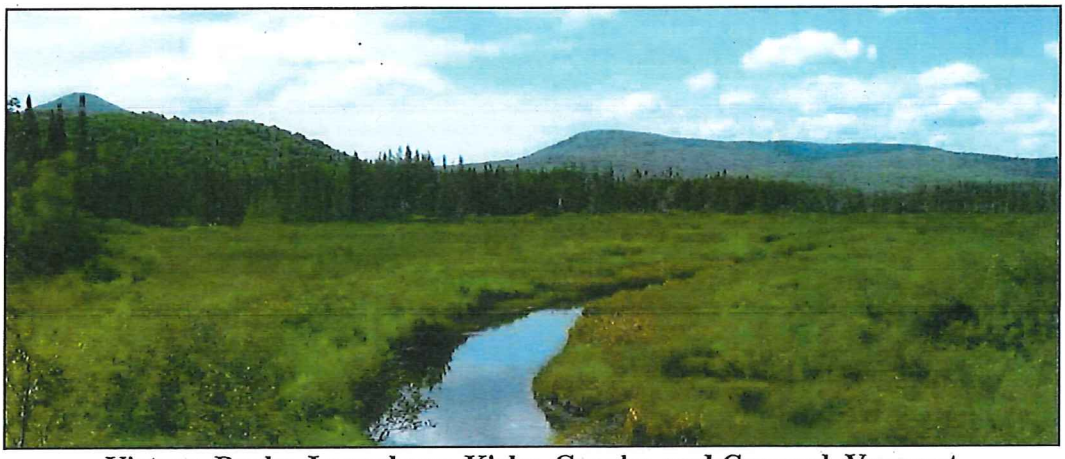
State of Vermont
Agency of Natural Resources
Department of Forests, Parks, and Recreation
Fish & Wildlife Department

Long Range Management Plan

Victory Management Unit

Victory Basin Wildlife Management Area
Victory State Forest
Darling State Park



Victory, Burke, Lunenburg, Kirby, Granby, and Concord, Vermont

Prepared by: St. Johnsbury Stewardship Team

Approved by: _____ 1 June 2017
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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 are:

- 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 23,645-acre Victory Management Unit (VMU) is composed of three adjoining parcels: Victory Basin Wildlife Management Area, Victory State Forest, and Darling State Park. Together, the VMU covers a large portion of the southern Northeast Highlands Biophysical Region. These state lands contain a range of natural features from the rare Victory Basin at near 1,100 feet up to the heights of Umpire, Kirby, and Burke Mountains, above 3,000 feet. The Management Unit is host to a variety of recreational experiences ranging from deep forests and quiet trails to skiing and biking at the Burke Mountain Resort.

Natural Communities
The uplands of the VMU are characterized by extensive matrix forest community types: lowland spruce-fir, red spruce-northern hardwood, and northern hardwood. Conifer-dominated communities are predominant at the highest and lowest elevations, with hardwood-dominated forests abundant at the middle elevations. Within these upland forests, smaller patch communities are present including seeps, vernal pools, and rock outcroppings. The floodplain and tributaries of the Moose River support floodplain forests, shrub swamps, and beaver wetlands. Softwood swamps and dwarf shrub bogs in the Victory Basin combine with lowland spruce-fir forests to form one of the best examples of boreal habitat in the state, and are all of high ecological quality and of statewide significance.

Wildlife and Habitat
The Victory Management Unit provides a range of important and rare wildlife habitats. The majority of the VMU's natural communities are examples of statewide significance—meaning they likely support the full range of wildlife native to those communities. In addition, the VMU provides a number of special habitat features including extensive wetlands, numerous cliffs and talus slopes, and one of the largest deer wintering areas in the state. The combination of these numerous and high-quality communities, their boreal composition, and a diversity of successional stages allows the VMU to be one of the highest quality habitats in the state for common species including moose and snowshoe hare, and rare species including spruce grouse, American marten, black-backed woodpecker, and gray jay.

Timber Resource
Management of the timber resource varies across the VMU. The higher elevation red spruce, balsam fir, and birch forests of Burke, Umpire, and Kirby mountains have traditionally been excluded from timber management because of rugged terrain, fragile resources, and other constraints. Mid-elevation northern hardwood forests have been managed intensively for timber production, and future management in these areas will focus on maintaining diverse and healthy forests while producing forest products. Lowland balsam fir-red spruce forests are strongly composed of mature even-aged fir, and management in these areas will focus on promoting softwood regeneration and increased spruce composition, while attempting to lessen the conversion of softwood stands to hardwood due to large-scale blowdowns.

Fisheries and Water
Most of the management unit is a part of the Moose River watershed, and the entire VMU eventually drains to the Connecticut River. The Moose River and its associated wetlands throughout the Victory Basin form the main hydrologic feature of the VMU.

The fish community at higher elevations consists of only natural brook trout and slimy sculpins. One or more species of fastwater minnows and longnose suckers join brook trout / sculpin fish community at more down-gradient sites, and the complexity of the fish community increases dramatically at stations in the Moose River and the valley-bottom segments of the tributaries. Additional minnow and sucker species are present, as well as burbot, but brook trout young-of-year do not occur. Yearling brook trout are stocked annually in the Moose River, and the Moose is also an Atlantic Salmon restoration site.

Invasive Exotic Species
Known populations of nonnative invasive plants include common reed, white poplar, and false spirea. Occurrences, however, are localized and are being actively controlled.

Historic Resources
The earliest historic resources known on the VMU date to European settlement of the area and include a variety of railroad infrastructure and stone foundations.

Recreational Users
The Victory Management Unit supports a wide array of public uses. The most intensive use of the area occurs on the Burke Mountain ski area of Darling State Park, including ski lifts and trails, mountain bike trails, and hiking trails. Other uses across the VMU include snowmobiling, horseback riding, mountain biking, hiking, hunting, fishing, trapping, and wildlife observation.

Infrastructure and Access
The VMU contains about 29 miles of Class B and C roads, in addition to one town road, which bisects the management unit. Access patterns will largely be maintained across these roads, with some open for public use while conditions allow and others available only for forest management. In addition, continued deficient road maintenance funding may necessitate the closure of some currently accessible roads due to their deteriorating condition.

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 the Victory Management Unit are Highly Sensitive (20.0%), Special Management (23.1%), General Management (53.1%), and Intensive Management (3.8%). 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 VMU.

Management goals for the Victory Management Unit include strategies to:

- Provide a range of public use and recreational experiences for visitors.
- Provide habitat for many species of plants and animals.
- Sustainably provide forest products for the local economy.
- Provide examples of sustainable forest and habitat management for the public.

I. TABLE OF CONTENTS

II. PARCEL DESCRIPTION

A. Purpose of Ownership

The Victory Management Unit (VMU) is composed of three different ownership types—Victory State Forest (VSF) and Darling State Park (DSP) are managed by the Department of Forests, Parks, and Recreation (FPR). Victory Basin Wildlife Management Area (VBWMA) is managed by the Department of Fish and Wildlife (FW).

While both FPR and FW are part of the Agency of Natural Resources (ANR) and each parcel shares many management goals, the relative priority of these goals may vary between parcels. Each department has its own distinct mission (as shown on page 3), each acquisition came with its own mandate, and funding sources used by each department come with various requirements—for example, portions of the VBWMA was acquired by FW with federal funds tied to the conservation of birds and mammals, while other portions were acquired for purposes including "the broadest outdoor recreational use."

With that said, these parcels share much more in common than separate them, and will largely be managed as a single unit. More specific details on how the purposes of the VMU will be accomplished are provided in the Management Actions section.

B. Location Information

The nearly 24,000 acre Victory Management Unit is located in the Northeast Kingdom of Vermont in the towns of Victory, Burke, Lunenburg, Kirby, Granby, and Concord. The unit lies in the heart of what is known as the Northeastern Highlands biophysical region, and connects to a large area of conserved land to the north, including both publicly-owned land and land under conservation easements.

The management unit centers on the town of Victory and is almost entirely contiguous, with only one small section of Darling State Park unconnected to the rest of the parcels. DSP is on the eastern borders of Burke and Kirby. VSF extends across the entire town of Victory, and crosses over onto small sections of adjacent towns, while surrounding the VBWMA in the center of the management unit.

The Victory Road and Granby Road cross to the north of the management unit, Mountain Road in Burke leads to DSP, Victory Hill road extends into privately-owned lands surrounded by the western portion of VSF, the River Road in Victory bisects VBWMA and VSF, and the Tug Mountain Road in Lunenburg leads to the eastern part of the ownership.

C. History of Acquisition

The management unit was acquired in many transactions over the years beginning with 1747 acres of Darling State Park in 1933 and continuing through 2011 with the donation of 11 acres. Following the initial donation of a large portion of Darling State Park by the Darling Family in the 1930's, Victory State Forest was established in 1952 with the acquisition of 3,100 acres from the Victory Lumber

Company. Several other purchases in the 1950s and 1960s from the Victory Lumber Company and Weyerhauser helped to consolidate both Darling State Park and Victory State Forest.

The main portion of the WMA was acquired from the New England Power Company in 1969 ending a long debate over the US Army Corps of Engineer's plan to build a dam on the Moose River, which would have flooded Victory Basin. Concern over the potential loss of one of the state's largest deer yards and rare wetland areas drove conservation groups to oppose the construction of the dam and eventually led to state ownership of the property. Frederick Mold, former Director of the Fairbanks Museum and Planetarium, was central in these efforts and his contributions to the conservation of Victory Basin are recognized with a plaque on the WMA near River Road.

In 1988, approximately 7500 acres that would eventually become part of Victory State Forest traded hands from Diamond International Paper Company, to the Rancourt Real Estate Development Corporation, to the Nature Conservancy, and finally to the State of Vermont. This land was comprised of six separate parcels on both the east and west sides of the Moose River, predominantly in the town of Victory, with a 220 acre parcel lying in Granby. A 55-acre land swap with the Coburn Realty Corporation in 1989 helped consolidate the State Forest and granted the state a permanent ROW to much of the newly acquired Diamond Lands.

In 1995, the Unit was expanded by 2603 acres with the purchase of former Hancock lands in the towns of Victory and Concord and, in 2005, the Unit was further consolidated with the addition of approximately 515 acres purchased with Forest Legacy funds.

In 2016, Drury Vinton donated 176.6 acres to the State. The parcel was an in-holding bounded on three sides by Victory State Forest and it sits along the Forest's northeast boundary. The acquisition also includes a right-of-way that provides access to Victory State Forest.

D. Land Use History

The primary historical use of the management unit was for forest products. Historically, farming was attempted only on the most fertile sites of the VMU, likely adjacent to Moose River. During the late 1800's and early 1900's, however, the Victory Basin was a center of intensive logging activity. The basin was originally accessed by railroad. Several sawmills were built including one on Bog Pond in what is now VSF. At its peak, the Town of Victory had seven villages, three post offices, five schools, six lumber mills, a starch factory, a granite quarry, four railroad stations, and a hotel. Evidence of this bustling period is still visible today in the form of bridges, the railroad bed, and cellar holes. The forest also shows evidence of this time, when softwoods were cut heavily and preferentially, likely driving many sites to increase in hardwood composition.

A fire tower erected on the summit of Burke Mountain in 1912 is reported to be the first fire tower in the state of Vermont, though the current tower is a replacement constructed in 1938. From this vantage point, forest fires could be located and the proper authorities notified.

Sometime in the 1930s Burke Mountain was identified by local residents as a potential recreation site. The early plan for this "forest park" included an auto road, ski trails, hiking trails, picnic facilities and

running water. A Civilian Conservation Corps crew was employed to build the auto road to the summit and completed it in 1935. Interest in downhill skiing grew over the years with the first ski lift installed in 1953. Since this time there has been steady growth of Burke Mountain as a ski destination.

The Victory Basin was authorized as a potential site for a flood control and power generation dam multiple times beginning in the 1930s and culminating in 1960, when the US House of Representatives authorized the construction of a dam that would inundate 3,000 acres of the basin. In 1969, after significant study and public discourse, DFW (then, Vermont Department of Fish and Game) purchased 4,500 acres of the basin from the New England Power Company for $205,000, to protect the unique habitats of the area and end plans for dam construction.

At present, the management unit serves a wide spectrum users including hunters, fishermen, hikers, bicyclists, birders, snowmobilers, and skiers. The ANR continues to manage these uses in coordination with timber harvesting and habitat management programs.

E. Resource Highlights

The sheer size and diversity of the Victory Management Unit are amongst its most unique qualities. It is host to 31 different natural community types, including several classified as *rare* or *very rare*, and nearly every community has an example of such quality to be officially ranked as significant for the state.

The wetland complex and lowland forests along the Moose River represents one of the best examples of boreal habitat in the entire state. The Victory Basin has been the site of a reintroduction effort for Endangered spruce grouse. American marten, Canada lynx, gray jay, black-backed woodpecker, boreal chickadee, are amongst the other northern species that are known to use the VMU. In addition, this extensive softwood basin provides one of the largest deer wintering areas in the state.

The management unit provides diverse and abundant recreational opportunities which are continually expanding. Thousands of people visit the VMU each year. The unit is host to numerous snowmobile, hiking, skiing, equestrian, and biking trails, as well as large undeveloped areas for backcountry travel, hunting, fishing, wildlife observation, and other uses. The basin is also an important and popular birding destination, as one of the only locations in Vermont to find rare boreal species.

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

This plan is in conformance with the Northeastern Vermont Development Association's *Regional Plan for the Northeast Kingdom* of 2013. This regional plan states goals including the maintenance and promotion of sustainable forestry, multi-use forests, public access and recreation, and traditional development and land use patterns.

This plan is in conformance with all existing local municipal plans. Plans for the towns of Granby (2009), Concord (2009), Kirby (2012), and Burke (2011) state desires for goals compatible with this plan, including maintaining working forest lands, public recreation opportunities, and traditional development patterns. The towns of Burke and Kirby particularly note the importance and sensitivity of high elevation areas, which include Darling State Park. The towns of Lunenburg and Victory do not have municipal plans in effect.

Figure 1: Locator and Biophysical Region Map

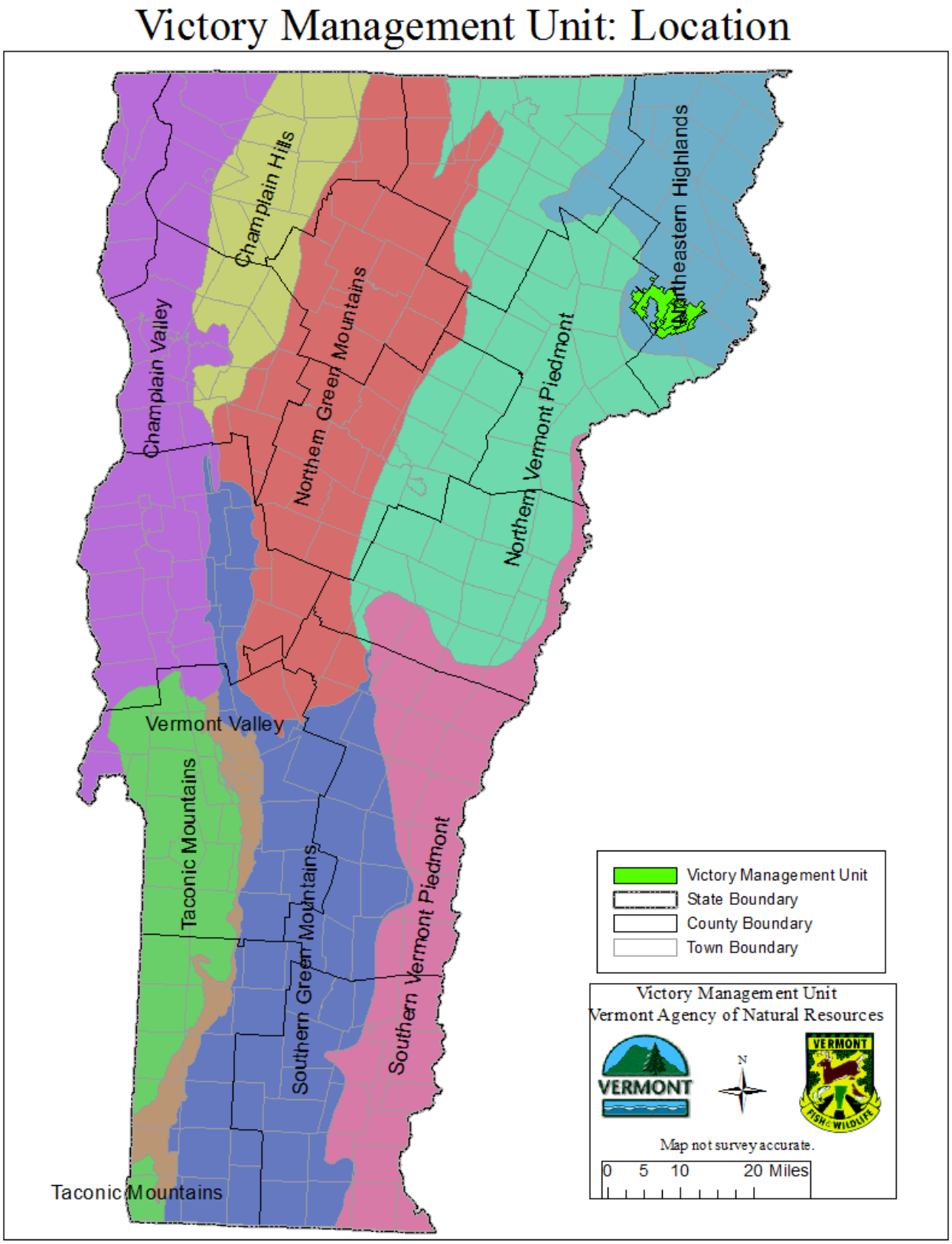
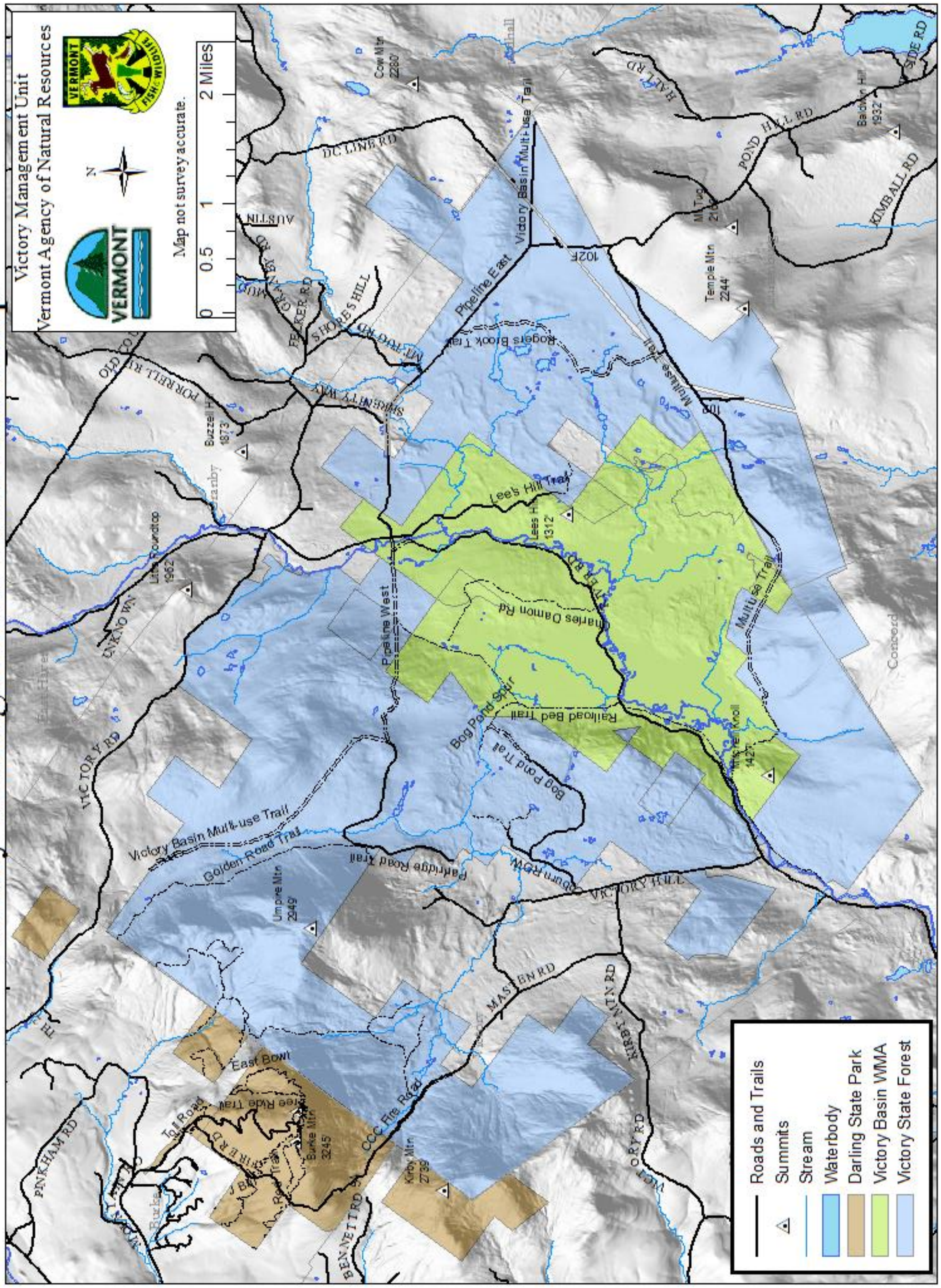


Figure 2: Parcel Base Map



III. PUBLIC INPUT

The public participation process for The Victory Management Unit Long Range Management Plan was conducted with a variety of methods to allow the opportunity for all interested parties to participate. All public input received has been considered in the preparation of this plan.

Scoping

An open-house style informational public meeting was held on August 7, 2013 at the Town Clerk's Office in West Burke, Vermont. The purpose of the meeting was to introduce stakeholders to the management planning process and to receive preliminary input on management goals and strategies. The meeting was held prior to the completion of most inventory assessments so most comments were related to the *public's* vision and priorities. The meeting consisted of a short presentation introducing the management planning process and briefly outlining resource highlights of the VMU. Participants were then given the opportunity to visit four separate stations and talk with ANR staff and other stakeholders about their concerns and ideas. Participants were encouraged to leave comments on easels. These written comments can be found in Appendix A

To reach out to additional stakeholders that may not have been present at the August 7 meeting, a questionnaire was created and emailed to stakeholder groups in the area and a press release was issued soliciting comments. Few comments, however, were received.

Finally, ANR staff maintain relationships with both individuals and organizations, and have added suggestions from these conversations to the list of public comments.

Draft Review

Once a complete draft LRMP was complete, ANR sought additional public input.

ANR hosted public meetings on November 11, 2016 and January 10, 2017, and had an open comment period from early November 2017 to February 1, 2017.

All public comments were reviewed and analyzed by the District Stewardship Team and evaluated on their merits and potential outcomes. Paring this information with ANR's detailed resource assessments, the Stewardship Team produced this final Long Range Management Plan.

A summary of public comments and Agency responses, as well as changes between the draft and final plan may be found in Appendix D.

IV. RESOURCE ANALYSIS

A. Legal Constraints Assessment

The VMU was acquired in multiple pieces over the course of many years and numerous land transactions. Because of this acquisition history, there are a number of constraints that affect the management of the unit, ANR's relationship with adjacent landowners and its obligations to partnering conservation organizations. Below is a summary of major legal constraints. For more details concerning any particular easement, restriction, right-of-way, or lease, more details can be had by visiting the ANR district office in St. Johnsbury.

Summary of Major Legal Constraints:

1. **Conservation Easements**

   A. In 1995, FPR acquired 2,603 acres of land in the town of Victory referred to as the *Hancock Parcel*. The Vermont Housing and Conservation Board (VHCB) awarded The Nature Conservancy (TNC) and FPR a grant of $732,650 for the purchase of the parcel. During the deal, TNC granted VHCB a conservation easement on the property. The easement prohibits:
      - commercial development of the land and building of structures except as allowed by the management plan
      - billboards and outdoor advertising
      - placement, collection or storage of trash, human waste, or any other unsightly or offensive material
      - disturbance of the surface, except as required and necessary to carry out the uses permitted in the grant
      - the granting of any future rights-of-way, easements, driveways, roads, etc. without the written consent of VHCB

2. **Deed Restrictions or Obligations**

   A. Portland Pipeline Company holds an easement/ROW allowing them to construct, maintain, operate, alter, repair, remove, change the size of and replace a "line of pipe for the transportation of a common carrier for hire, of oil, crude petroleum and refined petroleum products or combinations thereof or similar thereto, natural and artificial gas, casing head and natural gasoline". This ROW was established and agreed upon by Portland Pipeline Company and four separate landowners, prior to state ownership:
      - *i. Victory Lumber Company conveyed a ROW to Portland Pipeline Company, 1941; (location described by lot and range in deed).*
      - *ii. Essex Storage Electic Company Incorporated to Portland Pipeline Company, 1943; (location described by lot and range in deed).*
      - *iii. Connecticut River Power Company to Portland Pipeline Company, 1950; (location described by lot and range in deed).*
      - *iv. New England Power Company, 1965; (location described by lot and range in deed)."*

The original deeds do not specify the actual width of the right of way. In the absence of this specification ANR considers the historically cleared width (60') as the legal width.

B. In 1969, FPR acquired a 66' ROW across private land, owned at one time by Solon Patridge in the town of Victory. There was a verbal agreement that FPR would install a gate and provide Patridge with a key. This land has since changed ownership, but the *Partridge right-of-way* remains heavily used as access to the interior of VSF.

C. FPR accesses a portion of VSF and DSP through what is commonly known as the *Masten-Drown right-of-way*. This section of road lies at the end of the town section of the Masten Road and connects to the Fire Road originating on Burke Mountain in DSP. This ROW has been a source of contention for 40+ years. The actual legal status of this ROW is still being determined. No deeded ROW exists for the road, however a 1913 document from the town of Victory serves as evidence that the road was once a town road and was discontinued. The state maintains that the discontinuance allows for public access. Meanwhile FPR continues to use it and the road is opened on special occasions for bike races.

D. In 1972 the state acquired a 30' ROW from the Burke-Gallup Mills Road in the town of Victory, across land then owned by J.C.Weymss. The agreement stipulated that the state would erect a gate and furnish Mr. Weymss with a key. To this day, no gate has been constructed on the *Weymss right-of-way*. The state also agreed to get approval from the landowner before upgrading the road.

E. In 1975, Burke Mt. Recreation Inc. granted to the state a ROW allowing the use of a road from the Ben Jenkins Farm across a field and 1 mile to the boundary of Darling SF. Maps and documentation of this ROW are lacking and the exact location of the ROW is unclear.

F. In 1975 a 50' right-of-way across land then owned by Kenneth and Ingrid Parr was acquired in the town of Burke. Known as *The Parr right-of-way,* it gave FPR access to a 160 acre piece of DSP acquired in 1966 from The Weyerhaeuser Company. In return, the state granted a ROW across a portion of DSP for the Parr's to more easily access a portion of their property. The State and the landowner retain the right to erect a gate. Maintenance of the ROW may be conducted by either party on the granted ROWs if permission is granted first by the landowner.

G. In 1982, FPR acquired two 50' rights-of-way from the Demazo family. These cross the Demazo property along what is sometimes shown on maps as *The Bennett Road* in the town of Kirby. These ROWs provide access to the southwest parts of DSP.

H. In 1989, FPR engaged in a land trade with Coburn Realty Corporation. The 55 acre trade near the Partridge Road allowed both the state and Coburn to consolidate property and granted a 50 foot wide ROW (lot 11, range 8) across Coburn's land to allow access to recently purchased Diamond Lands. In the spring of 2013, this ROW was altered and moved to allow additional privacy to landowners whose property was traversed by the *Coburn right-of-way*. In 2013 the Vermont State Legislature authorized the FPR to exchange the ROW acquired from Coburn for a

more northerly access across the same property. The new access road was constructed by the new landowner and the ROW exchange is being documented.

I. In 1992, the DFW and FPR exchanged 33' ROWs with TJCC Properties. This is often referred to as the *Vinton right-of-way* and allows TJCC Properties access to its property across VSF and VBWMA along the Portland Pipeline. In return, FPR was granted access across TJCC Properties along the Portland Pipeline. ANR may use the ROW for the sole purpose of forest management. Neither party is required to maintain the road to a higher standard than the party requires for its own uses.

3. **Regulatory**

A. The leased area of Darling State Park falls under Act 250 jurisdiction. Most projects undertaken within this area require review under Act 250.

4. **Funding Conditions or Restrictions**

A. In 1989, the State of Vermont purchased 7700 acres from the Nature Conservancy. This land was purchased by TNC from Diamond International Corporation. The state used funds granted by VHCB and appropriated by the legislature for the purchase. The deed required that FPR maintain a "permanent plaque or other appropriate record at a prominent location on the within-described premises bearing the following statement: 'This area was acquired with the assistance of The Nature Conservancy."

B. A 0.5 mile snowmobile trail along the old CCC Road was funded through the federal Land and Water Conservation Fund and is subject to LWCF use restrictions (LWCF 50-00077)

5. **Long-term Leases and Licenses**

A. The State of Vermont has licensed Vermont ETV, Inc. to use a 0.5 acre parcel at the top of Burke Mountain for the installation and operation of electronic communications equipment. The license grants Vermont ETV rights to access the facilities, use power, use space in the transmitter building, and sublicense to others. Any new construction or vegetation management must be approved by the state, and the state retains access and priority in use of all facilities.

B. The majority of Darling State Park is leased for use as a ski area (approximately 1000 acres). Beginning in 1966, this area has been leased to a series of companies operating the ski area, and is currently leased by a company until 2054. The lease allows the management of vegetation and construction of ski lifts, trails, warming huts, restaurants, and maintenance facilities, amongst other things.

B. Wildlife and Natural Community Assessment

The Agency of Natural Resources uses a "coarse filter/ fine filter" approach to the ecological inventory and assessment of state lands. Widely employed as a management tool on state, federal, and private lands, 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. 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. 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 "meso filter" to cover special habitats and 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 meso and fine filter inventories described below include breeding birds, deer on their wintering areas, and rare plants.

Natural Community Summary

The Victory Management Unit (VMU) occupies a wide valley and several mountain peaks. The bedrock geology of the VMU is mainly granite and other nutrient-poor rock, and the area is characterized by low-nutrient, acidic soils. Glacial till carpets the bedrock on midslopes, and esker deposits are present in the basin. The climate is among the coldest in Vermont. Most of the VMU drains into the Moose River, and all is in the Connecticut River watershed. Overall, the landscape is boreal – to an extent surpassed in Vermont only by the larger Nulhegan Basin to the north.

Past land use has shaped the current ecological condition of the VMU. Some agriculture occurred in the basin proper, and extensive logging has occurred throughout most of the area. However, some older late-successional forests exist between Burke and Kirby mountains and in some of the conifer swamps.

The uplands of the VMU are characterized by extensive matrix forest community types. Conifer-dominated natural communities are predominant at the highest and lowest elevations, with hardwood-dominated forests abundant at the middle elevations. Within these upland matrix forests, smaller patches of natural communities are present on small-scale topographic features, including seeps, vernal pools, and rock outcroppings. The floodplain of the Moose River supports floodplain forests and alluvial shrub swamps, with beaver wetlands abundant along many of the smaller tributaries. Wetlands in the main wetland complex intergrade from shrub swamps on floodplain edges to softwood swamps in areas further from the river. A large open peatland occurs in the heart of the wetland complex. A similar pattern is repeated in the VMU's smaller wetlands outside the main basin. Taken together the VMU has nearly the full range of Vermont's cold-affinity natural communities.

Most of the natural communities in this large area of intact habitat are state-significant. The centerpiece is the well-studied Dwarf Shrub Bog in the heart of the basin and its surrounding conifer swamps such as Spruce-Fir-Tamarack Swamp, Black Spruce Swamp, and Northern White Cedar Swamp. Patches of the cedar swamp are late successional. There is a large area of rare Northern Conifer Floodplain Forest along the Moose River. Beyond the basin proper are small pockets which hold Poor Fens and Hemlock-

Balsam Fir-Black Ash Seepage Swamps. In the high-elevation areas around Umpire, Burke, and Kirby mountains there are several state-significant natural communities including expanses of Boreal Talus Woodland and on the east slope of Umpire Mountain a very rare Cold-Air Talus Woodland. On the north slopes of Kirby Mountain there are areas of late-successional Northern Hardwood Forest and Montane Yellow Birch-Red Spruce Forest. The Boreal Outcrop and Montane Spruce-Fir Forest on the peaks are also state-significant.

Wildlife summary

Wildlife species known from the VMU reflect the habitats summarized above and discussed in-detail below. The most common species on the VMU are those that rely on forests for some or all of their needs (e.g., fisher, bear, ruffed grouse, and scarlet tanager). Also common are many species that rely on wetlands (e.g., otters, beaver, dragonflies, and numerous birds). In addition, the VMU supports a variety of species that use young forest habitats for at least part of their annual needs (e.g., moose, bobcat, snowshoe hare, American woodcock, and ruffed grouse), while species associated with human development (e.g., starlings and house sparrows) are rare. Importantly, many species found on the VMU are common to boreal communities, north of the United States, but uncommon in Vermont (e.g., gray jay, American marten, and mink frog).

The following are summaries of wildlife known from the VMU organized by major species groups. See the following sections for more details on listed species (Special Concern, Threatened, and Endangered) and focal species (those featured in management of the VMU). See Appendix B for a list of species known to occur in and around the VMU.

Birds

The VMU provides habitat for at least 139 species of birds. Most of these species breed on the VMU, while others use the area during migration or wintering.

Numerous species of birds that are known to or may occur on the VMU are of conservation concern including the Special Concern black-backed woodpecker, gray jay, Bicknell's thrush, and boreal chickadee; the Endangered spruce grouse; and the Rusty Blackbird, which was recently listed as Threatened. Most of these rare species are "boreal birds" that occur mostly in the spruce-fir forests of Canada. As one of only two extensive lowland spruce-fir forests in Vermont (the other is the Nulhegan Basin), the VMU provides a rare habitat for these birds—and a popular destination for Vermont's bird watchers.

Game birds likely find good habitats in the VMU. Turkey likely inhabit the extensive forests of the VMU at low densities, waterfowl breed in the numerous wetlands, and ruffed grouse and American woodcock make use of the shrubby floodplain habitats in Victory Basin. More information on these species may be found in Section III.H., Recreation and Public Use.

Mammals

The VMU supports at least 33 species of mammals.

The fifteen species of small mammals known to occur in or around the VMU, including the Special Concern rock vole, generally rely on forested and riparian environments and make use of habitat

elements including uncompacted soils, ground cover, rocky areas, herbaceous understory vegetation, downed logs, and tree cavities.

Most of Vermont's nine bat species have been found in the region and may occur on the VMU, though specific survey have not been conducted in the area. Bats are a high conservation concern given recent dramatic population declines, but likely find good habitats across the VMU's forests, wetlands, and other features (such as talus slopes, used by small-footed bat).

Numerous mid-sized mammals are known from the VMU, including coyote, fisher, beaver, otter, raccoon, snowshoe hare, American marten, and Canada lynx. These species tend to use a variety of habitats. Many find their greatest success in areas of forest interspersed with regular openings (coyote, red fox), while other prefer continuous forest cover (fisher), and others still rely on streams and wetlands (otter, mink). Beaver are common on the VMU in the extensive wetland communities, and are particularly important for their role in creating open water, wetland, and successional habitats. In addition, American Marten (state Endangered) and Canada lynx (federally Threatened, state Endangered) have both begun to naturally recolonize northeastern Vermont and have been confirmed on the VMU. These two species specialize more in their habitat choices, with marten preferring structurally diverse mature forests and lynx preferring dense, young softwood forests.

The three big game mammals likely find good habitats across the VMU. Bear and moose thrive in the extensive, contiguous forests of northeastern Vermont. The VMU's large softwood areas provide critical, and regionally-significant, wintering areas for deer, and wetlands provide feeding areas for bear and moose. Soft and hard mast plants throughout the forest and openings provide important food sources for bears, and the remoteness of the region allows generally shy moose and bear to largely avoid human contact.

Reptiles and Amphibians
Twenty-two species of reptiles and amphibians are known to occur on the VMU or in its surrounding towns. The VMU itself contains at least three species of turtles (including the Special Concern wood turtle), two species of snakes, five species of salamanders (including the only known population of Special Concern blue-spotted salamanders in northeast Vermont), and nine species of frogs and toads (including the uncommon mink frog). Generally, these species rely on wetlands including vernal pools, streams, and ponds, and adjacent uplands. Many also require or prefer the cool, moist conditions offered by a full forest canopy and downed woody material to provide cover, moisture, and thermal moderation.

Invertebrates
Invertebrates are very poorly surveyed across the VMU, as with much of the state. Limited sampling of odonates (dragonflies and damselflies) discovered five rare species and six uncommon species across the VMU. In addition, the biophysical region supports at least fourteen other species of rare and uncommon odonates, a rare noctuid moth, and three rare or uncommon mussels (one of which is state Threatened). The odonates and moth known from the VMU rely on wetland and adjacent upland habitats, while the mussels rely on high-quality stream and river ecosystems. Our knowledge, however, of invertebrate biology is generally poor.

Coarse-filter / Broad-scale Habitat

The coarse filter assessment begins by describing landscape and climatic factors that characterize the Victory Management Unit (VMU), such as bedrock geology and water resources. It then details the 32 distinct natural community types documented and mapped during inventories of the VMU. This is followed by a fine filter assessment describing rare species and wildlife habitats found here.

Biophysical Region and Climate

Vermont is divided into eight biophysical regions where climate, topography, geology, human history, and natural communities tend to be similar (Thompson and Sorenson 2005). The VMU is located in the Northern Highlands biophysical region, which encompasses the mountains and basins of the northeastern corner of the state, and includes much of the region known locally as the "Northeast Kingdom". It is bounded by the relative lowlands of the Northern Piedmont to the west, the upper Connecticut River Valley and northern White Mountains of New Hampshire to the east, and the Saint Lawrence Valley of Quebec to the north. This region is part of the Appalachian Mountain system that stretches across much of the eastern side of North America, but is characterized by scattered mountains, valleys, and highlands rather than a well-defined mountain range. The Green Mountains to the west and the White Mountains to the east decrease the moderating effects of Lake Champlain and the Atlantic Ocean on the area's climate. Several largely-enclosed basins, including Victory Basin, occur amidst mountains reaching above 3000 feet; the basin floors themselves are generally above 1000 feet. This creates ideal conditions for cold air drainage. These factors combine to make the Northern Highlands the coldest part of Vermont and amongst the coldest areas in New England – especially within basins such as Victory Basin. The region has moderate levels of precipitation, very low temperatures, and a short growing season. The terrain varies from flat in the basin floors to very steep on the slopes of the larger mountains such as Burke Mountain. The igneous and metamorphic bedrock is generally acidic, and the region usually lacks the limey, nutrient-rich soils found in the neighboring lowlands. Glacial surficial deposits are abundant, especially in the lowlands, with eskers and kettle ponds among the features adding to the diversity of terrain. Glacial till is present above the bedrock in many areas.

Bedrock Geology, Surficial Geology, and Soils

The geologic history of an area can have a strong influence on the distribution of natural communities. Bedrock underlying the VMU consists of igneous rock in the basin surrounded by metamorphic rock on the surrounding peaks. The most widespread rocks are granite within the basin with quartzite, schist, and slate also present in surrounding areas; these rocks formed during the Devonian time period (360 to 415 MYA) (Ratcliffe, et. Al 2012). The granite in the basin is softer and more erodible than the metamorphic rock in adjacent areas, which led to the formation of the basin over time through erosion. Both the metamorphic and igneous rock types are acidic and provide very few nutrients, which strongly influences the distribution of plants and natural communities in the mapping area.

Within the basin, bedrock outcroppings were not observed, but large granitic boulders are present in many areas. On the adjacent hills and mountains there are exposures of granitic and metamorphic rock in the form of ledges, outcroppings, boulders, cliffs, and talus slopes.

The degree to which this bedrock affects growing conditions in the VMU is mediated by the depth of the surficial materials deposited at the end of the last 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. This till covers the majority of the VMU, and varies in depth from very shallow to extremely deep. Some of the slopes surrounding Victory Basin include exposed bedrock; till was either never deposited in these areas or was removed by erosion after being deposited. Within the basin, depositions of sediments and organic matter have buried much of the till, especially along the Moose River and the large adjacent wetland complex. Eskers, glaciolacustrine deposits of gravel, sand, silt and clay, and modern-day accumulations of alluvium and peat can also be found at low elevations in the basin.

The soils of the VMU are the products of these surficial deposits, or in the case of the wetlands and floodplain were produced by later processes. Upland soils are mostly till-derived, rocky and stony soils. Muck and peat abound in the wetlands, and alluvial soils occur along the Moose River. There is a high diversity of soils in the mapping area, with some of the more widespread including the Cabot-Colonial complex (often associated with seeps and seepage forests); very stony Tunbridge soils; the Wonsqueak, Pondicherry, and Bucksport mucks in the wetlands; and the Charles silt loam in floodplains.

