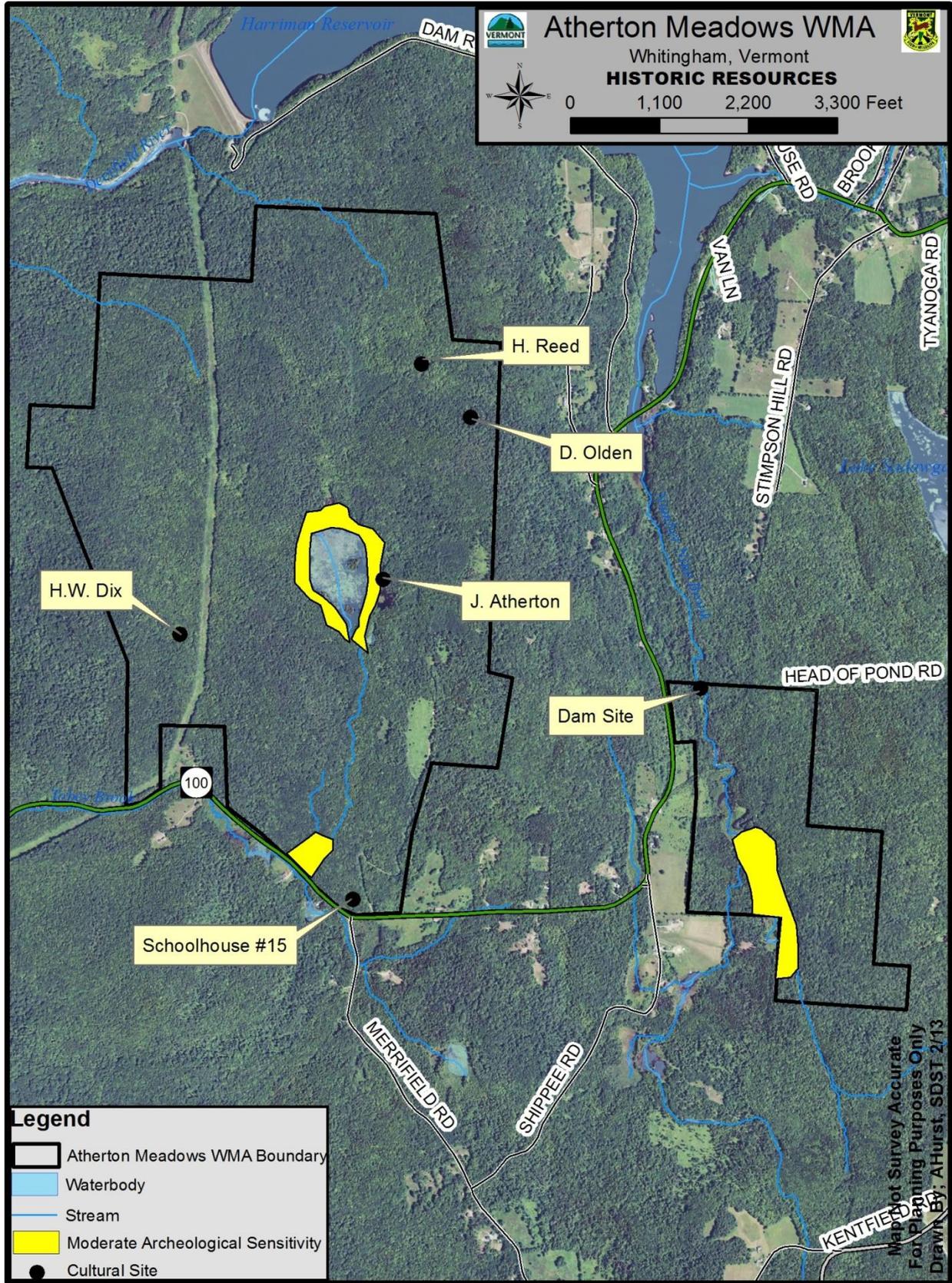
Pertinent Issues:

- Sensitivity to known historic structures during management activities.
- Additional historic sites may be found within AMWMA and will need to be protected during management operations.

Assessment of Need:

- Additional field research into the exact location of Schoolhouse #15.
- Stone walls were not mapped during inventory process and should be documented as management activities precede.
- Information concerning the historic structures on #9 Brook.

**Figure 9: Historic Resource Map**



## **I. Recreation Resource Assessment**

Atherton Meadows WMA is located in a remote area of extreme south-central Vermont less than two miles from the Massachusetts state line. Population centers close to the WMA include the small Vermont villages of Readsboro, Whitingham, and Jacksonville. The WMA has approximately 0.75 miles of frontage on Route 100, one of Vermont's most scenic and popular foliage viewing roads. Most of the WMA is located within one mile of this busy paved road although very little of the interior can be seen from Route 100.

Although Route 100 bisects the WMA and is very busy, the WMA itself sees limited recreational use. Most recreational use occurs during the fall hunting seasons and the winter snowmobile season. The WMA is predominately characterized by a natural appearing setting with obvious modifications scattered about including constructed roads and trails, a major power line, and evidence of active timber cutting.

Two parking areas along Route 100 provide visitor access to both compartments of this WMA. The parking area located on the main block is a four-car parking area and was constructed in 1964. A two-car parking area was constructed in 2011 along Route 100 to provide access to the Steam Mill Lot. These parking lots are not plowed during the winter.

### **Existing Conditions:**

The following activities have been identified as recreational uses of the land within the scope of the Atherton Meadows WMA LRMP planning process.

- a) Hunting, Fishing, and Trapping – Hunting is the most popular recreational activity that occurs on the WMA with most of this activity occurring during the white-tailed deer seasons including bow, rifle, and muzzleloader. Turkey, ruffed grouse, moose, and black bear are also hunted on the WMA.

Approximately 0.75 miles of No. 9 Brook crosses through the Steam Mill Lot providing opportunities for native brook trout fishing.

- b) Birding, Wildlife Viewing, and Nature Appreciation – Although these activities do take place on the WMA, at this time we do not have an accurate figure on visitation by the public.
- c) Hiking and Hiking Trails – There are no formal hiking trails on the WMA though a network of skid trails and VAST trails are used frequently. One popular destination is the so-called “Green Mountain Giant” on nearby private lands adjacent to the VAST trail. This estimated 3400 ton rock is a glacial erratic which many believe to be the largest in the State, measuring an average of 40 feet long, 32 feet wide, 20 feet high and 125 feet in circumference.
- d) Winter Recreation – Snowmobiling is a popular winter activity within Atherton Meadows WMA. A local snowmobile club, named the E-Z Riders of Jacksonville, Vermont, grooms and maintains approximately 4.5 miles of VAST snowmobile trails within the unit. VAST Corridor Trail #9, a major east-west trail, crossing both the Steam Mill Lot

and the Atherton Lot was established in 1989. The trail through the Steam Mill Lot includes a gate off Route 100 and a bridge over the No. 9 Brook. A major portion of this snowmobile trail is located on the main access within the Atherton Lot and provides a connection to the snowmobile trail network in Massachusetts. The access road also connects to another snowmobile trail, a VAST secondary trail named the Deerfield River Trail that crosses north-south through the Atherton Lot and provides a loop trail with the primary trail. This trail also includes a bridge of the tributary of Tobey Brook.

e) Partnerships and Agreements – none currently.

Pertinent Issues:

- VAST trail traverses a deer wintering area.
- Erosion on the Town-owned Steam Mill Lot Head of Pond road.
- Damage to roads and trails by off-roading.

Assessment of Need:

- Coordinate with local VAST club for trail access and maintenance.
- Head of Pond Trail needs stabilization and maintenance.
- Assess options for relocating the trails out of sensitive wildlife habitat.

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

### Description:

Public access to AMWMA is off State road Route 100. Two parking lots and a management road permit good foot access to both the Atherton Lot and the Steam Mill Lot. A ¾ mile gated access road on the Atherton Lot provides foot access into the interior of that portion of the WMA. On the Steam Mill Lot a gated access road provides foot access and links up with a Class 4 town road which runs through the center of that portion of the WMA. This access requires use of a wooden snowmobile bridge that is only suitable for foot traffic.