Hydrology

The Victory Mapping Unit experiences varied yearly precipitation totals, reported by the National Weather Service to range on average from over 50 inches on the slopes of Burke and Umpire mountains to under 40 inches in central portions of the basin. The Moose River drains almost all of the VMU, with several tributaries converging in the basin including Bog Brook, Rogers Brook, Granby Brook, and Hay Hill Brook. A substantial portion of Darling State Park, however, drains into the Passumpsic River, and a small southern area of Victory State Forest drains directly into the Connecticut River via Miles Stream. The Moose River drains into the Passumpsic River in Saint Johnsbury, which in turn drains into the Connecticut River; thus the entire VMU is within the Connecticut River watershed.

The floor of Victory Basin includes a large complex of wetlands within the watershed and sometimes the floodplain of the Moose River. Smaller pockets of wetland occur outside of this area in smaller basins defined by bedrock or surficial features. Seepage is abundant at the mid and upper elevations, both in individual seeps and in Hardwood Seepage Forest. Many of the seepage areas are associated with the Colonel-Cabot soil complex. Surface water also collects in depressions to form vernal pools, especially on mid-elevation knolls, terraces, and saddles. Unlike in many areas of the Northern Highlands bioregion, there are no significant ponds or lakes within the VMU with the exception of beaver ponds and small oxbow ponds. The wetlands, seeps, and vernal pools provide important landscape diversity that supports many species of plants and animals.

Natural and Human Disturbance

Natural and human disturbances have both played a role in shaping the natural communities of the VMU. Natural disturbance regimes vary based on the natural community affected. In upland hardwood forests, natural disturbance is primarily the result of wind, ice, or insect damage to individual trees or small patches, resulting in small canopy gaps. Large-scale blowdown or ice storm events are normal processes, but very infrequent – occurring on the order of every 1,000 years for a large blowdown (Lorimer and White, 2003). In the spruce-fir forests, blowdowns and areas of fir mortality occur on larger scales, with extensive areas of blowdown currently present in the Lowland Spruce Forest within the basin. The large extent of current blowdowns may, however, be in part a result of past land use history which has led to large areas of single-aged fir forest senescing and dying at the same time. The

natural pre-Colonization fire regime of the spruce-fir forests in the VMU was probably one of small, infrequent fires (Lapin and Engstrom, 2001). Within the wetland areas and along tributaries to the Moose River, beaver disturbance plays a significant role. Beavers enter an area, cut hardwood trees, and kill other trees via flooding behind their dams. When their food supply is exhausted, they abandon an area, and forests regrow until the next wave of beaver activity occurs. Along the Moose River, flooding and ice scouring are frequent disturbances as well.

Human disturbance has played a major role in shaping the landscape of the VMU. Much of the land was very heavily harvested for timber over an extended period from 1810 to 1942, with another period of logging in the early 1960s. A railroad used to remove timber operated in the area from 1885 until 1917, and a sawmill operated at Bog Pond from 1882 to 1900. A small community of 20 dwellings was also present in this area. After the sawmill burned in 1900, a new sawmill was constructed at Damon's Crossing near the conjunction of Bog Brook and the Moose River (Hopper, 1989). Red Spruce (*Picea rubens*) and Eastern White Pine (*Pinus strobus*)were the timber species of highest value for most of the logging history of the area; due to selective logging these species may be much less abundant in some natural communities now than they were 200 years ago.

The extensive logging, and the associated accumulation of slash, were factors in several fires in the VMU – historic records indicate a very large fire occurred on Burke Mountain in 1907 (Burbank, 1985), and several fires also occurred in Victory Basin including one in 1910 (Bubier, 1989A). Much of the floodplain area and some adjacent slopes were also utilized as pasture or hayfield, and cleared land along the Moose River is visible in a 1944 aerial photo. By the 1960s, aerial photos indicate that most of these fields in the mapping area were regrowing into shrubland or forest. The agricultural history of the Victory Basin area was brief and limited largely due to the harsh climate and poor soils.

Timber management continues to the current day, with the goals of sustainable timber production and enhancement of wildlife habitat. Other human uses of the land that may lead to human-caused disturbance in the mapping area include use of River Road within Victory Basin and the operation of the Burke ski area in Darling State Park.

Landscape-scale land use and connectivity

The VMU is a large area of forests and wetlands within the least developed region of the state, the Northeast Kingdom. Undeveloped land stretches north from the VMU across more than 200,000 acres of conserved lands forming a nearly contiguous corridor to the Canadian Border.

Core Forest and Habitat Blocks

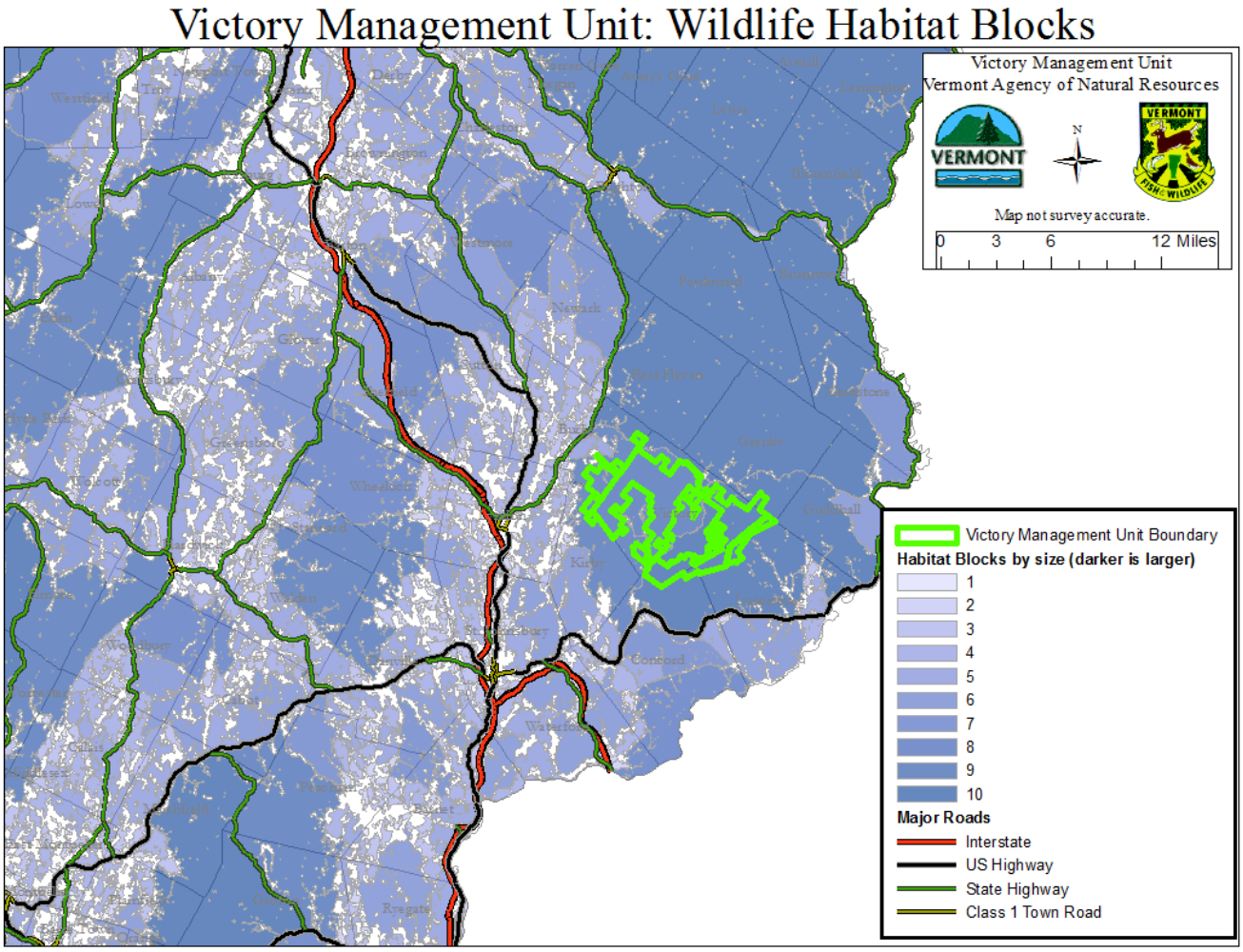
Habitat blocks are defined as single intact blocks of undisturbed habitat, and core forest is a biological term that refers to any forested areas that are greater than 100 meters from a permanent human-created disturbance zone, such as a road, farm field, or residential area. Although these cultural landscapes create habitat for some native plant and animal species, they also negatively impact forest resources. In particular, fragmented forests are likely to have an increased number of invasive species, an increase of predation on many native songbirds, and a decrease in wildlife species that prefer to use large blocks of intact forest. Core forest, in contrast, is largely protected from these disturbances. Additionally, unbroken forest allows for easy dispersal of plants and animals, without barriers to movement.

The VMU itself forms large portions to two major habitat blocks. A habitat block to the southeast of River Road is the 21st highest ranked block in Vermont for biological and physical diversity value out of 4,055 total core forest blocks, according to the Vermont Department of Fish and Wildlife's Habitat Block project. It stretches over almost 44,000 acres and stretches from Guildhall in the east to North Concord in the west and Granby in the north. Within this habitat block is a core forest block of 28,407 acres that includes a large area of Victory Basin. The habitat block to the northwest of River Road extends from the Victory town center in the south to the Burke area in the northwest and Gallup Mills in the northeast. This habitat block covers over 28,000 acres, includes a core forest block of approximately 16,820 acres, and is the 22nd highest ranked habitat block in Vermont. These blocks are also adjacent to several other very high-quality habitat blocks to their north.

Mixed development and agriculture, however, surrounds these habitat blocks. The area following the Passumpsic River north from St Johnsbury through Lyndon and Burke is the most developed in the region, including residential communities, commercial strip development, Interstate 91, and intermixed pasture and crop fields. In addition, the corridors west on Route 2 from St Johnsbury and north on Route 102 along the Connecticut River contain light development and agriculture.

As a result of this development, habitat blocks to the west, south, and east of the VMU are generally smaller. These smaller blocks are still reasonably large in comparison to more developed areas of Vermont, and form a critical connection across the Connecticut River and its associated development to large undeveloped areas in northern New Hampshire. The nearest large, anchoring habitat blocks are in the areas of Walden-Wheelock and Groton-Peacham. Because of the development to the south and west of the VMU, connectivity for wildlife to move between these large habitat blocks is best well to the north of the VMU—heading north to the Seneca Mountain area and there turning south-west through Newark, Sutton, and Wheelock.

Figure 3: Wildlife Habitat Blocks



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 material across the region. Even the occasional travel of a few individual animals between otherwise isolated populations can substantially increase the long-term viability of each, because the genetic diversity within each group is effectively increased.

As noted above, the Victory Management Unit is almost entirely without internal fragmentation, and is bisected by only one significant road (River Road/Victory Road). This expanse of unbroken habitat provides ample movement opportunities for wildlife that will travel through hardwood forests and spruce-fir forests. The Moose River and its tributaries provide riparian connectivity as well, though riparian habitats begin to be encroached downstream in north Concord and drop off entirely in St Johnsbury. At the landscape level, a model for wildlife corridors developed by the The Nature

Conservancy (Anderson and Clark, 2012) indicates that the VMU is an area of concentrated current flow in habitat connectivity, and offers a strong connection to northern New Hampshire to the east.

Local connectivity within the mapping area and to the expansive core forest blocks to the north is also strong. Mostly unfragmented conserved lands extend north from the VMU all the way to the Canadian border through ANR fee lands, easements, and the Silvio O. Conte National Fish and Wildlife Refuge. Protecting and enhancing connections between the VMU and surrounding wildlands will help preserve the long-term viability of many species. Of particular importance to connectivity in and around the VMU is the River Road, which bisects the VMU itself. In addition, the Victory-Granby Road in the northwest of Victory passes through a large undeveloped, privately-owned area, making an important connection to East Haven. Finally, another important connection is across the Victory-Granby Road, from eastern Victory to southern Granby, east of the main settlements.

Regional Forest Patterns

The habitat blocks in and around the VMU are composed overwhelmingly of deciduous and coniferous forests, mostly of early and middle age forests, with interspersed wetlands, open water, and non-forest areas. US Forest Service Forest Inventory and Analysis data estimates Essex County as 12% aspen-birch, 16% spruce-fir, and 71% maple-beech-birch cover types by area. Further, 65% of the County's forests are 40-79 years old, while 12% are older than 79 and only 10% are 0-19 years.

The variety of softwood, mixed, and hardwood forests supports diverse wildlife in throughout this area of Vermont. Particularly important for the state is the occurrence of spruce-fir and mixed spruce-fir-hardwood communities that are common in Canada, but rare in Vermont and farther south. Though they cover only a portion of the region's land, these communities are critically important in supporting many wildlife species that occur nowhere else in the state. In addition, these communities have been subject to particularly hard impacts by former industrial logging practices, which targeted spruce and fir trees.

The distribution of forest age/size classes in the region, creates quality habitat for many, but not all, species of wildlife. Most of the County's forests are old enough to provide the closed canopy conditions required by forest wildlife. Most, however, are also too young to provide significant levels of vertical structure from natural disturbances or snags, downed wood, and other features common in older, uneven-aged forests. In addition, the level of young forest across the County is higher than occurs in much of Vermont, and is likely sufficient for most of the species of native wildlife, from moose and deer to ruffed grouse and chestnut-sided warbler.

Natural Communities

A natural community is an assemblage of biological organisms, their physical environment (e.g., geology, hydrology, climate, natural disturbance regime, etc.), and the interactions between them (Thompson and Sorenson 2000). More than a simple collection of species, a natural community is characterized by complex webs of mutualism, predation, and other forms of interaction. The 89 natural community types described in Vermont repeat across the landscape in patches (or "polygons") of various sizes. These patches (or groups of patches in close proximity to each other) are referred to as natural community occurrences, and are to be distinguished from broad descriptions of community types. Natural community occurrences vary greatly in their size. Matrix communities, such as Northern Hardwood Forests, occur in broad expanses across the landscape, and form the context in which other,

smaller communities are found. Large patch communities, such as Spruce-Fir-Tamarack Swamp, typically occur at scales of 50-1000 acres. Small patch communities such as Seeps or Boreal Outcrops are usually less than 50 acres in size; many are much smaller and owe their existence to highly localized site and disturbance characteristics.

Natural communities in the VMU were identified through aerial photograph interpretation and field surveys. The expansive range and detail of this spatial data allowed for detailed delineation of the complex natural communities of the VMU. However, because some natural communities occur at very small scales (e.g., less than ¼ acre), this mapping effort is probably incomplete. Natural community mapping is an iterative process, and our knowledge improves with each mapping effort. Thus, the map presented here should not be viewed as a final statement on community distribution in the VMU; instead, it should be treated as a first attempt at describing natural communities in this area. Land managers and members of the public should be aware that additional examples of small patch natural communities (e.g., vernal pools and seeps) probably occur on the management unit. As subsequent inventories and site visits are conducted, this map will be improved and updated.

Natural community occurrences are assigned a quality rank, a statement of their overall ecological value which helps guide management. An "A"-ranked occurrence is of high quality relative to others of its type in the state, while a D-ranked example is of comparatively low quality. Quality ranks are objectively assigned on the basis of three factors: occurrence size, current condition, and landscape context. The three factors vary in the degree to which they influence overall quality in different communities. For example, size and landscape quality are more important factors than current condition in the quality ranking of Northern Hardwood Forests, while current condition and landscape context receive greater attention in the ranking of Rich Northern Hardwood Forests. 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. It is recommended that state-significant natural communities be afforded a higher level of protection than other areas of the management unit.

258 occurrences of 31 natural community types were identified and mapped in the VMU (see table below). A total of 1,277 natural community polygons were mapped.

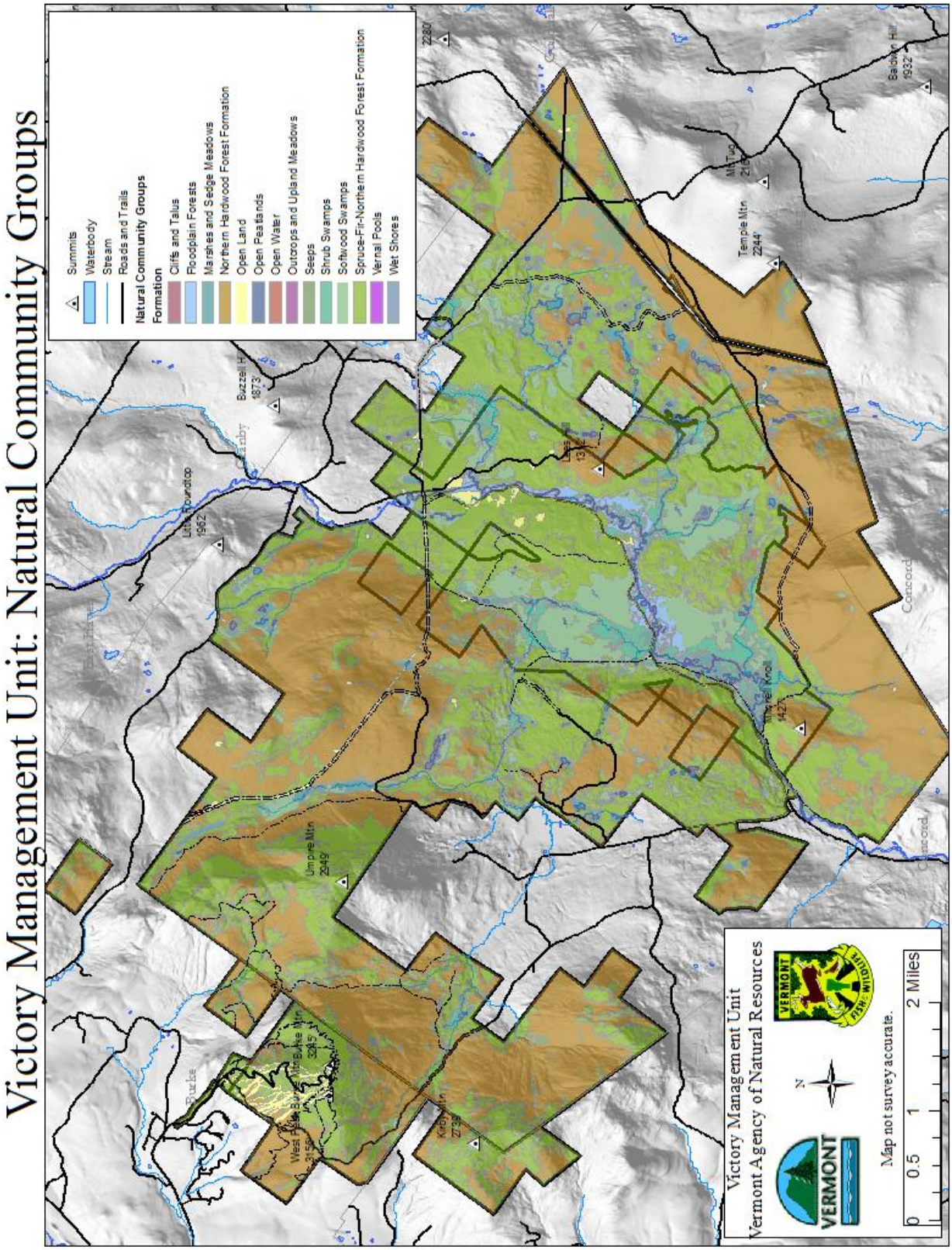
Some broad patterns emerged from this mapping effort. First, and not surprisingly, the uplands of the VMU are characterized by extensive matrix forest community types. Conifer-dominated natural communities are predominant at the highest and lowest elevations, with hardwood-dominated forests abundant at the middle elevations. Within these upland forests, smaller patches of natural communities are present on small-scale topographic features, including seeps, vernal pools, and rock outcroppings. The floodplain of the Moose River supports floodplain forests and alluvial shrub swamps, with beaver wetlands abundant along many of the smaller tributaries. Wetlands in the main wetland complex intergrade from alder swamps on floodplain edges to softwood swamps in areas further from the river. A large Dwarf Shrub Bog occurs in the heart of the wetland complex. A similar pattern is repeated in the VMU's smaller wetlands outside the main basin. These natural communities combine to form one of the best examples of boreal habitat in the state, and are all of high ecological quality and of statewide significance.

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

Natural Communities of the Victory Management Unit				
Natural Community		**Acres**	**Vermont Distribution**	**Example of Statewide Significance?**
Wetlands	Alder Swamp	430	very common	yes
	Alluvial Shrub Swamp	328	uncommon	yes
	Beaver Wetland	389	very common	
	Black Spruce Swamp	281	rare	yes
	Black Spruce Woodland Bog	30	rare	yes
	Dwarf Shrub Bog	4	uncommon	yes
	Hardwood Seepage Forest (provisional)	204		
	Hemlock-Balsam Fir-Black Ash Seepage Swamp	97	uncommon	yes
	Northern Conifer Floodplain Forest	280	rare	yes
	Northern White Cedar Swamp	262	uncommon	yes
	Poor Fen	11	rare	yes
	Red Spruce-Cinnamon Fern Swamp	3	uncommon	
	River Sand or Gravel Shore	5	uncommon	unknown
	Rivershore Grassland	1.5	uncommon	yes
	Sedge Meadow	38	common	yes
	Seep	38	common	yes
	Spruce-Fir-Tamarack Swamp	560	uncommon	yes
	Vernal Pool	2	uncommon	yes
Uplands	Boreal Acidic Cliff	1	common	yes
	Boreal Outcrop	3	common	yes
	Boreal Talus Woodland	306	uncommon	yes
	Cold Air Talus Woodland	3	very rare	yes
	Hemlock-Northern Hardwood Forest	29	common	yes
	Lowland Spruce-Fir Forest	3452	uncommon	yes
	Montane Spruce-Fir Forest	685	uncommon	yes
	Montane Yellow Birch-Red Spruce Forest	755	uncommon	yes
	Northern Hardwood Forest	10403	very common	yes
	Open Talus	3	rare	yes
	Red Spruce-Heath Rocky Ridge Forest	141	uncommon	yes
	Red Spruce-Northern Hardwood Forest	4457	common	yes
	Rich Northern Hardwood Forest	13	common	yes
	Subalpine Krummholz	0.7	very rare	unknown
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				

Descriptions of individual natural community types and related wildlife occurrences are described in Appendix A: Natural Community Descriptions.

Figure 4: Natural Communities



Meso-filter / Special Habitats

Structural Diversity

The VMU is dominated by a mix of three forest types, in generally even-aged stands with relatively little age/size class diversity. Forests cover about 87% of management unit. Northern hardwood forests are most common, covering about 43% of the management area, while red spruce-northern hardwood forests cover about 19%, and lowland spruce-fir cover about 14%.

In addition, the diversity of forest wildlife comes partially from the variety of structures provided within forest communities—from leaf litter and ground cover, through the low herbaceous layer, the smaller shrub layer, and the taller-still mid-story, each level of vegetation provides nesting, foraging, and cover for a range of forest wildlife. Generally, the variety of species and conditions observed across the VMU will provide adequate habitat for most species. These structures are naturally patchy and uneven in their distribution, so areas will favor different species based on their structures (for instance, dense shrub layers will favor wood thrush compared to open shrub layers that favor spruce grouse). Lowland spruce-fir communities have herbaceous cover including three-leaved goldthread, Canada mayflower, and numerous bryophytes and shrub layers composed of dense spruce-fir recruitment and native shrubs covering up to one-third of the area, in places. Northern hardwood communities have herb layers with ferns and clubmosses, and shrub layers dominated by hobblebush, with striped maple. Red spruce-northern hardwood communities include Canada mayflower and woodferns as herbaceous growth and red spruce, American beech, balsam fir with hobblebush and striped maple as shrub layers.

Early successional / young forest habitat

Early successional or young forest areas are important habitats for some species, including ruffed grouse, chestnut-sided warbler, American woodcock, and snowshoe hare. These habitats are created following forest disturbances by natural (wind, ice, beaver, etc) or human (forestry) forces. Dense seedlings and saplings quickly grow into sites, providing cover, browse, soft mast, and other resources uncommon in closed forests. Within 15 years, however, trees typically have grown enough to create a closed canopy, shading the understory, and reducing their value for young forest wildlife.

On the VMU, young forest patches cover about 5% of the landscape, due to past forest management as well as significant openings from the blowdown of mature balsam fir in and around Victory Basin.

Late successional habitat /old forest

The majority of the forests in the Victory Management Unit (VMU) are regrowing from past land use, and do not have characteristics of old forest. However, there are a handful of exceptions.

The northeast-facing slopes of Kirby Mountain support approximately 180 acres of forest with old-growth characteristics. While it is possible some limited cutting of timber occurred here long ago, the stand shows classic signs of old forest including trees of varied age, abundant downed large trees, large snags, natural single tree blowdown clearings, and well-developed pit-and-mound topography. This high-elevation forest primarily consists of Yellow Birch (Betula alleghaniensis) and Sugar Maple (Acer saccharum), with quite a few large trees including a yellow birch of 95 cm dbh and many others of 70-85 cm dbh. A 52 cm dbh red spruce (Picea rubens) was cored, with around 140 rings counted. At its highest elevations this forest supports an open forest of stunted, small-statured maples that despite their small stature could also be quite old.

The Boreal Talus Woodland on the eastern slope of Umpire Mountain includes areas on very inaccessible terrain that have almost certainly never been cut. Red spruce is the dominant species with areas of heart-leaved paper birch (Betula cordifolia) also present. The trees are growing on moss-covered talus and tip over readily, so there is much downed wood and overall the trees are not particularly large.

A large cedar swamp occurs in Victory Basin proper south and east of the Moose River. Some of the trees in this swamp are over 150 years old, and review of historic aerial photos indicate this swamp was not logged when adjacent areas were cut in the 1960s.

Some of the high, rugged ground around Burke and Umpire mountains may have escaped logging. However, other types of disturbance have impacted these areas. Records exist of an intense fire on Burke Mountain in 1907 and the hurricane of 1938 was reported to have caused an extensive blowdown in this same area. As such many of these forests contain a high heartleaf paper birch component and lack older trees.

Other small uncut patches may occur in the area, especially in places with very steep terrain or in places such as bogs where trees are stunted and not commercially valuable.

Managed openings

Herbaceous and shrub communities are important wildlife habitats for many species, including deer, snowshoe hare, and dozens of birds. These habitats, however, are rare in the northeast and many species that rely on them are declining in this region, largely due to loss of habitat. Additionally, these communities are ephemeral in nature, as they develop into forest without repeated disturbance.

No grasslands occur on the VMU, but the management unit does support a range of forb and shrub habitats. Across the management unity, about 225 acres are maintained as permanent openings. On the WMA, DFW maintains about 17 acres of small (typically 1 acres or less) openings with brushmowing, and about 18 acres (over two fields) with prescribed fire. In addition, the Portland Pipeline Right of Way is maintained in low vegetation, creating a long linear opening totaling about 100 acres. In addition, the Burke Mountain Resort maintains approximately 90 acres of ski trails on Darling State Forest in low vegetation.

The majority of these openings is composed of forbs (herbaceous, non-grammanoid plants) such as goldenrod, meadowsweet, and *rubus* species with grasses, shrubs, and taller trees only uncommonly mixed in. The two burned fields are the exception to some extent, with greater shrub coverage. While open habitats are used by a variety of wildlife, for a variety of reasons, forb openings tend to support fewer animals than either grass or shrub communities[1]. In addition, despite adding substantial areas of open habitats, the pipeline and ski trails are likely sub-prime habitat for many species, notably grassland and shrubland birds, which avoid forest edges, preferring larger, concentrated openings over long, linear ones.

[1] DeGraaf et al. 2006

Finally, about 750 acres of the VMU are composed of naturally-occurring swamps dominated by alders and other woody shrubs (these are also categorized as wetlands). These are likely high-quality habitats for a variety of species including American woodcock and snowshoe hare.

Deer Wintering Areas
Deer wintering areas provide critical habitats where deer can survive harsh winter conditions. They tend to be lower elevations, southern exposures, and have dense softwood canopies that reduce ground-level snow depths and minimize wind-chill effects. Ideally, an ample supply of food near the softwood cover is also available, typically in the form of hardwood shoot growth and cedar or hemlock foliage.

The VMU contains a very large deer wintering area, centered on the Victory Basin. With essentially no wintering areas in adjacent towns, it is likely that many deer travel long distances to winter here, and thus that this wintering area is a significant resource for deer throughout the region. Much of the potential wintering area, however, is not currently providing functional shelter due to the widespread mortality and blowdown of even-aged fir. Such stands are becoming too open to serve as shelter for wintering deer, and the open conditions in many are favoring intolerant hardwood species over the preferred softwood. Figure 5b illustrates a map of stands that are potentially functional deer winter shelter based on forest inventory data and aerial imagery – this is a coarse and general categorization of "low potential" and "high potential" for broad planning purposes only.

Interior forest habitat and edge habitat
Interior habitats are areas of forests, wetlands, and natural openings that are greater than 200 meters from a permanent human-created disturbance zone, such as a road, farm field, or residential area. While these human land uses support a variety of wildlife (such as bluebirds and grey squirrels), they alter the environment of the surrounding forest and cause negative "edge effects" for many other species, including increased predation on forest birds; decreased habitat quality for amphibians due to increased light and wind in the forest; increased nonnative invasive species such as honeysuckle and buckthorn; and disturbance of sensitive wildlife such as bears.

The vast majority of the Management Unit is more than 100 meters from developed land uses. These large core habitats provide excellent areas for most of Vermont's wildlife to meet their needs. Areas of edge habitat, those within 100 meters of development, on the VMU occur near the Burke ski resort and toll road, along the River Road through Victory, along the Victory Road just north of the VMU, along the Tug Hill Road in the eastern portion of the management unit, and along the pipeline right-of-way. With limited residential development and agriculture around most of these roads, their edge effects are likely less severe than those caused by more developed land uses, like those in Darling State Park.

Riparian areas
Riparian areas are upland communities adjacent to wetlands and waterbodies. These areas are often the most biodiverse on the landscape because they contain both terrestrial and aquatic species and many species make use of both upland and wetland habitats. Riparian habitats are particularly important for amphibians, mink, beaver, otter, and wood duck.

Almost one-third of the Management Unit is within 100 meters of a wetland or waterbody. These areas are concentrated on Victory Basin around the Moose River, but also cross much of the management unit,

with the main drainages (Umpire Brook, Weir Mill Brook). The steeper uplands around Umpire, Kirby, and the Burke Mountains are the farthest from water.

Hard mast concentrations
Many species of wildlife consume hard mast (in Vermont, beechnuts and acorns), including deer, ruffed grouse, turkey, blue jay, fisher, squirrel, and mice. Hard mast is particularly important to bears, and its availability effects both their reproduction and cub survival. With few oaks, beech nuts are the main source of hard mast in northeastern Vermont. In years of good beechnut production, these stands are heavily used by bears and are known as "key mast areas."

ANR has information on stands with high concentrations of beech and reports of bear-scarred beech from forest inventory data collection. Stands demonstrating both of these qualities may be important mast areas. Additional field inspection is needed to determine the status and condition of potential stands identified from inventory data.

Soft mast concentrations
Soft mast are fleshy fruits like those from mountain-ash, pin-cherry, apples, *rubus*, and *vaccinium* species. These fruits are consumed by a variety of wildlife including wood turtle, wood duck, wild turkey, mice, coyote, and, bear.

Soft mast occurs commonly in managed and natural openings that are able to develop *rubus* and shrubby vegetation. The fields maintained through prescribed burning also produce *vaccinium* (blueberry) plants. In addition, the extensive floodplain communities of the basin contain many soft mast species including *rubus*, viburnum, and cherry.

Dead and dying wood features / Forest structure components
Overall, about one-third of New England's forest wildlife makes use of dead and dying wood features, including cavity trees, snags, downed wood, and large trees. Often these are critical elements, affecting the distribution, behavior, and survival of wildlife.

Cavity trees are standing trees, typically alive, that have sections of decay or damage creating openings within the tree. Cavities in small trees are used by both boreal and black-capped chickadees, while cavities in larger trees may be used by species including pileated woodpecker, wood duck, fisher, raccoon, grey fox, American marten, and multiple bats. Standing dead trees, called snags, serve as perches for birds, cavity trees for birds and mammals, and will eventually fall to the ground, becoming downed wood. Downed wood of small diameters is used by species including white-throated sparrows for nesting and American marten for access to subnivean areas, while larger downed wood is used by salamanders and snakes for cover and temperature/moisture moderation, by ruffed grouse for drumming sites, and by species including black bear, smoky shrew, and ovenbird for access to invertebrates living in the wood. Finally, large trees are required to produce large cavities and large downed wood, which receive disproportionally more use compared to smaller cavities and downed wood. For example, bear and grey fox will use large, but not small, downed wood for foraging and cover.

The history of intensive forest management across the VMU has limited, to some extent, the presence of dead and dying wood, particularly in the important large size classes. The VMUs forests, however, have begun to generate dead wood through natural forest development, and areas of Victory Basin in

particular provide excellent sources of these habitat features due to the maturity of much of the balsam fir in the area and recent blow-down events in softwood stands. The even-aged nature of the fir forests, however, also poses a risk for the long term supply of these features, as the forest may produce high levels of dead wood for a short time then little more for many decades as the next cohort matures.

Overstory inclusions

The presence of softwood trees within a hardwood stand or hardwood trees within a softwood stand, can add valuable feeding, nesting, and sheltering resources not otherwise available. These inclusions can be as small as a group of just a few trees or as large as a few acres. At least 50 species of birds and 8 species of mammals will make sure of such features, including porcupine, southern red-back vole, broad-winged hawk, and golden-crowned kinglet.

Overstory inclusions are common in VMU. The large area of red-spruce northern hardwood forest provides an excellent mix of this habitat feature. In addition, while both the lowland spruce-fir and northern hardwood forests are more homogeneous then the mixed forest, each does contain inclusions of the other tree types.

Anthropogenic/highly modified areas (e.g., developed)

Developed land uses exist only on roads and the Burke Mountain ski area of Darling State Forest. The VMU contains about 20 miles of class A and B state forest highways, in addition to 5.5 miles of River Road, a class 2 Town Highway, which bisects the management unit. In addition, the toll road up Burke Mountain, ski lifts, utility towers, and associated buildings contribute to the developed area on Darling State Park. Overall, these land uses occupy less than 1% of the area of the VMU. These areas may support adaptable generalist species such as raccoons and blue jays to the detriment of more sensitive native forest wildlife.

Figure 5: Wildlife and Special Habitats

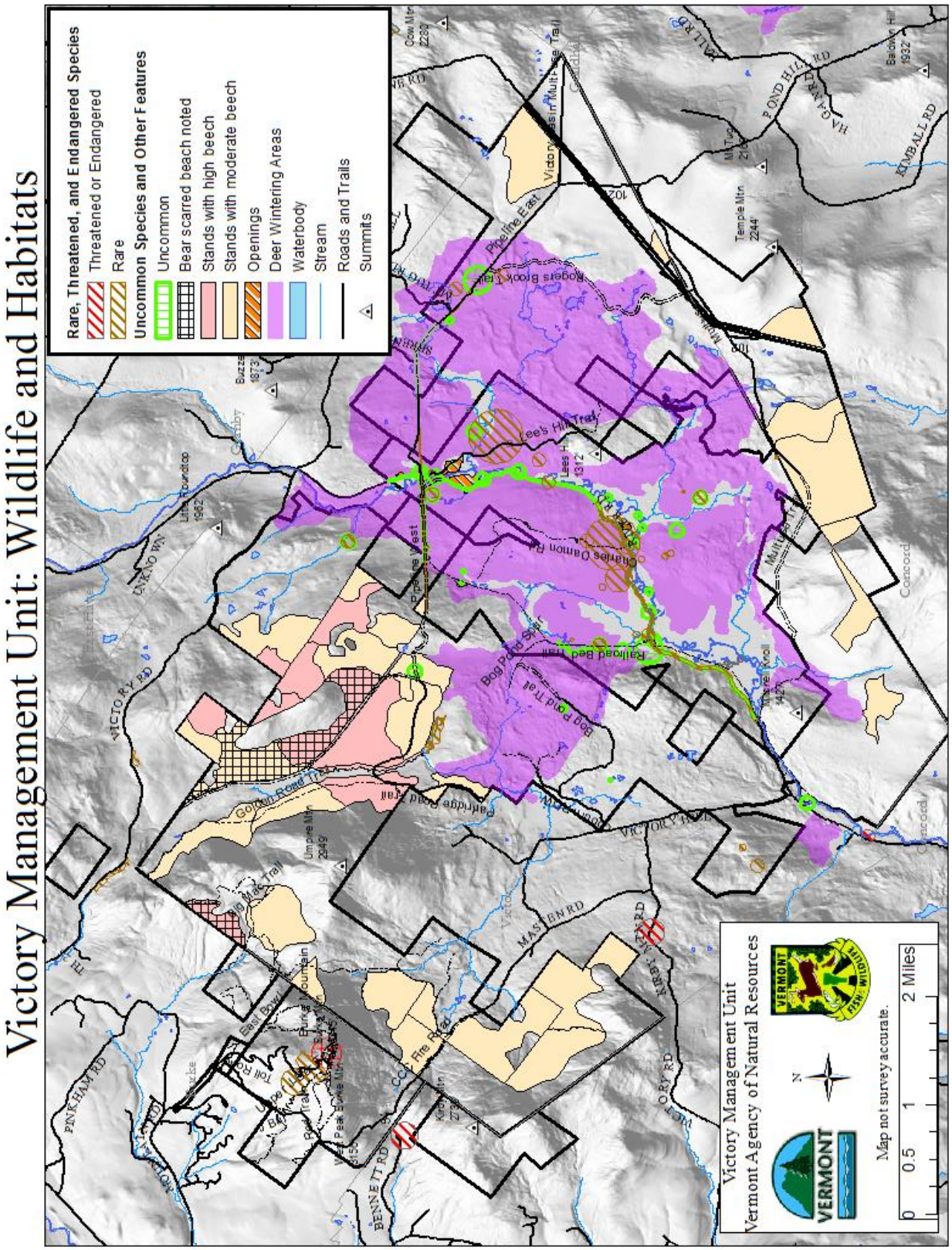
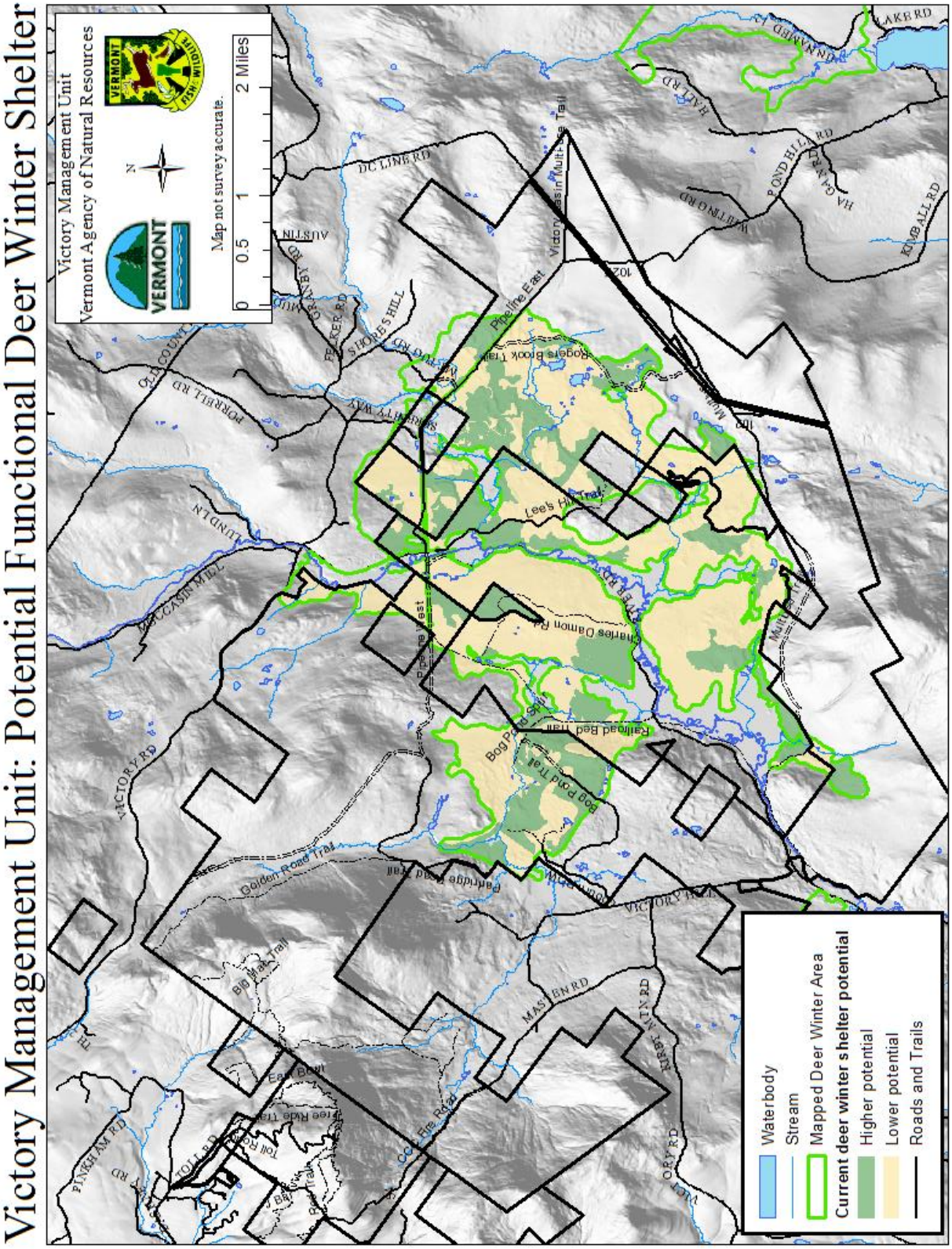


Figure 6: Potential Functional Deer Winter Habitat



Fine-filter / Special Species

Fine Filter Plants

The Victory Management Unit is home to many rare and uncommon species of animals and plants. These species and their management needs are summarized in the table and text below.