### Existing Conditions:

#### *Atherton Lot*

A four-car parking area was constructed in 1969 along Route 100 to accommodate public access. This was re-graveled in 2006 and a signpost and sign installed in 2008. In 1986 a ¾ mile gated access truck road was constructed into the interior of the parcel. A wooden sign was erected along Route 100 at the entrance of this road, which can accommodate several additional vehicle parking spaces. Since then maintenance activities include culvert repair, ditch clearing, spot graveling and gate replacement.

#### *Steam Mill Lot*

In 1985 the Head of Pond road, which goes through the lot, was reclassified to Class 4 road after it was determined that maintenance costs and upkeep were too expensive for the Town to continue. The original western access to this lot was provided by that road and was abandoned after that decision. A wooden sign is still standing where the old public parking area once existed. To access the snowmobile trail on the Class 4 Town road, a new trail was constructed on the WMA utilizing management roads. This is gated on the western end but because that portion is a Class 4 Town road, it is open on the eastern side. On the Class 4 Town road there is also a bridge over Number 9 Brook. The trail, gate, bridge and signage are maintained by the local snowmobile club. In 2011 the State financed construction of a two car parking area and short driveway on the south side of Route 100 to facilitate public access and crossing safety of snowmobiles over Route 100. The original gate was moved from the Route 100 roadside to the parking area.

### Pertinent Issues:

#### *Atherton Lot*

- Main truck access road is not in a condition to serve summer commercial timber sale activities.
- Vandalism has been a continuing occurrence, particularly with gates.
- Unauthorized use by ATVs and trucks has been a minor problem.

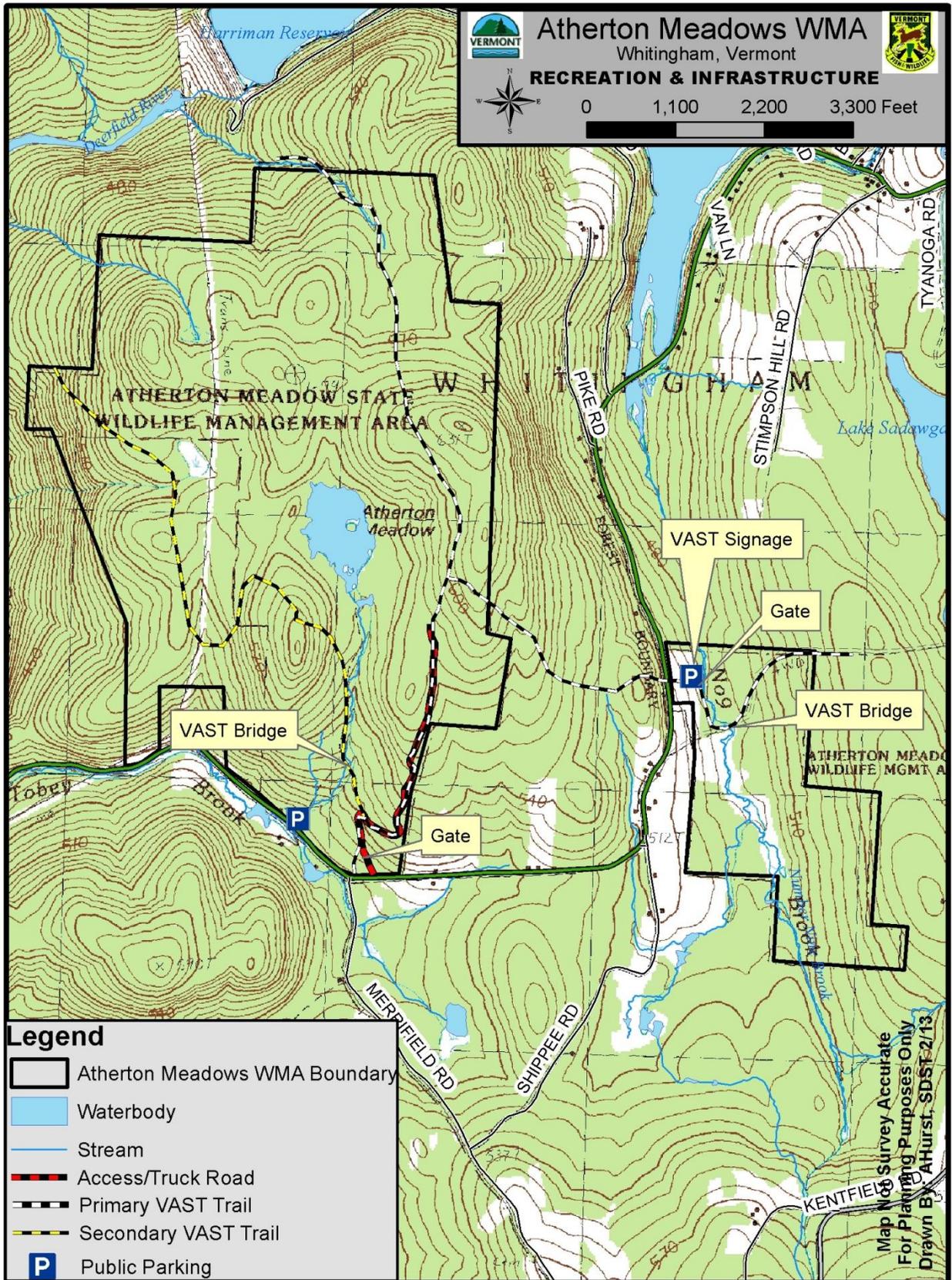
#### *Steam Mill Lot*

- Head of Pond Road Class 4 section needs to be stabilized to control further degrading of the road surface.
- Head of Pond Road Class 4 section needs to be upgraded to accommodate truck access for commercial timber sale operations.
- Unauthorized use by ATVs and trucks has been a minor problem.

Assessment of Need:

- Additional work on the truck road to facilitate winter or summer truck access.
- Establish a permanent right-of-way from Dam road on the north.
- Stabilize Head of Pond Road class 4 section on Steam Mill Lot.
- Upgrade Head of Pond Road class 4 sections to facilitate truck access.
- Kiosks at each State-designated parking area.

Figure 10: Recreation and Infrastructure 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 Atherton Meadows 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 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 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**– 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: Atherton Meadows WMA

Protect and improve the condition and resiliency of important biological resources.

- a. Habitat for rare, threatened or endangered species will take precedent over habitat for more common species.
- b. Maintain existing Core Forest and increase its size and resiliency through acquisition and conservation agreements.
- c. Monitor for Hemlock Woolly Adelgid, Emerald Ash Borer, and Asian Longhorned Beetle.
- d. Maintain or improve the quality ranking of sensitive natural communities.
- e. Protect and enhance wetland function.

Create age class and habitat diversity within the region by contrasting and complementing management on private adjacent lands.

- a. Produce a sustainable supply of timber products where this production improves habitat and opportunities for habitat improvement
- b. Maintain stands of hemlock in high density condition to provide winter deer cover and to maintain an unfragmented core forest area. Utilize all-aged management techniques.
- c. Practice early successional, even aged management for wildlife habitat and browse in general management land use classifications.
- d. Demonstrate exemplary wildlife management practices so that practices applied here may find broader application on private lands.

Protect and enhance important wildlife habitats and features.

- a. Forest management techniques such as patch clearcuts, annual brush hogging, creation of additional down woody material, and crop tree release of mast trees.
- b. In anticipation of the possible loss of eastern hemlock to the Hemlock Woolly Adelgid, promote other conifer species wherever feasible.
- c. Where feasible, relocate snowmobile trails out of deer wintering areas.
- d. Promote the growth of mast-producing trees.
- e. Manage riparian areas and borders as buffer management areas. Buffer guidelines followed during management activities will be designed to protect water quality and to protect and enhance habitat for amphibians, reptiles, and mammals near water bodies. Manage travel corridors between seeps and wetlands to maintain or improve conditions for amphibians.
- f. Retain dense hemlock stands for deer winter cover.
- g. Retain 2–4 large, old trees per acre for dens, snags, and dead and down material.
- h. Minimize the spread of exotic shrub species through appropriate management activities.
- i. Manage floodplain areas for habitat and flood flow protection.

Develop and improve appropriate non-motorized recreation opportunities for wildlife-based activities including hunting, fishing, trapping, and wildlife viewing while maintaining and protecting infrastructure and historic sites.