Based on both the BIOTICS database and recent surveys, 11 rare or very rare plants have been located within the VMU. Eight uncommon plants and one plant of unknown abundance are also known to be present. Of the rare/very rare species, one is listed as "endangered" and another two are listed as "threatened" by Vermont state endangered species statute (10 V.S.A. 123). Their occurrence in the VMU is thus very important on a statewide basis.

Mare's-Tail (*Hippuris vulgaris*) occurs in an oxbow wetland near the Moose River, Marsh Horsetail (*Equisetum palustre*) and Lance-Leaved Violet (*Viola lanceolata*) occur within the pipeline right-of-way to the west of where it crosses the river. Ongoing monitoring and management are necessary to maintain the viability of these populations. In particular, maintenance of the right-of-way should be conducted in a way that preserves the conditions necessary for the survival of the latter two species.

Rare, Threatened, and Endangered Plants of the Victory Basin Management Unit

Species Name	Common Name	Sites Where Found	State Rarity Rank*	Rarity*	Legal Status
Hippuris vulgaris	Mare's Tail	oxbow wetland along Moose River	S1	Very Rare	Endangered
Equisetum palustre	Marsh Horsetail	Pipeline ROW near river.	S2	Rare	Threatened
Viola lanceolata	Lance-leaved Violet	Pipeline ROW	S1	Very Rare	Threatened
Lonicera oblongifolia	Swamp Fly-honeysuckle	Softwood swamps	S2	Rare	
Malaxis unifolia	Green Adder's-mouth	Northern Hardwood Forest/basin edge	S2	Rare	
Rosa nitida	Shining Rose	Alder Swamp	S2	Rare	
Vaccinium vitis-idaea	Mountain Cranberry	Softwood swamp	S2	Rare	
Spiranthes casei	Case's Ladies'-tresses	Burke Mountain ski run	S2?	Apparently Rare	
Diphasiastrum sabinifolium	Ground-fir	Ski run of Burke Mountain	S2/S3	Uncommon to Rare	
Diphasiastrum sabinifolium	Ground-fir	Ski slope of Burke Mountain	S2/S3	Uncommon to Rare	
Luxula parviflora	Small-flowered Rush	Montane Spruce-Fir Forest, Burke Mountain	S2/S3	Uncommon to Rare	
Cirsium muticum	Swamp Thistle	Cleared area	S3	Uncommon	
Elymus wiegandii	Wild-rye	Floodplain forests	S3	Uncommon	
Glyceria borealis	Northern Mannagrass	Alder Swamp	S3	Uncommon	
Juncus marginatus	Grass-leaved Rush	Red Spruce-Northern Hardwood Forest (edge), Cleared Areas	S3	Uncommon	

Lonicera villosa	Blue-berried Honeysuckle	Swamps and peatlands	S3	Uncommon	
Milium effusum	Tall Millet-grass	Montane Spruce-Fir Forest	S3	Uncommon	
Pogonia ophioglossoides	Rose pogonia	Poor Fen	S3	Uncommon	
Polygala sanguinea	Field Milkwort	Cleared/Disturbed Rocky Areas	S3	Uncommon	
Eurybia radula	Rough-leaved Aster	Softwood Swamps	SU	Unknown Rarity	

Fine-filter animals

Twenty-four wildlife species known from the VMU are rare in the state of Vermont (S1, S2) or listed as Special Concern, Threatened, or Endangered by Vermont or the US Fish and Wildlife Service. In addition, 32 other species within the biophysical region meet these criteria and may occur on the VMU, but have not been confirmed there, and 15 common species known from the area are of regional conservation concern.

Rare species known from the VMU	Global Rank	State Rank	US Listing	VT Listing	VT SGCN	Regional Concern
Birds						
American Black Duck	G5	S3B, S5N		SC	SGCN	RSGCN
Bay-breasted Warbler	G5	S2B			SGCN	RSGCN, BCC
Bicknell's Thrush	G4	S2B		SC	SGCN	RSGCN, BCC
Black-backed Woodpecker	G5	S2		SC	SGCN	
Boreal Chickadee	G5	S2B		SC	SGCN	
Gray Jay	G5	S2		SC		
Northern Goshawk	G5	S2B,S3N			SGCN	RSGCN
Northern Harrier	G5	S3B		SC	SGCN	RSGCN
Palm Warbler	G5	S1B				
Red Crossbill	G5	S1B,S2N				
Rusty Blackbird	G4	S3B		SC	SGCN	RSGCN, BCC
Spruce Grouse	G5	S1		E	SGCN	RSGCN
Mammals						
Canada Lynx	G5	S1	T	E	SGCN	RSGCN
American Marten	G5	S1		E	SGCN	RSGCN
Pygmy Shrew	G5	S2			SGCN	
Rock Vole	G4	S2		SC	SGCN	
Southern Bog Lemming	G5	S2			SGCN	RSGCN
Reptiles and Amphibians						

Blue-spotted Salamander	G5	S3		SC	SGCN	RSGCN, PARC
Wood Turtle	G3	S3		SC	SGCN	RSGCN, PARC
Insects						
Delicate Emerald	G5	S1S2			SGCN	
Forcipate Emerald	G5	S2S3			SGCN	
Harlequin Darner	G5	S2S3			SGCN	
Kennedy's Emerald	G5	S1S2			SGCN	
Ocellated Emerald	G5	S2				

Rare species known from the Biophysical Region						
Birds						
American Three-toed Woodpecker	G5	S1				RSGCN
Bald Eagle	G5	S1B,S4N		E	SGCN	BCC
Blue-winged Teal	G5	S2B		SC	SGCN	
Cape May Warbler	G5	S1B				RSGCN
Clay-colored Sparrow	G5	S2B				
Common Nighthawk	G5	S1B		E	SGCN	RSGCN
Eastern Whip-poor-will	G5	S2B		T	SGCN	RSGCN
Least Bittern	G5	S2B		SC	SGCN	RSGCN, BCC
Long-eared Owl	G5	S1B			SGCN	RSGCN
Merlin	G5	S2B				
Philadelphia Vireo	G5	S1B				
Pied-billed Grebe	G5	S2S3B		SC	SGCN	RSGCN, BCC
Prairie Warbler	G5	S3B		SC	SGCN	RSGCN
Red-shouldered Hawk	G5	S2B			SGCN	RSGCN
Sandhill Crane	G5	S1B				
Sora	G5	S3B		SC	SGCN	RSGCN
Tennessee Warbler	G5	S1B				
Vesper Sparrow	G5	S2S3B		SC	SGCN	RSGCN
Wilson's Warbler	G5	S1B				
Mammals						
Northern Long-eared Bat	G1G3	S1	P	E	SGCN	RSGCN
Little Brown Bat	G3	S1		E	SGCN	RSGCN
Silver-haired Bat	G5	S2B			SGCN	
Small-footed Bat	G1G3	S1		T	SGCN	RSGCN
Tri-colored Bat	G3	S1		E	SGCN	RSGCN
Insects						
A Noctuid Moth	G4	SH			SGCN	
Black Meadowhawk	G5	S1S2			SGCN	
Ebony Boghaunter	G4	S1S2			SGCN	
Lake Emerald	G5	S1S2			SGCN	

Ringed Emerald	G5	S1		SGCN	
Subarctic Darner	G5	S1		SGCN	
Mussels					
Creek Heelsplitter	G5	S2		SGCN	RSGCN
Eastern Pearlshell	G4	S2	E	SGCN	RSGCN

Common Species of Regional Concern					
Canada Warbler	G5	S4B	SC	SGCN	BCC
Olive-sided Flycatcher	G4	S4B	SC	SGCN	BCC
Scarlet Tanager	G5	S5B			RSGCN
Wood Thrush	G5	S5B	SC	SGCN	RSGCN, BCC
Big Brown Bat	G5	S4		SGCN	RSGCN
Hairy-tailed Mole	G5	S4		SGCN	RSGCN
Smoky Shrew	G5	S4		SGCN	RSGCN
Star-nosed Mole	G5	S5			RSGCN
Woodland Jumping Mouse	G5	S5			RSGCN
Ring-necked Snake	G5	S4			RSGCN, PARC
Northern Leopard Frog	G5	S4			PARC
Northern Dusky Salamander	G5	S5			RSGCN, PARC
Northern Two-lined Salamander	G5	S5			RSGCN, PARC
Spotted Salamander	G5	S5		SGCN	PARC
Spring Salamander	G5	S4			RSGCN, PARC

Abbreviations

Global Status and State Status:
1 = very rare or critically imperiled
2 = rare or imperiled
3 = uncommon or vulnerable
4 = common to uncommon or apparently secure
5 = common or secure
U = unrankable, due to lack of information
B = breeding status
N = nonbreeding status

Federal Listing and State Listing
E = E
T = Threatened
SC = Special Concern
P= Proposed

SGCN = Species of Greatest Conservation Need, Vermont Wildlife Action Plan

Other:
RSGCN = Regional Species of Greatest Conservation Need, Northeast Fish and Wildlife Diversity Committee (2014)
BCC = Birds of Conservation Concern, US Fish and Wildlife Service (2008)
PARC = Species of Regional Responsibility and Conservation Concern, Northeast Partners in Amphibian and Reptile Conservation (2010)

Listed Species

Eighteen of the species of known from the VMU are listed by the state of Vermont as Special Concern, Threatened, or Endangered. These eighteen species include eight birds, seven mammals, two reptiles or amphibians, and one invertebrate. Due to their particular conservation importance, a brief description of the habitat and potential management opportunities for each is included here, though specific management activities that will be undertaken as part of this plan are laid out in Section IV:

Birds

American Black Duck

American black ducks have been sighted in the area of the VMU, though no information on breeding or abundance is known. It is likely that the numerous wetlands throughout the Victory Basin support some breeding black ducks.

Habitat: American black ducks breed on the margins of a variety of wetlands from swamps and marshes to rivers and lakes. They feed primarily on vegetation, but also consume small aquatic animals.

Potential management:

- Maintain and enhance naturally functioning wetlands and high-quality waters.

Northern Harrier

Northern harrier have been sighted in the area of the VMU, though no information on breeding or abundance is known. It is likely that the VMUs extensive forests present only marginal habitat for this bird of open lands.

Habitat: Harriers prefer open, and often wet, areas such as meadows, swamps, and fields, where they hunt for small mammals.

Potential management:

- Maintain large open areas at Lee's Field and Buckminster Field.

Bicknell's Thrush

see Focal Species accounts, below

Black-backed Woodpecker:

see Focal Species accounts, below

Boreal Chickadee

see Focal Species accounts, below

Gray Jay

see Focal Species accounts, below

Rusty Blackbird

see Focal Species accounts, below

Spruce Grouse

see Focal Species accounts, below

Mammals

Canada Lynx

Canada lynx were extirpated from Vermont in the late eighteenth century. From 2012 to 2014, however, USFWS documented evidence of a family group breeding in the Nulhegan Basin. Presumably, these individuals dispersed from populations in New Hampshire or Maine. One confirmed sighting occurred in the VMU in 2007, though subsequent surveys have not found lynx. Habitat modeling indicates that the Victory Basin is the second best area for lynx in Vermont, after the Nulhegan Basin.

Habitat: Lynx rely on snowshoe hare as the staple of their diet, so they are strongly associated with forests with dense understories, especially sapling/small pole-sized coniferous forests that support high hare densities. They thrive in northern climates, where deep snow allows them to outcompete bobcats, coyotes, and fishers. They also make use of swamps, bogs, and rocky areas, and create dens in rocky openings, large tree cavities, or fallen trees.

Potential management:

- Create or maintain regenerating conifer or mixed forest juxtaposed with mature forest.
- Create or maintain large diameter snags and woody material.
- Protect rocky and talus areas from disturbance.
- Manage snowshoe hare populations to provide sufficient prey base.
- Maintain landscape connectivity between VMU and Nulhegan habitat block to north.
- Continue regular surveys for lynx in both the VMU and the Nulhegan Basin.
- Survey abundance and distribution of snowshoe hare to determine suitability of prey base.

American Marten
see Focal Species accounts, below

Rock Vole
Within Vermont, rock voles are found only in the northeast kingdom. Records indicate this species is present in the town of Victory, though specific locations are unknown at this time. Based on its habitat preferences, it may occur on the multiple talus and rocky slopes present especially on the western portion of the VMU.

Habitat: Rock voles rely on cool, moist talus slopes and rocky areas. They prefer sites near surface water, with coniferous or mixed forest cover, and herbaceous ground cover.

Potential management:

- Maintain forest cover in and around rocky and talus sites, to preserve moist conditions.
- Assess distribution across VMU and corridors for dispersal and genetic exchange.

Bats
Four species of state-listed bats may occur on the VMU. In recent decades, non-migratory bats have faced some of the steepest declines of any species in North America. These bats use caves to hibernate through the winter, and have been declining from an introduced fungal disease known as White Nose Syndrome (WNS). The VMU may host four species of state-listed, non-migratory bats: the Endangered little brown bat, the Threatened tri-colored bat, the Endangered northern long-eared bat, and the Threatened small-footed bat. Of these, the northern long-eared is

proposed for federal Endangered listing, while the small-footed bat is of particular importance in this area because the northeast supports a large portion of its global population.

Habitat: These species of bats have a variety of habitat requirements, but generally use forested landscapes with wetland/water and upland openings. They forage both in the forest canopy and over openings, with northern long-eared bats specializing in interior forests with low edge-to-interior ratios, and tri-colored bats avoiding dense forest. These species may use barns and attics for maternity colonies, but may also use forest stands, or (as in the case of the small-footed bat) crevices in cliff faces. Roost areas tend to have greater standing wood volumes, larger trees, and more dead wood than average forest stands, and cavity trees may be important sites. Finally, these species all rely on caves that maintain a stable temperature over the winter for hibernation.

Potential management:

- Creating or maintaining an adequate supply of dead and dying trees, especially large trees, complex forest structure, and extensively forested areas.
- Maintaining stream, pond, and wetland buffers for travel and access to aquatic insects.
- Maintaining openings in forested habitats for foraging.
- Assess species present, abundance, and distribution across VMU.

Reptiles and Amphibians

Blue-spotted Salamander
see Focal Species accounts, below

Wood Turtle
see Focal Species accounts, below

Invertebrates

Eastern pearlshell mussel
Eastern pearlshells are a freshwater mussel that occur across Vermont and may be present on the VMU. They can live over 150 years and reach a size of six inches. Eastern pearlshells are known from the northeast kingdom, but their status on the VMU is unknown.

Habitat: Bottoms of fast-moving, cold, clean streams and rivers. They require trout or salmon species as hosts for part of their life-cycle. Eastern pearlshells are threatened by over-collection, pollution, and habitat alteration from the manipulation of waterbodies and infrastructure construction.

Potential management:

- Protect clear, cool waters and riparian areas.
- Design road maintenance and crossing structures to limit stream alteration and sedimentation.
- Assess if present on VMU.

Focal species

Focal species are a subset of all the species known (or likely) to occur on the VMU, which will be the focus of the most management and research efforts over the lifetime of this plan. These species were chosen based on their conservation need (e.g., spruce grouse and American marten), importance in ecological relationships (e.g., snowshoe hare), and/or human value for wildlife observation (e.g., boreal birds) or hunting (e.g., moose).

Focal Species Details			
Common Name	**VT Rank***	**Global Rank***	**Legal Status***
Spruce grouse *Falcipennis Canadensis*	S1 (very rare)	G5 (common)	Endangered (VT)
Spruce grouse are year-round residents of Vermont, but over the 19th and 20th centuries were reduced to only a single breeding population of 150-300 individuals in the Nulhegan Basin area. Recovery of this species will require establishment of 2 additional populations each with 30 or more breeding females. The VMU likely has some of the best spruce grouse habitat in Vermont, as a large area of spruce-fir owned and managed by ANR. In an effort to establish the first of these additional populations, 134 spruce grouse were trapped in Maine and Quebec and introduced by DFW into Victory Basin and the adjacent State Forest from 2008-2010. Subsequent monitoring indicates that this population is likely not well established, and may not persist much longer Habitat: Spruce grouse prefer dense lowland softwood forests with low branches, understory berries, and small openings. Threats: Population declines have been driven by a loss of softwood habitat, particularly their preferred dense, young stands. Additional mortality may come from accidental shooting, by hunters seeking ruffed grouse and woodcock, though those hunters tend to avoid coniferous stands preferred by spruce grouse. Finally, climate change may pose a threat to this species and its habitats, which are at the southern extent of their ranges. Management Opportunities: • Continue to post signage warning hunters of spruce grouse presence. • Creating or maintaining young softwood stands with low branches and dense understory vegetation, following Vermont's Spruce Grouse Recovery Plan management guidelines. Research and Monitoring Opportunities: • Continue monitoring reintroduction success. • Consider more in-depth study of reproductive success and mortality if reintroduction efforts continue.			
Bicknell's thrush *Catharus bicknelli*	S2B (rare)	G4 (common to uncommon)	Special Concern (VT)
Bicknell's thrush is one of the rarest and most vulnerable songbirds in North America, with a population under 126,000 individuals. Bicknell's thrush breeds in the northeastern United States and southeastern Canada, and winters in the Caribbean.			

On the VMU, 60 acres of montane habitats near the summits of Burke and West Burke mountains on Darling State Park has been identified as potential habitat. Bicknell's thrush have been identified across this area regularly since at least 2001.

Habitat: Bicknell's thrush rely on dense, stunted montane fir and spruce habitats, typically above 3,000 feet in elevation. Particularly, on slopes exposed to wind that lead to disturbances such as fir waves.

Threats: The gravest threats to this species may be the loss and degradation of its wintering habitats and the potential loss of montane breeding habitats due to climate change. In addition, degradation and disturbance of breeding habitats is likely the primary threat currently affecting populations in Vermont. The high levels of infrastructure and use of Burke and West Burke mountains—including ski infrastructure, biking, and hiking—are a consideration on the VMU.

Management Opportunities:

- Maintaining subalpine spruce-fir habitats in their natural condition.
- Exploring management of spruce-fir habitats for dense regenerative stages preferred by Bicknell's Thrush.

Research and Monitoring Opportunities:

- Identify the highest-quality sites (such as windward slopes) within the potential habitat.
- Study the impact of ski trails, hiking trails, and the toll road in and around the habitat.
- Monitor the number of birds present annually.

Black-backed woodpecker *Picoides arcticus*	S2 (rare)	G5 (common)	Special Concern (VT)

Black-backed woodpeckers are residents year-round in Vermont. The WMU is one of the best places in the state to find these typically boreal birds, which occur in the extensive lowland coniferous forests of the Victory WMA.

Habitat: Black-backed woodpeckers are habitat specialists, preferring mature spruce-fir-tamarack forests with numerous dead or dying trees. Black-backed woodpeckers forage for beetle larvae in loose bark and nest in decaying trees. Fires, boggy areas, beetle-infestations, and logging operations may all favor this species, if significant amounts of dead and dying wood result.

Threats: State-wide habitat loss from development is likely the primary threat. In addition, forest management practices may adversely impact this species if mature spruce-fir and dead/dying wood habitats are not maintained. Finally, climate change may pose a threat to this species and its habitats, which are at the southern extent of their ranges.

Management Opportunities:

- Continue surveys of potential habitats before timber harvests.
- Create or maintain areas with high levels of snags and coarse woody debris.

Research and Monitoring Opportunities:

- Map areas of suitable breeding habitat (mature spruce-fir forests greater than 250 acres in size) on the VMU.

Rusty blackbird *Euphagus carolinus*	S3B (uncommon)	G4 (uncommon to common)	Special Concern (VT)

Rusty blackbirds have experienced one of the most dramatic population declines of any North American bird species, decreasing as much as 95% across their range. These inconspicuous birds breed in boreal wetland edges and winter in the southeastern United States. On the VMU they likely occur reliably, but not at high densities, throughout the forests and wetlands of the Victory Basin.

Habitat: Rusty blackbirds rely on coniferous cover in and around forested wetlands, marshes, bogs, and ponds.

Threats: Threats range-wide may include development on lakeshores in breeding habitats, degradation and loss of wintering habitat, and mortality from pesticides. Locally, disturbance and alteration of riparian areas for forest management may have most significant impacts. Finally, climate change may pose a threat to this species and its habitats, which are at the southern extent of their ranges.

Management Opportunities:

- Maintain coniferous vegetation throughout riparian areas.
- Maintain active populations of beavers, which create additional wetland habitat and regenerating riparian vegetation.

Research and Monitoring Opportunities:

- Assess the abundance and distribution of rusty blackbirds across the VMU. Also, consider such an effort across all state land in northeastern Vermont.

Boreal birds	n/a	n/a	n/a

In addition to black-backed woodpecker, rusty blackbird, and spruce grouse, many other boreal birds use the VMU each year. The Special Concern gray jay and boreal chickadee are known to occur on the VMU, as are the rare cape may warbler, Tennessee warbler, Wilson's warbler, bay breasted warbler, and palm warbler. Many of these species occur in very low numbers and are likely only occasional and irregular breeders in Vermont, hence their treatment as a group. Nonetheless, they are a unique part of the ecology of the VMU and have become highly-sought by wildlife watchers, drawing many people to the VMU.

Habitat: These species use a variety of coniferous habitats, from spruce-fir forests to riparian thickets and peatlands. Overall, they have a general preference for mature spruce-fir habitats (compared to young forest), though some species rely on small openings and thickets.

Threats: Loss or degradation of boreal forests due to development or climate change would impact all members of this group.

Management Opportunities:
- Maintain diverse, mature spruce-fir forests with small openings.

Research and Monitoring Opportunities:
- A targeted survey of the distribution and abundance of late successional lowland boreal birds is identified as a high priority strategy in the 2005 Wildlife Action Plan (under Bay Breasted Warbler), because traditional monitoring doesn't adequately cover many of these species.
- Consider a larger project in northeastern Vermont to investigate the minimum patch size for gray jay breeding and determine the total minimum area to support 500 breeding pairs.
- Monitor populations through targeted surveys.

American marten *Martes Americana*	S1 (very rare)	G5 (common)	Endangered (VT)

American marten were extirpated from Vermont in the nineteenth century. In recent decades, however, marten sightings have been confirmed, primarily in northeastern Vermont. These individuals are likely a natural recolonization from populations in New Hampshire and Maine. Habitat modeling indicates that the Victory Basin is one of the best locations for marten in Vermont. Since 1998, marten have been both sighted and accidentally caught in traps on the VMU, on both the State Forest and Wildlife Management Area.

Habitat: Marten are opportunistic carnivores, and forage in trees and forest understories. They are associated with dense forest, especially softwood, and prefer mature, undisturbed forests with complex structure, but may use forests as young as 30 years. They rely on large cavities in trees for resting and denning, and extensively use coarse woody material and its associated subnivean tunnels for accessing prey in winter.

Threats: Incidental mortality through trapping may be a problem in some locations, and a small number of marten have been taken in this way in WMU E recently. In addition, plowed roads in winter may allow competitor species such as coyotes increased access to marten habitat. Finally, climate change may pose a threat to this species and its habitats, which are at the southern extent of their ranges.

Management Opportunities:
- Create or maintain extensive areas of mature forest with complex structure, including large diameter live and dead trees.
- Limit young forest to a minority of the forested landscape.
- Minimize incidental trapping mortality through outreach and collaboration with local trappers.

Research and Monitoring Opportunities:
- Assess abundance and distribution in VMU.
- Monitor trapping mortality.

Moose	S5 (common)	G5 (common)	none

Alces americanus			

Moose were virtually extirpated from Vermont by the mid 1800's, due to conversion of forests to agricultural uses and unregulated hunting. Moose returned to Essex County in the 1970's, and dramatic population growth led to densities of 4-5 moose/mi^2 in the county by 2005. Vermont began regulated hunting seasons for moose in 1993, and, harvests were accelerated through 2008 in an attempt to reduce moose densities which had overbrowsed their range and were causing damage to forest regeneration. From 2000 to 2012, 2745 moose were harvested in WMU E. Presently, in WMU E2, moose density is estimated at 1 moose/mi^2, substantially down from its peak, and now at a level believed to be in balance with the habitat.

Habitat: Coniferous and mixed forests with semi-open areas and wetlands. Young regenerating forest provides important woody browse and open water provides aquatic plants consumed in summer.

Threats: Increased winter tick populations may be impacting moose populations across the northern United States. In addition, warming weather due to climate change may lead to lower productivity due to thermal stress and warm springs may allow winter tick populations to expand. Locally, overbrowsing due to moose overabundance may have reduced habitat quality for moose and deer in northeastern Vermont.

Management Opportunities:

- Maintain coniferous and mixed forest cover.
- Create and maintain young regenerating forest stands for browse.
- Protect wetland feed habitats.

Research and Monitoring Opportunities:

- Monitor moose abundance across VMU.
- Monitor impact of moose herbivory on forest regeneration.

White-tailed deer *Odocoileus virginianus*	S5 (common)	G5 (common)	none

Deer densities in the northeast kingdom were high in the 1960's when Vermont's statewide deer population was at its peak. After a population crash due to overbrowsed habitats and three consecutive severe winters, DFW has maintained deer densities at lower levels, below the carrying capacity of the habitat. Deer numbers in the area are currently about 5-6 per square mile from spring to fall and expected to increase due to recent mild winters and the virtual absence of antlerless harvests in WMU since 1987.

In winter, deer from the VMU and many nearby towns likely concentrate in the Victory Basin, taking advantage of its softwood cover as critical protection from snow and wind. As discussed in the habitat assessment above, this deer wintering area is a significant value of the VMU, but is not providing functional shelter across much of its area due to the loss of mature, even-aged balsam fir.

Habitat: As generalist herbivores, deer prefer habitats with a diversity of forest and openings. The biggest limiting factor for deer in Vermont is likely the availability of suitable wintering areas, where they can find softwood stands to provide protection.

Threats:
- Continued loss of functional deer wintering areas due to widespread mortality of mature, even-aged fir.
- Continued damage to softwood regeneration from moose herbivory.

Management Opportunities:
- Treat mature stands with fir overstories and insufficient softwood regeneration to encourage softwood regeneration before natural mortality leads to large, hardwood-dominated openings.
- Maintain diverse forests with interspersed fields and young regenerating forest.
- Manage Victory Basin deer wintering areas to provide functional shelter and browse for the present and into the future.

Research and Monitoring Opportunities:
- Assess levels of use of wintering area habitats.

Snowshoe hare *Lepus americanus*	S5 (common)	G5 (common)	none

Snowshoe hare have a key place in local food webs, as the obligate food source for Canada lynx, and a preferred food source for coyote, bobcat, fisher, and raptors. Simultaneously, hare are hunted through a regulated season. Snowshoe hare are common throughout the younger, dense coniferous forests and alder swamps of the VMU.

Habitat: Snowshoe hare prefer rely on dense understories of coniferous, mixed, or deciduous vegetation for both browse and cover. They will use a variety of natural habitats including swamps, but also make extensive use of young forest (approximately 7-15 years).

Threats:
- Climate change may pose a threat to this species and its habitats, which are at the southern extent of their ranges.

Management Opportunities:
- Create and maintain dense regenerating forest patches, especially softwood.

Research and Monitoring Opportunities:
- Assess abundance across VMU and monitor over time.

Blue-spotted salamander *Ambystoma laterale*	S3 (uncommon)	G5 (common)	Special Concern (VT)

Blue-spotted salamanders occur in Vermont mostly in the Champlain Valley. The Victory Basin, however, has a population that occurs just south of Damon's Crossing. This is

potentially an extremely isolated population, as the nearest known population in Vermont is in Craftsbury.

Habitat: Primarily, deciduous forests around wetlands. Downed wood and leaf litter are critical habitat features for cover and temperature/moisture moderation for this (and other amphibian) species. Wetlands including marshes, swamps, and peatlands may be used for communal breeding, but vernal pools are often the critical breeding sites for this species.

Threats: Loss or alteration of breeding wetlands sites is a major threat to blue-spotted salamanders. In addition, soil compaction or the loss of downed wood and leaf litter in areas surrounding wetlands will reduce the habitat quality for this species. Finally, mortality from traffic across roads during annual breeding migrations may severely impact some populations. This is a known source of mortality for the population in Victory, but its extent and impact remain unstudied.

Management Opportunities:
- Maintain undisturbed breeding wetlands, including vernal pools.
- Maintain and enhance forest cover around breeding areas.
- Maintain and enhance uncompacted soil, downed wood, and leaf litter around breeding areas.
- Mitigate mortality from road crossings.

Research and Monitoring Opportunities:
- Assess distribution and abundance on the VMU.
- Assess effects of road mortality on population.
- Monitor population over time.
- Targeted searches for undiscovered nearby populations in potential habitats.

Wood turtle *Glyptemys insculpta*	S3 (uncommon)	G4 (common-uncommon)	Special Concern (VT)

Wood turtles have been discussed as worthy of consideration for federal listing. They are a long-lived species with low reproductive success and a long time to maturity. This makes them susceptible to significant population declines and slow to rebound even if threats are mitigated. Wood turtles are known from two locations in the VMU, though their populations have not been studied.

Habitat: Slow-moving streams with riparian vegetation, shrub swamps, meadows and woods near streams. They also require sandy sites for egg-laying.

Threats: Range-wide, habitat loss from development and human landuses are the largest threats. They are also susceptible, however, to mortality from mowing and cars, and loss to human collectors.

Management Opportunities:
- Maintain high-quality streams and riparian habitats.

- Mow fields in October and mow more than six inches high, to prevent direct mortality.
- Where prescribed burns are carried out to maintain openings, survey fields for wood turtle within 48 hours prior to burning and relocate any individuals found.
- Prevent the creation of trails or roads near streams with wood turtles, to minimize loss to collection.
- Consider enhancing extant populations through introductions.

Research and Monitoring Opportunities:
- Assess distribution and abundance across VMU.
- Monitor populations over time.

C. Timber Resource Assessment

1. History of Forest Management on Parcel:

The current condition of timber resources throughout the VMU is largely a result of past forest management activities. Due to the soil types throughout the basin the primary type of land management throughout the basin has been focused on timber rather than agriculture. Unlike the majority of the rest of the state of Vermont, most of the land area within the VMU was not used for agriculture during the 19th and 20th centuries. The first settlers moved into the Granby area in 1790 and within the subsequent half century a number of small sawmills were established throughout VMU. By the mid-19th century intensive logging of white pine was abundant throughout much of the VMU, resulting in the removal of most of the large white pine by 1860. Following the removal of white pines, sawmills began to target other softwood species with a focus on the stands of large red spruce found in the upland areas of the basin. In the 1880's the first railroad connecting the basin to larger timber markets resulted in the increase of timber exploitation throughout the entirety of the basin. Larger sawmills emerged and harvesting extended to the farthest reaches of the basin, resulting in the selective harvesting of nearly all stands within the VMU by the beginning of the 20th century.

The result of the early timber resource exploitation of the 19th century was a transformation in the forest types to present condition we see today. Although red spruce is still a significant component of the forest composition throughout the VMU, much of the area previously dominated by red spruce and white pine is now dominated by sugar maple and other tolerant hardwood species. Following the selective removal of red spruce a majority of the upland forests transitioned to sugar maple-beech-yellow birch forest type, whereas the lowland areas which are much wetter remain dominated by softwood species. Following intensive harvests of the late 19th century and early 20th century the harvest levels within the VMU decreased as many of the small sawmills were closed and population dwindled within the small communities of Bradley's Vale Township (now North Concord), Gallup Mills and Stevens Mill. During this lull in activity the forest began to regrow and shift to the species composition we see today.

Timber remained the primary driver in the Victory and Granby economies through the 20th century, and still is today. During the first half of the 20th century, much of the land base was owned by private timber companies. Prior forest management practices during private ownership was predominantly even-

aged forest management throughout the entirety of the VMU, and many of the upland forest stands experiencing diameter limit harvesting where the most valuable timber was extracted from the forest, leaving behind a forest comprised of a high proportion of unacceptable growing stock (UGS).

Following the purchase of the VMU lands, the forests were managed in two distinct blocks: 1) Upland forests classified for timber management which are predominantly found in the Victory State Forest, and 2) forests identified as deer wintering area which are predominantly found in the Victory Basin WMA. Within the timber management areas, the 1994 management plan identified 61% of the land base within Victory State Forest as appropriate for forest management. Of the timber management area two major forests types were identified northern hardwood (6,132 acres) and mixedwood 2,298 acres. Northern hardwood forests were managed using even-aged silviculture on a site class specific rotation age (ranging from 100 years for site class I to 50 years for site class III) and uneven-aged silviculture on an 80 year rotation was applied to mixedwood forests. From 1994 to 2006 a total of 1,644 acres were treated throughout Victory State Forest, resulting in the removal of 3.4 million board feet of timber and 13,218 cords of firewood and pulpwood, in addition to treatments on the Wildlife Management Area.

Following the purchase of the lowland areas of the Victory Basin WMA forest management has largely focused on maintaining a healthy deer wintering area, recognizing the critical importance of the large contiguous softwood cover found throughout the Victory Basin. Since 1983 with the drafting of the Victory Basin WMA Management Plan, timber harvests have been used as a tool to balance age classes across the Victory Basin, creating a balance of winter shelter and younger forests for food sources while maintaining travel corridors of high cover between forage areas. In order to accomplish these objectives the deer wintering areas within Victory State Forest and Victory Basin WMA have been managed in accordance with DFW deer wintering area management guidelines, using even-aged forestry and applying area regulation harvesting which is defined in the 1994 Victory State Forest Management Plan as harvesting 49 acres per year within the 3,432 acre wintering area in order to maintain a 70 year rotation throughout the deer wintering area.

Over the last 175 years the use of timber resources within the VMU has evolved from specific species exploitation to the current multi-faceted, science-based silvicultural approach utilized today to manage the forests for a variety of objectives. It is this history of past forest management that resulted in the forest we see today. More recently, forest managers have strived to apply consciously minded silviculture in an effort to increase the health and rigor of the VMU forests. Below is a description of the current condition of the VMU forests based on forest inventories completed during 2008/09 and 2012-15.

2. Existing Conditions:

Forest resource assessments are conducted periodically using the FOREX inventory (forest examination) method developed by the Vermont Department of Forests, Parks and Recreation, to inventory and evaluate state lands for long range management planning. The inventory for this plan was completed in two stages, the first from 2007-08 where the entire deer wintering area was inventoried, and the second stage in 2012-15 when the remaining stands within the VMU were inventoried. Prior to the current inventory, a similar inventory was completed in 1989 within the State Forest and 1981 within the WMA. Data collected provide detailed information on the forest at regular intervals allowing long-term monitoring of the timber resource. Data are systematically collected at a series of plots distributed

throughout the VMU. Information collected throughout the inventory process provides land managers with the necessary data to make informed decisions to best manage the natural resources within the VMU. Below is a summary of the most recent findings from the timber resource inventory.

a. Regeneration/Age Class Distribution –

The VMU has been mapped into administrative units of 9 blocks of 52 compartments that contain 486 forested and non-forested stands.

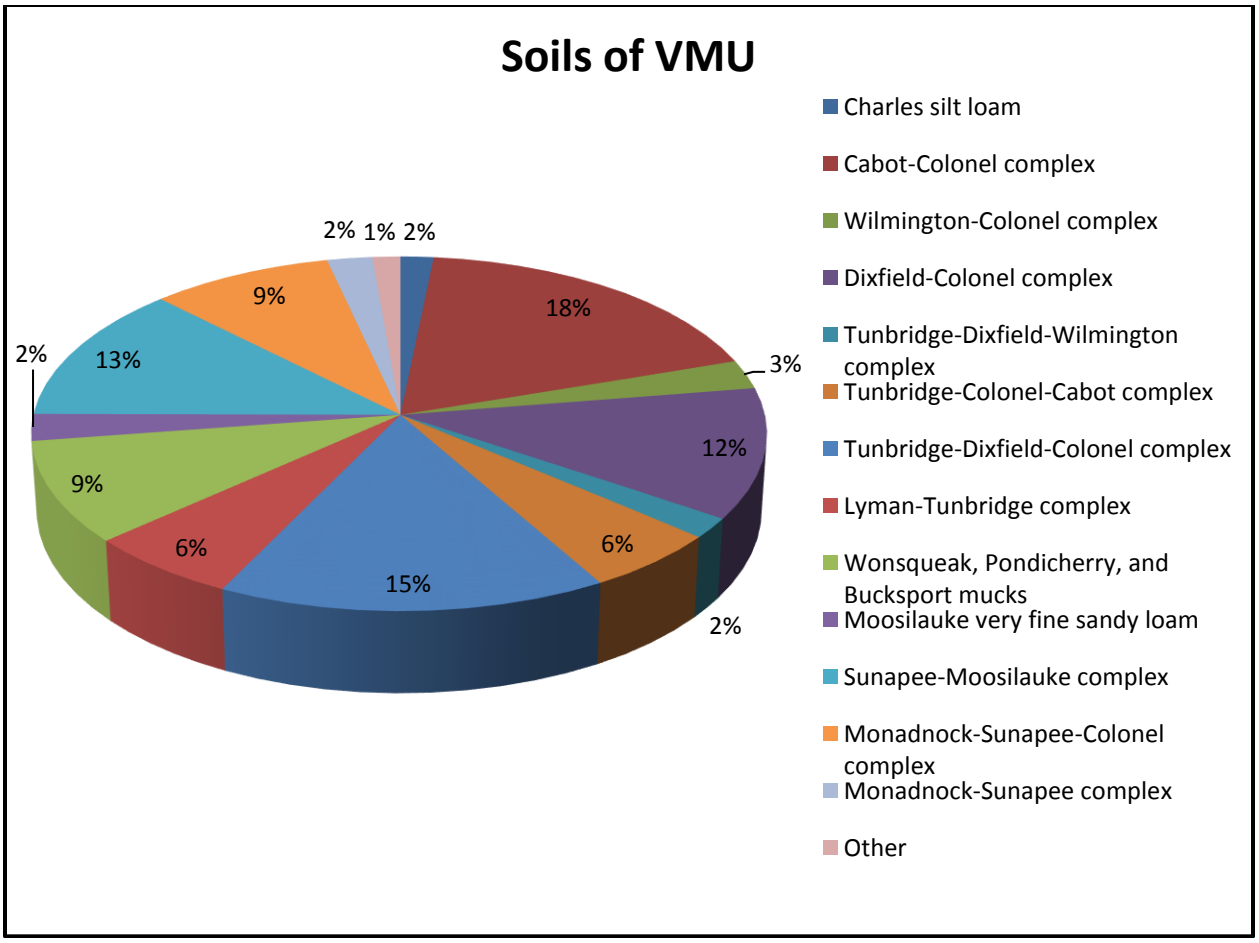
Over the WMA and State Forest, the diameter distribution shows a predominance of trees 4.6-10.5 inches dbh (57%), with smaller amounts of larger (23% greater than 10.5 inches dbh) and a minimal amount of young forest (5% between 0 and 4.4 inches dbh).

Stand data acreage of forest type by size class

Forest Type	***Poletimber*** *(4.6"-10.5")*	***Sawtimber*** *(>10.5")*	***Seedling - Sapling*** *(<4.5")*
Lowland Spruce-Fir	3343	245	234
Mixed	3750	307	305
Northern Hardwood	5124	4314	477

b. Soil and Site Conditions –

Due to the size and elevation and hydrological heterogeneity of the VMU, many different soil types exist throughout the management unit. In total 31 different soil types within the VMU are identified by the Natural Resource Conservation Service (NRCS) Soil Surveys for Caledonia and Essex counties. The graph below shows the relative proportion of total area covered by each soil type (soil types with less than 1% coverage are aggregated under “Other”).