- a. Facilitate uses of the WMA by the public that are compatible with wildlife habitat and conservation goals by maintaining access roads and parking areas, providing foot access for users. Any upgrades should avoid sensitive sites, such as cultural and historic districts, and wetlands. Limit road construction into critical habitats or rare natural

communities and prevent inappropriate use such as ATVs and discourage the spread of exotic plants and animals.

- b. Maintain or improve public access, parking facilities, and signage.
- c. Minimize recreational conflicts with deer wintering areas.
- d. Restore heavily-eroded roads and prevent continued damage by off-roading with trucks, ATVs, and motorcycles.
- e. Support and enhance opportunities for wildlife-based recreation, particularly hunting, fishing, and trapping.

## *Land Management Classification on Atherton Meadows WMA*

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### **1.0 HIGHLY SENSITIVE MANAGEMENT — 38 acres**

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Highly Sensitive Management areas represent approximately 38 acres or 4% of the WMA.

**1.1** Beaver Wetland Complex and associated riparian areas: Two RTE species were found within this area which is also located in a sensitive area for archeological/cultural resources. Primary use of this area will be protection of wildlife habitat, scientific research, and non-motorized dispersed recreation.

#### **Management Conflicts and Resolution:**

##### **HSM 1.1 – *Apple Orchard (2 Acres)***

- A 2-acre historic apple orchard has been maintained by the State since ownership in 1964.

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

- Continue to release and manage for apple productivity.

##### **HSM 1.1 Historic Homestead (2 Acres)**

- Associated with and adjacent to the orchard is the homestead of John Atherton. This is a complex of building foundations and stone walls.

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

- No management activities are proposed for this area.

##### **HSM 1.1 – Rare Plant Species**

- Two RTE plant species found in this area

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

- Protect natural water level and enhance riparian buffers.

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### **2.0 SPECIAL MANAGEMENT — 452 acres**

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Special Management areas represent approximately 452 acres or 48% of the WMA.

**2.1** This is a 27-acre Beaver Wetland Complex with associated riparian areas on #9 Brook within the Steam Mill Lot. This area is also located in a sensitive area for archeological/cultural resources. Primary use of this area will be protection and enhancement of wildlife habitat and dispersed recreation.

#### **Management Conflicts**

##### **SM 2.1 – Beaver Wetland Complex (27 Acres)**

Head of Pond and VAST Trail need erosion control and maintenance work.

Snowmobile Bridge #9 Brook was established in 1989 and has a history of stability and maintenance problems. In 1997 a Recreation Trails Grant was awarded to VAST for trail maintenance and bridge replacement.

***Management Actions:***

- Work with VAST to design and build an improved bridge when the current structure is replaced.
- Work with VAST state and local chapters to address erosion concerns on the trail.
- Work with the Town of Whitingham to improve trail surface and prevent erosion.
- Contact adjacent landowner to stabilize abandoned section of the Class 4 Town road.

**2.2A** Deer wintering area comprise approximately 310 acres on the Atherton Lot, consisting of Hemlock and Hemlock Northern Hardwood stands on south and southwest facing slopes. Primary use will be habitat management and dispersed recreation.

**SM 2.2A - Deer Wintering Areas (310 Acres)**

Several VAST snowmobile trails traverse this area. The primary trail was established in 1989 after permission was granted by DFW. There is no record of permission for the secondary trails.

Hemlock Woolly Adelgid has been found in Windham County. It has been found within 10 miles of AMWMA. AMWMA is at a high enough elevation that spread of HWA and/or the severity may be minimized.

***Management Actions:***

- All-aged management to favor development of softwood cover and hardwood browse.
- VAST trail – potential to relocate snowmobile trails out of deer wintering area low due to terrain. Management of this conflict as follows:
  - limit trail improvements or increases in capacity;
  - monitor impacts to deer wintering area and deer use; and
  - prioritize relocation if impacts determined to be significant.
- HWA – Annually monitor for HWA presence.

**2.2B** Bobcat denning areas comprise approximately 10 acres of the Atherton Lot. It consists of a steep westerly slope with large boulders and exposed ledge. No management is expected in this area due to inoperable terrain. Primary use of this area will be protection of wildlife habitat and dispersed non-motorized recreation.

**SM 2.2B - Bobcat Denning Area (10 Acres)**

A secondary VAST trail passes the northern section of this area.

***Management Actions:***

- Look for opportunities to relocate trail out of this area.

**2.2C** Hard mast area is an important habitat feature for many species of wildlife. In this case bear-scarred beech is a strong component to this stand. This area will be managed to promote the

health and vigor of mast trees. Primary uses will include wildlife habitat management and dispersed non-motorized recreation.

**SM 2.2C – Hard Mast Area (31 Acres)**

Severe Beech Bark Disease and ice storm damage within stand.

***Management Actions:***

- Beech trees that show resistance to disease and good crown ratio will be retained.
- Regenerate stand as appropriate.
- Retain additional mast crop trees as available.
- Maintain and recruit den and snag trees as well as down woody material to enhance wildlife habitat and nutrient cycling.
- See VT ANR Beech MPA Guidelines 3-22-2011.

**2.2D** Spruce/fir stands represent an additional management goal by offering potential habitat for snowshoe hare and other species associated with softwood forest types. Access to these stands and close proximity to archeological/cultural resources may be a challenge. Management in these areas will focus on even-aged practices to promote softwood regeneration. Primary uses will include wildlife habitat management and dispersed non-motorized recreation.

**SM 2.2D – Spruce/Fir (62 Acres)**

Potential conflicts for management activities with archeological/cultural resources.

***Management Actions:***

- Identify all areas where historic remnants are located.
- Even-aged management to promote growth of softwood regeneration.
- Maintain and recruit den and snag trees as well as down woody material to enhance wildlife habitat and nutrient cycling.

**2.4** Early successional habitats are an important component within a landscape for many wildlife species. This area will focus on soft mast species such as blueberry, serviceberry, and apples. In addition there are alder and aspen stands. Management activities have included apple tree release, alder and aspen ¼ acre even-aged regeneration cuts, and release of serviceberry and blueberry. Primary uses will include wildlife habitat management and dispersed recreation. This area is very popular for woodcock and grouse hunting activities.

**SM 2.4 – Early Successional Habitat (12 Acres)**

Potential conflicts for management activities with archeological/cultural resources.

Infrastructure vandalism, VAST trail maintenance, and damaging motorized activities are the major issues in this area.

***Management Actions:***

- Periodic maintenance through brush hogging and brush cutting.
- Identify all areas where historic remnants are located.
- Monitor parking area for trash and vandalism.
- Document off-roading problems and report to district Game Warden for enforcement.
- Develop agreement with VAST for trail maintenance.

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### **3.0 GENERAL MANAGEMENT — 457 acres**

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General Management areas represent approximately 457 acres or 48% of the WMA.

This is the largest single classification of land area. It is composed primarily of Northern Hardwood forest types and has historically been used for wildlife habitat management and forest management purposes. Within this area are many water features such as seeps, streams, and vernal pools. Cultural/historical sites have also been documented. Illegal ATV and truck use along with vandalism of WMA infrastructure has been documented in the past. Management activities have included patch clearcuts, forest thinning, timber stand improvement projects, along with road building, parking lot, gate installation, signage, and maintenance activities. Access to the northern sections of the Atherton Lot needs development. The Steam Mill Lot is accessed via a class 4 town road that is not in condition to facilitate management access. Primary uses will include wildlife habitat management and dispersed non-motorized recreation.

#### **GM 3.0 – General Management (457 Acres)**

Potential conflicts for management activities with archeological/cultural resources.

Infrastructure vandalism, VAST trail maintenance, and illegal motorized activities are the major issues in this area.

Access to the northern sections of the Atherton Lot needs development. The Steam Mill Lot is accessed via a class 4 town road that is not in condition to facilitate management access.

Severe insect and disease, ice storm damage, and previous high grading have damaged forest resource condition over time.

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

- Identify all areas where historic remnants are located.
- Monitor parking area for trash and vandalism.
- Document trespass issues and report to district Game Warden for enforcement.
- Prescribe even-aged forest management techniques to expand on previous early successional management efforts for regeneration.
- Work with the Town of Whitingham to improve trail surface and access.
- Attempt to secure a right-of-way from landowners to the north.
- Monitor for Emerald Ash Borer.
- Monitor for Asian Longhorned Beetle.
- Maintain and recruit den and snag trees as well as down woody material to enhance wildlife habitat and nutrient cycling.

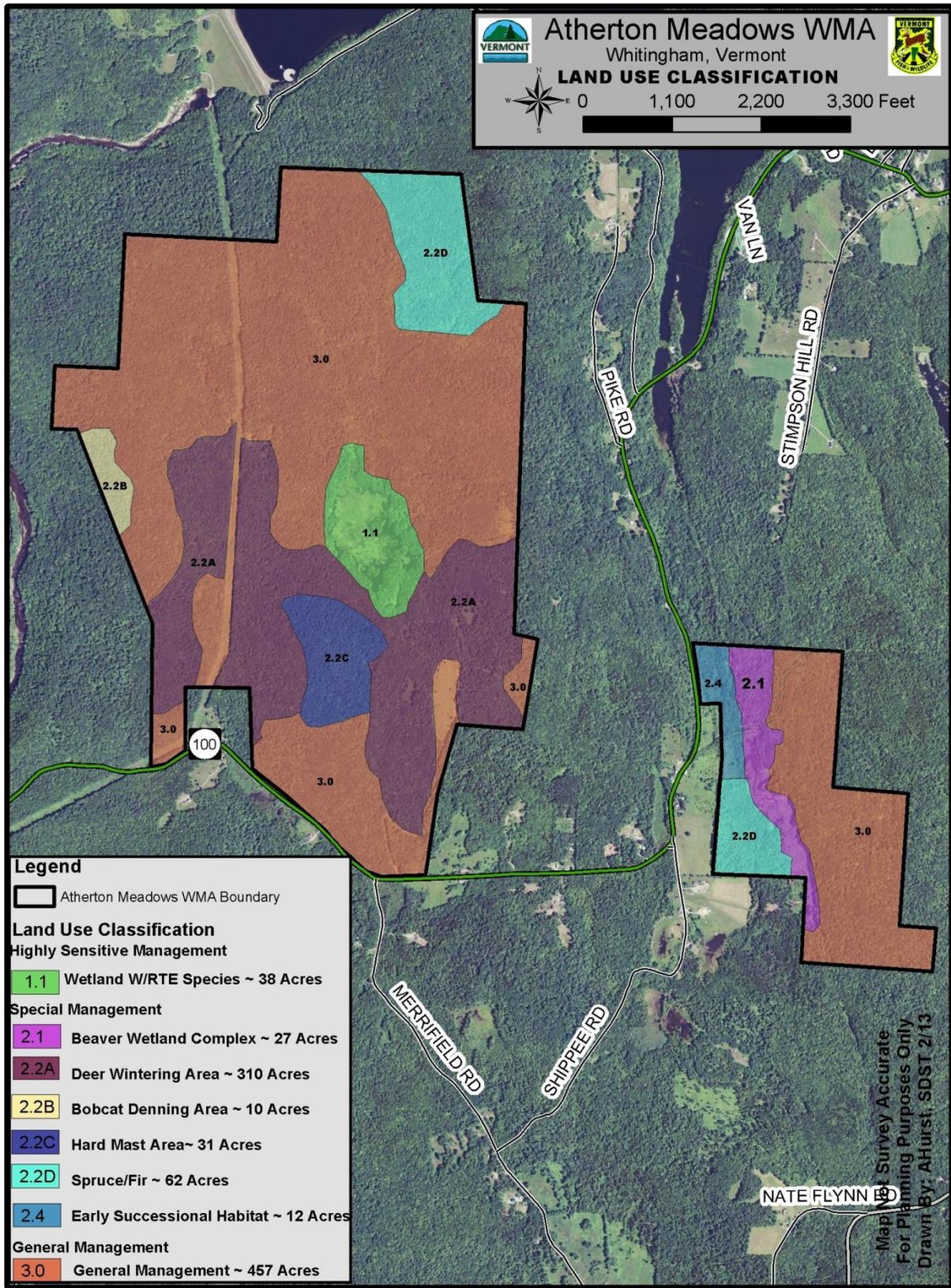
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### **4.0 INTENSIVE MANAGEMENT — no acres**

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No areas within AMWMA were included in the Intensive Management classification. This is primarily due to the low levels of human density. This category may need to be revisited in the future if levels of use become incompatible with the goals and/or start to degrade the natural resources of the parcel.