Soil types within the VMU generally fall into two categories: 1) Poorly drained such as Cabot-Colonel complex and Wilmington-Colonel complex; and, 2) Moderate to well drained soils such as Lyman-Tunbridge complex. Lowland areas include several large areas of Wonsqueak, Pondicherry and Bucksport mucks a deep, poorly drained soil that formed in a mantle of well decomposed organic soil material within depressions on ground moraines, outwash plains, lake plains and flood plains found mainly in the Victory Basin WMA. These areas are generally less productive for timber growth, and consist of a variety of open and forested wetlands dominated by softwood species. Upland soils throughout the basin are generally better drained and very stony. Uplands soils are dominated by hardwood species and offer better growing conditions for timber.

c. Dominant Forest Types –

A cover type is a point-in-time identification of the main forest canopy, in other words it is a snap shot of the current conditions found within the forest. They are discrete, predictable associations of tree species that occur within a set of conditions. Natural communities (see Natural Community Assessment) are, by definition, a description of late successional condition and consider many elements in addition to canopy vegetation. In many instances cover type and natural community are the same. At other times, particularly when the cover type reflects early successional tree species or a plantation, the two may be different. What follows is a general overview of the timber resources on lands of VMU based upon

information derived from the FOREX inventory completed in 2009 and 2015, management records, and interpretation of aerial photography.

Northern Hardwoods (sugar maple-beech-yellow birch)

Northern hardwood forest type is found on approximately 48% of the VMU. This cover type is found on the more productive soils, usually on upland sites or elevated areas that tend to have moderate to well drained soils. Dominant canopy trees within this cover type include sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), yellow birch (*Betula alleghaniensis*) red spruce (*Picea rubra*), and lesser components are black cherry (*Prunus serotina*), red maple (*Acer rubrum*), and white ash (*Fraxinus americana*). The quality of timber within this forest type varies significantly and is impacted by several factors, the two most significant being past forest management and site quality. Soils at higher elevation (above 2,500 feet) and lower wet areas tend to be more poor quality sites for northern hardwood species. Regeneration within this forest type varies throughout the management unit and is strongly correlated to browse pressure and presence of American beech in the overstory (as American beech declines in response to the Beech Bark Disease complex, individual beech trees grow many "suckers" from their root systems, creating a dense understory of beech saplings which outcompete other hardwood species).

The Natural Community Assessment identified this forest type as a state significant matrix natural community as a result of the large contiguous size of the forest type within the VMU, its largely natural condition, and its position in a relatively undeveloped landscape. Large blocks of contiguous northern hardwood forests are relatively rare throughout Vermont, and as such management of the VMU should consider habitat connectivity and maintenance of continuity throughout the northern hardwood forest type within the VMU.

Lowland Spruce-fir (red spruce-balsam fir)

Lowland spruce-fir forest type is found on 17% of the VMU. This cover type is found on less productive soils in low lying areas, often in wet soil types. As noted in the sections below, small to medium scale windthrow is a common occurrence in this forest type throughout the Victory Basin lowlands. Dominant canopy trees within this cover type include red spruce (*Picea rubra*), balsam fir (*Abies balsamea*), red maple (*Acer rubrum*) and lesser component is paper birch (*Betula papyrifera*). The quality of timber within this forest type is generally good. Lowland areas throughout the Victory Basin have good growing conditions for spruce-fir forest types.

Spruce-fir forests in the VMU are often used by deer as wintering areas, and due to the large contiguous forest cover found throughout the Victory Basin, since the transfer of lands to the State, this forest type has historically been managed as a deer wintering area. Regeneration within this forest type is generally good, and often very dense following canopy openings created either naturally or following harvesting activities. Some openings, particularly large openings from fir blowdown, however are regenerating strongly to red maple.

Mixed (red spruce-northern hardwood)

Mixed forest type is found on 19% of the VMU. This cover type is found on a variety of soil conditions and is strongly correlated to recent disturbance (in the VMU these are primarily harvesting activities). Dominant canopy trees within this cover type include intolerant hardwood species such as trembling aspen (*Populus tremuloides*), bigtooth aspen (*Popuulus grandidentata*), paper birch (*Betula papyrifera*),

red spruce (*Picea rubra*), balsam fir (*Abies balsamea*), red maple (*Acer rubrum*) and lesser components include a variety of species often reflecting the dominant canopy species prior to harvesting activities. The quality of timber within the forest type is generally fair to poor, as this forest type is largely an early successional forest type and is quickly replaced by more tolerant species better suited for the soil conditions found in the VMU.

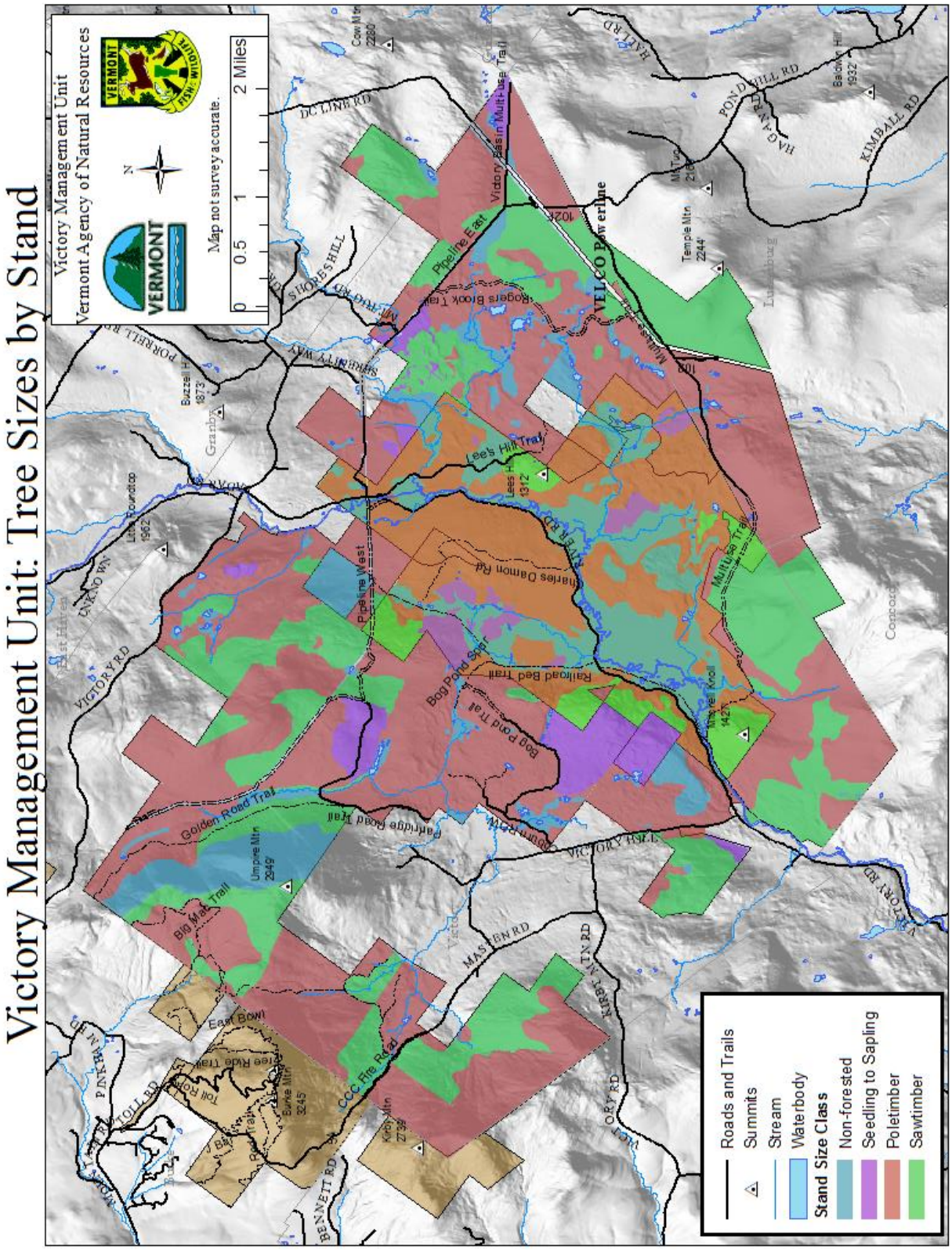
Table 7: Dominant Forest Types

Type	Major Species	Condition	Quality	Regeneration
Northern Hardwood	Sugar maple, American beech, yellow birch, red spruce	Mature	Moderate vigor	Heavy to diseased beech with moderate browse
Red Spruce-Northern Hardwood	Aspen spp., paper birch, balsam fir, red spruce, red maple	Mature	Moderate vigor	Mixed species with heavy browse
Lowland Spruce-fir	Balsam fir, red spruce, red maple, paper birch	High Risk	Low vigor	Mixed species with heave browse

Pertinent Issues:
Moose browse on seedling/sapling trees has caused a substantial reduction in the quantity and quality of forest regeneration, particularly of hardwood species and fir. In response to similar effects noted across this region of Vermont, DFW increased moose hunting permits and reduced the moose population in the area. Moose are now near their target level, though may still impact forest regeneration where locally overabundant.

Many even-aged stands of balsam fir are reaching their biological maturity and experiencing loss to blowdown events. Many of these openings have regenerated to hardwood species due to their large size and lack of established softwood regeneration.

Figure 7: Forest Resources



D. Forest Health Assessment

1. General Forest Health:

History of VMU forest health issues:
Spruce budworm caused significant defoliation in Essex and Caledonia County in 1981, including areas close to the VMU in Burke, however the VMU was largely spared during this outbreak. Also during this time the *Scleroderris* canker was positively identified in the town of Burke and the entire town of Burke, including portions of Darling State Park and Victory State Forest, was included in the *Scleroderris* canker quarantine area which continues through the present (The town of Kirby was added to the quarantine zone in 1984 when *Scleroderris* canker was positively identified within close proximity to the western edge of the VMU).

The spruce budworm defoliation continued in 1982, including one area identified within the town of Victory, and a large outbreak throughout the town of Burke. Defoliation within these areas was identified through 1983. In 1984 no additional defoliation was noted in Victory, however the outbreak continued in Burke areas to the north of the VMU through 1986. During this time, spruce budworm populations within the VMU increased, however mortality was never severe. By 1986 the areas impacted by the Spruce budworm had declined and were reduced to isolated patches throughout the Northeast Kingdom.

In 1985 a significant size area of hardwood dieback was found near the northwestern (spanning the East Haven and Burke town lines) and southwestern portions of the VMU (in the town of Kirby). The cause was believed to be due to the cold, open winter of 1980-1981, rather than Forest Tent Caterpillar damage seen at the same time in other areas of the state. At this time, large areas of upland spruce-fir mortality were also found near the summits of Umpire and Kirby mountains. From 1986-87 new areas of hardwood dieback were identified within the town of Victory, including within the VMU. Those areas identified in 1987 were thought to be associated with logging activity within the VMU, which damaged some trees and retained decaying cull trees.

In 1989 significant Anthracnose damage was identified throughout the entirety of the VMU. Despite the relative widespread identification of the damage, it was not until 1996, when aerial surveys over the VMU noted a reoccurrence of large areas of hardwood anthracnose damage. At this time additional dieback within hardwoods in the southeastern portion of the VMU was noted as chlorosis, early color, dieback, mortality and thin crown, a general identifier for hardwood decline and mortality.

In 1990, large areas of Beech Bark Disease mortality was first mapped during aerial surveys in the western portion of the VMU. Beech Bark Disease (BBD), a non-native disease complex, has continued to impact nearly all of the American beech stems within the VMU, although some individuals have demonstrated resistance to the complex, the vast majority of trees eventually succumb to the disease. In 1992 and again in 2001, 2007, 2010 and 2011, new areas within the northwestern portion of the VMU were mapped as beech decline and mortality related to BBD. In subsequent years small patches of BBD decline and mortality were identified throughout the northern hardwood forests of the VMU.

From 1991-2000, and again in 2005, 2007 and 2011 small areas, increasing in size over time, of birch defoliation were mapped within the town of Victory, including within the VMU. Defoliation was likely due to birch leaf miner, although some impacts of drought during summer months may have also caused decline in health on thinner, high elevation soils. For example, in 1991 drought conditions likely caused a combination of scorch, chlorosis and crown thinning in multiple hardwood stands within the VMU. Drought conditions continued through 1992 when additional drought related symptoms were identified in hardwood stands of the VMU. Drought conditions in 1995 were also noted within the VMU in the annual aerial surveys, and significant damage associated with drought was noted in 1999. Following one of the wettest winters on record, the summer of 2001 reported extensive foliar symptoms caused by drought throughout the VMU.

Following the winter of 1993, small areas of red spruce winter injury were reported within the VMU. Significant winter damage was not noted for another 5 years until 1998, when large areas of the VMU were mapped as heavily damage with greater than 25% of trees experiencing more than 25% damage from the ice storm in January of 1998. Damage was greatest on the higher elevation and western slopes of Umpire Mountain and Kirby Mountain.

In 2003 two small patches of balsam wooly adelgid mortality were identified in the southeastern portion of the VMU. However, relative to other populations identified throughout the state, populations in the VMU were found to be low, and large scale impact was not identified. During 2003, a small patch of hardwood decline was identified in the VMU. Of greater significance was Spruce Winter Injury which was identified in multiple patches in the western portion of the VMU. The following year spruce-fir dieback and mortality was identified, however direct relationship to either winter injury or Balsam wooly adelgid was not specified.

In 2006, a significant area hardwood decline and mortality was identified in the southeastern portion of the VMU. Again in 2008 and 2009 aerial surveys detected large areas of late season defoliation of birch and other hardwoods throughout many large areas within the VMU.

In 2010, significant areas of frost damage were identified during spring aerial surveys. This was in large part due to a late spring frost that impacted 414,901 total acres throughout the state. This frost occurred in mid-May, following a record setting high temperatures and dry conditions throughout the spring resulting in an earlier than usual bud-break throughout the state.

Current forest health conditions in the VMU:

The current forest health conditions within the VMU are good. Despite wide scale infestation of Beech Bark Disease, beech continues to act as a co-dominant species within much of the upland hardwood forests. Hardwood decline noted in 2005, 2007 and 2011 did not appear to be as widespread in 2012, despite one of the warmest and driest summers in recorded history. The diversity within the forest types and tree species within the VMU add to the resilient nature of this forest. Wind disturbance continues to be the most wide scale natural disturbance type within the area, however, despite high intensity the magnitude of these disturbance is relatively low, with usually less than 5 acres being impacted at a time. These small to medium scale disturbances create a mosaic patchwork of age classes throughout the forest, similar to the impact of past and present forest management, helping to diversify the age class

within the forest which in turn adds to the resiliency of the forest. Despite the resiliency of the VMU's forests, several forest pests are significant management concerns:

Spruce budworm
Historic trends show that the spruce budworm (*Choristoneura fumiferana*) populations follow cyclic patterns. The last major outbreak in Vermont occurred from 1975 to 1985, when winds from the north transported the spruce budworm southward into northeastern Vermont (Parker et al. 1989). Recent data from monitoring traps through Essex, Orleans, Chittenden and Caledonia counties show a decline in spruce budworm populations over the last three years and significant defoliation from spruce budworm is not expected. However, close evaluation of historic population trends show that another population explosion is likely in the next decade, and recent population growth in Quebec suggests cause for concern. As such, in 2009 the state of Vermont re-initiated spruce budworm monitoring and this information will be used to inform management decisions in mature spruce-fir stands, which are most impacted by a significant spruce budworm outbreak.

Hemlock wooly adelgid
As of 2014, hemlock wooly adelgid has been detected in 17 towns in southern Vermont, primarily in Windham County. This non-native invasive pest is a potential concern to the VMU, however due to the low proportion of hemlock in mixedwood and softwood stands within the VMU, the impact of this pest would be less than other potential threats.

Emerald ash borer (EAB) and Asian longhorned beetle (ALB)
Of greatest concern to the upland forests throughout the VMU are the expansion of two non-native pests, the emerald ash borer (*Agrilus planipennis*) and the Asian longhorned beetle (*Anoplophora glabripennis*). In 1996 the Asian longhorned beetle was first identified in Brooklyn and Long Island, NY, and efforts to monitor the spread of this pest into Vermont began in earnest. Emerald ash borer was first introduced to the United States in 2002 in the southeastern Michigan, and spread of this pest has occurred at a rapid pace throughout much of the eastern United States.

Both of these species target hardwood species, which compose a large percentage of the VMU landscape. In the 2012 Forest Insect and Disease Conditions in Vermont, the Department of Forests, Parks and Recreation stated that at this time no specific management adjustments in anticipation of ALB are suggested. Similarly, no specific forest management activities are suggested in response to recent expansion of EAB quarantine zones to the southwestern Vermont border and recently near Concord, NH. In 2012, VT FPR produced guidance on how landowners could manage forests in response to potential threats from EAB. These guidelines will assist ANR in implementing a response, if an outbreak of EAB occurs near or within the VMU.

Overall concerns
Historically, pest outbreaks such as the spruce budworm outbreaks of the 1980's, the VMU was spared significant mortality, partially due to the isolated nature of this parcel. However, as seen with the high proportion of infected American beech trees resulting from the spread of the Beech Bark Disease, the VMU's relative geographic isolation alone is not an effective management tool. As such monitoring programs for EAB and ALB have begun throughout the state, including several EAB monitoring traps along the major roads that bisect the VMU. As neither of these pests have been detected within a 100 mile radius of the VMU, at this time no specific management changes will be applied, however

following a detection of any non-native invasive pest within the VMU, forest managers will work with relevant agencies to develop and engage in an adaptive management strategies to respond to the potential threat of the specific pest.

2. Browse Sensitivity Assessment:

During the forest inventory of the VMU, qualitative assessments of browse were noted in both hardwood and softwood stands. Browse pressure is largely related to moose presence. In some hardwood stands adjacent to dense coniferous canopy cover, significant moose browse was noted, resulting in almost the complete inhibition of hardwood regeneration. In regenerating softwood stands, browse on young fir trees was noted in numerous instances, however browse pressure rarely seemed severe enough to inhibit successful regeneration of all fir seedlings within the stand.

3. Nonnative Invasive Species Assessment:

Unlike many other areas in the state of Vermont, the impact of invasive exotic species is relatively low within the VMU. This is in part due to the isolation of this area, and also the land use history which has focused primarily on maintaining a continuous forest cover through active forest management. Isolated populations of *Phragmites* have been identified within the VMU by State lands staff, and are usually less than ¼ acre in size and can be controlled and effectively eradicated using localized application of herbicides. The spread of this plant is usually the result of the spread of seed transported on heavy machinery such as logging and excavation equipment, or through the transport of fill in road construction. Most isolated patches found in the VMU are in or adjacent to log landings, road ditches, or borrow pits from past road construction, or along the VELCO transmission line and Portland Pipeline right of ways. At this time all current and future timber harvest and road work contracts include a clause that all machinery must be free of debris in order to avoid any additional transport of seed or invasive plant material into the VMU.

In addition, false spirea (*Sorbaria sorbifolia*) and white poplar *(Populus alba*) are both known from a single, old field site. Comparisons of mechanical and herbicide treatments have been conducted on the false spirea, and the first stages of control have been conducted. White poplar has not been treated yet.

Beyond these a number of other invasive exotic plants pose a potential threat to native forests within the VMU. Although not presently found in the VMU Morrow's Honeysuckle and Tartarian Honeysuckle (*Lonicera morrowii and Lonicera tatarica*) are found in areas within close proximity to the VMU. Other potential threats include glossy buckthorn (*Frangula alnus*), autumn olive (*Elaeagnus umbellate*), and Japanese knotweed (*Fallopia japonica*). The presence of non-native invasive species will be monitored by FPR staff, and if identified specific eradication and/or control plans for individual populations identified will be created by FPR staff and executed in a timely fashion.

A number of invasive exotic pests have significant impacted the forests of VMU. Table 4 below lists a complete list of these pests. Most notable is the introduction of the Beech Bark Disease complex which arrived to Nova Scotia around 1920, arriving in the United States by 1929. Today nearly all beech trees within the VMU show scars from this disease, which has resulted in a shift in the role of beech trees within the northern hardwood forests of the VMU from a co-dominant canopy tree to a dominant understory tree with few large individuals. Of notable consequence from this complex is that prior to

dying back the final response of large beech stems is to release many "suckers" from its root system, creating a dense understory of beech saplings that are clones of the parent tree. The relationship between the decline of beech in the overstory and the increase of beech in the understory illustrates just how far reaching the impact of an individual pest can be. This illustration becomes even more worrisome when looking at the potential pest impacts from those pests not yet found in the VMU such as Asian longhorned beetle and emerald ash borer. These pests have the potential to significantly impact not only the specific trees which the pests attack, but also have a broader impact on forest composition and structure within the VMU.

In order to monitor the presence and impact of exotic pests FPR conducts annual aerial surveys as well as participates in state wide monitoring programs for emerald ash borer. Following the positive identification of new pests to the area, FPR staff will work with State and Federal experts to develop pest management and/or eradication programs for the specific pest.

Table 4: Invasive Exotic Plants and Pests of VMU

Invasive Exotic Plants of VMU					
Species Name	**Common Name**	**Distribution**	**Estimated % Cover**	**Sites Where Found**	**Present Threat to Native Plant Communities**
Phragmites australis	Common reed	Isolated patches	<1%	River Rd Victory Rd Pipeline	Moderate-High
Sorbaria sorbifolia	False spirea	Isolated patch	90%	Shaw Place	Low
Populus alba	White poplar	Isolated patch	50%	Shaw Place	Low

Invasive Exotic Pests of VMU					
Species Name	**Common Name**	**Distribution**	**Estimated % Cover**	**Sites Where Found**	**Present Threat to Native Plant Communities**
Nectria faginata	Beech Bark Disease	Widespread	>80% of American beech infected	Northern hardwood stands	Significant impact on mature beech
Ophiostoma novo-ulmi	Dutch Elm Disease	Widespread	>90% of American elm infected	Floodplain and wetlands	Significant impact on mature elm trees
Cronartium ribicola	White Pine Blister Rust	Isolated patches	Localized impact where	Localized impact where *ribes* present	Impact on young white pine trees and new growth

			ribes present		
Fenusa pusilla, Messa nana and others	Birch Leaf Miners	Varies, but can be widespread	<5% when widespread	Red spruce, northern hardwood	Decline or mortality of white birch from defoliation
Taeniothrips inconsequens	Pear Thrips	Varies	Varies	Northern hardwood	Persistent outbreaks can cause crown dieback

E. Water Resource Assessment

Watershed description:
The VMU is all contained within the Connecticut River watershed divided between the Upper Connecticut River and Passumpsic River basins with most of the lands residing in the Passumpsic River basin. A ridge that runs along Burke and Umpire Mountains make up the divide between the Moose River and East Branch Passumpsic watersheds while a less prominent ridge between Miles, Temple and Stone Mountains make up the divide between the Moose River watershed and smaller streams that drain directly to the Connecticut River.

The Moose River watershed is 130 square miles in area with land use that is largely forested lands and wetlands with some more intense agricultural and developed land use in the lower portions of the watershed before it joins the Passumpsic River in St Johnsbury. The East Branch watershed covers 77 square miles which are also predominantly forested with small pockets of agricultural and developed land use with the exception of the lower watershed between East Burke and its confluence with the West Branch in the town of Lyndon where there is a greater intensity of developed and agricultural landuse. The Passumpsic River joins the Connecticut River below the Comerford Dam which then flows down to Long Island Sound.

There are just small portions of the VMU that drain to the Connecticut River directly. These are part of the Miles Stream watershed which covers a total of 25 square miles.

The Moose River is the largest stream in the VMU with a watershed area of 81 square miles as it leaves state lands. Of these, 33 square miles are within the management unit. Over 90 miles of streams in the VMU are in the Moose River watershed. Bog Brook is the second largest stream on the VMU . It has a watershed area of nearly 19 square miles, a majority of which is in the VMU. Other streams in the Moose River watershed within the VMU include Weir Mill Brook, Schoolhouse Brook, Hay Hill Brook, Granby Brook, Suitor Brook, Rogers Brook, Cold Brook, Umpire Brook, James Brook, Pond Brook and Dudley Brook.

The Victory segment of the Moose River grows from a fourth-order stream where it enters VMU to fifth-order where it exits at the Victory: Concord town line, and its drainage area more than triples. Its average gradient for the roughly 9 miles from Gallup Mills to the USGS Streamflow Gaging Station is 22’/mile (0.4%), suggesting deceptively a gradient steeper than the predominant character of the river.

This results from the influence of the upstream-most 2 miles where the gradient is 71'/mile (1.3%) and the downstream-most half-mile where the gradient is 42'/mile (0.8%). The central 6.5-mile reach through the Victory Bog area is very low gradient, only 3'/mile (0.06%). The vertical profiles of the Moose River tributaries from ridge top to valley floor are generally very steep. In the most extreme case, Bog Brook loses over 2000' elevation in the 8.5 miles from its headwaters to the Moose River confluence, roughly 235'/mile (4.5%).

Wetlands are the defining water feature in the VMU making up over 13% of the VMU in the Moose River watershed. The Victory Bog and Moose River wetlands complex intergrades from alder swamps on floodplain edges to softwood swamps in areas further from the river with a large Dwarf Shrub Bog in the heart of the wetland complex forming one of the best examples of boreal community. This is described in greater detail in the natural communities section of the Long Range Management plan.

Biological assessments on Rogers Brook in 2010 by the DEC BASS unit using *Index of Biotic Integrity* metrics showed an "excellent" macroinvertebrate community with a "good" fish community assessment. The upper Moose River itself hasn't been monitored for over 10 years but had a macroinvertebrate assessment of "good" at mile 14.3 in 1999 and "excellent-very good" at mile 3.9 in 2004.

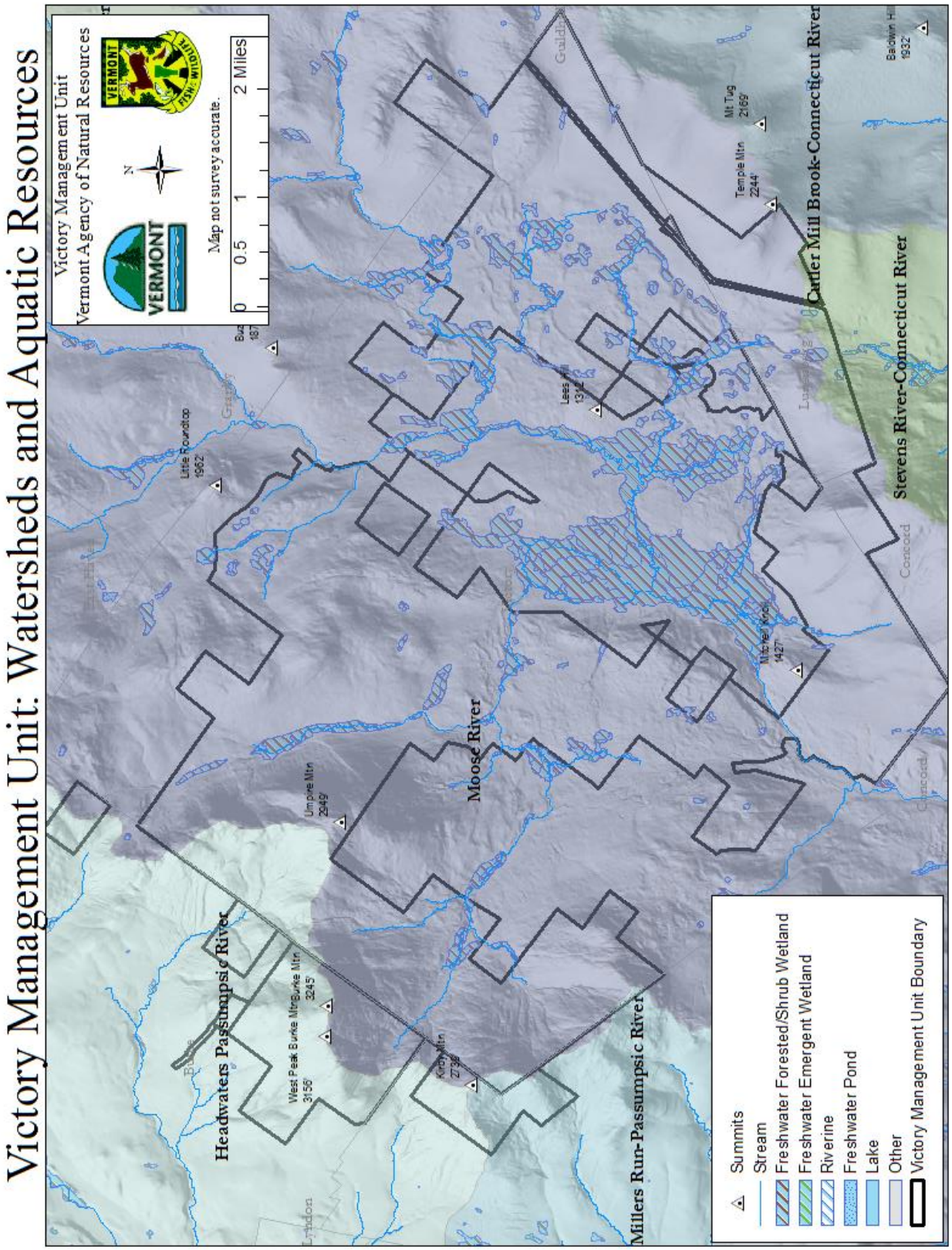
The VMU includes only three square miles in the East Branch watershed mostly draining into Dish Mill Brook watershed but also including small segments of the Mountain Brook, Flower Brook, Simpson Brook and Barns Brook or unnamed tributaries to these waters. Dish Mill Brook is listed as stressed from mouth upstream to mile 1.3 due to hydrologic scour and some sedimentation from ski area development and roads. Dish Mill Brook and the tributary to Dish Mill Brook that drains much of Burke Mountain ski area have been noted in the water quality stream assessment database since 1988 when construction at Burke threatened Dish Mill Brook and sand embeddedness affected the tributary to Dish Mill along Burke Mountain Access Road. During this time, Dish Mill Brook and to a greater extent, Dish Mill Brook tributary, were degraded with low abundance and altered functional group composition in the macroinvertebrate community. The Dishmill Brook monitoring site at river mile 1.3 is located several hundred meters above the third access road bridge and had a macroinvertebrate assessment of "good-fair" in 2010 although the fisheries assessment was "excellent". The tributary site at river mile 0.1 is located about 50 meters below the access road and an additional site on this tributary was added in 2010 just above the access road at river mile 0.2. The site at river mile 0.2 was rated in "excellent" condition in 2010 with a large number of water quality sensitive taxa suggesting restoration of this stream since 2007 when this stream was considered to be in ""fair" condition due to elevated levels of sediment. The assessment of "excellent" at river mile 0.2 is based on only one year of data and there is evidence of continued sedimentation in tributaries to this stream in 2013 so status of the streams recovery needs to be assessed another year.

The VMU covers just under a third of a square mile of the Carr Brook watershed that drains Miles stream which is a tributary to the Connecticut River. Macroinvertebrate assessments showed good conditions on Carr Brook further downstream at mile 0.4 in 2005 and excellent condition on Miles Stream at mile 2.1 in 2010.

Relationship to Basin Plan:
The current condition of Dish Mill Brook as stressed due to stormwater runoff has been identified in the current water quality assessment report and draft watershed plan as an area of focus for watershed

improvement. The goal of the draft Passumpsic and Upper Connecticut River basin water quality management plan is to work to increase treatment of existing sources of stormwater runoff in this watershed to reduce stress on the aquatic community. In addition to this any additional development should be done in a way to minimize sediment runoff and maintain natural hydraulic capacity as well as to consider innovative ways to reduce peak stormwater flows.

Figure 8: Water Resources



F. Fisheries Resource Assessment

As with all Long Range Management Plans, fisheries management for waters and watersheds not enclosed by the VMU is not within the scope and authority of the Plan. Such waters are addressed only in their limited connection to the VMU, that is, insofar as land use activities on VMU affect or are influenced by them, and the public land ownership of the management unit affords access to them.

No sampling to inventory fish in waters at VMU has been undertaken specifically for this Plan. Existing sampling records are adequate to describe the current fish communities. Recent sampling, using electrofishing and concentrating on fast-water habitat conditions, complements investigations dating back to the 1950s. No sampling has occurred in the deeper and slower zones of the low gradient reaches of the Moose and its tributaries at valley bottom. A summary of the sampling history and documented fish species is presented in Table (2) below.

There is a relationship between stream size, fish communities and fishery resources. For most small coldwater streams, the fish community is simple. The smaller the drainage area of a stream, the greater is the probability that the stream will be ephemeral or intermittent (seasonally ceasing to flow above ground in most years). Seasonal streams may be fishless. Streams that dry out every few years may have a simple fish community that is dependent entirely on re-colonization from permanent waters downstream. Likewise streams that are reduced seasonally to unconnected pools may have a fish community that is simple and population abundance that is low. The transition point from fishless to fish-bearing for individual streams in the VMU has not been determined. High stream gradient (steep slope) may have major implications for re-colonization following droughts and other events that extirpate fish populations. Some stream segments in VMU may fall into these categories. For example watercourses within VMU in the East Branch Passumpsic and Carr Brook watersheds are high elevation, first-order, steep gradient, mainly ephemeral / intermittent and assumed to have no fish fauna. Fisheries resources of these watercourses are, however, of State management concern downstream, outside the VMU boundary. The presence of the many beaver flowages in VMU will influence re-colonization of stream reaches upstream and downstream, because they may provide refugia during the most extreme drought conditions. For all streams, species richness begins with one species, usually brook trout. The further downstream, the more species are added.

The water resources of the VMU are mainly lotic (flowing waters). With the exception of numerous beaver flowages and extensive low gradient stream reaches, there are no truly lentic (still water) waterbodies of significant size. The fish communities found in the waters of the VMU are predictably riverine.

Geologically, the granitic composition of underlying bedrock, as in the case for the Victory pluton, contributes to waters with lower conductivity, pH, and buffering capacity. These factors contribute to the intrinsically low productivity of the VMU's surface waters for aquatic biota.

The fish community documented at the higher elevation stations for the Moose River tributaries is relatively simple, consisting of only brook trout (including young-of-year) and slimy sculpins. The brook trout populations observed are all of natural origin (confirmed by characteristics of individual specimens and the presence of young-of-year that are evidence of natural reproduction). Although they

are assumed to be native to the VMU, it cannot be readily ascertained if their population genetics have been influenced by VTFW stocking over the past century, or by more recent undocumented stocking by individuals participating in a VTFW-supported brook trout rearing and stocking collaboration. Longnose suckers and one or more species of fastwater minnows join the brook trout / sculpin fish community at more down-gradient stations. The complexity of the fish community increases dramatically at stations in the Moose River and the valley-bottom segments of the tributaries. Additional minnow and sucker species are present, as well as burbot, but brook trout young-of-year do not occur.

Thermal regime, especially summer temperature maxima and duration of high temperature periods, can play a major role in fish species occurrence and distribution. Water temperature was recorded continuously in 2007 at several stations in the VMU vicinity along the Moose River mainstem and in the two largest tributaries, Bog Brook and Rogers Brook, just above their confluence with the mainstem. In addition water temperature in Weir Mill and Umpire brooks was data-logged in 2010 and 2011. Table **(**1) includes the maximum temperature and the number of hourly readings at or above 20^{o}C for the data-logging stations. Table **(**3) presents additional relevant metrics for Weir Mill and Umpire brooks. As is typically the case, the temperature regime becomes warmer from the headwaters to the mainstem, from higher to lower elevation, from upstream to downstream. This is especially evident in the VMU portion of the Moose River watershed, where low gradient, slow water conditions in the Victory Basin area strongly influence water temperature. Although not an absolute determinant, the prevalence of summertime water temperatures in the mid- to upper- 20s^{o}C decreases the likelihood of viable naturally reproducing trout populations, and summertime widespread presence of trout, especially brook trout. Individual extreme high temperatures (*maximum water temperature* in Table 1) may suggest that thermal conditions challenging to trout occur, but the frequency and long duration of warm water conditions (*number of readings* in Table 1) may be most indicative of formative factors for the fish community. The existence of thermal refugia (small cold tributaries, springs and significant groundwater water inputs) may support highly localized but undocumented concentrations of trout in the Victory Bog area. The warm thermal regime documented in Rogers and Granby brooks and in the Moose River starting at Victory Bog is likely to be the main factor accounting for the absence of wild trout.

Yearling brook trout are stocked annually in the Moose River from above Gallup Mills downstream to the Bog Brook confluence, and yearling rainbow trout (or brook trout or brown trout in the occasion of rainbow trout production shortages) are stocked from the Victory Hill Rd. downstream to St. Johnsbury. This stocking follows the prescriptions of VTFW's Management Plan for Brook, Brown, and Rainbow Trout which address fishing interest and effort, public access, and the abundance of catchable-size trout in waters readily accessible for angling.

The Moose River is included in the Connecticut River Atlantic Salmon Restoration Program as *natal* habitat (originally accessible by spawning adults from the ocean) for rearing juvenile life stages. From the early 1990s through 2013 salmon fry were stocked annually throughout the mainstem, typically from the East and West Branches down to the mouth in St. Johnsbury, but excluding the low gradient Victory Bog area. Restoration efforts have now been suspended as a result of discontinuation of salmon culture activities by the U.S. Fish and Wildlife Service following serious damage to the White River National Fish Hatchery in Bethel due to Tropical Storm Irene in 2011. The final stocking in the VMU area was in 2011. There is no salmon presence in the Moose River at this time, as all outmigration of juveniles to the ocean will have occurred before spring 2015. The Moose River mainstem would be targeted again for fry stocking if and when salmon restoration efforts were to resume.

Table (1). Physical and thermal information for the streams in Victory Management Unit

Victory Management Unit streams	elevation: maximum	elevation: minimum	total drainage area (miles^2)	% lakes & ponds	water temperature maximum	hourly temperature readings >20ºC
Bog Brook		**1103**	**18.9**	**0.07**	**24.3**	**213**
Weir Mill Brook ([a] =2010; [b] =2011)	3148	1267	8.2	0.04	21.8 [a]	44 [b]
Umpire Brook ([a] =2010; [b] =2011)	2971	1262	5.6	0.15	26.1 [b]	309 [a]
James Brook	**2975**	**1223**	**3.7**	**0.15**		
Rogers Brook		**1135**	**17.0**	**0.44**	**29.2**	**524**
Granby Brook	2386	1153	9.1	0.76		
upper Rogers Brook	2335	1312	1.4	0.09		
Suiter Brook	2084	1310	1.3	0.18		
Next W Brook	2102	1269	1.0	0.13		
Next next W Brook	2162	1208	1.2	0		
Hay Hill Brook		**1102**	**5.4**	**0.52**		
north	2255	1103	3.5	0.67		
south	2272	1102	1.9	0.25		
Cold Brook	**2667**	**1103**	**2.2**	**0**		
Moose River						
East Branch					22.5	52
West Branch					20.0	1
Moccasin Mils above Gallup Mills					23.4	68
Above James Brook confluence		1223	23.8			
Above Victory Basin					25.1	192
Victory Basin		1120			26.5	427
USGS Gaging Station		1102	75.6			
Victory : Concord line		1046	81.1		27.0	597
Above Kirby Brook confluence					28.4	670

Table (2). Fish species documented in Victory Management Unit streams, based on sampling by electrofishing.

Major Stream	Bog Brook			James Brook	Rogers Brook		Moose River				
General Location	Weir Mill Brook	Weir Mill Brook	Umpire Brook		Granby Brook	Rogers Brook	Portland Pipeline	Opposite Lees Hill Rd.	above Victory Basin	Victory Basin 1mi. above Damons	Victory Schoolhouse
Elevation (feet above sea level)	410	426	415	481	372	360	366	357	353	346	329
Date	7/2/2010 7/7/2011	7/23/1985	8/5/2009 7/2/2010 7/7/2011	8/5/2009	8/5/2009	7/23/1985 9/13/2010	7/22/1985 8/20/2013	9/13/2011	7/21/1983 7/19/1985 9/15/1999	7/27/1983	9/22/1993 8/26/1994 8/1/1995 9/17/2003
SPECIES											
CATASTOMIDAE (suckers)											
longnose sucker			X		X	X	X	X	X	X	X
white sucker									X		X
COTTIDAE (sculpins)											
slimy sculpin	X	X	X	X		X	X	X	X	X	X
CYPRINIDAE (minnows)											
blacknose dace			X		X	X	X	X	X	X	X
common shiner						X					X
creek chub			X		X	X		X	X		X
fallfish		X					X		X		
lake chub						X		X			X
longnose dace					X	X	X	X	X	X	X
GADIDAE (codfishes)											
burbot					X	X	X	X	X	X	X
SALMONIDAE (char,trout,salmon)											
Atlantic salmon								X			X
brook trout	X	X	X	X			X	X			X
brook trout YOY	X	X	X	X			X				
brown trout											X

Table (3). Habitat metrics comparing two Moose River tributaries in Victory Management Unit with tributaries upstream of VMU (based on 2011 fish sampling).

Moose River tributary	Line	East Branch	West Branch	Umpire	Weir Mill
Station Elevation (m)	477	543	542	415	410
Lat	44.61268	44.63419	44.63428	44.56451	44.5417
Long	-71.7934	-71.8115	-71.8119	-71.8405	-71.85308
brook trout (kg/ha)	15.9	28.7	9.2	28.9	13.5
brook trout >6" (kg/ha)	0.0	14.5	2.7	6.1	3.8
Alkalinity	2.0	3.0	4.0	18.0	21.0
Color	50.0	45.0	45.0	23.0	15.0
pH	6.89	6.8	6.97	7.28	7.38
Conductivity	18.4	15.6	19.1	46.7	64.5
Mean Slope(%)	2.0	2.3		1.1	3.0
Mean Wet. Width(ft)	13.2	12.2		16.7	26.0
Mean BKF(ft)	26.4	30.6		25.8	42.0
Ratio of WW/BKF	0.5	0.4		0.6	0.6
Mean Pool Depth(ft)	1.3	1.5		1.9	0.0
Mean Riffle Depth(ft)	0.5	0.4		0.5	1.0
Mean Glide Depth (ft)	0.7	0.6		0.7	0.0
Max pool depth (ft)	1.9	1.9		3.2	0.0
Max riffle depth (ft)	0.9	1.0		1.1	1.4
Max glide depth (ft)	1.0	1.3		1.8	0.0
%Pool	0.26	0.10		0.30	0.00
%Riffle	0.66	0.62		0.27	100.00
%Glide	0.08	0.28		0.43	0.00
Total wood	496.85	492.93		873.13	183.18
Functional wood/ha	390.38	224.06		838.20	36.64
Pool-forming wood/ha	70.98	0.00		244.48	36.64
Cover wood	390.38	268.87		838.20	36.64
Cover Wood in pools	70.98	89.62		174.63	36.64
Hours $\geq$18^{o}C	36	101	252	711	168
Hours $\geq$20^{o}C	0	16	52	233	25
Hours $\geq$22^{o}C	0	0	8	61	0
Hours $\geq$24^{o}C	0	0	0	17	0
Exceedance statistic $\geq$18^{o}C	10.7	54.1	150.5	613.5	86.3
Exceedance statistic $\geq$20^{o}C	0.0	5.1	24.7	172.7	10.0
Exceedance statistic $\geq$22^{o}C	0.0	0.0	1.2	39.3	0.0
Exceedance statistic $\geq$24^{o}C	0.0	0.0	0.0	8.3	0.0

G. Historic Resource Assessment

Native American and Pre-historic
The first humans to occupy this region were likely small groups of semi-nomadic hunter-gatherers in about 9,000 B.C. Little evidence of these people exists, however, from the northern Connecticut River area. Most known pre-European archeological sites in this area are from the woodland period (100 B.C.-1600 A.D.), and are located on the mainstem of the river or its tributaries.

Early Settlement and Industrial History
European presence in this area began in the mid-17th century with the fur trade and associated trading posts such as those built in Danville, Vermont and Stratford, New Hampshire. More permanent settlement by Europeans began in the area in the late 18th century with the creation of subsistence farms and water-powered mills.

Early settlers made use of many forest products including potash, maple sugar, tannins from hemlock, and cedar and spruce oils. In the mid- to late-19th century, however, logging became the dominant landuse of the area. In 1882, a steam and water powered sawmill that could cut 5 million board feet of spruce each year was constructed at Bog Pond. From 1883 to 1917, an 11 mile logging railroad connected North Concord to Granby, including a 0.5 mile spur connecting to the Bog Pond Mill. In 1900, the Bog Pond Mill burned and was replaced with a larger mill at Damon's Crossing. In 1904, a six mile spur extending east from the new mill was created, and began supplying spruce logs from the Rogers Brook drainage. By 1917, however, all mills served by the Victory branch railroad had closed, so the lines were closed and the rails pulled up.[2]

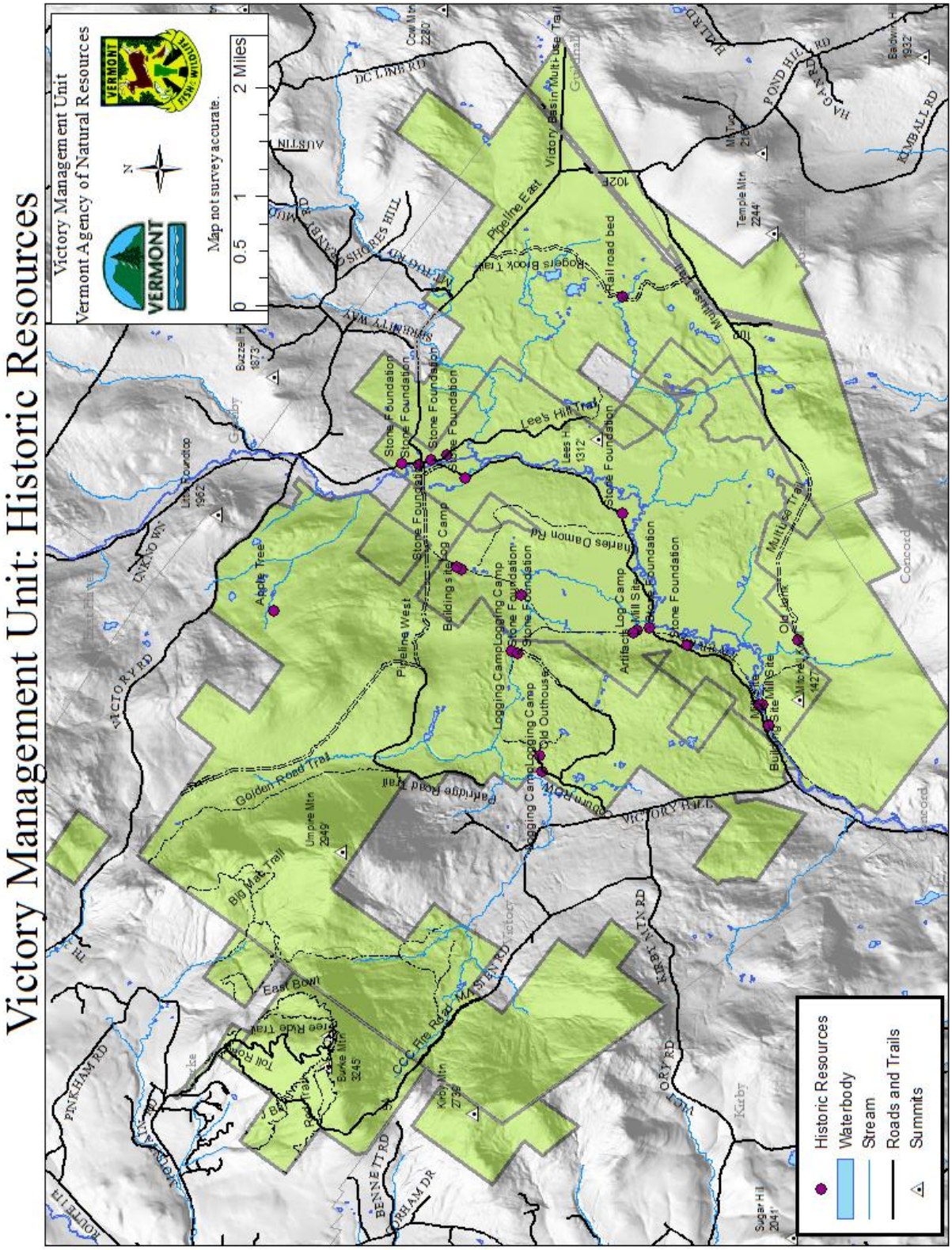
A number of historic features remain in the Victory Basin, including stone foundations, bridge abutments, and the railroad bed. Four home sites have been identified on historical maps from the 1800s, and corresponding foundations have been located. Most are of fieldstone and present little historic evidence other than the foundation structures, worn by time and regrown vegetation. One location, the "Works Farm" also has a foundation for a barn and a well. Additional foundations are known from Damon's Crossing and an area about 0.5 mile south of the crossing. These are believed to have been associated with the railroad, and the southern site also has an outbuilding foundation and a well. Farther south still, stone abutment remains show where the railroad crossed the Moose River, and additional stone work in and around the river may indicate a mill location. Finally, the stone and fill railroad bed itself is a conspicuous feature in many areas, though no remains of ties and tracks are known.

In addition, Darling State Park contains a number of historic features, including the lookout tower and features other associated with the Civilian Conservation Corps and early ski area development. The tower atop Burke Mountain currently was constructed in 1938, on the site of the first lookout tower in Vermont (constructed in 1912). The current tower was registered as a National Historic Lookout in 1999. Numerous other features on the State Park originated from the CCC including fireplaces, tent

[2] G. Hopper. 1989. *The Victory Branch Railroad of Vermont*.

platforms, a CCC workers camp, and the “toll road” up Burke Mountain (completed in 1935). In addition, other sites exhibit features of the historical ski area use including former lift equipment, bench seats, wells, and foundations.

Figure 9: Historic Resources



H. Recreation and Public Use Resource Assessment

1. Existing Conditions:

The following as recreational uses are known to occur on the Victory Management Unit:

a. Hunting, fishing, and trapping – These activities are permitted on all state lands, unless otherwise designated and are subject to the rules and regulations established by the Vermont Fish and Wildlife Board. Due to its large size and diverse habitat, the VMU is a popular hunting designation and a place where a hunter can get a "big woods" experience. Both large and small game hunting is popular in VMU including deer, bear, moose, hare, ruffed grouse, and turkey.

   Big game hunting has been, and continues to be, popular in the VMU. Though the VMU no longer has its historical reputation as being some of the best hunting for larger, older bucks in Vermont, deer are still present in the unit and harvests average about 5 bucks each year from the VMU area. In addition, moose are hunted extensively on the VMU. In fact, WMU E leads the state in harvest of moose, with 177 harvested from Victory since 1995. Finally, bear are hunted commonly on the VMU, and it has special value for both bear habitat and hunting as a part of the landscape of large, undeveloped parcels in northeast Vermont.

   Ruffed grouse and American woodcock can be found commonly in the extensive floodplains of the Victory Basin, where shrubby habitats provide good cover, while interspersed small openings provide foraging areas and conifers provide winter shelter and foraging for grouse. Grouse and woodcock hunting is popular at the VMU, though no specific numbers of use or harvest are known. In addition, Victory Basin is home to a population of spruce grouse, a state Endangered species. Warning signs are maintained annually in spruce grouse habitat to remind ruffed grouse hunters that it is illegal to intentionally or accidentally shoot a spruce grouse.

   In addition, snowshoe hare hunting is a popular activity in the VMU, and with the hare season recently extended only in WMU E, this area may see additional use from hunters traveling from other parts of the state.

   The VMU is not known to be a popular location for waterfowl hunting and no numbers on harvest or use are known.

   Turkey numbers in the area are relatively low, and hunters harvested 152 turkeys from WMU E in 2012, one of lowest harvests per square mile in the state. Populations, however, have grown noticeably over the past 12 years and turkeys are commonly seen in and around the VMU.

   A small number of trappers annually trap on the VMU. Harvest locations by township are available for fisher, bobcat, and otter, and over the last 10 years Victory has yielded 60 fisher, 13 bobcat and 4 otter. Other furbearer harvests are tracked by WMU. Across WMU E, yearly harvests from 2002-2012 have averaged: 3446 muskrat, 832 beaver, 449 raccoon, 357 mink, 297 coyote, 184 red fox, 53 grey fox, 163 skunk—to which the VMU has contributed an unknown portion.

The streams of the VMU, especially in their middle reaches, offer excellent angling opportunity. Wild self-sustaining populations of brook trout occur in the virtually all the streams, in their associated beaver ponds, and in the Moose River mainstem upstream of the low gradient Victory Basin area. Angling opportunity in the Moose River mainstem is augmented by the stocking of catchable-size trout: brook trout above and rainbow trout below Victory Basin. Fishing at VMU waters is allowed under general regulations: only by angling and only during the open water fishing season for trout and salmon. Angling effort is estimated to be a relatively low 40 angler hours per mile in the most popular summer months. This intensity of angling is lower than the threshold for stocking according to the Trout Plan guidelines. VTFW plans to repeat fishing effort surveys and will consider eliminating stocking in this area if fishing effort is confirmed to be low.

b. Wildlife viewing – Wildlife related activities are plentiful on the VMU due to the myriad of habitats present. Wildlife found on the property include a full range of birds, invertebrates, small and large mammals, reptiles, amphibians, and fish.

   In particular, Victory Basin has high value as a bird observation site. It is one of the few places in Vermont with extensive lowland spruce-fir habitat, which supports rare species including gray jay, boreal chickadee, and black-backed woodpecker. Popular destinations seem to include Damon's Crossing, the Guldenschuh Road, Lee's Hill Road, and the Pipeline East. While most wildlife watching in the VMU is dispersed, the Damon's Crossing area likely receives the largest visitorship. The Railroad Bed trail leading north from the Crossing, however, is regularly wet or inundated, particularly during spring birding months and maintenance of bog bridges is a management challenge. The VMU is often cited on state-wide bird sighting lists and as recommended trips for those wishing to view these birds.

   In addition, the higher elevations of Burke Mountain in Darling State Park are also home to montane birds including blackpoll warblers and Bicknell's thrush, though it is unknown how often visitors travel to this area for birding.

   Visitor education materials should be created for Victory Basin and Burke Mountain to describe the important habitats and species present, and ways to view them.

c. Hiking – Hiking is a popular activity across the VMU. On the Victory side of Burke and Umpire Mountains, it is largely associated with activities such as hunting and wildlife viewing. In Darling State Park, hiking tends to be more of a stand-alone activity, with several trails climbing to and around the summit of Burke Mountain. The VMU is home to a variety of trails, most of which are considered multi-use, and many of which are suitable for motorized uses as well. While hiking is permitted on any road that is open to motor vehicles or those designated as multi-use, there are about 8.8 miles of dedicated hiking trails on the property including several trails that extend onto adjacent private land (Figure 11.)

d. Skiing – Downhill skiing has occurred on Burke Mountain and a portion of Darling State Park for well over 50 years. Burke Mountain has grown into a major destination ski area and at the time of this writing, proposed development on the mountain could lead to growing use in the

next ten years. Many of the trails and infrastructure lie on the leasehold area of Darling State Park, and FPR is kept abreast of any improvements. In addition, the District Act-250 Environmental Commission monitors all activities to insure compliance with state regulations.

Backcountry skiing is growing in popularity throughout Vermont. Some backcountry skiing on the VMU is lift-served on Burke Mountain, while some skiers are also accessing portions of Umpire Mountain. The growing popularity of backcountry skiing is an opportunity for ANR to be proactive and create partnerships with other organizations to help guide this use and curtail the illegal trail clearing that can occasionally accompany it. With cooperation from Burke Mountain and the Kingdom Trails Association, ANR is confident that it can educate backcountry users on trail etiquette that will ensure long-term sustainability of the backcountry resource.

Cross country skiing is also a popular pursuit, yet there are currently no trails on VMU that are groomed specifically for cross country skiing. Trails were groomed within the past 15 years and there have been proposals floated around to resume grooming. For now, most cross country skiing exists on trails groomed for snowmobiles or on un-groomed back country roads and trails.

e. Snowmobiling – Snowmobiling is perhaps the most conspicuous winter recreation activity outside of the leased downhill ski area on Burke Mountain. VAST grooms 13.5 miles of trails through the VMU and these trails form a critical linkage for riders trying to connect from St. Johnsbury and Lyndonville to more remote areas of Essex County such as the West Mountain WMA and the Plum Creek Timberlands. Snowmobiling is a driver of economic activity in the northeast Kingdom in the winter and ANR is dedicated to working with VAST and the local clubs to continue to offer quality snowmobiling experience. Much of the trail mileage exists on already cleared Rights of Way for the Portland Pipeline and Vermont Electric Power Company (VELCO), however the CCC Fire Road and the Partridge Road are also important routes for local riders to access the more regional routes.

f. Horseback riding – Horses are permitted on any road that is open to motor vehicles. Additionally, they are allowed on trails that are designated for "multi-use" (figure 9). The Vermont Horse Council is the designated corridor manager for portions of the Victory Basin Multi Use trail, the heart of which is a loop that connects the Partridge Road to the Portland Pipeline, Velco Line, Tug Mountain Road, multi-use trail and the Victory Hill Road.

g. Mountain biking- Bicycling is permitted on any forest road that is also open to motor vehicle use. However, most of the mountain biking that occurs on the VMU takes place on the area leased by Burke Mountain. In recent years, Burke Mountain and the Kingdom Trails Association have collaborated to offer lift-served downhill biking, thereby adding to East Burke's reputation as a mountain biking destination. Total mileage of downhill biking trails on State property is only 6.2 miles, however portions of many trails lie on private land.

On the Victory side of the management unit, mountain biking is less common and more dispersed, but is allowed on all roads open to vehicles and also on specific trails (figure 9). Since 2010, Kingdom Trails and the neighboring Conservation Collaboratives property have hosted the "Circumburke" ride that goes around Burke Mountain in a 20-25 mile loop and utilizes several

trails that are not approved for mountain biking at other times of the year. In addition, biking is popular just off the VMU, in private land south of Umpire Mountain.

h. All-Terrain Vehicles (ATVs) – ATVs are prohibited on all state lands except where trails are specifically designated. While no such trails exist on the VMU, ATV use occurs on private lands around the VMU on trails in Concord, Granby, Lunenburg, and elsewhere, and some riders have illegally used the state land to connect these private trails. Continued illegal and unmanaged use may cause conflicts with natural resources and lawful users.

i. Camping and picnicking – Darling State Park hosts a historic Picnic Shelter constructed by the CCC as well as a number of lean-tos that are available for the public to use. The level of use at these sites is unknown, but they are regularly maintained to provide a positive visitor experience and preserve their historic value.

j. Cooperation and coordination – Because of the diverse array of recreational activities available on the VMU, the ANR has chosen to work cooperatively with several organizations to help manage trail users and fund trail improvements. Among them are VAST, Kingdom Trails Association, the Vermont Horse Council, and Burke Mountain. Maintaining these partnerships is critical if VMU is to continue as a four season recreation destination.

k. Future trail proposals – The village of East Burke is now a bustling four-season recreation area. We anticipate that recreational use will expand further and ANR will receive more proposals for trail development in the VMU.

l. Education and outreach – Many of the issues identified in the above section can be addressed through additional attempts at educating visitors. The VMU is a rich resource, that might further public education efforts through enhanced educational signage in highly visited areas (such as Damon’s Crossing and Burke Mountain)

Figure 10: Summer Recreation Resource Map

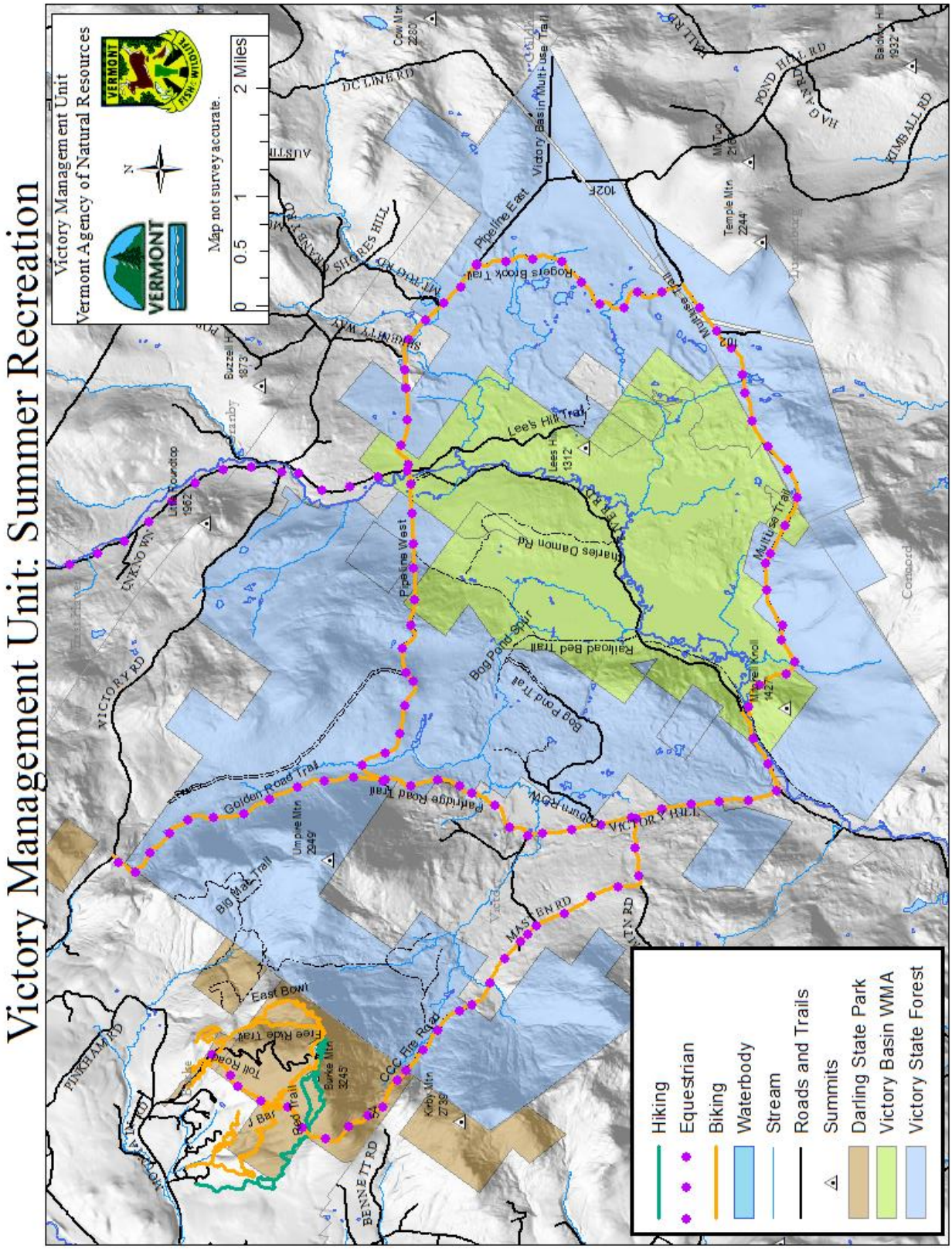
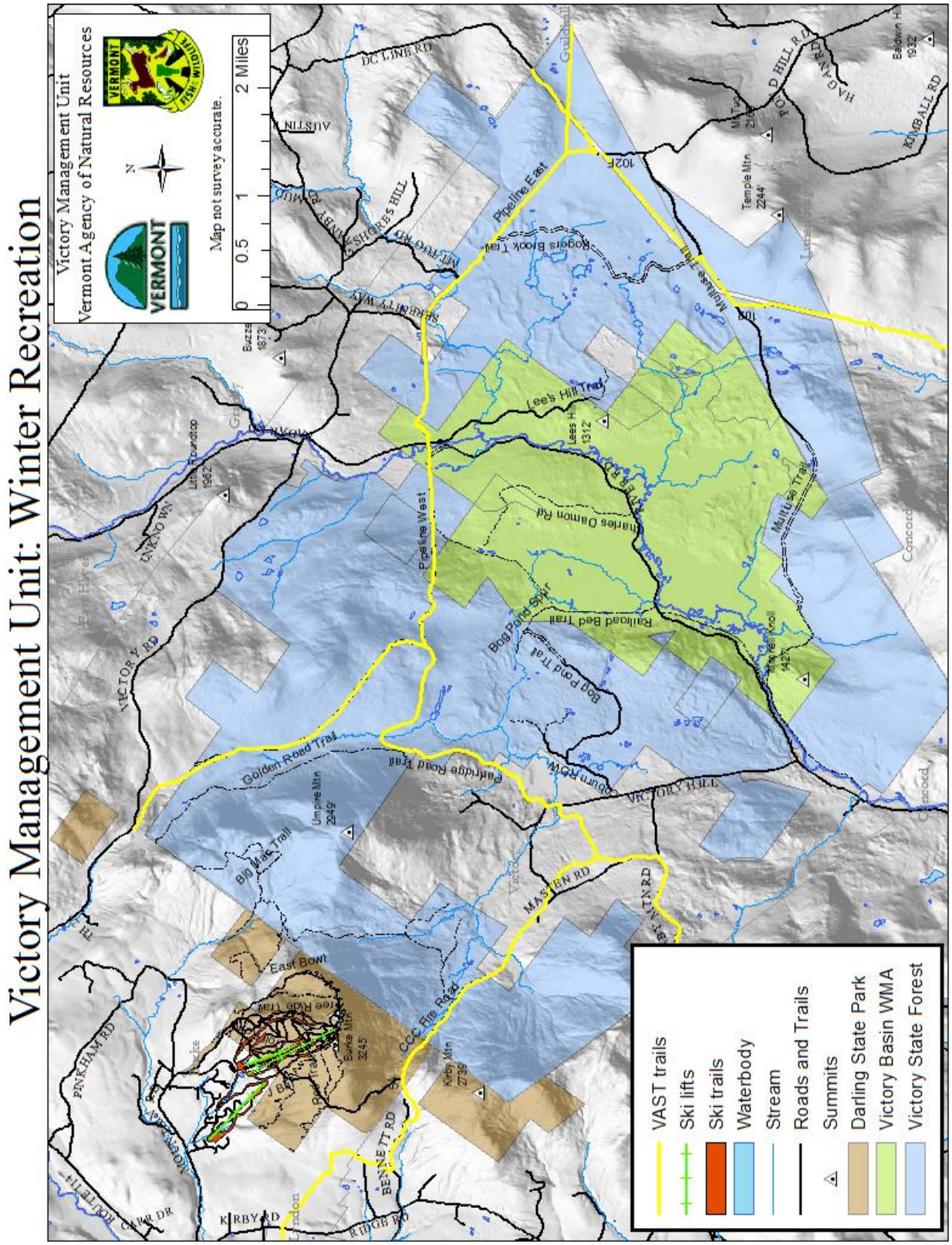


Figure 11: Winter Recreation Resource Map



2. Recreation Opportunity Spectrum:

The VMU is a four season multi-use area that hosts a broad array of different recreation activities throughout the year. These activities run the gamut between dispersed recreation such as bush-whacking, hunting, and wildlife viewing, to alpine skiing at Burke Mountain, a highly developed facility that operates on a portion of Darling State Park.

Thanks to its large size, the VMU is host not only to a variety of recreational activities, but different user experiences as well. There are parts of the unit which are very remote and interaction with other visitors is highly unlikely. On the other hand, there are popular areas, close to established roads, trails, and facilities where the user is likely to interact with numerous other visitors.

This distinction between user *experiences* is an important one and is addressed by a tool known as the "Recreation Opportunity Spectrum" (ROS). The ROS is an assessment process designed to focus on the *character* of the experience that a user can find across a parcel of land. The specific categories of the ROS run the gamut from "Primitive" to "Highly Developed" and areas are classified based on several criteria including remoteness, size, level of visitor interaction, evidence of human influence and more. Because of changes in use and accessibility, the VMU has slightly different classifications depending on whether a user visits in the winter, when most roads are inaccessible to vehicles or during the summer months when access is easier.

The VMU offers three different ROS classifications in both summer and winter:

> **Semi-primitive:** areas are predominantly natural. Interactions between users are low, but there is often evidence of other users. Areas are ½ mile or greater from roads or trails with designated motorized or mechanized use, and road and trail density is low. Timber harvesting and vegetation management may occur on a short-term basis.
>
> Year-round semi-primitive areas are centered on Kirby Mountain, Umpire Mountain, Bog Pond, and Lee's Hill-Mitchell's Knoll, while an addition Semi-primitive area shows up around Hobart Ridge in summer but not winter.
>
> **Semi-developed:** areas appear as natural environments. Interaction between users may be low to moderate, but evidence of other users is prevalent. Areas are within half a mile of improved roads or mechanized recreational trails, and road and trail density is moderate. Many timber harvesting and vegetation management practices are compatible.
>
> The Semi-developed natural class is by far the most prevalent on the VMU (Figure__). Certain portions of this class feel more remote than a map would suggest and tend toward the semi-primitive class in experience, while other areas are adjacent to the heavily used Burke Mtn. Ski Area and feel more developed.
>
> **Developed natural:** areas are substantially modified from the natural environment to enhance recreation activities. Sights and sounds of people are readily evident and interaction between users is moderate to high.

Developed areas on the VMU are confined to the Burke Mountain ski area, with its large concentration of trails, roads, and buildings, and other infrastructure.

Acres and percent of VMU total area in each ROS category, by season

	Summer		Winter	
Semi-primitive	6052	(26%)	8829	(37%)
Semi-developed	17275	(73%)	14498	(61%)
Highly-developed	317	(1%)	317	(1%)

Figure 12: Summer Recreation Opportunity Spectrum

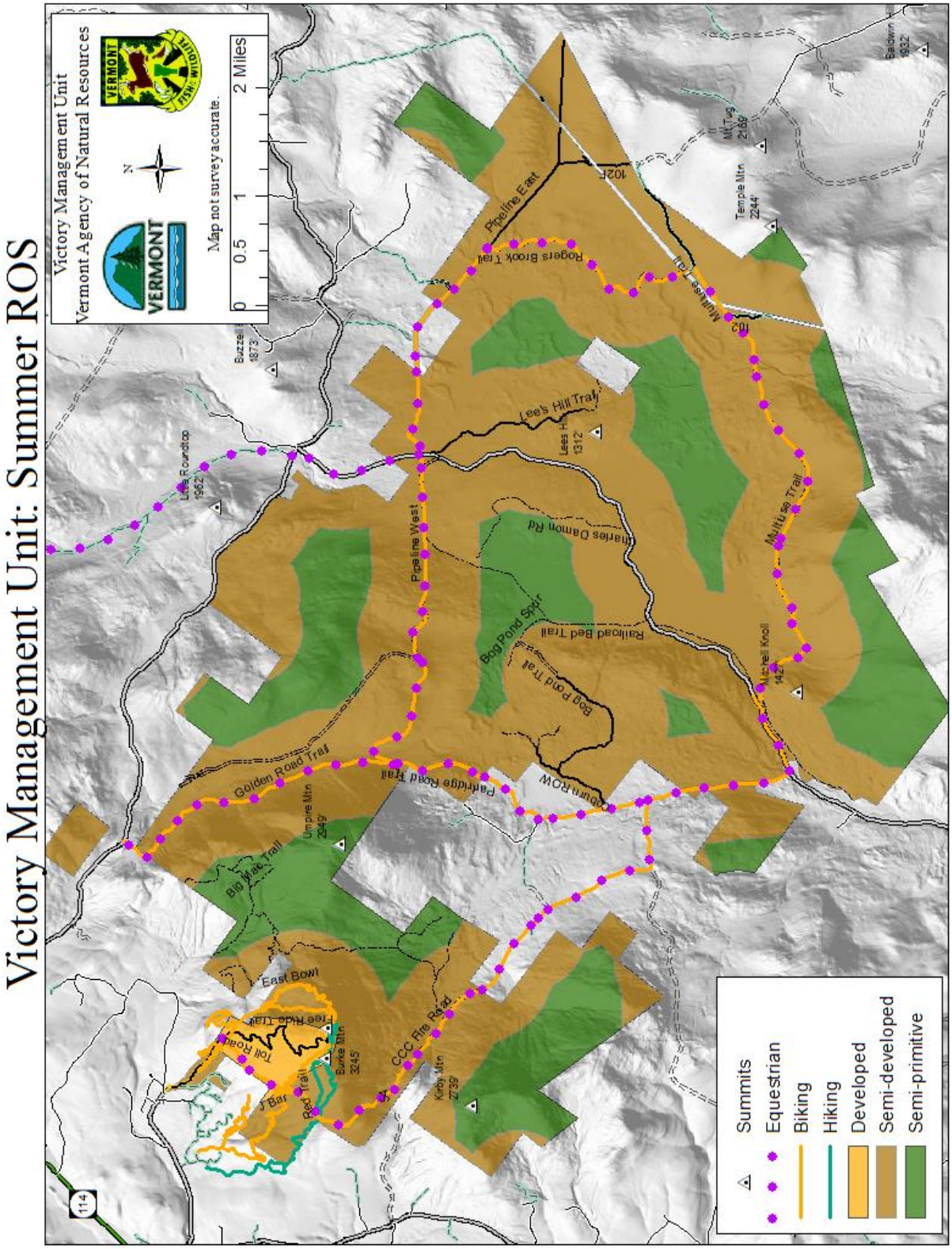
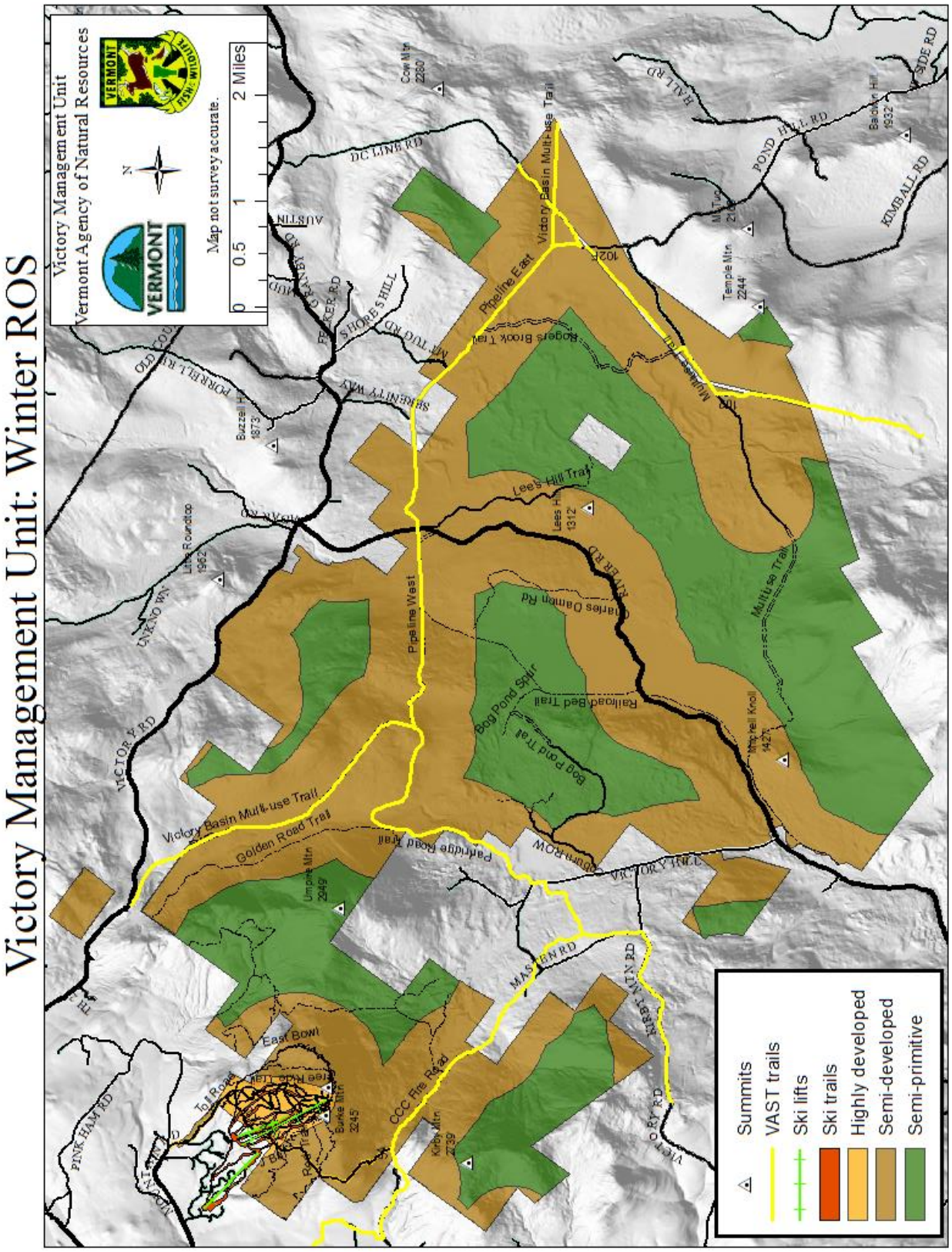


Figure 13: Winter Recreation Opportunity Spectrum



I. Infrastructure and Public Access Assessment

1. Description: The VMU can be accessed from numerous year-round and seasonal roads. Primary access points to the VMU from the west are from the town of Burke along VT Rt 114, from the south on River Rd in Concord, from the north along the Victory Road in Victory, and from the east on Tug Mountain Road from Lemington. The primary forest access roads are maintained in good to fair condition. Roads are maintained to allow continued access for both recreation and vegetation management within the interior of the VMU.

2. Existing Conditions:

   For management purposes, roads are placed into three classes based on their function and condition:

   Class A - A paved or unpaved state forest highway that is open for year-round public vehicle use.

   Class B - A paved or unpaved state forest highway that is generally open for public vehicle use, but may be closed at certain times of the year to restrict such access.

   Class C - An unpaved state forest highway not generally open for public vehicle use. Class C Roads typically do not have an aggregate surface or permanent drainage structures and are used primarily for management activities (e.g., logging operations) under frozen ground conditions.

   The VMU contains about 29 miles of Class B and C roads. No Class A roads exist within the VMU under ANR's management, the VMU—however—is bisected by a town highway, River Road, which runs from Granby to Concord.

   Below is a table of all existing State Forest Highways within the VMU:

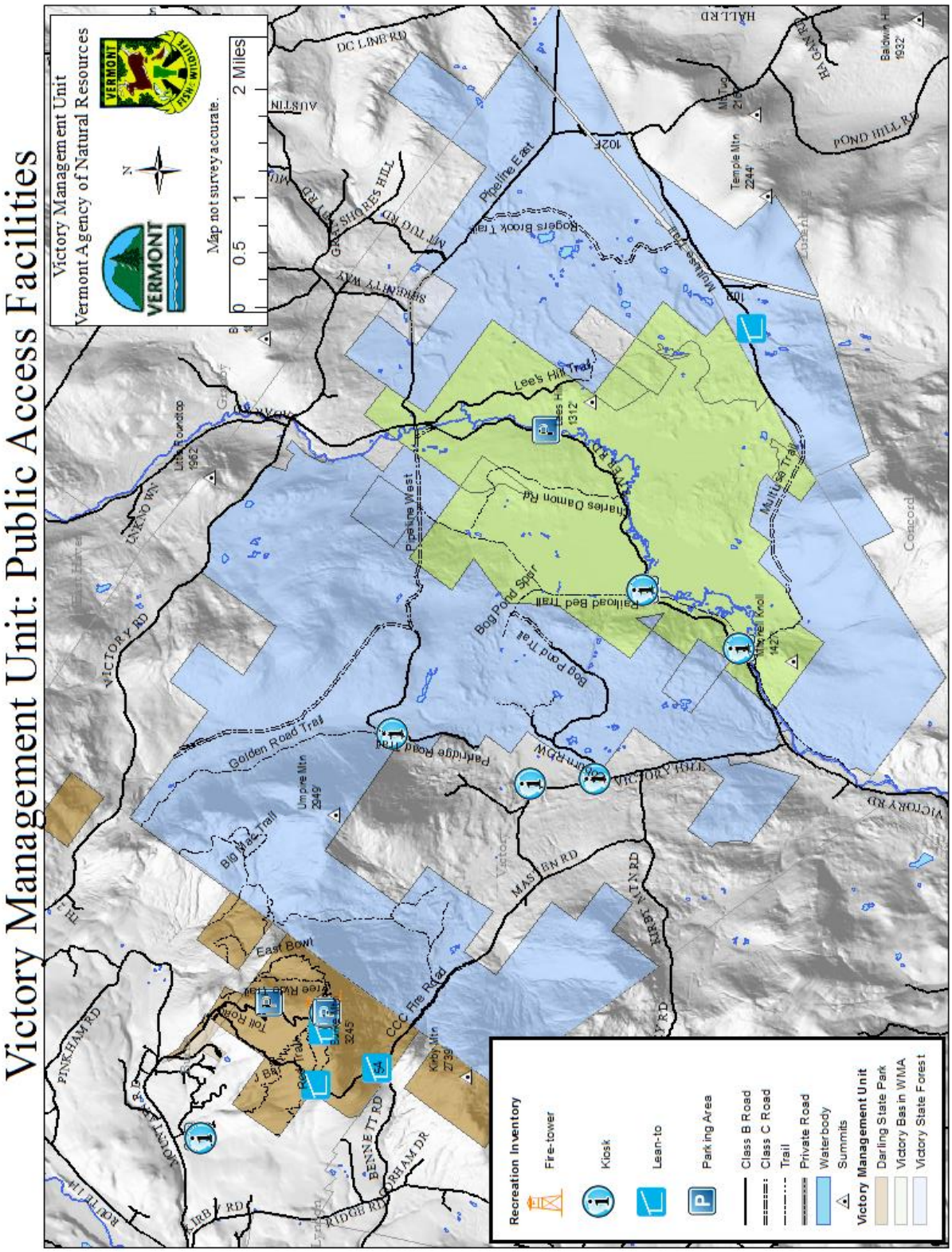
Road Name	Road Class	Condition	Mileage[3]
Burke Mountain Toll Road	B	Good	2.5
Coburn Right of Way	B	Fair	2.4
Partridge Road	B	Fair	2.3
Pipeline East	B	Poor	4.4
Tug Mt Road	B	Good	1.0
Pipeline West	C	Poor	4.3
Fire Road	C	Poor	1.3
Guldenshuh Road	C	Poor	1.9
Lee's Hill Road	C	Fair	2.0
Roger's Brook	C	Fair	2.2
Temple Barway Road	C	Poor	4.8

[3] Measured as mileage on state land only (excluding mileage on private land).