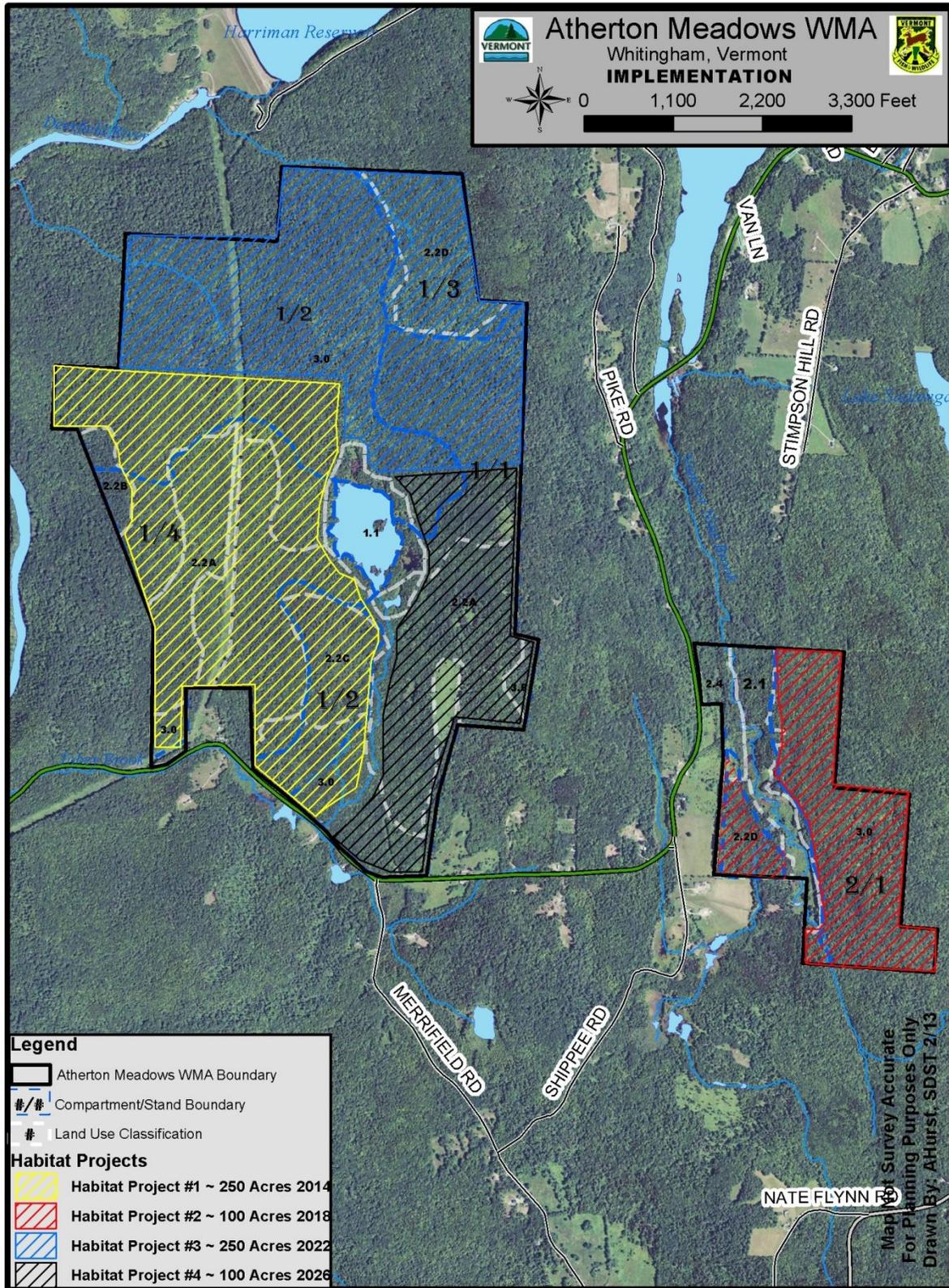
Figure 11: Land Use Classification Map



**Table 9: Implementation Schedule**

<b>Activity</b>	<b>Location</b>	<b>Acreage</b>	<b>Goal</b>	<b>Calendar Year</b>	<b>Outcome</b>
HWA Monitoring Plots	DWA 2.2A	310	Detect early infestation	Annually	
Infrastructure Monitoring	Public parking areas and gates 3.0/2.4	n/a	Monitor damage and repair	Annually	Infrastructure secure
Apple Tree Release	2.4/1.1 Atherton & Steam Mill Lots	12 acres	Soft mast production/wildlife habitat	2015, 5 year re-entry	Apple Release ¼ acre Alder cut ¼ ac. Aspen cut
Habitat Project #1	2.2C, 2.2A, 3.0 Atherton Lot	250	Mast tree release, early successional habitat	2014	Wildlife Habitat. VAST
Habitat Project #2	2.2D, 3.0 Steam Mill Lot	100	Mast tree release, early successional habitat	2018	Improved Wildlife Habitat, Hop Trail
Habitat Project #3	2.2D, 3.0 Atherton Lot	250	Mast tree release, early successional habitat	2022	Improved Wildlife Habitat, secure access
Habitat Project #4	2.2A, 3.0 Atherton Lot	100	Mast tree release, early successional habitat	2026	Improved Wildlife Habitat
Road Maintenance			Stabilize and improve access	2015 5 year re-entry	Improved access
Invasive Plant Monitoring and Control	As referenced on pp. 18 & 19	<5 acres	Populations treated and/or removed	2015, 2020	Spread of invasive plants limited
Invasive Insect Monitoring				As needed	
Rare Plant Monitoring				As needed	

Figure 12: Implementation Map



## V. MONITORING AND EVALUATION

During the life of the LRMP for Atherton Meadows 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 Atherton Meadows 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 Atherton Meadows WMA?

Obtaining quality information is critical to making informed decisions and conducting sound, thoughtful management actions. Research projects on Atherton Meadows WMA are directed by the District Stewardship Team to ensure that they do not conflict with the goals and objectives for Atherton Meadows 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 Atherton Meadows 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 Atherton Meadows WMA (including forest inventory, aerial insect and disease surveys, 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 Atherton Meadows 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).
- 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 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 Atherton Meadows 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 Atherton Meadows 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. The District Stewardship Team will monitor the WMA for the presence of invasive exotic species and work with cooperating partner organizations to develop a monitoring protocol. The District Stewardship Team will work to identify populations of invasive exotic species and implement control measures where feasible.

### ***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.

## **Climate Change**

If the most conservative current models of climate change are accurate (Iverson, Prasad, Hale, and Sutherland), Atherton Meadows 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 Atherton Meadows 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:

- 1) Substantial changes to any goals, management objectives, and implementation actions contained in the current plan;
- 2) Major change in land use, land classification, or species management direction;
- 3) Designation of non-developed camping sites (via statute regarding camping on state lands);
- 4) Permanent closure of existing trails and/or permanent creation of new recreation corridors not identified in the current plan;
- 5) 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;
- 6) Major land acquisitions added to the existing parcel;
- 7) Major capital expenditures for new projects;
- 8) Facility closures;
- 9) Transfers in fee ownership;
- 10) Leasing of new acreage (e.g., ski resort); and
- 11) 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
- 4) parcels that serve an identified facility, infrastructure, or program need.

All new acquisitions of land to Atherton Meadows 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.

Any future disposition of land from Atherton Meadows 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: Public Comment Summary
- APPENDIX 3: Works Cited
- APPENDIX 4: 10 V.S.A. App. § 15 Rule Governing Public Use of Vermont Fish and Wildlife Department Lands
- APPENDIX 5: Glossary

## APPENDIX 1: 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 and their wintering areas, and rare plants.

The coarse filter assessment begins by describing landscape and climatic factors that characterize Atherton Meadows WMA, such as bedrock geology and water resources. It then details the 9 distinct natural community types documented and mapped during inventories of the WMA. 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. Atherton Meadows WMA is located within the Southern Green Mountains biophysical region. This region is part of the Appalachian Mountain system that stretches across much of the eastern side of North America. As a result of the high elevations, it has increased levels of precipitation, low temperatures, and a short growing season. The terrain is frequently steep, though there are some large high-elevation plateaus. The metamorphic bedrock is acidic, but is much older than similar rocks found in the Northern Green Mountains. Glacial till covers much of the region, with glacial and river sediments present in the valleys.

#### Bedrock, Surficial Geology and Soils

The geologic history of an area can have a strong influence on the distribution of natural communities. Atherton Meadows WMA is underlain by several types of bedrock, all of which are very old rocks dating back to the Precambrian and Cambrian eras. These are primarily schist and gneiss of the Mount Holly complex and the Hoosac and Cavendish formations, and are slow-

weathering, acidic rocks that do not contribute significantly to soil enrichment. Ratcliffe et al. (2011) mapped a band of marble that underlies part of the eastern parcel of the WMA, and while this bedrock has the potential to contribute substantially to soil enrichment, only minimal evidence of this was observed in the field. The degree to which any bedrock types affect growing conditions in the WMA is mediated by the depth of the 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. Most of Atherton Meadows WMA features a layer of this over the bedrock, but in some places the till is buried by recent alluvial deposits along flowing streams. In addition, many wetlands have post-glacial accumulations of muck and peat. These are organic materials deposited in very acidic and anaerobic environments, which consequently decay more slowly than they are produced. The soils of AMWMA are primarily the results of these surficial deposits. NRCS soil mapping indicates that till-derived fine sandy loams cover the vast majority of the WMA (approximately 900 acres). These soils include the Rawsonville, Hogback, Houghtonville, and Wilmington series. Worden loam is mapped on 77 acres. Muck is mapped on just 16 acres, but many of the small wetlands do not appear on NRCS soil maps. Additional details on soils can be found in the natural community descriptions below.

#### Hydrology/Streams/Rivers/Ponds

Atherton Meadows WMA receives around 53” of precipitation annually, which is above average for the state but expected at sites where relatively higher elevations contribute to increased levels of precipitation. The WMA is contained within the upper Deerfield River watershed, which eventually drains into the Connecticut River. The large beaver pond on the main parcel, and Number Nine Brook on the smaller parcel, are the most prominent water features of the WMA, but there are numerous small streams, vernal pools, and areas of groundwater seepage as well.

#### Natural and Human Disturbance

Natural disturbance process, such as wind, fire, and flooding, continually shape landscapes and define their natural communities. As is typical of Vermont’s forest natural communities, the most frequent upland disturbances at Atherton Meadows WMA are small-scale events, such as individual tree death and canopy gap dynamics. Moderate scale disturbances such as blowdown, ice storm, and insect defoliation events are expected less frequently, but have the potential for larger impacts. An ice storm in 2008, for example, resulted in heavy damage to the tree canopy in portions of AMWMA. Very large scale disturbances (events affecting many hundreds of acres or more) are expected to occur very rarely, but if an event does occur it would have the potential to create dramatic changes in natural communities. The small wetlands of the WMA are probably most influenced by disturbances to the surrounding upland forest, but the larger wetland and riparian natural communities can be influenced by beaver activity, floods, and ice scouring.

Land use history can also influence the present-day distribution and condition of natural communities. Not surprisingly, the land has a history of agriculture and timber harvesting. The was reported to have been used for sheep farming in the late 19<sup>th</sup> century, but then abandoned around the turn of the 20<sup>th</sup> century. Cellar holes and a few areas of young forest remain as fading evidence of the agricultural use. Timber harvesting (for wildlife habitat management) continues as an ongoing use of the land.

## 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). 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. Some, such as Northern Hardwood Forests, occur in broad expanses across the landscape, and form the context in which other communities are found. In contrast, the smallest natural communities, such as Seeps and Vernal Pools, owe their existence to highly localized site and disturbance characteristics.

Natural communities at Atherton Meadows WMA were identified through aerial photograph interpretation and field surveys. 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 at Atherton Meadows WMA; 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 may 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. 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 and which are available upon request. State-significant natural communities are usually managed to maintain or improve their overall ecological quality.

Twenty-seven occurrences of 9 natural community types were identified and mapped in Atherton Meadows WMA (see table below). A total of 53 natural community polygons were mapped. Some broad patterns emerged from this mapping effort. AMWMA is primarily a forested landscape, with a matrix of Northern Hardwood Forest and Hemlock-Northern Hardwood Forest. Within these two communities are many small wetland natural communities. The most prominent wetland on the WMA is the beaver wetland complex in the center of the main parcel, which provides diverse habitat and hosts rare plant species.

Natural Communities of Atherton Meadows WMA				
Natural Community		Acres	Vermont Distribution	Example of Statewide Significance?
<b>Wetlands</b>	Beaver Wetland	26	very common	
	Hemlock-Balsam Fir-Black Ash Seepage Swamp	17	uncommon	yes
	Red Spruce-Cinnamon Fern Swamp	3	uncommon	
	Seep	2	common	yes
	Vernal Pool	0.5	uncommon	
<b>Uplands</b>	Hemlock-Northern Hardwood Forest	370	common	yes
	Hemlock Forest	7	common	
	Northern Hardwood Forest	556	very common	
	Northern Hardwood Talus Woodland	3	uncommon	

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: [http://www.vtfishandwildlife.com/books.cfm?libbase\\_=Wetland,Woodland,Wildland](http://www.vtfishandwildlife.com/books.cfm?libbase_=Wetland,Woodland,Wildland)

### 1. Beaver Wetland

The namesake feature of Atherton Meadows WMA is a 16-acre beaver-influenced pond and wetland complex. USGS topographic maps indicate that this wetland has changed over time. The 1954 Wilmington, VT 15' quad indicates a wetland feature, while the more recent 7.5' quad shows only open water. The extent of natural and human disturbance on this feature is not fully understood. At present, the wetland is a mix of open water and floating vegetation mats that could not be fully inventoried. Species noted include Sphagnum mosses, Blue Iris (*Iris versicolor*), sedges (*Carex* spp.) and cattail (*Typha* sp.). Of important note, the very rare plant species Inflated Bladderwort (*Utricularia radiata*) is abundant in some areas of open water. This wetland probably provides important wildlife habitat for many species in addition to beavers, such as muskrats, waterfowl, osprey, and others. Additional inventory is recommended for this wetland complex prior to any management that might affect water levels or the adjacent upland forest. In addition, there is also a smaller beaver wetland complex along Number Nine Brook in the parcel east of Route 100. Species noted in this wetland include Rattlesnake Manna Grass (*Glyceria canadensis*), Common Woosedge (*Scirpus cyperinus*), Sallow Sedge (*Carex lurida*), Speckled Alder (*Alnus incana*), and Dark-Green Bulrush (*Scirpus atrovirens*).

### 2. Hemlock-Balsam Fir-Black Ash Seepage Swamp

Five occurrences (covering 17 acres) of this mixed hardwood-softwood swamp type are mapped on AMWMA; one is considered an example of statewide significance. In general, seepage provides nutrient input and results in a relatively diverse species composition in these swamps. Individual examples, however, have varying seepage influence, affecting the overall species composition and soil structure of each swamp. Soils ranged from 10" of muck to 3.5' of moderately decomposed peat; pH measured in one swamp was 7.0-7.2. Most patches are characterized by an open canopy (average 50% cover, 35' tall) of Eastern Hemlock (*Tsuga canadensis*), Balsam Fir (*Abies balsamea*), Red Maple (*Acer rubrum*), and Black Ash (*Fraxinus nigra*). Some swamp patches also have Yellow Birch (*Betula alleghaniensis*) and Red Spruce (*Picea rubens*) as co-dominant species. Black Ash (*Fraxinus nigra*) can be abundant in the subcanopy (15-20' tall, 20% cover), which can also contain the tree species noted above. Shrubs

in these swamps include Striped Maple (*Acer pensylvanicum*), Mountain Holly (*Ilex mucronata*), and American Honeysuckle (*Lonicera canadensis*). Common Lowbush Blueberry (*Vaccinium angustifolium*) is sometimes present. The herb layer is diverse with over 25 species observed in these patches. Frequent species include Cinnamon Fern (*Osmunda cinnamomeum*), Sensitive Fern (*Onoclea sensibilis*), Interrupted Fern (*Osmunda claytoniana*), a sedge (*Carex* cf. *gynandra*), Tussock Sedge (*Carex stricta*), and Dwarf Raspberry (*Rubus pubescens*). Patches with strong seepage influence can have Eastern Rough Sedge (*Carex scabrata*), Golden-Saxifrage (*Chrysosplenium americanum*), Water Avens (*Geum rivale*), and Swamp Saxifrage (*Saxifraga pensylvanica*). This community can provide foraging and nesting habitat for some songbird species (such as Winter Wren which will nest in tip-up mounds). The early spring vegetation in these swamps can be an important food source for black bear.

### 3. Hemlock-Northern Hardwood Forest

Hemlock-Northern Hardwood Forest is the second most widespread type in AMWMA, it is found primarily on flats and southwest-facing slopes. At these sites it is likely shallow, rocky, and dry soils that favor the mix of Hemlock (*Tsuga canadensis*) and the northern hardwood species Sugar Maple (*Acer saccharum*), Yellow Birch (*Betula alleghaniensis*), and American Beech (*Fagus grandifolia*). One site had large boulders (up to 6 feet on the longest side) and just 8-12 inches of sandy/silty loam, with a strong eluviated layer. In addition to species noted above, Red Maple (*Acer rubrum*) is also not uncommon in the closed canopy. A sub-canopy (20-30% cover) includes Hemlock (*Tsuga canadensis*), Red Maple (*Acer rubrum*), and Balsam Fir (*Abies balsamea*). Shrub cover is sparse, but includes Hobblebush (*Viburnum lantanoides*) and Striped Maple (*Acer pensylvanicum*). The invasive Common Buckthorn (*Rhamnus cathartica*) was noted in this community near Route 100. Herbs (40% cover) include Tree Clubmoss (*Lycopodium obscurum*), Hay-scented Fern (*Dennstaedtia punctilobula*), Small Solomon's-seal (*Polygonatum pubescens*), Shining Clubmoss (*Lycopodium lucidulum*), and Wild Sarsaparilla (*Aralia nudicaulis*). The dense hemlock cover in this community can provide winter shelter from deep snow and extreme temperatures for white-tailed deer, and much of this community at AMWMA has been identified and mapped as deer wintering area. While not an undisturbed forest, the size and landscape context combine to make the occurrence of Hemlock-Northern Hardwood Forest in the main parcel an example of statewide significance.

### 4. Hemlock Forest

Two small patches of Hemlock Forest are found in the southeast corner of the main parcel of the WMA, forming a single occurrence of just over 7 acres. Since this is a small example of a common natural community type, it is not of statewide significance. Only the larger western patch was visited during inventories. This patch is characterized by a steep slope with shallow (6-12" deep), well drained sandy soil. Hemlock (*Tsuga canadensis*) forms a dense canopy (90% cover, 60' tall), with almost no trees or shrubs beneath. A sparse herb layer contains Evergreen Woodfern (*Dryopteris intermedia*), Marginal Wood Fern (*Dryopteris marginalis*), and Pink Ladyslipper (*Cypripedium acaule*). This Hemlock Forest, along with the surrounding Hemlock-Northern Hardwood Forest, is mapped as deer wintering area due to the dense conifer cover. Other common wildlife species that might be found in this community include porcupine, red squirrel, and red-breasted nuthatch.