3. Pertinent Issues / Assessment of Need:

Due to persistent deficits in funding, many of these roads are deteriorating in condition. Road surfaces are becoming progressively poorer and, in some places, failed culverts now block access to sections of useable road. Without additional funding, roads may need to be closed to public use, reconstructed with water bars, and/or decommissioned to prevent natural resource and user impacts from inadequate maintenance.

Figure 14: Infrastructure and Public Access Map



J. Scenic Resource Assessment

As a large and diverse management unit, the VMU contains many features that are recognizable, visited, and enjoyed by the public for their visual qualities.

1. Description:
   Notable scenic resources on the Victory Management Unit include:

   a. Views available from the summit of Burke, West Burke, and Kirby Mountains, notably including the extensive forested landscape of the management unit overall.

   b. Views of Burke, West Burke, and Umpire Mountains available from outside the VMU.

   c. Views from Victory Basin of the surrounding hills and mountains.

   d. The view from Damon's crossing, across the Bog Brook wetlands and of the surrounding mountains.

   e. Views of the Moose River available regularly as it winds through the Victory Basin.

2. Pertinent Issues and Assessment of Need

   - Infrastructure on Burke Mountain currently impacts the views both to and from this site, as would new development on any other mountains on the management unit.

   - In addition to signage and educational materials near the Burke Mountain summit, users could be better managed in this sensitive area by developing a more clear trail to the summit overlook. In addition, being a short distance from the parking area, this presents an opportunity to create access to this overlook that would be accessible by individuals with disabilities.

V. MANAGEMENT ACTIONS

A. Management Vision for the Victory Management Unit

Over the long term, the VMU will be a place where:

- Ecosystems function naturally and provide services including clean water, clean air, wildlife populations, and forest products.
- A range of native biological diversity is present, including rare, threatened, and endangered species.
- Wildlife habitat will be maintained and enhanced through management of vegetative conditions and special focus on selected habitats and species.
- A variety of wood products are produced through exemplary and sustainable practices.
- A range of sustainable recreational uses is managed for public use.
- Existing historical, cultural, and scenic resources are maintained.
- An ethic of respect for the land, sustainable use, and exemplary management is fostered in visitors.
- Management will adapt with new scientific understanding, changing resources, and varying uses.

As stated in I.A. (Purpose of Ownership) and the Mission Statements on Page 3, each department has its own mission and priorities. While the above vision applies across the VMU, each parcel (the Wildlife Management Area, State Forest, and State Park) will emphasize different aspects of this vision and will rely on a different mix of goals.

Generally, these different focuses are:

- Management of the Wildlife Management Area will emphasize the maintenance and enhancement of wildlife habitats and hunting, fishing, trapping, and wildlife watching experiences.

- Management of the State Forest will emphasize sustainable forest management and a variety of public uses.

- Management of the State Park will emphasize a variety of recreational uses, including the most intensive uses available across the VMU.

Specific differences in how the parcels will be managed may be found in the land use classifications and strategies laid out in section IV.C. *Location-specific management strategies*.

B. General Management Strategies

Natural Communities

Each natural community type serves as a proxy for the species it is expected to support. Rather than attempting to identify and protect all species on a landscape, protecting high-quality natural communities can ensure that all species, known and unknown, are supported. Natural communities with the best likelihood of supporting the most native species, because of their size, condition, and landscape

context, are designated as State-Significant. These State-Significant natural communities are believed to provide excellent habitat for the majority of their associated native species, and are the foundation for conserving the full range of Vermont's species.

1. Goal: maintain or enhance the condition of all State-Significant natural communities.
    a) State-Significant matrix communities (Northern Hardwood Forest, Red Spruce-Northern Hardwood Forest, and Lowland Spruce-Fir Forest) will be actively managed for forest products, wildlife habitat, and recreational use without degrading their condition, in accordance with DFW's Vermont Natural Community Ranking Specifications. Such management will include limiting the size of canopy openings, managing invasive species, and retaining woody material.
    b) Smaller State-Significant communities (mostly wetlands and high-elevation forests on the VMU) will be classified as Highly Sensitive under the landuse categories (see IV.C. for more details), and active management and recreational development will be limited.

Forest Health

2. Goal: Prevent the introduction of additional nonnative invasive plants to the VMU
    a) All logging and earthwork equipment will be required to undergo cleaning before use on the VMU, to prevent the introduction of nonnative invasive plants.
    b) All gravel sources will be inspected for nonnative invasive plants before use on VMU.
    c) All roads will be monitored for nonnative invasive plants annually.
    d) All earthwork and timber harvest sites will be monitored for nonnative invasive plants annually for at least 2 years after completion.
3. Control or eradicate all known nonnative invasive plant populations on the VMU.
    a) All known occurrences of nonnative invasive plants will be treated as necessary for their control or eradication.
    b) Within six months of first identification, a plan will be created to control or treat any nonnative invasive plants found.
    c) ANR will evaluate and treat Japanese knotweed throughout the Moose River in the VMU and will evaluated known patches upstream and consider options for cooperating with other landowners in treatment.
4. Goal: Prevent or manage any non-native invasive pests identified on the VMU.
    a) Within six months of the detection of any non-native invasive pest, ANR will develop and engage in adaptive management strategies to respond to the potential threat in collaboration with other appropriate agencies.
5. Goal: manage native forest health threats identified on the VMU.
    a) Identify, monitor, and manage native forest health threats including shoe string rot, hypoxilin canker, black knot, and beech bark disease in collaboration with FPR Forest Health staff.

Forest and Wildlife Habitat Management

The general approach in the VMU is to maintain the area as extensively forested; protect valuable ecological resources such as wetlands and rare natural communities; develop arrangements, types, and sizes of vegetation as productive wildlife habitat; and sustainably harvesting forest products. This will be done by employing a variety of forest management techniques.

As the VMU is almost entirely forested, manipulation of vegetation will most often be accomplished via commercial timber sales, however, some pre-commercial activities may be utilized to achieve desired habitat conditions (e.g., to improve crown development and species composition in deer wintering areas).

Timber harvesting will occur on the VMU in the General Management Area and portions of the Special Management Areas (see section IV.C.). Within the next 10 years, a total of 4,508 acres will be managed (see Figure 14). A total of 2794 acres will be managed using even-aged silvicultural techniques over the life of the plan. Within this acreage, 1591 acres will be regenerated and 1,203 acres will be treated with intermediate cuts in the next 10 years. There is a total of 1,714 acres which will be managed using uneven-aged silvicultural techniques over the life of the plan.

Northern Hardwood Forest Types
These forest types are associated with the Northern Hardwood natural community consisting of sugar maple, beech, yellow birch, white ash, and associated species. Overstory beech trees are declining due to widespread beech bark disease and are growing root system "suckers". This is creating a dense understory of beech saplings which outcompete other hardwood species. In the VMU, this forest type occupies approximately 10,178 acres. Management across the VMU will strive to provide habitat for a variety of wildlife species while improving the quality of the timber resource and harvesting forest products.

6. Goal: Manage Northern Hardwood forests for diverse structures, age classes, and species compositions, utilizing both even-aged and uneven-aged silvicultural systems.
    a) In hardwood stands adjacent to deer wintering area, 1-2 acre regeneration treatments may be used to promote the growth of accessible woody browse. The potential for such treatments will be assessed by a DFW Biologist when harvests adjacent to the deer winter area are being planned.
    b) To provide the habitat potential for DFWs regional target of 10-15 deer per square mile, additional early successional habitat may be created within the WMA, up to 6% of the total Northern Hardwood natural community area (in excess of the 2% designated for the remainder of the management unit).
    c) Even-aged silvicultural systems may be utilized to encourage species diversity where the understory is dominated by beech saplings.

Red Spruce-Northern Hardwood
These forest types are associated with the Red Spruce-Northern Hardwood Forest natural communities and make up approximately 4,436 acres. They are primarily found at the mid to upper elevations and in the transition area from upland hardwood communities to lowland spruce-fir forests along drainages.

Since many of the softwood species have been sought for numerous cutting cycles the percentage of softwood in these stands is less than would occur naturally.

7. Goal: Manage Red Spruce-Northern Hardwood stands to become multi-aged forest communities with diverse compositions of red spruce, white pine, sugar maple, yellow birch, and American beech and complex structural characteristics, while sustainably producing forest products and enhancing habitat for focal wildlife species.

    d) During harvesting operations, practices will generally seek to maintain or increase the level of softwood species within the harvest unit.

    e) Planting of softwood species such as white pine may be used to enhance natural regeneration and increase softwood composition and species diversity.

    f) Breeding season surveys for black-backed woodpecker nests will be conducted in all Red Spruce-Northern Hardwood stands scheduled for harvest before treatment. One acre around confirmed nest sites will be retained.

Lowland Spruce-Fir Types

These forests are associated with Lowland Spruce-Fir natural communities and cover approximately 3,707 acres. Lowland spruce-fir occur along many of the major drainages at lower elevations, particularly in the Victory Basin. The species mix in many of these stands is heavy to balsam fir, and many fir stands are reaching the age of natural mortality and decline, leading to blowdown events.

Montane spruce-fir communities found at the highest elevations of the management unit are classified as Highly Sensitive and will be managed as Highly Sensitive natural communities, as described in Section IV.C.

Uneven-aged spruce fir forests are vital to providing the high, continuous canopies that protect deer from deep snow, strong winds, and low winter temperatures. Such forests are also important for a host of northern species including moose, spruce grouse, snowshoe hare, gray jay, black-backed woodpecker, and American marten.

8. Goal: Manage Lowland Spruce-Fir stands to support the development of multi-aged forest communities with substantial components of red spruce and white pine, complex structural characteristics, and natural disturbance dynamics, while sustainably producing forest products and enhancing habitat for focal wildlife species.

    a) Long-term, uneven-aged silvicultural management of these communities will be preferred. In the near term, however, even-aged management will be necessary in some areas—for example, large stands of overmature balsam fir present a high risk for blowdown and subsequent dominance by shade-intolerant hardwoods. Management in such stands may use even-aged techniques such as shelterwoods and patch cuts to promote desirable spruce and fir regeneration before the overstory is lost. In the near term, such treatments may push the VMU outside of its long-term goals such as levels of deer wintering cover and openings in natural communities, these short-term treatments, however, will be important in accomplishing the end goal of developing a multi-aged spruce-fir forest.

    b) Coniferous species diversity will be maintained and enhanced by actions including:

- designing treatments to favor softwoods over hardwoods.
- designing treatments to favor red spruce will be promoted over balsam fir.
- retaining hemlock and northern white cedar where present.
- supplementing natural regeneration by planting white pine seedlings in chosen locations.

c) The age of red spruce and pine components will be allowed to increase, with some individuals eventually reaching over 200 years.

d) Deer winter shelter will be promoted by maintaining at least 50% of the area in functional shelter (softwood cover >35 feet in height and with >70% average crown closure) when possible.

e) Where appropriate, trees will be retained in travel lanes for deer (>200ft wide) and hare (15-45ft wide) within softwood areas and to adjacent hardwood stands.

f) Thinning treatments may be conducted before stands reach the poletimber stage, to preserve functional deer winter shelter.

g) Breeding season surveys for black-backed woodpecker nests will be conducted in all Lowland Spruce-Fir stands scheduled for harvest before treatment. One acre around confirmed nest sites will be retained.

Vegetation Management Standards
The following are general strategies that will apply to most vegetation management activities across forest types.

Even Aged Silvicultural Standards

- Rotation ages will generally range from 80 to 120 years in northern hardwood stands and 60 to 80 years in spruce-fir stands, but may be as little as 40 years for aspen dominated stands.
- Three entries in each stand will be made at approximately 50, 75, and 100 years of age.
- Regeneration cuts will be up to 25 acres in size, though most will be smaller. If strip cuts are used, the maximum length will be 800 feet.
- Thinning will often occur between groups/patches, to favor preferred species and enhance growing conditions.
- Where possible, softwood components will be maintained and increased.
- Individual trees of special wildlife significance will be protected.

Uneven Aged Silvicultural Standards

- Stands will be treated on a 20 to 25 year cutting cycle.
- Techniques will be single tree or group selection (generally under 2 acres), to maintain canopy cover, promote regeneration of shade tolerant softwood species, and release regeneration.
- Trees of all sizes may be removed in each entry, but a range of ages and sizes will be constantly retained in the stand.

- Minimum basal areas will be consistent with silvicultural guides.
- Harvest openings will be designed to create a vertical structure within the stand.
- Where possible, softwood components will be maintained and increased.
- Individual trees of special wildlife significance will be protected.

Salvage Harvest Standards

- Salvage harvest will be considered only in stands designated for vegetation management in accordance with this plan.
- Salvage harvest will be implemented only if it furthers the goals of the stand as described in this plan.
- Retention of woody features will be implemented as with all operations across the VMU.

Treatments for Specific Wildlife Habitats and Ecosystem Functions

Young, Regenerating Forest: Regenerating forest provides important habitat and resources for deer, moose, black bear, snowshoe hare, ruffed grouse, woodcock, spruce grouse, Canada lynx, bobcat, red fox, shrubland birds, and other species. Simultaneously, other species (such as American marten) will not persist in landscapes with too much open and young forest.

9. Goal: Maintain a small portion of the VMU as young, regenerating forest at all times, while maintaining natural community condition ranks.
    a) In the long term, create regenerating forest[4] on up to 7% of lowland spruce-fir communities, 4% of red spruce-northern hardwood communities, and 2% of northern hardwood communities.
    b) In the near term, treatments may create regenerating forest in excess of these targets, in order to maintain and enhance desirable softwood regeneration in light of widespread blowdowns.
    c) To provide the habitat potential for DFWs regional target of 10-15 deer per square mile, additional early successional habitat may be created within the WMA, up to 6% of the total Northern Hardwood natural community area (in excess of the 2% designated for the remainder of the management unit).

Upland Openings: Openings provide somewhat similar habitats and resources as regenerating forest, but can provide a different species composition and structure, creating additional habitat diversity. Such openings, for instance, can be important foraging areas for bats and other wildlife. These openings complement natural disturbances like beaver activity and flooding, which can create similar, but often more ephemeral, openings.

10. Goal: Maintain up to 40 acres (the current level) of the VMU in permanent upland openings.
    a) Existing openings will be mowed or burned approximately every three years to maintain open, herbaceous conditions.

[4] Defined here as 0-15 years old and in patches of greater than 2 acres.

b) Mowing will occur after August 1 to allow fledging of ground nesting birds, and in areas where wood turtles are likely to occur, mowing will take place after October 1 to prevent direct mortality.

c) New openings may be developed to replace current openings by mowing or burning recent log landings.

Deer wintering areas: Forests with conifers providing high, continuous canopies serve a crucial function in protecting deer from the deep snows, strong winds, and low winter temperatures in northern Vermont. While predominantly softwood forests are optimal for deer wintering habitat, mixed conifer-deciduous forests may also provide adequate winter protection. Red spruce-northern hardwood forest in the WMA identified as deer wintering area may be managed to enhance its value as deer habitat.

11. Goal: manage lowland spruce-fir forests to accommodate deer wintering needs

    a) Management will aim to provide functional shelter across at least 50% of the deer wintering area.

    b) Connectivity throughout all non-regenerating segments of the winter area will be maintained.

    c) Browse accessible from shelter areas may be provided in adjacent hardwood areas. The managing Biologist will review potential timber sales adjacent to deer wintering areas before development of prescriptions to assess and plan for any such browse enhancement.

Beech Mast Production Areas: American beech is the key mast producing tree in northern Vermont. Its nuts provide significant food resources for black bear, white-tailed deer, American marten, fisher, wild turkey, ruffed grouse, and many small mammal and bird species.

12. Goal: Develop and maintain beech mast production areas in northern hardwood stands with sufficient healthy beech trees and evidence of bear use, through uneven-age management.

    a) Generally, BMPAs will be managed in accordance with VDFW Guidelines (including the strategies below), but management may vary depending on site-specific conditions:

        - Crowns of crop mast trees will be released crowns from competition by crown-thinning on 3 sides (W-N-E).
        - In areas without crop trees, single-tree and ½ acre group selection may be used to encourage crown development on healthy trees and to encourage regeneration.
        - A 200 foot wide uneven-aged buffer zone will be established around the BMPA to maintain shade and prevent winter injury to beech crop trees from sun scald.
        - Operations will generally be conducted in winter conditions, on frozen ground or more than 12 inches of snow, to minimize injury to beech roots and boles.

Riparian Areas: Terrestrial areas bordering streams, ponds, and wetlands serve critical functions including providing terrestrial and aquatic wildlife habitats and maintaining water quality.

13. Goal: manage riparian areas to provide ecosystem services and wildlife habitat.

    a) Riparian areas will be managed as per ANR Guidelines on Riparian Area Management.

b) Forest management within 75 meters of wetlands with confirmed or potential breeding rusty blackbirds may be limited or designed to prevent dense spruce-fir regeneration, which may negatively impact breeding success.

c) From April 15 to October 15, heavy machinery will be excluded from within 300 meters of locations with known wood turtles, and within 90 meters of streams with potential to support wood turtles.

Vernal Pools:

14. Goal: Manage vernal pools for amphibian habitat, in accordance with the Vermont Agency of Natural Resources Riparian Management Guidelines.

    a) No ground disturbance or vegetation management will be allowed within the pool itself and within 100 feet of the pool edge, except for restorative purposes as described in the Guidelines.

    b) Within a secondary buffer zone, extending 500 feet past the primary buffer zone, at least 60% of the canopy will remain intact within this zone, composed of trees at least 25 feet tall.

    c) Landings, skid roads, and truck roads will not be located inside the secondary buffer zone whenever possible.

    d) Operations will avoid disturbing fallen logs, will leave limbs and tops where felled, and may create downed coarse woody material by cutting large trees and leaving them in place.

    e) Canopy cover and downed woody material between pool, wetland, and riparian habitats will be maintained whenever possible.

Snags, cavity trees, and woody material: Dead and dying wood are important resources for wildlife habitat and ecosystem function. Snags (standing dead trees) are used extensively insects, bats, birds, and other species. Cavity trees (living or dead trees with hollows in them) are critical nesting, denning, and roosting sites for species including owls, bats, wood duck, American marten, and black-backed woodpecker. Dead wood on the ground plays a role in regulating forest nutrient cycling, water flow, and erosion, while also providing a critical resource for dozens of species of wildlife, including: insects for bear foraging; den sites for bears, lynx, and American marten; cover for snowshoe hare and blue-spotted salamanders.

15. Goal: Retain wood habitat elements in harvested areas to provide ecosystem services and wildlife habitat for a range of species.

    a) A minimum of 6 snags per acre, four of which are >14" dbh and two of which are >24" dbh, will generally be retained where possible. Where trees of this diameter are lacking, retaining both large healthy trees, and large diameter trees with defects will maximize current and future snag habitat.

    b) Where feasible, all cavity trees will be retained, unless they pose a safety hazard to the loggers or the public. When this target substantially conflicts with the silvicultural prescription, a lesser number of snags may be retained, counting as part of living "recruitment" tree goals below.

c) Downed woody material will be retained in all but specific circumstances to meet defined management objectives. Generally, a minimum of 3-5 stems >18" in diameter and 16 feet in length and 10 stems >14" in diameter and 16 feet in length should be provided per acre.

d) Whole-tree harvesting will be avoided in low-fertility sites, shallow-to-bedrock soils, coarse sandy soils, poorly drained soils, steep slopes, and erosion-prone sites.

e) A minimum of 5 living "recruitment" trees per acre, four of which are >15" dbh and one of which is >20" dbh, will be retained where possible, to ensure a future supply of snags, cavity trees, and dead material. Where trees of this diameter are lacking, a minimum of 5 of the largest trees possible will be retained.

Structural Complexity Enhancement: The structural complexity of forests is key to their habitat value and ecosystem function. The history of intensive timber management on the WMA has left a simplified structure—for example, most of the forest belongs to one or two young age classes, dead and downed wood is limited, some features created by natural disturbances (like wind-thrown and ice-damaged trees) are uncommon, and large-diameter trees (live or dead) are relatively rare.

16. Goal: Maintain and enhance the structural complexity of the VMU's forests.

    a) Identify locations where management to enhance the structural diversity of the forest may be used to accelerate the development of features and processes of old forests, for ecological restoration or the mimicking of natural ecological processes.

Passive management areas: Given that much of the landscape in and around the VMU has been and will continue to be managed for direct benefits to humans, primarily for forest products, the designation of other areas to develop naturally as communities is an important conservation tool to ensure the needs of all of Vermont's 40,000 native species are met and to preserve the greatest value in ecosystem services such as clean water and carbon storage. For example, such an area on the VMU will promote habitat for species including black bear which avoid human disturbance, American marten which require extensive mature forests, black-backed woodpeckers which rely on woody habitat features, and reptiles and amphibians which require leaf litter, undisturbed soils, and downed woody material. In addition to rare natural communities identified above, such an area must represent common natural communities, in order to support the many species that rely on them.

17. Goal: Maintain and enhance the ecosystem, wildlife habitat, and other values of the VMU's forests by designating areas that will not be subject to timber harvesting.

    a) 660 acres of near Mitchell's Knoll will be maintained to promote the functions and values of mature northern hardwood and red spruce-northern hardwood forest communities. (see figure 16)

    b) An area of Victory Basin 370 acres southwest of Lee's Hill, between large wetland complexes, will be maintained to promote the functions and values of mature lowland spruce-fir and red spruce-northern hardwood forest communities. (see figure 16)

    c) These areas will be managed primarily to allow natural processes to proceed and will not be subject to vegetation management in the future (except for ecological restoration such as treatment of nonnative invasive species). Existing roads and trails may be maintained through these areas, however, development of new infrastructure will be prohibited.

Soft Mast Concentrations: Soft mast such as the fruits of cherries, *viburnum*, *rubus*, and apples are important food sources for a variety of wildlife.

18. Goal: Maintain and enhance soft mast species for their value to wildlife.
    a) Natural soft mast areas in floodplain communities will be maintained by limiting disturbance of those communities and maintaining the ecological processes allowing them to persist.
    b) Maintenance of permanent upland openings and creation of temporary silvicultural openings will contribute additional soft mast.
    c) Fruit bearing trees may be retained, released, and pruned in appropriate locations, to provide mast for wildlife.

Bird nests:

19. Goal: Limit disturbance to any active bird nests of priority species.
    a) When identified, active heron rookeries and nests of raptors, black-backed woodpeckers, spruce grouse, and other rare species will be managed with appropriate buffers, in accordance with DFW guidance. Disturbance will be limited within buffer zones and any timber harvesting will avoid the active nesting period.

Nest boxes and platforms:

20. Goal: Supplement natural habitat features for priority species with nesting and roosting structures as needed.
    a) Nesting structures such as osprey platforms, bat boxes, and wood duck boxes may be used in suitable locations to enhance limiting habitat elements.

Habitat connectivity:

21. Goal: Enhance conditions that allow unimpeded movement of wildlife and plants across the landscape.
    a) Pursue opportunities to work to adjacent landowners and municipalities in maintaining and improving habitat conditions and connectivity, particularly including potential barriers such as the River Road through the VMU and the Victory Road to the north of the VMU.

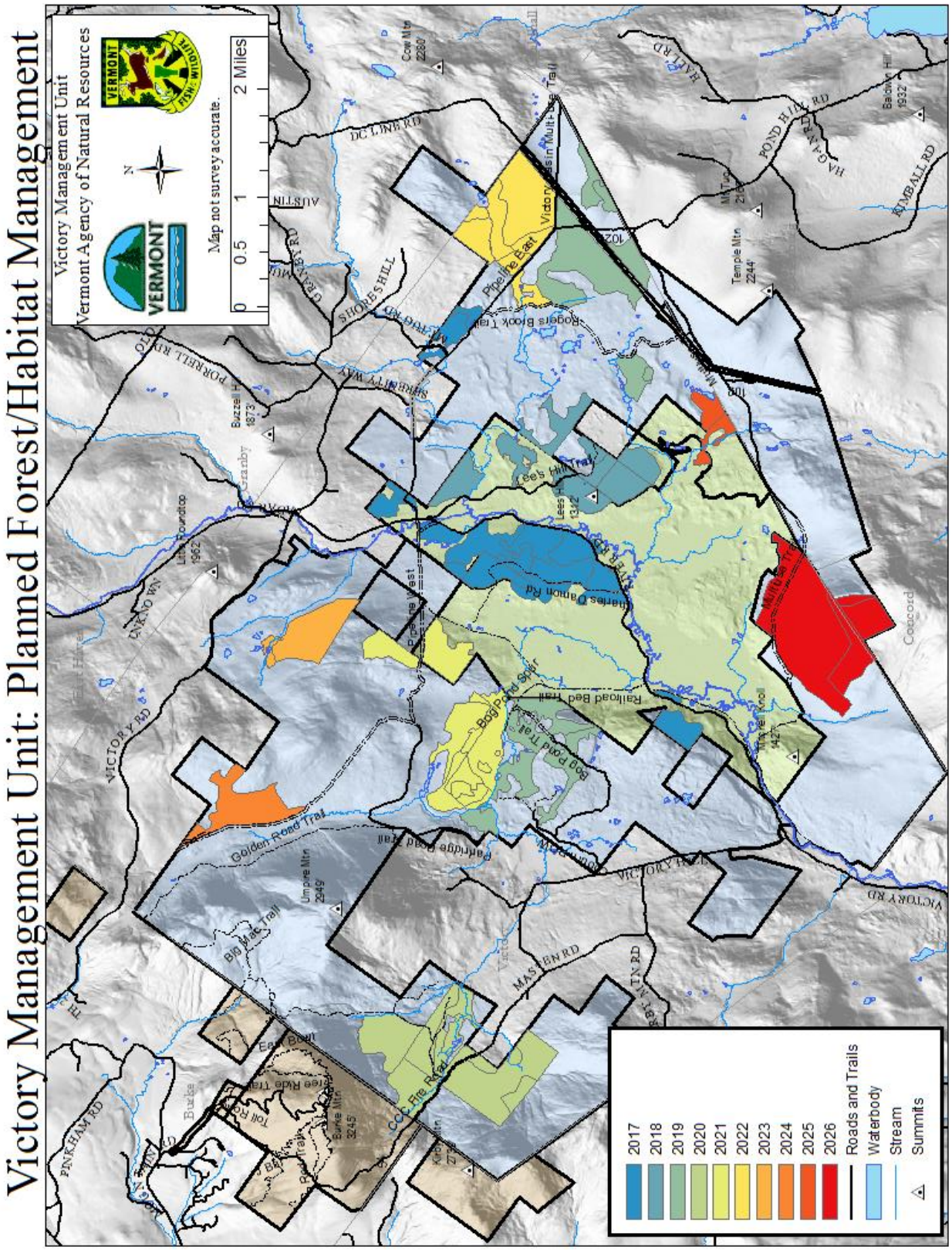
Schedule for Implementation

The following is based on inventories to gain general information on the forests of the VMU. Prior to the development of harvesting prescriptions a more intensive assessment of the wildlife and timber resources in each location targeted will be completed.

Areas for treatment have been identified for the next 10 years as illustrated in Figure 14. These stands were identified based on the general condition of each stand, the size class distribution of forests/habitats across the VMU, and the size class distribution within the individual compartments. Many of these

stands were chosen because they are spruce-fir stands assessed to be at high-risk for loss to blowdown and harvest in the near future may help promote desirable regeneration.

Figure 15: Stands Targeted for Treatment 2016 – 2025



Stands identified for vegetation management 2016 – 2024

Year	Parcel	Block	Compartment	Stand	Acres
2016	Wildlife Management Area	2	6	5	9.07
2016	Wildlife Management Area	2	2	1	31.2
2016	Wildlife Management Area	1	11	4	36.69
2016	Wildlife Management Area	1	11	9	13.43
2016	Wildlife Management Area	1	11	10	113.44
2016	Wildlife Management Area	1	11	2	69.55
2016	Wildlife Management Area	1	10	3	46
2016	Wildlife Management Area	1	11	1	98.15
2016	Wildlife Management Area	1	10	1	27.94
2016	Wildlife Management Area	1	8	2	56.37
2016	Wildlife Management Area	1	11	3	70.84
2016	State Forest	4	7	5	17.16
2016	State Forest	1	17	1	65.7
2016	Wildlife Management Area	1	11	11	3.57
2016	Wildlife Management Area	2	2	2	14.4
2016	State Forest	4	7	9	45.55
2017	Wildlife Management Area	2	3	5	79.95
2017	Wildlife Management Area	2	3	2	48.25
2017	Wildlife Management Area	2	2	3	65.69
2017	State Forest	4	11	1	69.63
2017	State Forest	4	8	4	27.59
2017	State Forest	4	9	1	49.7
2017	State Forest	4	8	3	20.65
2017	State Forest	4	3	1	68.59
2018	State Forest	1	12	1	128.89
2018	State Forest	4	5	3	46.74
2018	State Forest	4	5	11	17.64
2018	State Forest	4	5	10	37.13
2018	State Forest	4	4	5	258.24
2018	State Forest	4	10	11	6.24
2018	State Forest	1	8	4	35.6
2018	State Forest	1	11	10	1.71
2018	State Forest	1	8	7	2.98
2018	State Forest	1	12	4	84.17
2018	State Forest	1	12	5	63.99
2018	State Forest	4	10	5	50.73
2019	State Forest	2	3	1	94.59
2019	State Forest	2	4	2	125.85

2019	State Forest	2	6	3	57.93
2019	State Forest	2	6	5	74.99
2019	State Forest	2	6	9	28.26
2019	State Forest	2	6	4	10.22
2019	State Forest	2	6	1	271.26
2019	State Forest	2	6	2	27.96
2020	Wildlife Management Area	1	9	3	97.57
2020	State Forest	1	5	4	58.84
2020	State Forest	1	7	3	88.09
2020	State Forest	1	7	5	45.07
2020	State Forest	1	11	2	28.08
2020	State Forest	1	11	1	14.58
2020	State Forest	1	11	6	5.21
2020	State Forest	1	11	13	0.98
2020	State Forest	1	7	4	26.29
2020	State Forest	1	11	8	9.58
2020	State Forest	1	11	3	108.81
2020	State Forest	1	11	7	17.88
2021	State Forest	4	7	1	58.66
2021	State Forest	4	7	2	12.89
2021	State Forest	4	6	1	190.2
2021	State Forest	4	6	3	30.01
2021	State Forest	4	6	2	61.4
2021	State Forest	4	4	7	36.46
2021	State Forest	4	6	4	23.6
2022	State Forest	1	15	4	158.97
2022	State Forest	1	15	5	14.69
2023	State Forest	1	4	1	177.05
2024	Wildlife Management Area	2	4	5	8.92
2024	State Forest	4	10	4	37.85
2024	State Forest	4	10	9	24.54
2025	State Forest	7	1	1	68.37
2025	State Forest	3	3	1	462.23
2025	State Forest	3	2	7	90.18
2025	State Forest	7	1	2	15.02

Maple sugaring
Private leases of maple sugaring rights are allowable under Forests, Parks, and Recreation policy on State Forests and Parks (but are not allowable on WMAs under Fish and Wildlife policy).Leases may be considered in General Management Areas, where they are consistent with the goals of the area as specified in this plan, including future vegetation management, wildlife habitat, and public access. Forests, Parks, and Recreation will evaluate and implement sugaring leases in accordance with Department policy. Any such potential lease would be made available to the public through an open bid system.

Water and Fisheries

22. Goal: Maintain and enhance water quality, wetland functions, and aquatic conditions.

a) All waters will be managed for characteristics of a nearly natural condition, and limited to minor changes from reference conditions for aquatic macro-invertebrates, fish assemblages and aquatic habitat.

b) All streams and waterbodies will be evaluated for strategic wood addition activities and if appropriate management will occur.

c) At a minimum, all logging operations will follow the guidelines set forth in "Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont" (August 15, 1987 or successive versions) and Agency of Natural Resources Riparian Management Guidelines.

d) Where possible, impacts of beaver impoundments on infrastructure will be mitigated with water control devices, rather than lethal controls.

e) All future development (such as roads and parking areas) will minimize impacts to riparian areas, as per ANR state Riparian Management Guidelines.

f) Timber harvesting will be conducted in accordance with ANR policy on Riparian Management.

23. Goal: Maintain and enhance native fish species diversity and fish habitat connectivity and quality.

a) All culverts on perennial streams will be evaluated using DEC's culvert assessment protocol by 2017. Structures causing undue erosion or sedimentation, prohibiting aquatic organism passage, or causing infrastructure concerns will be planned for repair or replacement.

b) Oversimplified fish habitat may be enhanced by cutting riparian trees, dropping them into streams, and anchoring them to create structures that guide the stream and provide fish cover. Such "Strategic Wood Addition" restoration activity will be at the direction of the Fisheries Division of DFW.

c) The Moose River has been one of the Connecticut River watershed's sites for Atlantic salmon reintroduction, and may continue to be used as such in the future, if the federal program resumes from its current hiatus.

Historic

24. Goal: Maintain or enhance the condition of historic resources.

a) Management that occurs near known historic resources (e.g., mowing historic fields with cellar holes) will be designed to avoid negatively impacting resources.

b) The Vermont Division for Historic Preservation will be consulted before implementing activities that disturb the soil.

Recreation and Public Access

The central goal of recreational use and public access across the VMU is to permit and support a variety of recreational and public use opportunities in appropriate locations and times, while protecting important resources. Due to the nature of these strategies, this section will not use the goal-objective format as with the natural resource sections above.

Permitted and Prohibited Uses

The permitted uses listed below are consistent with the goals and objectives for the Victory Management Unit and State policy. These uses are believed to have limited impacts on the resources of the VMU and its other users.

- *Dispersed*, low-impact activities are generally allowed throughout the management unit, including: walking/hiking, wildlife observation, photography, hunting, fishing, trapping, swimming, picnicking, snowshoeing, skiing, canoeing, gathering renewable and abundant resources (e.g., berries and shed antler) for non-commercial use, campfires, and dispersed primitive camping for groups of less than 10 (in accordance with DFW and FPR primitive camping policies, which differ).
- The development of *roads and trails* and the concentrated public use of such facilities are allowed in designated corridors only, including: Motor vehicle use, snowmobiling, horseback riding, hiking, and skiing.
- Certain activities are allowed with a license or Special Use Permit from ANR, in advance, including: Commercial guiding, non-commercial group outings (e.g., non-profit tours, school trips), and scientific research.

Uses that are allowed on State Forest and Park land, but are not allowed on Wildlife Management Areas (except where specifically designated), as per state policy include:

- Ice and rock climbing, biking, and horseback riding.

Uses that significantly conflict with other public uses; have detrimental impacts to the fish, wildlife, and habitat of the management unit; and/or are inappropriate for the physical and aesthetic setting of the management unit are prohibited.

- Prohibited uses (except where specifically designated) include target and skeet shooting, all-terrain vehicle use (ATVs) (except for access by persons with disabilities on designated trails and with a no-cost user pass and agreement from ANR), commercial activities other than ANR-licensed guiding (e.g., commercial group tours; collection of fish, wildlife, plants and their fruits for sale), timber harvesting by the public, including collection of firewood or Christmas trees,

maple sugaring, artifact hunting, and the construction of permanent structures including permanent hunting stands.

Trail and Corridor Management

Concentrated public uses will continue to be managed by ANR in designated trails. Most trails within the VMU are located within the General Management Areas. These trails will be managed to minimize impacts to the natural resources and other users of the property.

General corridor management

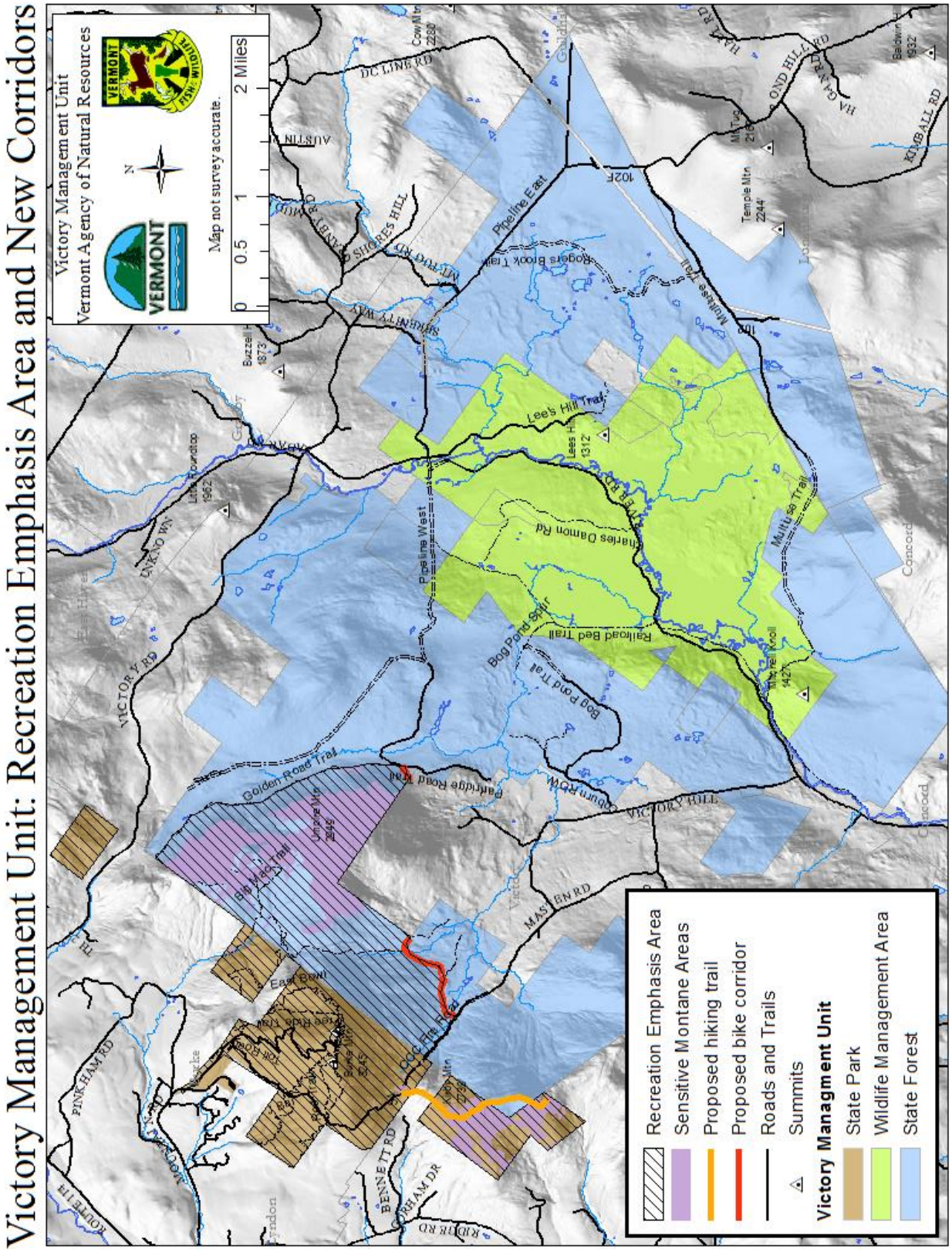
- Where appropriate recreational trails will be designed and improved to support multiple uses.
- Managing and maintaining trail networks will be conducted cooperatively with partner organizations where possible.
- New trail proposals will be evaluated based on agency and department policy and using criteria including compatibility with deed restrictions, the Land Use Classification, and the Recreation Opportunity Spectrum.
    - Are there significant resource issues? wildlife habitat; rare, threatened and endangered species; wetlands; cultural/historic, etc.
    - Are there other user group conflicts?
    - Is an Act 250 permit required? local permits required? Is a storm water permit required? wetland permits?
    - Who will be responsible for construction, maintenance, signing, parking, enforcement, etc.?
- Where trail proposals are only described in concept in this LRMP, ANR will seek additional public comment on the projects if and when full, detailed proposals are ready.

Intensive and dispersed recreation areas

Recreational uses across the VMU cover a wide spectrum from the most intensive uses (mostly near Burke Mountain) to dispersed, remote uses across much of the rest of the management unit. In recognition of the value of both intensive recreation and large areas where dispersed recreation is the primary public use, the existing pattern of use will be maintained through the life of this LRMP.

1. Within a "Recreation Emphasis Area," intensive recreational proposals will be considered, in accordance with standard ANR policy and practice. This area is in and around Burke Mountain, bounded by the Bennett Road/Fire Road and Weir Mill Brook Road to the south and the Golden Road to the east (see Figure 16).
    - All areas of Darling State Park will receive the same consideration.
    - Within this area, intensive uses will be discouraged from montane areas of Umpire and Kirby Mountains, as sensitive and remote areas.
2. Dispersed, remote recreational uses will be emphasized in all other areas of the VMU. In these areas, new intensive recreational proposals will be discouraged during the life of this plan.