### 5. Northern Hardwood Forest

Covering 556 acres of the WMA, Northern Hardwood Forest is the matrix into which all other natural communities on the fit. The vast majority of the acreage is found on the main parcel of

the WMA, with just 30 acres on the smaller, eastern parcel. Soils are coarse sandy loams and very rocky. The canopy contains Sugar Maple (*Acer saccharum*), American Beech (*Fagus grandifolia*), Yellow Birch (*Betula alleghaniensis*), and White Ash (*Fraxinus americana*), along with Black Cherry (*Prunus serotina*) and Big-toothed Aspen (*Populus grandidentata*) in areas of younger forest. The canopy cover averages around 80% and tree heights range from 50 – 80 feet tall. Shrubs include Striped Maple (*Acer pensylvanicum*), American Beech (*Fagus grandifolia*), and Hobblebush (*Viburnum lantanoides*). Herb cover averages around 30% and includes Evergreen Woodfern (*Dryopteris intermedia*), Narrow beach Fern (*Phegopteris connectilis*), Wild Cucumber (*Medeola virginiana*), Common Wood-Sorrel (*Oxalis acetosella*), Partridge Berry (*Mitchella repens*), Christmas Fern (*Polystichum acrostichoides*), Common Bellwort (*Uvularia sessilifolia*), and New York Fern (*Thelypteris noveboracensis*). On the eastern parcel, and on the main parcel west of the powerline, there is evidence of mild enrichment, with herbs such as Wild Leeks (*Allium tricoccum*), Squirrel-corn (*Dicentra canadensis*), and Mackay's Bladder Fern (*Cystopteris tenuis*). Portions of this forest have fairly large trees (over 20" dbh) but stumps and old skid trails indicate that the forest has a history of management. Northern Hardwood Forest can host a wide variety of wildlife species, and some species expected at AMWMA include white-tailed deer, black bear, turkey, black-throated blue warbler, hermit thrush, and redback salamander. Habitat features in this community vary on the WMA. Some areas of Northern Hardwood Forest suffered disturbance in a 2008 ice storm and have more dead and downed wood, which contributes to excellent wildlife habitat. Other areas, notably the eastern parcel, appear to lack down woody material and abundant snags. Because these are two relatively small examples of Vermont's most common community type, they are not considered to be examples of statewide significance.

#### 6. Northern Hardwood Talus Woodland

A single small patch of this community is found on the western boundary of the WMA, where there is a steep slope with boulders that are 2-6 feet on their longest side. Little soil is present other than a layer of leaf litter. Species noted in this community include a canopy of Yellow Birch (*Betula alleghaniensis*), American Linden (*Tilia americana*), Sugar Maple (*Acer saccharum*), White Ash (*Fraxinus americana*), and Eastern Hemlock (*Tsuga canadensis*); an understory of Mountain Maple (*Acer spicatum*), Black Cherry (*Prunus serotina*), Striped Maple (*Acer pensylvanicum*); and an herb layer with Marginal Wood Fern (*Dryopteris marginalis*), Zig-Zag Goldenrod (*Solidago flexicaulis*), Rock Polypody (*Polypodium virginianum*), and Evergreen Wood Fern (*Dryopteris intermedia*). Though the patch is small, the jumbled rocks in this community can provide habitat for many wildlife species including porcupine, bobcat, as well as other small mammals such as voles.

#### 7. Red Spruce-Cinnamon Fern Swamp

Two small occurrences of Red Spruce-Cinnamon Fern Swamp are found on AMWMA. These patches are similar to Hemlock-Balsam Fir-Black Ash Seepage Swamp natural community, but lack notable influence from groundwater seepage. As a result, they are more acidic and are typically less diverse in vegetation. The examples noted on the WMA have a canopy (50-60% cover, 30-40' tall) of Red Spruce (*Picea rubens*) and Balsam Fir (*Abies balsamea*). Eastern Hemlock (*Tsuga canadensis*) and Yellow Birch (*Betula alleghaniensis*) are sometimes present in varying abundance. An understory, if present, has a similar species composition as the canopy, but Red Maple (*Acer rubrum*) can also be present. Shrub cover was noted around 30-40% and include Common Winterberry (*Ilex verticillata*), Mountain Holly (*Nemopanthus mucronata*), Speckled Alder (*Alnus incana*), and Beaked Hazelnut (*Corylus cornuta*). As the name implies,

Cinnamon Fern (*Osmunda cinnamomeum*) is a dominant herb. Sensitive Fern (*Onoclea sensibilis*), Fringed Sedge (*Carex crinita*), Marsh Fern (*Thelypteris palustris*), Round-Leaved Sundew (*Drosera rotundifolia*), and Northern Green Orchid (*Habenaria hyperborea*) were also noted as characteristic of these patches. A population of an uncommon species, Northern Long Sedge (*Carex folliculata*), was found in this community in the smaller parcel east of Route 100. *Sphagnum* mosses are abundant. A soil sample in one swamp found 18" of mucky peat over rock. Like other wetlands on the parcel, these swamps can provide important spring forage for black bear, and may offer breeding and foraging habitat for some bird species.

#### 8. Seep

Seven seeps have been mapped in AMWMA, and it is likely that others are present as well. These are small patches where groundwater flow reaches the surface, resulting in muck soils. One sample found 16" of muck over sand, but many seeps likely occur where mucky soil directly overlays bedrock. Trees and shrubs are usually absent in these patches, but herbs can be abundant. Observed species include: Sensitive Fern (*Onoclea sensibilis*), Eastern Rough Sedge (*Carex scabrata*), Northeastern Manna Grass (*Glyceria melicaria*), an *Impatiens* species, and Golden-Saxifrage (*Chrysosplenium americanum*). Because groundwater flow moderates the soil temperature in seeps, these can be among the first places to melt and thaw, and have plant growth in spring. This early vegetation is an important food source for black bears in spring. Seeps also provide habitat for several amphibians, including spring salamander, dusky salamander, and northern two-lined salamander

#### 9. Vernal Pool

Nine Vernal Pools have been mapped in AMWMA. These small woodland basins are often dry, but fill with water in the spring (and occasionally in other seasons) due to heavy rain and snowmelt. Because they lack fish, these pools are excellent breeding habitat for invertebrates, and amphibians that migrate to the pools to reproduce and lay eggs. Of the nine pools at AMWMA, five were visited during inventories. These pools average 60' long and 25' wide, and are located within either Northern Hardwood Forest or Hemlock-Northern Hardwood Forest. Associated plant species include Winterberry Holly (*Ilex verticillata*), Sensitive Fern (*Onoclea sensibilis*), Lady Fern (*Athyrium filix-femina*), and *Sphagnum* moss species. Inventories did not coincide with amphibian breeding season, so no data on pool use by species such as wood frogs and spotted salamanders could be collected. One pool (on the eastern parcel) is impacted by a trail that runs directly through the pool; illegal ATV use on the WMA appears to contribute to ongoing damage. The other visited pools appear largely undisturbed and likely provide good invertebrate and amphibian habitat. Finally, four pools were identified using aerial photo interpretation. Additional field visits are needed to confirm and assess these pools.

### **Fine Filter Assessment**

#### Rare, Threatened, and Endangered Species

Atherton Meadows WMA is home to three rare and uncommon species of plants. These species and their management needs are summarized in the text below.

#### PLANTS

Two species of very rare plants have been located within the WMA; neither of these species is listed as "threatened" or "endangered" by the Vermont state endangered species statute (10 V.S.A. 123). In addition, one uncommon species is located within the WMA.

1. Pinxter-flower (*Rhododendron periclymenoides*) is a very rare (S1) species in Vermont known only from scattered locations in the southern portion of the state. All known populations are suffering damage from heavy deer browse, and none have been observed with evidence of flowering. The occurrence at Atherton Meadows WMA is found along the shoreline of the central beaver pond/wetland complex, in Hemlock-Northern Hardwood Forest. In 2011, a small browse exclosure fence was set up around several stems, and will be monitored for evidence of flowering. This species could potentially be found in a wide range of habitats, thus additional field surveys would be needed to determine the full extent of this plant within the WMA.
2. Inflated Bladderwort (*Utricularia radiata*) is also a very rare (S1) species found growing in the beaver pond/wetland complex of the WMA. This species is known only from three other sites in the state, all of which are in extreme southern Vermont. In the WMA, it is found growing in shallow open water of the beaver wetland, and the population appears large. Natural water-level fluctuation may change the location and extent of suitable habitat for this species, and permanent de-watering of the beaver pond could have negative impacts on this occurrence.
3. Long Sedge (*Carex folliculata*), an uncommon (S3) species, is found in a Red Spruce-Cinnamon Fern Swamp in the eastern parcel of the WMA. Maintaining the hydrological and ecological integrity of this wetland should protect this occurrence.

#### Non-native Species

There are many non-native plant species at Atherton Meadows WMA. Most are not a threat to native vegetation, habitats, or wildlife.

#### Core Forest and Habitat Blocks

Core forest is a biological term used to refer to any forested areas that are greater than 100 meters from human-created, non-forested opening. While edges and transition zones are excellent habitat for some native plant and animal species, edges also negatively impact many forest resources. Increases in invasive species and in predation on many native songbirds, and a decrease in wildlife that prefer to use large blocks of intact forest, are all associated with an increase in forest edge. Additionally, unbroken forest allows for easy dispersal of plants and animals, without large barriers to this movement.

Atherton Meadows WMA is located in a mostly forested landscape with areas of agricultural land and moderate-density human development. Route 100, which runs between the two parcels of the WMA, is the primary fragmenting feature in the local landscape. The western, larger parcel of the WMA is within a 21,247 acre habitat block that is roughly bounded by Routes 100, 8, and 9. Harriman Reservoir is an important feature in the eastern portion of the block, while the northwestern portion is within the Green Mountain National Forest. Excepting the reservoir, most of this block has been mapped as core forest. To the east of Route 100, the smaller WMA parcel is within a much smaller 1,315 acre habitat block, bounded by Route 100, Kentfield Road, and several other local roads. This block contains Sadawga Lake, and approximately half the block is considered core forest.

### 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 increased.

Atherton Meadows WMA is on the edge of a wide swath of land, extending along the higher elevations of the southern Green Mountains, and south into Massachusetts, that offers excellent wildlife movement potential. This corridor may facilitate dispersal of some wide-ranging mammal species into source populations in the Green Mountains. It could allow some plant and animal species long-term opportunities to expand or move their ranges in response to climatic changes. On a more local scale, the western parcel of the WMA, along with undeveloped lands to the south, likely creates favorable conditions for wildlife crossing Route 100.

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## APPENDIX 2: Public Comment Summary

### Summary of Public Meeting Comments and Written Comments Atherton Meadows WMA Long Range Management Plan

A total of 8 people attended the scheduled and publicized public involvement meeting for the presentation of the draft LRMP for Atherton Meadows WMA. Hosting the evening event was Aaron Hurst, FPR State Forester, Tim Morton, FPR Stewardship Forester and Chris Bernier, F&W Biologist. The hour long presentation 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. No comments or questions were received after this meeting during the 30 day comment period.

#### VAST Trails

- There was some concern about relocation of trails out of Deer Wintering Areas and who would pay for relocation. *If an opportunity exists this will be accomplished during management activities with at least a portion incorporated into harvest or road projects. Trail relocations are typically done cooperatively with ANR and VAST and often utilize grant funds. If no alternatives exist and the trail is an important through-trail, use is typically maintained at its current level.*
- There was a question about what the State does to help the local club with annual maintenance. *The State provides maintenance during management activities and through infrastructure projects such as the new Steam Mill Parking Area and snowmachine access built on the WMA in 2011. VAST clubs may apply for funding through the Department of Forest Parks and Recreation for snowmobile maintenance projects on state land. Potential projects should be submitted to the Springfield District Office by late summer or early fall so that they can be reviewed and approved by the District Stewardship Team. Funding requests should include a map of the trail locations to be worked on and a description of the project. If supported by local ANR staff, the project is included in the District proposal for Recreation Trail Fund projects submitted to the Recreation Trails Program Administrator in December. If approved, funds are available the following summer. Equipment operators working on state land are required to provide proof of general liability and automobile insurance coverage.*

#### Process and Planning

- Some frustration was expressed about the length of time it takes to draft and finalize a management plan and the years without habitat creation in this period. *State LRMP's are very thorough in resource inventory and involve multiple disciplines from many natural resource fields to fully provide the context needed to adequately determine management goals and objectives. They are a long term investment and they include a 20 year management schedule to reflect the significant investment in the document. Once an LRMP is approved significant activities will occur over a long time period.*
- The plan does not include specific recommendations outlined in the Deerfield River Basin Plan. *The Deerfield Basin Plan was just released in March of 2014 and could not*

*be incorporated before the scheduled meeting. The regional basin planner did have input through the District Stewardship Team and the draft Basin Plan was reflected in the LRMP through that participation.*

#### Implementation

- *Apple tree release projects are an important management activity. Offered a possible location for an additional orchard. Apple tree release has been and will continue to be a part of the management schedule for the property. Additional apple tree locations are welcomed and should be brought to the attention of staff.*
- *Need to develop better access, particularly to the center of the parcel. The management plan calls for improved access in a number of locations. The parcel has significant steep slope and a water course limitations making access from some locations impossible. Discussions with abutters will be re-started in regard shared access development. If these options fail extending the truck road will be considered as an option to reach more area.*
- *What kind of forest management techniques will be utilized in habitat project #1. A detailed prescription is developed prior to operations. The preliminary prescription specifies creation of early successional habitat and mast tree release. We anticipate 20 to 30 acres of patch clearcuts, each 2 to 5 acres in size, embedded in a larger area of mast tree release.*
- *A preponderance of American Beech (beech) regeneration could limit future species diversity. There are some areas where this may be a concern. Patch clear-cuts of 2 to 5 acres will be used in these areas to diversify the regeneration. Where beech is healthy, beech seedling and saplings may contribute mast crops into the future and will be managed as an asset.*

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## **APPENDIX 4: 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.

- 3.21 “Ground blind” means a structure or manufactured enclosure made of natural or man-made 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, full-time 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;

- ii. 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.
- g) 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 3 V.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 5: Glossary

The following is a series of key words and their definitions used in the development of Long Range Management Plans for Vermont Agency of Natural Resource lands.

***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.

***Acceptable Growing Stock (AGS).*** AGS trees exhibit form and appearance that suggests they will maintain and/or improve their quality and can be expected to contribute significantly to future timber crops in the form of vigorous high quality stems. They contain or may potentially produce high or medium quality sawlogs.

***Age Class.*** One of the intervals, commonly 10 to 20 years, into which the age range of forest trees are divided for classification or use. Also pertains to the trees included in such an interval. For example, trees ranging in age from 21 to 40 years fall into a 30-year age class; 30 designates the midpoint of the 20-year interval from 21 to 40 years.

***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.

**Cull Tree.** Tree that does not meet regional merchantability standards because of excessive unsound cull. May include noncommercial tree species.

**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.

**Down woody material (DWM).** DWM is also referred to as coarse woody debris, woody material, and down woody debris. DWM is comprised of woody material left in the woods from harvested trees as well as portions or whole trees that die and fall naturally.

**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.

**Gap.** An opening in the forest canopy caused by the death or harvest of one or several overstory trees.

**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.** The removal of small groups of trees to meet a predetermined goal of size, distribution, and 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 and 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.

**Invasive Exotic (Non-native).** A species that is 1) non-native (or alien) to the ecoregion or watershed under consideration and 2) whose introduction does or is likely to cause economic or environmental harm or harm to human health.

**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.

**Patch Clearcut (Patch-cut).** Under an even-aged method, a modification of the clearcutting method where patches (groups) are clearcut in an individual stand boundary in two or more entries. Under a two-aged method, varying numbers of reserve trees are not harvested in the patches (groups), to attain goals other than regeneration.

**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.** Seedlings or saplings existing in a stand. Regeneration may be artificial (direct seeding or planting) or natural (natural seeding, coppice, or root suckers).

**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.

**Sawlog or Sawtimber.** A log or tree that is large enough (usually > than 10 or 12 inches DBH) to be sawn into lumber. Minimum log length is typically 8 feet.

**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.

**Site Quality.** A broad reference of the potential of forest lands to grow wood. Site class identifies the potential growth more specifically in merchantable cubic feet/acre/year.

**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.

**Stocking.** A description of the number of trees, basal area, or volume per acre in the forest stand compared with a desired level for balanced health and growth. Most often used in comparative expressions, such as well-stocked, poorly stocked, or overstocked.

**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.

**Unacceptable Growing Stock (UGS).** UGS trees are high risk and are expected to decline before harvest. UGS trees are of poor form and/or low quality and cannot reasonably be expected to improve. They have the potential to produce only low quality logs or pulp-type products.

***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.