Figure 16: Recreation Emphasis Area and New Corridors



Ski trails
Ski trails currently exist only on Darling State Park and are managed by the lessee of the park area. Changes to ski trails at DSP will be made in accordance with the Burke Mountain Master Plan and subject to the Act 250 process.

A proposal for a ski trail and glades on the northwestern slopes of Umpire Mountain was submitted and subsequently withdrawn by Kingdom Trails Association. Any future similar proposal should consider the ANR's decision that such use in this location would need to avoid montane natural communities and the summit ridge of Umpire Mountain.

Hiking trails
Hiking trails currently exist primarily on Darling State Park and are managed by the lessee of the park area. Maintenance to hiking trails on DSP is currently being undertaken by seasonal trail crews employed by the lessee. Changes to hiking trails at DSP will be made in accordance with the current Burke Mountain Master Plan and subject to Act250.

Signs will be placed near the summit of Burke Mountain to guide visitors and prevent continued development of unsanctioned trails.

Pedestrian uses of roads and trails is, and will continue to be, allowed throughout the VMU, including on the "multi-use trail" and forest management roads. The Bog Trail, heading north on the old railroad bed from Damon's Crossing, is used by many visitors, looking for a place to walk from the Damon's Crossing parking area. This trail, however, is regularly wet or inundated, particularly during spring birding months, and presents both challenges for users and for maintenance. Maintenance will continue on this section of trail, though future decommissioning or relocation of this trail may be necessary depending on its condition. In addition, the railroad bed heading south from Damon's Crossing may be maintained again to provide a low-impact trail through the wetland and floodplain habitats.

The Northeast Kingdom Chapter of the Green Mountain Club has proposed one new hiking trail on the VMU, travelling approximately 3 miles from the Fire Road up the north side of the mountain to an overlook about 0.3 miles south of the summit. This trail will be allowed and constructed based on review of a detailed proposal by ANR and the public. Effort will be made to ensure minimal potential impact to the montane communities of Kirby Mountain. To maintain the remote character of the area, no additional trails will be constructed on Kirby Mountain or Umpire Mountain within the Victory Management Unit.

Snowmobiling trails
Snowmobiling trails exist across a large area of the VMU. These trails are cooperatively managed with the Vermont Association of Snow Travelers (VAST). Trail management tasks including signing and water crossing maintenance are regular activities on the VMU, as with all snowmobile trails, and will be conducted as needed. No new trails or relocations of existing trails are planned. Trail relocations will be evaluated as necessary to maintain the integrity of the VAST network in the region.

Equestrian trails
Equestrian trails exist across much of the VMU and are managed by ANR.

Existing trails are in acceptable condition and no major work is planned.

The Vermont Horse Council has requested the creation of additional trails in the area of the Coburn right-of-way, to create shorter loops for riders. This location is outside the Recreation Emphasis Area, and so ANR will encourage VHC to consider alternatives using primarily existing roads and trails within the Recreation Emphasis Area (potentially using the MacDonald Road). Any proposal with potential locations for new trails or use of existing trails will be evaluated by ANR and the public.

Biking trails
Biking trails in Darling State Park are managed by the lessee of the park area. Maintenance to biking trails on DSP is currently being undertaken by seasonal trail crews employed by the lessee. Interest in increasing lift-served downhill mountain biking is expected to increase, and any changes or additions to trails at DSP will be made in accordance with the current Burke Mountain Master Plan and subject to Act250.

Bikes will continued to be allowed on gravel-surfaced roads open to vehicles on the unleased portion of DSP and State Forest roads, and designated areas of the WMA.

In addition, two small segments of existing forest management roads on VSF will be designated for mountain bike use, to enable connections to/from private lands with extensive trail networks.

All-Terrain Vehicles (ATVs)
All current ATV use on the VMU is illegal. This use will be controlled through enhanced use of signs and enforcement.

Public use infrastructure
Lean-tos

- Lean-tos will be regularly maintained.

Kiosks

- Kiosks will be regularly maintained with updated information and signage.
- A new kiosk will be placed near the summit parking area of Burke Mountain.
- New kiosks may be placed at the beginning of the Guldenshuh Road and/or Lee's Hill Road.

Parking areas

- Parking areas will be maintained at a standard to allow use by the public.
- Trailhead and winter access areas will continue to be plowed whenever feasible.

Roads and Gates

- Existing vehicle access patterns will generally be continued. Some roads will remain gated year-round to allow for low-impact, remote recreational activities, minimize disturbances to wildlife, and reduce maintenance costs. Other roads will continue to be open to public vehicular travel as

conditions allow. New or improved logging roads will be blocked to vehicular access at the end of operations.

- Changes to access via gates will be made to some gates which had been seasonally opened only during fall, to allow access for the public consistently across the year:
    - The gate at River Road on to the Pipeline East will remain open as conditions allow (generally, May to December).
    - The gate at River Road on to the Pipeline West will remain closed.
    - The gate at River Road on to Lee's Hill Road will remain closed.
- Due to persistent budget shortfalls for road maintenance, some roads may be temporarily closed, permanently decommissioned, or altered with water bars that will prevent many vehicles from passing.
- No new permanent roads will be constructed. Short extensions or temporary logging roads, however, may be constructed to access timber sale landings off of existing roads.
- No new gates are planned, however, they may be installed where necessary to protect natural resources or prevent user conflicts.
- Annual maintenance operations will focus on the main access roads (Partridge Road, Pipeline East of River Road, Tugg Mtn Road, and Bog Pond Road) and will include grading, resurfacing, mowing, and upkeep of drainage structures.
- Forest management roads will be inspected periodically and graded, resurfaced, mowed, and drainage structures kept up as needed and as funding permits.
- All culverts on perennial streams will be evaluated using DEC's culvert assessment protocol by 2017. Structures causing undue erosion or sedimentation, prohibiting aquatic organism passage, or causing infrastructure concerns will be planned for repair or replacement.
- Reptile and amphibian mortality (especially blue-spotted salamander, a focal species for the VMU) as a result of traffic on the River Road will be evaluated in the Spring of 2017 and mitigation measures may be considered if impacts are determined to be significant.

User management

- Outreach on Endangered spruce grouse will be conducted, including the maintenance of signs warning upland bird hunters of spruce grouse presence.
- District Biologists and the state Furbearer Biologist will continue to communicate with local trappers about the presence of American marten and Canada lynx, and will discuss use of mitigation measures to avoid incidental take.

Public safety

- Wildfire detection will be based upon public reporting and air patrols. The town Forest Fire Warden in each town is responsible for wildfire suppression within their municipality. A list of contacts within the Forestry Division who are able to assist if necessary is located in the District Fire Plan available at the district office.

- Each year, heavily used areas (such as lean-tos and parking areas) will be monitored for hazard trees. These trees will be evaluated and treated in accordance with FPR Procedure. As in all forests, however potentially hazardous trees will exist naturally across the management unit, and such trees may be left in place for their value in ecosystem function and wildlife habitat. Visitors must use their own judgment to ensure their safety in the woods.

Education and Outreach

- Exemplary land management practices will be demonstrated across the VMU so that they may find broader application on private lands.
- Interpretive materials will be placed in Victory Basin and near Burke Mountain summit educating visitors about important resources and viewing opportunities including spruce-fir habitats, Bicknell's thrush, and American marten.

Access for people with disabilities

- Efforts will be made to comply with Americans with Disabilities Act (ADA) standards allowing wheelchairs to access pedestrian-accessible areas.
- In accordance with the ADA, the Agency of Natural Resources issues free passes for the use of Other Power Driven Motorized Devices in appropriate areas to any individual with a disability who requests access.

Scenic

- In addition to signage and educational materials near the Burke Mountain summit, users could be better managed in this sensitive area by developing a clearer trail to the summit overlook. In addition, being a short distance from the parking area, this presents an opportunity to create access to this overlook that would be accessible by individuals with disabilities.
- Construction of roads, parking areas, buildings, or other infrastructure will be discouraged (but not prohibited) at areas identified in the Scenic Resources Assessment. Timber harvesting will not be precluded in these or other areas based on scenic concerns.

Climate change and flood resilience adaptation

The effects of climate change are an ongoing management issue at Victory Management Unit.

Historical data have shown changes across Vermont over the last 50 years, including:

- Summer temperatures increased 0.4 degrees F per decade
- Winter temperature increased 0.9 degrees F per decade
- Spring thaw arrives 2.3 days earlier per decade
- Precipitation increased 15-20%, with 67% from "heavy precipitation" events

Anticipated Climate Change Effects

Scientific studies estimate a variety of potential changes in the future, including:

- Increased temperatures, especially in winter

- Increased precipitation, especially rain in winter
- Increased extreme weather events, including floods, wind storms, and fires
- Longer growing seasons, shorter winters
- Changing biological interactions

These potential changes are expected to have a range of effects on the forested ecosystems of the VMU, as with forests across the state. Table 4 lists examples of anticipated effects and timeframes of many key climate factors on upland forests of Vermont.

Table 4: Expected Climate Change Effects and Timeframes[5]

Key Climate Change Factors	Expected Effects	Timeframe
Warming temperatures	Compositional changes associated with changes in thermally suitable habitat (loss of cold-adapted species and increase in warm-adapted species)	Long-term, but localized effects could occur on a shorter timescale
	Increase in overwinter survival of pests, such as balsam and hemlock woolly adelgid	Immediate
	Increased physiological stress, resulting in increased susceptibility to pests and disease, decreased productivity and increased tree mortality	Immediate
	Increased evapotranspiration, resulting in a decrease in soil moisture; moisture limitation/stress negatively impacts productivity and survival in many species	Immediate
	Increased decomposition rate of organic material may enrich soils and make them more suitable for competitors	Long-term, but localized effects could occur on a shorter timescale
	Decrease in winter snow pack, leading to change in deer and moose browsing patterns, which may affect regeneration	Immediate
	Lengthening of growing season resulting in changes in species competitiveness, especially favoring non-native invasive plants	Immediate
Increase in extreme storm events	Increased physical damage and disturbance, leading to gap formation, which could facilitate the spread of invasive plants	Immediate
Phenology (timing)	Longer growing season	Immediate
	Early spring thaws/late frosts can damage buds, blossoms & roots, which affects regeneration	Immediate

[5] Source: TetraTech. 2013. Climate change adaptation framework. Prepared for Vermont Agency of Natural Resources.

	Change in freeze/thaw cycles could disrupt regular periodicity of cone cycles	Immediate
	Asynchronous changes in phenology may negatively impact some migratory species and pollinators	Immediate
Increase in fire risk	Loss of fire intolerant species and increase in fire tolerant species, such as red and pitch pines	Long-term, but localized effects could occur on a shorter timescale
	Earlier and warmer springs and smaller snow packs, and hotter drier summers conducive to increased fire risk	Immediate
Increase in number of short-term droughts	Declines in forest productivity and tree survival associated with water limitation	Long-term

Land Management Adaptation Strategies

Adaptation to these effects will take a variety of forms, many of which have long been a part of the excellent land management ANR strives to practice. Some of the key adaptation goals and strategies which will be used across the VMU include:

A) *Sustain fundamental ecological functions: protect soil quality, nutrient cycling, and hydrology*.

- Enhancing nutrient cycling and soil protection by retaining woody material on the forest floor.
- Matching harvesting equipment to the site for soil protection.
- Minimizing the number of skid roads and trails.
- Maintaining roads in good condition and following all AMP's.
- Replacing and enlarging inadequate culverts and stream crossing structures.

B) *Reduce impact of existing biological stressors: increase pest and pathogen resistance, limit herbivory, and manage invasive species.*

- Eradication and/or management of all non-native invasive plants.
- Avoiding negative impacts of overbrowsing through deer and moose population management.
- Management of Beech Mast Production Areas to promote resistant trees.

C) *Moderate impacts of severe disturbances, such as fire and wind disturbance*

- Managing for a multi-age, structurally diverse forest.

D) *Maintain or create refugia and increase ecosystem redundancy.*

- Maintaining areas not subject to timber harvesting and rare and sensitive natural communities as potential refugia.
- Maintaining and developing biological "legacies," such as very old trees.

E) *Maintain, enhance species and structural diversity and facilitate community adjustments through species transition.*

- Maintaining and developing a forest with a diversity of species and age classes.
- Retention of biological legacies from a variety of tree species.

F) *Promote landscape connectivity.*

- Maintain a landscape-scale focus, by planning in conjunction with the other nearby lands, and being mindful of management in the surrounding region.
- Reduce landscape fragmentation by closing designated roads in Core Area.

In addition, the VMU's extensive spruce-fir and mixed forests are valuable communities in the face of a changing climate, and management to maintain and enhance them will favor many species encountering additional stresses over time. Such strategies will include:

- Promoting natural softwood regeneration
- Enhancing natural softwood regeneration with underrepresented, native species such as white pine
- Limiting hardwood regeneration
- Promoting softwood recruitment into the overstory through silviculture
- Favoring species expected to do better in a changing climate (red spruce over balsam fir)
- Maintaining lowland spruce-fir forests as potential refugia

Taken together, these strategies will help the full range of native fish, wildlife, and plant species; natural communities; and ecological processes face a changing climate. For example, maintaining lowland spruce-fir forests, which may decline in a warming climate, and landscape connectivity should allow the rare boreal species of the region (e.g., spruce grouse, American marten) to persist on the VMU and move north across the landscape as needed.

Infrastructure and Public Use Adaptation Strategies

In addition to the far-reaching effects on ecological systems described above, climate change may also affect the infrastructure and public uses of West Mountain WMA.

Potential effects could include:

- Floods damaging roads, trails, and camp structures.
- Fires endangering WMA users, camp properties, and neighboring properties.
- Increased precipitation leading to more temporary/seasonal road closures and increased road maintenance.
- Shorter winters reducing snowmobile use seasons.
- Windstorms increasing maintenance needs to keep roads clear of trees.

Such effects will be dealt with on a case-by-case basis. It is anticipated that the systems in-place to manage many of these uses will readily handle these issues. Others will require more comprehensive considerations, for example, increased precipitation and flooding—maintaining the VMU as extensively forested, with significant riparian buffers and intact wetlands is a key strategy to reduce and mitigate flooding in the VMU and downstream areas. In addition, however, ANR has and will continue to replace undersized culverts (which can fail in flood events) with larger and better positioned structures, and—long term—may need to consider relocating some roads away from streams.

C. Location-specific Management Strategies

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 the VMU 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 – Highly Sensitive Management areas contain uncommon or outstanding biological, ecological, geological, scenic, cultural, or historic significance where protection of those resources is the primary consideration for management.[6] Human activities and uses should not compromise the exceptional feature(s) identified.

2.0) Special Management Areas – Special Management Areas contain unique or special resources where protection and/or enhancement of those resources is an important consideration for management. These areas do not require the same level of protection given to highly sensitive areas and may be intensively managed for specific purposes. However, timber harvesting, wildlife management, roads, and recreational activities should not compromise the unique or special resource(s) identified.

3.0) General Management Areas – The General Management areas contain few rare resources and support dominant uses including sustainable timber harvesting, wildlife habitat management, concentrated trail networks, dispersed recreation, and other general land uses. In these areas, a primary management consideration is minimizing conflict between the activities, as well as with lands categorized as more sensitive where they are adjacent to a general use area. In addition, more sensitive resources that occur within these areas may require special attention.

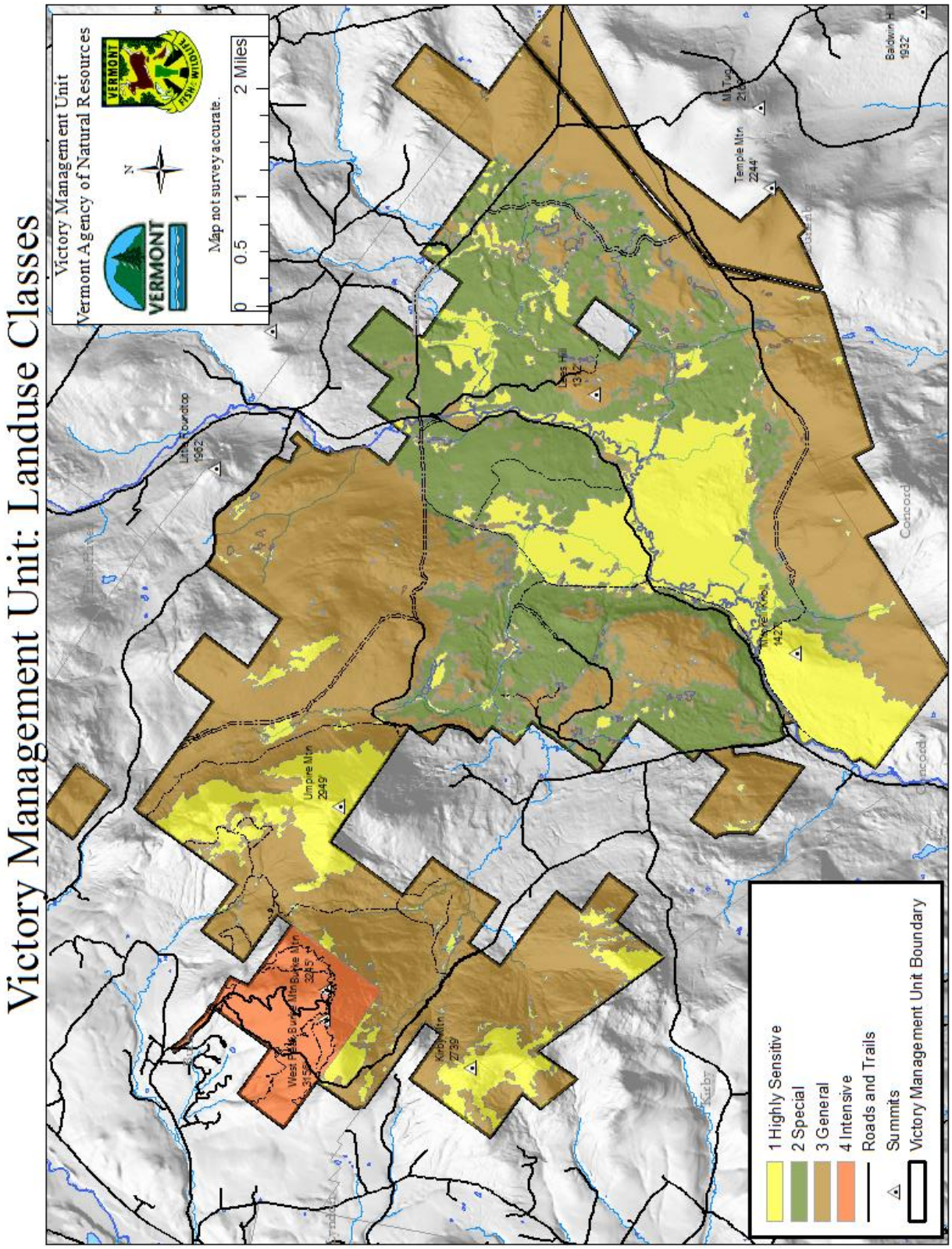
4.0) Intensive Management –Intensive Management areas are easily accessible and characterized by a high level of human activity and high intensity development on or adjacent to state land. Aesthetics and safety are the primary management considerations in these areas. However, more sensitive resources that occur within these areas may require special attention.

Some features and resources do not fit this classification system perfectly. For example, trail corridors that cross land use classification zones and natural communities or historic resources too small to represent as individual units. In cases such as these, management activities will be adjusted based on

[6] Highly Sensitive areas were chosen based having one or more of the following criteria: state significant (non-matrix) natural communities, S1 or S2 wetlands, seeps, vernal pools, threatened or endangered species habitat.

site-specific resources, constraints, and opportunities and will follow the management directions outlined previously in this document.

Figure 17: VMU Land Use Categories



Highly Sensitive Management Areas

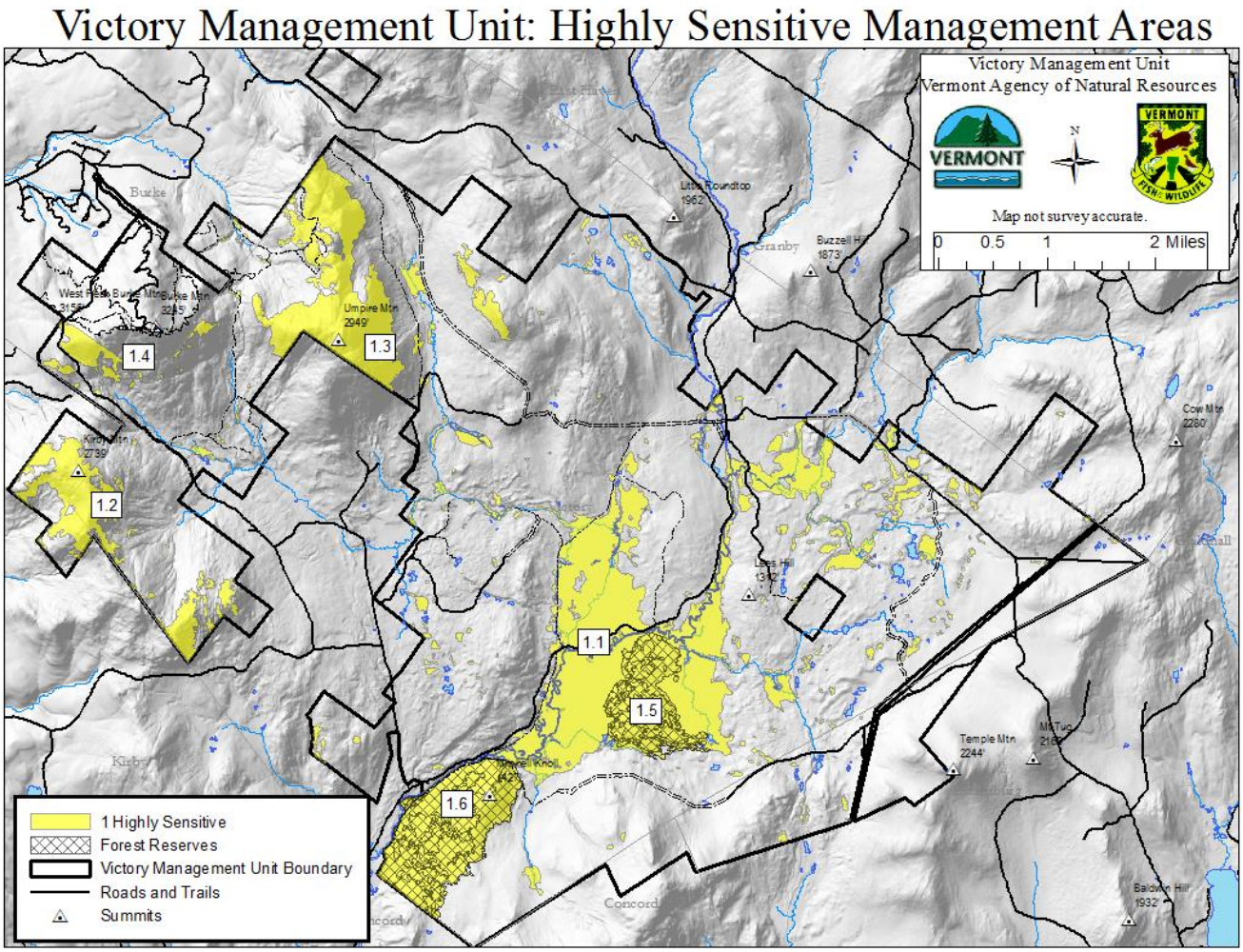
Highly Sensitive Management Area Goals

1. Protect rare, threatened and endangered plants and animals.
2. Protect examples of rare and exemplary natural communities.
3. Protect high elevation areas with steep slopes and fragile soils.
4. Maintain the natural condition of surface waters.
5. Protect significant and unique wildlife habitats.
6. Maintain areas of remoteness.
7. Provide recreational opportunities where appropriate and compatible with other goals.
8. Provide opportunities for education and outreach.

4,718 acres of the VMU (20.0%) are designated for Highly Sensitive management.

Acres managed under this category will be managed for the functions and values of the resources within them. In general, these will be achieved by allowing natural process to occur without active forest or habitat management, but in some limited cases vegetation may be manipulated for natural community restoration; management of specific habitats for rare, threatened, and endangered species; and to maintain safe and enjoyable recreational conditions. New recreational and public access infrastructure will be kept to a minimum and designed carefully to maintain natural resources.

Figure 18: VMU Highly Sensitive Management Areas



Highly Sensitive Areas: 1.1 (Victory Basin wetlands)

Description: Extensive open and forested wetlands of Victory Basin, providing a wide range of wildlife habitat and ecosystem services.

Featured management: Management will seek to maintain and enhance natural wetland function.

Implementation:

- Maintenance of trails on the railroad bed north and south from Damon's Crossing will take place in this management area. All activities will minimize impacts on wetlands and natural communities.

Highly Sensitive Areas: 1.2 (Kirby Mountain), 1.3 (Umpire Mountain)

Description: Montane natural communities, providing uncommon wildlife habitat and important scenic resources.

Featured management: Montane forests will be allowed to develop naturally. Limited development of concentrated recreational infrastructure will be allowed only in limited areas. The remote character of the areas will be maintained.

Implementation:

- The Northeast Kingdom Chapter of the Green Mountain Club has proposed one new hiking trail on the VMU, travelling approximately 3 miles from the Fire Road up the north side of the mountain to the summit. This trail will be allowed and constructed based on site-specific review by ANR. No additional trails will be constructed on Kirby Mountain within the Victory Management Unit.
- The montane areas of Umpire Mountain will be maintained without recreational infrastructure.

Highly Sensitive Areas: 1.4 (Burke Mountain)

Description: Montane natural communities, providing uncommon wildlife habitat and important scenic resources. Much of the montane habitat on Burke Mountain is contained within the Darling State Park lease area (and therefore classified as Intensive, below). These high-elevations, however, also contain the only known occurrences of Bicknell's Thrush (a rare, high-elevation songbird) within the VMU.

Featured management: Montane forests will be allowed to develop naturally. Populations and habitat of Bicknell's thrush will be maintained or enhanced.

Implementation:

- ANR will work collaboratively with the ski area lessee to maintain Bicknell's Thrush habitat within this area, with a goal of no net loss of habitat.
- Enhanced visitor management including signage, a new kiosk, and the creation of an improved summit viewing area will be used to prevent continued loss of habitat to development of unsanctioned trails.
- ANR may consider managing for dense regenerating softwood areas to enhance Bicknell's thrush habitat quality in certain areas.

Highly Sensitive Areas: 1.5 (Victory Basin lowland), 1.6 (Mitchell's Knoll)

Description: Lowland spruce-fir and mixed forests in the middle of the Victory Basin wetlands, and mixed and hardwood forests to the southwest of Mitchell's knoll. These areas have been reserved from timber harvesting since the state took ownership of the properties. As such, they are some of the older hardwood forest patches in the area. The inclusion of hardwood forests on the knoll down to lowland forests in the basin captures representation of some of the diverse landforms and forest types on the VMU.

Featured management: These hardwood, mixed, and softwood forests will be allowed to develop naturally, to create and enhance habitats and habitat features that are uncommon in the region including large trees, large downed material, and natural disturbance patterns.

Implementation:

- These areas will be allowed to develop passively. Vegetation management, infrastructure development, and other activities will be avoided.

Special Management Areas

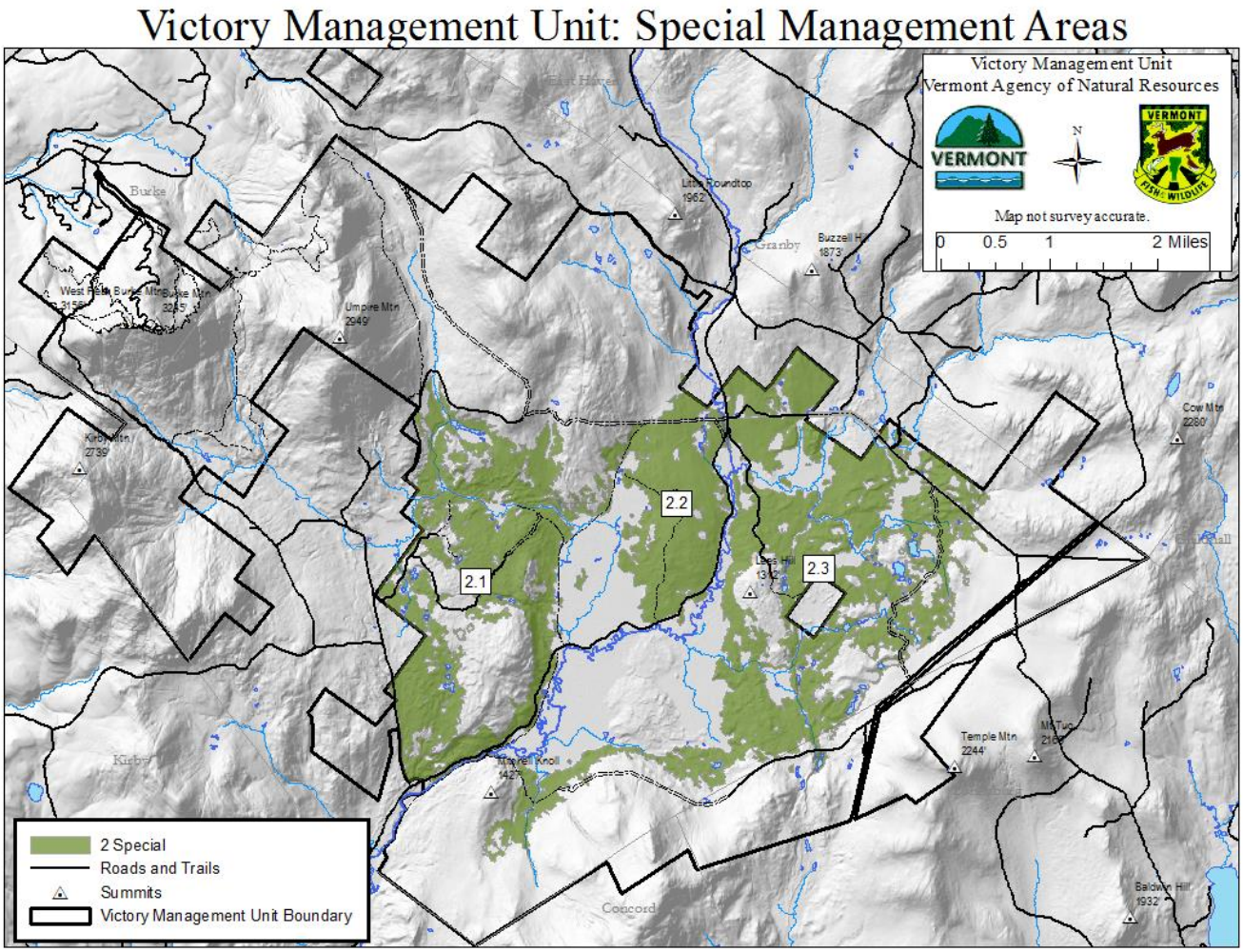
Special Management Area Goals

1. Provide high quality habitat for target wildlife species.
2. Provide opportunities for compatible recreational pursuits.
3. Maintain the natural or almost natural conditions of surface waters, with minimal changes from reference conditions for aquatic macroinvertebrates and fish assemblages.
4. Produce high quality timber where compatible with the "special" resource.
5. Protect representative examples of typical landscapes and natural communities.
6. Protect cultural and historic resources

5,451 acres of the VMU (23.1%) are designated for Special management.

Areas managed under this category will be managed primarily for the special resources within them. Forest and wildlife habitat management, recreation, and other uses may be conducted where appropriate.

Figure 19: VMU Special Management Areas



Special Areas: 2.1 (Western mixed forest), 2.2 (Central mixed forest), 2.3 (Eastern mixed forest)

Description: These areas are the main lowland spruce-fir and red spruce-northern hardwood forests in and around Victory Basin. These communities occur very rarely in Vermont at this scale and are important habitat for wintering deer as well as numerous rare species including spruce grouse, gray jay, and American marten.

Featured management: The long-term achievement of a multi-aged, structurally diverse forest with a significant component of spruce, for the production of forest products and the provision of valuable habitat for spruce grouse, gray jay, wintering deer, American marten, and other wildlife.

Implementation:

- Due to past management history, softwood is likely less common than it was in upland stands and mature even-aged fir stands predominate lowland areas. To reach the long-term desired future condition, silvicultural treatment of large areas may be required over the next decade. This

will likely move the area out of its goal range for deer winter shelter and natural community condition, but will ultimately aid in meeting these goals in future decades.

- Forest and wildlife habitat management details are described for red spruce-northern hardwood and lowland spruce-fir forests in section IV.B.

  These strategies include:

  - Long-term, uneven-aged silvicultural management of these communities will be preferred.
  - Harvesting practices will generally seek to maintain or increase the level of softwood species within the harvest unit, especially red spruce, hemlock, cedar, and pine.
  - Salvage harvests will be conducted only as per standards in IV.B. including harvesting only in stands targeted for treatment and if treatment furthers the goals of the stand.
  - Breeding season surveys for black-backed woodpecker nests will be conducted in all stands scheduled for harvest before treatment.
  - In the long term, young forest habitat will be created to benefit wildlife species, within natural disturbance ranges, on areas up to 7% of lowland spruce-fir communities and 4% of red spruce-northern hardwood communities.
  - Management will aim to provide functional shelter across at least 50% of the deer wintering area, connectivity throughout all non-regenerating segments of the winter area, and browse accessible from shelter areas.

- Recreation and public use management details are described in section IV.B.

  These strategies include:

  - Concentrated recreational use (e.g., biking, snowmobiling, trail hiking) will remain confined to existing corridors. Corridors will be kept up with routine maintenance.
  - New equestrian trails will be considered in area 2.1 (and the adjoining hardwood communities of 3.2 and 3.4), to provide shorter loops for horseback riders. Specific routes will be located subject to conditions on the ground.
  - Public vehicular access will continued to be managed via gates on spur roads.
    - The gate at River Road on to the Pipeline East will remain open as conditions allow (generally, May to December).
    - The gate at River Road on to the Pipeline West will remain closed.
    - The gate at River Road on to Lee's Hill Road will remain closed.
  - Illegal ATV use across the pipeline road in areas 2.2 and 2.3 m require additional outreach to riders and/or enforcement.
  - Reptile and amphibian mortality (especially blue-spotted salamander, a focal species for the VMU) as a result of traffic on the River Road will be evaluated in the Spring of 2016 and mitigation measures may be considered if impacts are determined to be significant.
  - Outreach on Endangered spruce grouse will be conducted, including the maintenance of signs warning upland bird hunters of spruce grouse presence.

General Management Areas

General Management Area Goals

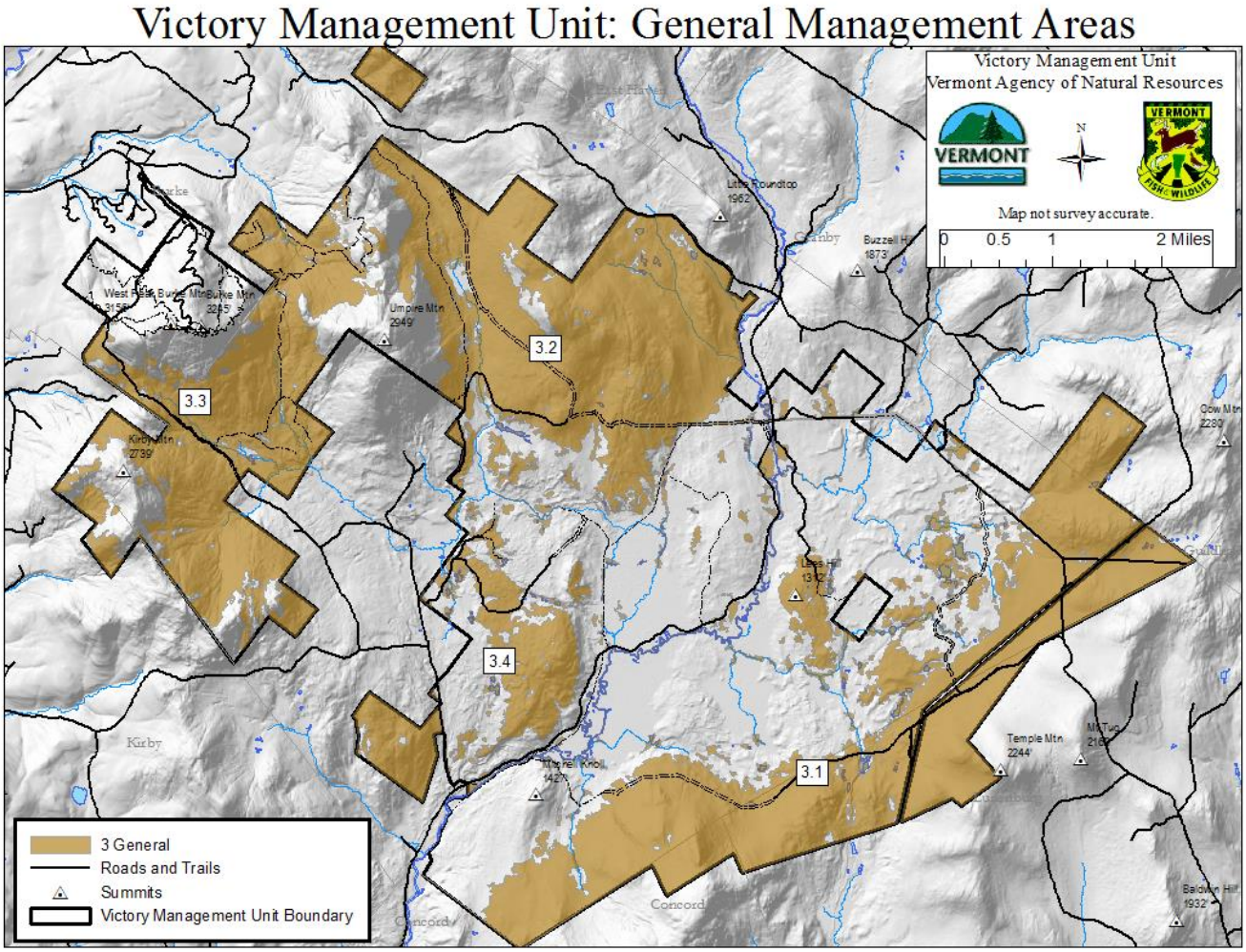
1. Promote healthy natural communities, protect rare and endangered plant and animal species, and sustain and enhance biodiversity.

2. Provide a sustainable flow of high quality forest products and to demonstrate sound forest management practices.
3. Provide high quality habitat for target and general wildlife species.
4. Provide opportunities for a wide variety of dispersed recreational pursuits to meet current and future needs of the public.
5. Improve and develop necessary recreational services and facilities to meet current and future needs of the public. Develop appropriate ADA accessible facilities.
6. Promote visitor knowledge of the natural and cultural history of the property.
7. Provide opportunities for education, research, and monitoring activities.
8. Maintain or enhance high quality water resources and aquatic habitats.
9. Protect cultural, historic, and pre-historic resources.

12,655 acres of the VMU (53.1%) are designated for General management.

Areas managed under this category have fewer rare and special resources and will therefore support a variety of uses including forest and wildlife habitat management, dispersed recreation, concentrated trail networks, and public access infrastructure.

Figure 20: VMU General Management Areas



General Areas: 3.1 (Tug Mountain hardwood forest),

Description: These are the large concentrations of hardwood forest in the eastern VMU. Generally occurring at mid-elevations, these forests contain a mix of maple, beech, birch, and other species. Primary access is through the Tug Mountain road, multi-use trail, and Roger's Brook trail.

Featured Management: Forests diverse in structure and composition, supporting the production of forest products, contiguous wildlife habitat, and a range of public uses including the Victory Multiuse trail.

Implementation:

- Forest and wildlife habitat management details are described in section IV.B.
  These strategies include:
  - In the long term, young forest habitat will be created to benefit wildlife species, within natural disturbance ranges, on areas up to 2% of northern hardwood communities.
  - In hardwood stands adjacent to deer wintering area, 1-2 acre regeneration treatments may be used to promote the growth of accessible woody browse.

- Up to 40 acres of openings will be maintained as herbaceous wildlife habitat.
- Stands with high percentages of healthy beech and signs of bear use may be managed as beech mast production areas.

- Recreation and public use management details are described in section IV.B.
  These strategies include:
  - As a primary access road, the Tug Mountain Road will be a focus of annual road maintenance.
  - All current ATV use on the VMU is illegal. This use will be controlled through enhanced use of signs and enforcement.

General Areas: 3.2 (Hobart ridge hardwood forest)
Description: These are the large concentrations of hardwood forest across the northern VMU. Generally occurring at mid-elevations, these forests contain a mix of maple, beech, birch, and other species. Primary access is from the Granby Road to the north, the Pipeline West trail, and the Partridge Road.

Featured Management: Forests diverse in structure and composition, supporting the production of forest products, contiguous wildlife habitat, and a range of public uses including the Pipeline West trail.

Implementation:
- Forest and wildlife habitat management details are described in section IV.B.
  These strategies include:
  - In the long term, young forest habitat will be created to benefit wildlife species, within natural disturbance ranges, on areas up to 2% of northern hardwood communities.
  - In hardwood stands adjacent to deer wintering area, 1-2 acre regeneration treatments may be used to promote the growth of accessible woody browse.
  - Up to 40 acres of openings will be maintained as herbaceous wildlife habitat.
  - Stands with high percentages of healthy beech and signs of bear use may be managed as beech mast production areas.

- Recreation and public use management details are described in section IV.B.
  These strategies include:
  - All current ATV use on the VMU is illegal. This use will be controlled through enhanced use of signs and enforcement.
  - Lean-tos will be regularly maintained.
  - As a primary access road, the Partridge Road will be a focus of annual road maintenance.

General Areas: 3.3 (Weir Mill Brook hardwood forest)
Description: These are the large concentrations of hardwood forest in the west of the VMU, around Kirby, Burke, and Umpire Mountains. Generally occurring at mid-elevations, these forests contain a mix of maple, beech, birch, and other species. Primary access is from the Fire Road.

Featured Management: Forests diverse in structure and composition, supporting the production of forest products, contiguous wildlife habitat, and a range of public uses including a potential hiking trail and backcountry skiing glades.

Implementation:

- Forest and wildlife habitat management details are described in section IV.B.
  These strategies include:
  - In the long term, young forest habitat will be created to benefit wildlife species, within natural disturbance ranges, on areas up to 2% of northern hardwood communities (and 6% within the WMA).
  - In hardwood stands adjacent to deer wintering area, 1-2 acre regeneration treatments will be used to promote the growth of accessible woody browse.
  - Up to 40 acres of openings will be maintained as herbaceous wildlife habitat.
  - Stands with high percentages of healthy beech and signs of bear use will be managed as beech mast production areas.

- Recreation and public use management details are described in section IV.B.
  These strategies include:
  - The proposal for a hiking trail from the Fire Road up Kirby Mountain would take place partially in this area.
  - Skiing trails to/from the northwestern slopes of Umpire Mountain will be considered in this area. Trails and glades would be limited in number and extent. No trails or glades will enter montane natural communities or the eastern side of the ridge.
  - Two small segments of existing forest management roads on VSF will be designated for mountain bike use, to enable connections to/from private lands in the Coburn Road area with extensive trail networks.

General Areas: 3.4 (Bog Pond hardwood forest)
Description: These are the large concentrations of hardwood forest across the VMU. Generally occurring at mid-elevations, these forests contain a mix of maple, beech, birch, and other species.

Featured Management: Forests diverse in structure and composition, supporting the production of forest products, contiguous wildlife habitat, and a range of public uses including potential equestrian loop trails.

Implementation:

- Forest and wildlife habitat management details are described in section IV.B.
  These strategies include:
  - In the long term, young forest habitat will be created to benefit wildlife species, within natural disturbance ranges, on areas up to 2% of northern hardwood communities.
  - In hardwood stands adjacent to deer wintering area, 1-2 acre regeneration treatments may be used to promote the growth of accessible woody browse.
  - Up to 40 acres of openings will be maintained as herbaceous wildlife habitat.
  - Stands with high percentages of healthy beech and signs of bear use will be managed as beech mast production areas.

- Recreation and public use management details are described in section IV.B.
  These strategies include:

- The Vermont Horse Council has requested the creation of additional trails in the area of the Coburn right-of-way, to create shorter loops for riders. Potential locations for a new trail or trails will be determined on-the-ground in the summer of 2017, and potential resource and user conflicts will be evaluated and mitigated at that time.
- Annual road maintenance operations will focus on the main access roads (including in this area, Coburn Road and Bog Pond Road) and will include grading, resurfacing, mowing, and upkeep of drainage structures.

Intensive Management Areas

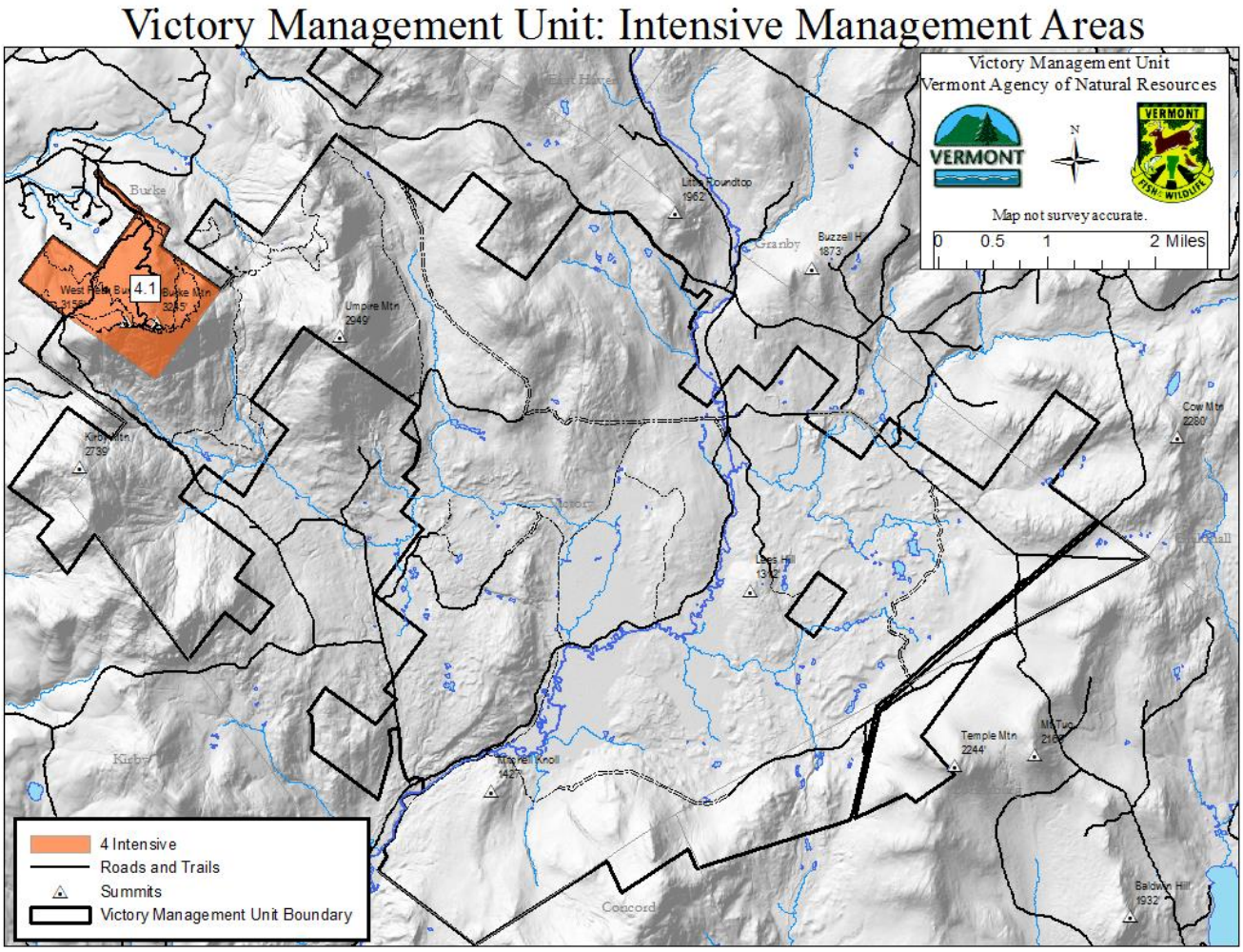
Intensive Management Area Goals

1. Protect the natural, cultural, and historic resources of the area for future generations.
2. Protect examples of unique or special natural communities.
3. Protect rare, threatened, and endangered species.
4. Manage and monitor use of area to maintain the high quality recreational experiences.
5. Continue to provide a wide range of recreational opportunities primarily for intensive activities, but also access to dispersed recreational opportunities.
6. Improve and develop necessary services and facilities to meet the current and future needs of the public. Develop appropriate ADA accessible facilities.
7. Provide for healthy and safe recreational facilities and environs for visitors.
8. Promote visitor knowledge of the natural and cultural history of the property.
9. Provide general public information about the forest and state parks.
10. Provide opportunities for education, research, and monitoring activities.
11. Monitor for and try to prevent invasive exotic species.

909 acres of the VMU (3.8%) are designated for Intensive management.

Areas managed under this category will support a variety of uses including the most concentrated public uses and public access infrastructure.

Figure 21: VMU Intensive Management Areas



Intensive Areas: 4.1 (Darling State Park lease area)

Description: The ski lease area covers the majority of Darling State Park. Lower elevations are hardwood forest, while upper elevations are more rare montane communities. The lease area is already heavily managed for public uses, with existing ski lifts, buildings, utility infrastructure, roads, and trails for skiing, hiking, and biking.

Featured management: Concentrated and intensive public uses of many kinds.

Implementation:

- Forest and wildlife habitat management details are described in section IV.B.
  These strategies include:

- Recreation and public use management details are described in section IV.B.
  These strategies include:

- Public safety and user conflicts are a continual management issue.
- ANR will collaborate with the lessee to maintain and enhance the functions and values the numerous state significant natural communities and rare Bicknell's thrush breeding habitat which over much of Burke Mountain and the West Peak within the lease area.
- A new informational kiosk will be placed near the summit parking area.
- A clearer trail to the summit overlook will be created to prevent unauthorized trails and add access for individuals with disabilities.
- Signs will be placed near the summit of Burke Mountain to guide visitors and prevent continued development of unsanctioned trails.
- ANR will continue to work with the lessee on new trail and use proposals to minimize conflicts with other uses and natural resources.
- The lessee has responsibility for management and maintenance of hiking, biking, and ski trails on the property.

VI. MONITORING AND EVALUATION

During the life of the LRMP for the Victory Management Unit, 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 VMU. 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 the VMU 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 the management unit?

Obtaining quality information is critical to making informed decisions and conducting sound, thoughtful management actions. Research projects on the VMU are directed by the District Stewardship Team to ensure that they do not conflict with the goals and objectives for the management unit 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 the Victory Management Unit requires long-term research and monitoring projects in a number of areas. Some of the efforts at meeting these goals include:

Strategies and Actions:

- Continue ongoing inventory and assessment projects promoting the collection and documentation of quality long-term information critical to the assessment and evaluation of management on the VMU (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 projects which further understanding of ecological elements and wildlife habitat on the VMU and the impacts of management activities.
- Specific projects identified as part of this LRMP include:
    - Evaluating the potential deer winter area for deer usage
    - Assessing culverts for geomorphic compatibility and aquatic organism passage.
    - Continuing monitoring of spruce grouse populations.
    - Monitoring Bicknell's thrush to determine distribution, abundance, and responses to management and public use.
    - Surveying boreal birds for species presence, abundance, and distribution.

- Monitoring snowshoe hare abundance.
- Monitoring hunting pressure on snowshoe hare.
- Assessing distribution and abundance of rock vole.
- Assessing distribution of blue-spotted salamanders and the impacts of mortality on river road during spring migrations.
- Assessing the distribution and abundance of wood turtle.
- Assessing the species presence, distribution, and abundance of bats.
- Monitoring trapping mortality of Canada lynx and America marten.
- Monitoring abundance, distribution, and trends over time in species of regional responsibility and concern, such as wood thrush, olive-sided flycatcher, and Canada warbler.

Timber

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 VMU will be periodically reviewed by 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.
- Conduct a Continuous Forest Inventory based on a system of permanent plots to be first established and sampled in 2015. This data will add important information about the growth and development of forests across the VMU.

Recreation

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

Strategies and Actions:

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

Historic

There are both historic and suspected pre-contact resources within the VMU. 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 the management unit 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 the management unit.

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 VMU 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, & Sutherland), the Victory Management Unit, 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 the VMU.

VII. 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.

VIII. 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.

In addition to these broad goals, the Stewardship Team for this region has identified the following as priority goals for future acquisition: 1) Enhancing wildlife connectivity both within the VMU and to/from adjacent areas, 2) Enhancing opportunities for public access and use of state land. Most importantly, these goals should be evaluated in light of the connections and relationships to the large area of public and conserved lands to the north of the VMU, throughout the Northeast Kingdom.

All new acquisitions of land to the Victory Management Unit 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 the Victory Management Unit will be accordance with Agency of Natural Resources policies and ultimately approved by the Secretary of the ANR after consultation with the regional planning commission and the town(s) in which the parcel is located.

IX. APPENDICES

Appendix A: Public Comment Summary

The following comments were written on easels by stakeholders at the August 7 2013 scoping meeting and transcribed as best as possible below.

Forest and Habitat Management

- Maintain power line and gas line motorized access
- Continue spruce grouse project
- Blowdowns- balance for timber vs. habitat (leave alone)
- Maintain "older growth" forests at Burke (West Peak)- Large maple and red spruce
- Conduct more harvests. 1 per year is not enough
- We hunt in grown over clear cuts. These benefit rabbit, birds, moose and deer
- Aggressive timber cuts are also good for rural economy
- Keep timber roads open for recreational motorized access. There are many advantages created by motorized access
- No restricted areas- managed land is healthier land and healthier wildlife.

Wildlife and Fisheries

- Enjoy the vastness of parcel for biking, snowshoeing, hiking and hunting
- Catch and release sections, barbless hooks
- Maintain the Vast trails
- Cuts, clearcuts for wildlife
- Maintain road access for all users
- Aggressive fish stocking
- No restricted ecological core areas
- Recognize unique values to wildlife communities of high elevation lands
- Are water withdrawals for snowmaking/hotel use affecting aquatic systems?

Natural Communities

- Don't restrict use on the basis of natural communities. Stay away from designating restricted areas.
- Don't close roads for this purpose and consider opening gates
- Keep things the way they are
- Access to natural community info online
- Keep the maintained Vast trail open

Recreation and Access

- Maintain Golden Trail- fix bridges
- Open up gated roads for bicycle use in DSP/VSF.
- Increase "adventure" recreational opportunities
- Open up gated roads for motorized use
- Allow scoping and design of connector singletrack between "log" roads

- Designated Kingdom Trails (KT) trail around Burke Mt.
- Expanded campground
- Expand Nordic ski trails including winter bike trails
- Recognized new Fat Bike activity
- Developing and delineating remote camping throughout the Victory State Forest
- Improve dissemination and promotion of state land recreational opportunities.
- Recognize positive economic impact that recreation brings to poorest region in VT
- Develop and maintain more trails in the Victory State Forest "Umpire Ridge" area for the purposes of winter recreation and resource education- Burke Umpire Loop
- What about low recreation areas in more remote spots?
- Overall strong local support for KT.
- Maintain the VAST snowmobile trail
- Maintain CCC Road on Burke Mountain (aksi access at Victory side)
- Backcountry ski access at Umpire…trail access/management
- Bridge at Parr's Meadow (set clear rules re: cutting)
- Maintain summit hiking trails (and add signage for toll road visitors)
- Aggressive fish stocking- Moose watershed
- Manage historic resources (interpretive sites) at Burke Summit (CCC fire pits, etc) and at Bog Pond Dam
- Need Kiosk at Burke summit to educate visitors (skiers, hikers, bikers, toll road people) about resource management
- What about Red Trail Access at Lyndon Institute Land?
- What about "dirtbag" campgrounds? With new hotels, where will the little people stay?
- State park camping?
- Recreation for most people benefits by road access- keep roads open- pipeline and powerline roads are part of it
- Restricted areas take away from people's enjoyment- hurt dispersal potential, bad for older and physically compromised people
- Aggressive timber cutting benefits hunting and wildlife- we hunt rabbits, birds, moose in grown over clearcuts
- Keep snowmobile trails
- Keep gates open all year for multi-use access
- Not all users have a "snow machine" for winter access to camps
- A "lot" of people paddle the moose river….
    - canoes/kayaks downstream of Damon's Crossing
        - Keep water access where consistent with fishing etc.

Appendix B: Species Known From the VMU

Birds

Alder Flycatcher
American Bittern
American Black Duck
American Crow
American Goldfinch
American Kestrel
American Redstart
American Robin
American Woodcock
Baltimore Oriole
Bank Swallow
Barn Swallow
Barred Owl
Bay-breasted Warbler
Belted Kingfisher
Bicknell's thrush
Black-and-white Warbler
Black-backed Woodpecker
Black-billed Cuckoo
Blackburnian Warbler
Black-capped Chickadee
Blackpoll Warbler
Black-throated Blue Warbler
Black-throated Green Warbler
Blue Jay
Blue-gray Gnatcatcher
Blue-headed Vireo
Bobolink
Boreal Chickadee
Broad-winged Hawk
Brown Creeper
Brown Thrasher
Brown-headed Cowbird
Canada Goose
Canada Warbler
Cape May Warbler
Cedar Waxwing
Chestnut-sided Warbler
Chimney Swift
Chipping Sparrow
Cliff Swallow
Common Grackle
Common Loon
Common Merganser
Common Nighthawk
Common Raven
Common Yellowthroat
Dark-eyed Junco
Downy Woodpecker
Eastern Bluebird
Eastern Kingbird
Eastern Meadowlark
Eastern Phoebe
Eastern Towhee
Eastern Wood-Pewee
European Starling
Evening Grosbeak
Field Sparrow
Golden-crowned Kinglet
Gray Catbird
Gray Jay
Great Blue Heron
Great Crested Flycatcher
Green Heron
Hairy Woodpecker
Hermit Thrush
Hooded Merganser
Horned Lark
House Finch
House Sparrow
House Wren
Indigo Bunting
Killdeer
Least Bittern
Least Flycatcher
Lincoln's Sparrow
Magnolia Warbler
Mallard
Mourning Dove
Mourning Warbler
Nashville Warbler
Northern Cardinal
Northern Flicker
Northern Goshawk
Northern Harrier
Northern Mockingbird
Northern Parula
Northern Rough-winged Sw
Northern Saw-whet Owl
Northern Waterthrush
Olive-sided Flycatcher
Osprey
Ovenbird
Palm Warbler
Philadelphia Vireo
Pileated Woodpecker
Pine Siskin
Pine Warbler
Prairie Warbler
Purple Finch
Purple Martin
Red-breasted Nuthatch
Red-eyed Vireo
Red-tailed Hawk
Red-winged Blackbird
Ring-necked Pheasant
Rock Pigeon
Rose-breasted Grosbeak
Ruby-crowned Kinglet
Ruby-throated Hummingbird
Ruffed Grouse
Rusty Blackbird
Savannah Sparrow
Scarlet Tanager
Sharp-shinned Hawk
Song Sparrow
Spotted Sandpiper
Spruce Grouse
Swainson's Thrush
Swamp Sparrow
Tennessee Warbler
Tree Swallow
Tufted Titmouse
Turkey Vulture
Veery
Vesper Sparrow
Warbling Vireo
White-breasted Nuthatch

White-throated Sparrow
White-winged Crossbill
Wild Turkey
Willow Flycatcher
Wilson's Snipe
Wilson's Warbler
Winter Wren
Wood Duck
Wood Thrush
Yellow Warbler
Yellow-bellied Flycatcher
Yellow-bellied Sapsucker
Yellow-rumped Warbler

Reptiles and Amphibians
Painted Turtle
Snapping Turtle
Wood Turtle
Common Gartersnake
Red-bellied Snake
Ring-necked Snake
Blue-spotted Salamander
Eastern Newt
Eastern Red-backed Salamander
Northern Dusky Salamander
Northern Two-lined Salamander
Spotted Salamander
Spring Salamander
American Bullfrog
American Toad
Gray Treefrog
Green Frog
Mink Frog
Northern Leopard Frog
Pickerel Frog
Spring Peeper
Wood Frog

Mammals
Water shrew
Masked shrew
Smokey shrew
Northern short-tailed shrew
Pygmy shrew
Star-nosed mole
Hairy-tailed mole
Snowshoe hare
Red squirrel
Eastern chipmunk
Beaver
Woodland jumping mouse
Meadow jumping mouse
Southern bog lemming
Rock vole
Southern red-backed vole
Meadow vole
Porcupine
Short-tailed weasel
Long-tailed weasel
Canada lynx
Fisher
Otter
Bobcat
American marten
Mink
Raccoon
Coyote
Red fox
Grey fox
Skunk
Muskrat
Black bear
White-tailed deer
Moose

Insects
Somatochlora franklini
Somatochlora forcipata
Gomphaeschna furcillata
Somatochlora kennedyi
Somatochlora minor
Gomphus descriptus
Gomphus adelphus
Enallagma annexum
Somatochlora elongata
Helocordulia uhleri
Stylurus scudderi

Appendix C: Natural Community Descriptions

Alder Swamp

Alder Swamp occurs as part of the main wetland complex of Victory Basin, usually between floodplain forests and forested wetlands or along small tributaries. It also occurs in smaller patches away from the main basin, especially around beaver wetlands. Beaver activity is the main form of natural disturbance in many Alder Swamps; this may expand the natural community by killing trees that are less tolerant of saturated soil than alders, but can also convert areas of Alder Swamp behind beaver dams to Open Water or Sedge Meadow. The soils in Alder Swamps usually consist of decomposed organic matter and muck.

The Alder Swamps observed in the VMU support a dense (often over 75% cover) shrub layer dominated by Speckled Alder (*Alnus incana*). Stunted emergent trees such as American Larch (*Larix laricina*) and Black Ash (*Fraxinus nigra*) were sometimes observed, usually with less than 10% cover. Northern Wild Raisin (*Viburnum cassinoides*) was noted in some areas. Species noted in Alder Swamp in the mapping area include small shrubs such as Labrador Tea (*Ledum groenlandicum*) and White Meadowsweet (*Spiraea alba*) as well as herbs such as White Turtlehead (*Chelone glabra*) and Cinnamon Fern (*Osmundastrum cinnamomeum*). One rare plant, Shining Rose (*Rosa nitida*), and two uncommon plants – Mountain Honeysuckle (*Lonicera villosa*) and Northern Manna Grass (*Glyceria borealis*) – were observed in VMU alder swamps.

Alder swamps are the most common natural shrub communities across the VMU. They provide dense cover adjacent to streams and wetlands, and are used by a variety of wildlife. Moose and beaver make extensive use of these communities. Alder Swamps provide habitat for breeding and foraging birds including American Woodcock, flycatchers, and Veery and mammals including mink, river otter, muskrat, and snowshoe hare. Reptiles and amphibians including Spotted Salamander, Green Tree Frog, Wood Frog. These swamps are likely important habitats for the Rare Blue-Spotted Salamander and Special Concern Wood Turtle, both of which move from wetlands to uplands during their annual cycles.

Alluvial Shrub Swamp

Alluvial Shrub Swamps occur on natural levees and other areas of frequent sediment deposit along the Moose River and adjacent tributaries. While Alluvial Shrub Swamp can be a stable part of the landscape, it also quickly colonizes River Sand or Gravel Shore if the river migrates away from these areas. In other areas, Alluvial Shrub Swamp is actively being eroded away and removed by natural riverine processes. In some cases Alluvial Shrub Swamp may convert to Northern Conifer Floodplain Forest over time. The soil is silt to fine sand, with some organic matter also present.

Occurrences of Alluvial Shrub Swamp within the VMU were observed to support a dense (70%) shrub layer dominated by Speckled Alder (*Alnus incana*), with Northern Wild Raisin (*Viburnum cassinoides*) and White Meadowsweet (*Spiraea alba*) also present in the shrub layer. Emergent trees may occur at low cover (usually under 5% cover, but denser in patches), including Black Cherry (*Prunus serotina*) and Black Ash (*Fraxinus nigra*). Herbs occur both amidst the shrubs and in scattered openings. Herbs observed include Sensitive Fern (*Onoclea sensibilis*), Spotted Joe-Pye Weed (*Eutrochium maculatum*), and Virginia Virgin's-Bower (*Clematis virginiana*).

Like Alder Swamps, Alluvial Shrub Swamps provide dense cover adjacent to streams and wetlands, and are used by a variety of wildlife. Moose and beaver make extensive use of these communities. Alder

Swamps provide habitat for breeding and foraging birds including American Woodcock, flycatchers, and Veery and mammals including mink, river otter, muskrat, and snowshoe hare. Reptiles and amphibians including Spotted Salamander, Green Tree Frog, Wood Frog. These swamps are likely important habitats for the Rare Blue-Spotted Salamander and Special Concern Wood Turtle, both of which move from wetlands to uplands during their annual cycles.

Beaver Wetland

Beaver wetlands occur on low-gradient tributaries of the Moose River and within Alder Swamps. Soils vary from alluvial to peaty, with exposed boulders often present.

Beaver wetlands are in a constant state of succession. As beavers move into an area, they create a dam and form a pond, which results in the death of nearby trees (often a swamp or Lowland Spruce-Fir natural community in Victory Basin). When the food supply is exhausted, the beavers abandon the dam and the water drains away. The wetland then progresses through a series of successional steps, which include transitional examples of cattail marshes, shallow emergent marshes, sedge meadows, and alder or alluvial swamps. Eventually, if beavers do not return, the site may revert to a forested type.

Because of the successionary nature of these wetlands, it is difficult to generalize plant composition. Cattails (*Typha*), water lilies (*Nuphar*), and other marsh species occur early in the successionary process, but are often later replaced by White Meadowsweet (*Spiraea alba*), Speckled Alder (*Alnus incana*), and eventually by trees such as American Larch (*Larix laricina*), Northern White-Cedar (*Thuja occidentalis*), and Balsam Fir (*Abies balsamea*).

The wetlands created by beavers supply habitat for many other animals as well. Eastern Newts often are present in beaver ponds, and Mink Frogs have been observed in beaver wetlands in Victory Basin. Northern River Otter, Mink, and Muskrat are known to occur in beaver wetlands and the open water provides excellent foraging areas for many species of bats. Beaver ponds provide feeding grounds for a variety of waterfowl and wading birds including Piede-billed Grebe and Herons. Rusty Blackbirds use stunted conifers in and around wetlands for breeding habitat. In addition, as beavers abandon ponds, the successional communities that result become important habitats for other species.

Black Spruce Swamp

Black Spruce Swamp occurs in wetland areas with low amounts of nutrient input from groundwater or stream flow. These swamps occur in two settings in the VMU: in isolated enclosed basins high in watersheds, and in the main wetland complex in backwater areas away from the Moose River and its tributaries. This community intergrades with wet-phase Lowland Spruce-Fir Forest. Natural disturbance most frequently comes in the form of beaver flooding or small-scale blowdowns. The soil in Black Spruce Swamp consists of poorly decomposed, acidic peat, muck, and woody matter. In one case the peat layer was measured to be at least 4 feet deep.

Black Spruce Swamp in the VMU supports an open (45% cover) to dense (70% cover) overstory dominated by Black Spruce (*Picea mariana*) in the tree layer. Other trees may be present at low concentrations, including Balsam Fir (*Abies balsamea*), American Larch (*Larix laricina*), and Red Spruce (*Picea rubens*). The shrub layer is variable in cover (10-45%), often contains Northern Wild Raisin (*Viburnum cassinoides*), and sometimes contains Mountain Holly (*Ilex mucronata*), Labrador Tea (*Ledum groenlandicum*), Rhodora (*Rhododendron canadense*), and Sheep American-Laurel (*Kalmia*

angustifolia). Tree saplings of the above tree species also are present. Herbs usually occur at fairly low cover (1 to 20% cover), and can include Three-Leaved Goldthread (*Coptis trifolia*), Canada Dwarf-Dogwood (*Cornus canadensis*), and Three-Leaved False Solomon's-Seal (*Maianthemum trifolium*). The bryophyte layer is extensive (60-75% cover) and diverse, supporting high cover of several varieties of *Sphagnum* moss. One rare plant – Swamp Honeysuckle (*Lonicera oblongifolia*) – was observed in Black Spruce Swamp in the mapping area.

Black Spruce Swamp offers habitat for a variety of wildlife. The rare bird species Gray Jay, Black-backed Woodpecker, Spruce Grouse, and Rusty Blackbird are known to use this habitat. Deer may use this natural community for winter cover, as part of the extensive Deer Wintering Area in Victory Basin. American marten likely also use these habitats.

Black Spruce Woodland Bog

Black Spruce Woodland Bog takes the form of an open woodland of stunted Black Spruce (*Picea mariana*) growing amongst acid-tolerant bog plants in a peatland substrate. This natural community type occurs in wetlands with little or no nutrient input from adjacent areas. In the VMU these natural communities occur in two landscape contexts – in isolated basins high in watersheds without significant runoff input, and where they are buffered from nutrient input by expanses of adjacent swamp. Black Spruce Woodland Bogs may occasionally be impacted by natural disturbance associated with beaver activity. Soils are highly acidic poorly decomposed peat over muck, and are at least four feet deep in some cases.

The dominant tree species in surveyed areas is Black Spruce, which occurs both as isolated larger trees and as stunted small trees. American Larch (*Larix laricina*) and Balsam Fir (*Abies balsamea*) can also occur in low concentrations. Emergent trees can range from less than 1% cover to 20% cover, and cover usually varies across the bog. The shrub layer in these occurrences is variable in cover (25 to 60% cover) and often consists of stunted Black Spruce (*Picea mariana*), but may also contain Northern Wild Raisin (*Viburnum cassinoides*), Common Winterberry (*Ilex verticillata*), Sheep American-Laurel (*Kalmia angustifolia*), and small shrubs like Labrador Tea (*Ledum groenlandicum*) and Leatherleaf (*Chamaedaphne calyculata*). The herb layer is variable in cover (15% in shrub-dominated examples, 60% in herb-dominated examples) and includes Purple Pitcherplant (*Sarracenia purpurea*), Three-Seeded Sedge (*Carex trisperma*), and Tawny Cottonsedge (*Eriophorum virginicum*). A sphagnum mat consisting of several species is always present, and sometimes approaches 100% cover.

Like Black Spruce Swamps, Black Spruce Woodland Bogs offer habitat for a variety of wildlife. The rare bird species Gray Jay, Black-backed Woodpecker, Spruce Grouse, and Rusty Blackbird are known to use this habitat. Deer may use this natural community for winter cover, as part of the extensive Deer Wintering Area in Victory Basin. American marten likely also use these habitats.

Boreal Acidic Cliff

Boreal Acidic Cliff occurs in areas of the VMU where steep rock faces are present, mainly on the slopes of Burke Mountain, Umpire Mountain, and Kirby Ridge in Victory State Forest and Darling State Park. Smaller examples that were not detected during inventories may occur elsewhere in the area except on the basin floor. These cliffs are exposed to very harsh conditions including rime ice, rapid water runoff, and freeze-thaw processes, all limiting the vegetation that can survive. Soil accumulation is negligible and mostly limited to small accumulations of organic matter and coarse sand in cracks and on ledges.

The Boreal Acidic Cliffs in the Victory area were observed to support very little vegetation (usually less than 10% cover), with most plants occurring on the margins of the cliff or on ledges. Stunted trees such as Red Spruce (*Picea rubens*) and Yellow Birch (*Betula alleghaniensis*) and scattered shrubs such as Mountain Maple (*Acer spicatum*) and Red Elderberry (*Sambucus racemosa*) may be present. The most abundant herbaceous plant is Rock Polypody (*Polypodium virginianum*). Abundant lichens and mosses may occur, especially in areas where water trickles down cliff slopes. Rock Tripe Lichen (*Umbilucaria* sp.) is present in many areas.

These communities are known to support nesting ravens and could potentially support peregrine falcons. Bobcats make extensive use of steep cliff areas. Small-footed bat is known to make use of south-facing cliff faces, talus slopes, and rocky outcroppings.

Boreal Outcrop

Boreal Outcrops occur in similar settings to Boreal Cliffs, but contain areas of flat to gently sloping exposed rock. Most of the Boreal Acidic Outcrops in the mapping area occur in a cluster in Darling State Park, on the south slope of Burke Mountain amidst Montane Spruce-Fir Forest. Smaller examples are present elsewhere. Boreal Acidic Outcrops are by definition mostly free of soil, but small areas of organic matter and sand accumulation can occur.

Plant cover on VMU Boreal Acidic Outcrops was noted to be very low (less than 30% total plant cover, excluding bryophytes). Trees in this natural community mainly occur on outcrop edges and include stunted individuals of Red Spruce (*Picea rubens*), Balsam Fir (*Abies balsamea*), Heart-Leaved Paper Birch (*Betula cordifolia*) , and American Mountain-Ash (*Sorbus americana*). Many of these trees were dead or dying at the time of the survey, apparently due to drought stress. Shrub cover is also low (around 10%), and includes stunted saplings of the above tree species, Mountain Maple (*Acer spicatum*), *Rubus* sp, and bristly sarsaparilla (*Aralia hispid*a). Bryophytes are abundant (75% cover in surveyed area) with some drier areas supporting a dense cover of Reindeer Lichen (*Cladonia* spp.) Areas where water trickles down the rock face support abundant bryophytes including *Sphagnum russowii*, *S. angustifolium*, several other *Sphagnum* species, *Polytrichum sp.*, and a liverwort (*possibly Scapania* sp.or *Bazzania trilobata*).

No animals were observed within the Boreal Acidic Outcrops, but it is likely that various animals take advantage of the landscape diversity offered by these small forest openings. Small-footed bat is known to make use of south-facing cliff faces, talus slopes, and rocky outcroppings

Boreal Talus Woodland

Boreal Talus Woodland occurs in cold areas of talus. Over time these areas develop very thin soils that support a woodland ecosystem, but any trees are subject to frequent rockslides and windthrow. In the VMU, Boreal Talus Woodland occurs on the slopes of Burke and Umpire mountains, with a less extensive patch also present on Hobart Mountain. Soils consist of a very thin organic layer – sometimes only an inch thick – covering loose boulders.

The canopy cover in VMU Boreal Talus Woodlands was noted to be variable (50-80% cover in surveyed areas, with sparser areas nearby), in part due to the frequent disturbance this natural community experiences. Red Spruce (*Picea rubens*) is present throughout, with Heart-Leaved Paper

Birch (*Betula cordifolia*) ranging from rare to locally dominant. This species often colonizes disturbed areas, and may be colonizing previous rockslides or blowdowns. In many areas the birch is dead or dying. Trees in the understory include abundant small Red Spruce, Yellow Birch (*Betula alleghaniensis*), American Mountain-Ash (*Sorbus americana*), and Striped Maple (*Acer pensylvanicum*). The shrub layer also contains Mountain Maple (*Acer spicatum*) and Red Elderberry (*Sambucus racemosa*). The herb layer is variable – with areas of low-cover (5%) Marginal Wood Fern (*Dryopteris marginalis*) and locally dense (up to 80% cover) patches of Rock Polypody (*Polypodium virginianum*). The bryophyte layer is well developed and includes liverworts (*Bazzania trilobata*) and Stairstep Moss (*Hylocomium splendens*). Wet areas also support *Sphagnum subtile.*

The abundant rock cavities in this natural community could also offer bobcat and porcupine denning habitat. The rare Rock Vole utilizes cold, mossy talus as habitat and may also be present in this natural community. Small-footed bat is known to make use of south-facing cliff faces, talus slopes, and rocky outcroppings

Cold Air Talus Woodland

Cold-Air Talus Woodland is a rare natural community type that only occurs where cold air settles out from within a talus slope. It occurs downhill from Open Talus and in the mapping area was only observed in one occurrence in Victory State Forest, below the talus on the eastern slope of Umpire Mountain. Small patches may also occur beneath the talus on Burke Mountain. Cold Air Talus Woodland experiences frequent natural disturbance associated with rockslides and freeze-thaw processes. It occurs on bare rocks with only minimal accumulations of organic matter and soil.

A few stunted trees (under 10’ tall, 5% cover) were noted in the VMU Cold-Air Talus Woodland, including Red Spruce (*Picea rubens*) and Heart-Leaved Paper Birch (*Betula cordifolia*). More characteristic are the low shrubs, which make up 25-30% cover and include Labrador Tea (*Ledum groenlandicum*) and Velvet-Leaved Blueberry (*Vaccinium myrtilloides*). No herbs were noted in this natural community, but 10% cover of bryophytes and lichen is present, including Reindeer Lichen (*Cladonia sp*), Rock Tripe (*Umbilucaria* sp.), and liverworts (*Bazzania* cf. *trilobata*)

No animals were observed in the Cold Air Talus Woodland, but the abundant rock cavities in this natural community could offer bobcat and porcupine denning habitat. The rare Rock Vole utilizes cold, mossy talus as habitat and may also be present in this natural community. Small-footed bat is known to make use of south-facing cliff faces, talus slopes, and rocky outcroppings

Dwarf Shrub Bog

Dwarf Shrub Bogs occur in areas where the only significant input of water is precipitation. Very low amounts of nutrients are present, and decomposition and growth of *Sphagnum* moss leads to extremely acidic soil conditions. As such these natural communities support a distinct assemblage of plants adapted to these unique conditions. Only one state significant Dwarf Shrub Bog was documented in the mapping area – the large bog in the heart of the Victory Basin wetland complex in the Victory Wildlife Management Area. This bog is in excellent condition and experiences very little human disturbance. The large bog is surrounded by an equally impressive expanse of Black Spruce Woodland Bog. Soils consist of a deep accumulation of highly acidic, poorly decomposed peat.

Trees are mostly absent from the VMU Dwarf Shrub Bog, except for a few highly stunted Black Spruce (*Picea mariana*). Shrubs are common and include Labrador Tea (*Ledum groenlandicum*), Sheep American-Laurel (*Kalmia angustifolia*), Bog American-Laurel (*Kalmia polifolia*), and Northern Wild Raisin (*Viburnum cassinoides*). Herbs include Purple Pitcherplant (*Sarracenia purpurea*), Small Cranberry (*Vaccinium oxycoccos*), Three-Seeded Sedge (*Carex trisperma*), and Tussock Cottonsedge (*Eriophorum vaginatum*). The bryophyte layer is very dense – near 100% cover in some areas – and is dominated by *Sphagnum fallax*, with *S. rubellum* and *S. magellicum* also present (Bubier, 1989b).

Mammals using dwarf shrub bogs include the rare Southern Bog Lemming (which has been documented in Victory Basin) and snowshoe hare. A variety of dragonflies and damselflies are known to use bogs. White-throated Sparrow, Lincoln's Sparrow, and the rare Palm Warbler nest in shrubby peatlands. Spruce grouse are known to use bogs for summer foraging habitat, and Rusty Blackbirds may make use of them for foraging or nesting.

Hardwood Seepage Forest

Hardwood Seepage Forest is a provisional natural community type that has not yet been formally described but has been documented in several areas of Vermont. It occurs within the hardwood forest of the VMU, primarily on gentle slopes and along small streams. As with most hardwood forest types, it is concentrated in mid elevations of the Victory Basin area, and as such intergrades with Northern Hardwood Forest and Red Spruce-Northern Hardwood Forest. Hardwood Seepage Forests appear to be associated with the Colonel-Cabot soil complex, and the terrain often consists of deep hollows of pooled water amongst boulders and hummocks. Surface water is often present, appearing from seeps, meandering through the hummocks, and composing the headwaters of tributary streams or sometimes disappearing back into the soil downstream. Natural disturbance in these stands probably usually consists of individual tree mortality, and perhaps occasional flooding along small streams. The soils of Hardwood Seepage Forest were observed to be shallow and silty, with layers of organic matter and silt overlaying till. The pH of the soil was measured to be 6.0 to 6.2 – less acidic than most soils in the Victory Basin area.

Yellow Birch (*Betula alleghaniensis*) is generally the most abundant tree in Hardwood Seepage Forest within the VMU, with Sugar Maple (*Acer saccharum*), White Ash (*Fraxinus americana*), Red Maple (*Acer rubrum*), and Paper Birch (*Betula papyrifera*) also present. In wetter areas, Black Ash (*Fraxinus nigra*) occurs and is locally dominant. Canopy cover was observed to be 75 to 80 percent. Shrubs are scattered (around 10% cover) and include Hobblebush (*Viburnum lantanoides*), Mountain Maple (*Acer spicatum*), and Beaked Hazelnut (*Corylus cornuta*). The herb layer is diverse and fairly dense (noted as 15-30% cover during the fall, probably significantly higher in the spring and summer). Foam-Flower (*Tiarella cordifolia*) was abundant in all surveyed examples of this natural community. Dwarf Raspberry (*Rubus pubescens*), Three-Leaved False Solomon's-Seal (*Maianthemum trifolium*), Spotted Touch-Me-Not (*Impatiens capensis*), Long Beech Fern (*Phegopteris connectilis*), and Zig-Zag Goldenrod (*Solidago flexicaulis*) were among the many herb species observed in this natural community type. A bryophyte layer was often present and consisted of a variety of mosses.

Most animals that utilize Northern Hardwood Forest or Seeps as habitat would also use this natural community type. The numerous small pools of open water and saturated soils in Hardwood Seepage Forest offer high-quality amphibian habitat. The abundant and diverse herb layer, which may sprout earlier in the spring than adjacent areas due to groundwater seepage, offer important early spring forage

for Black Bear, White-tailed Deer, and Wild Turkey. In addition, Rusty Blackbirds forage in small wetlands of this type.

Hemlock-Balsam Fir-Black Ash Seepage Swamp

Hemlock-Balsam Fir-Black Ash Seepage Swamps support a mix of hardwood and softwood trees. These natural communities occur in basins and floodplain backwaters where abundant groundwater and/or surface water flow supply a relatively high quantity of nutrients. They often act as headwaters for small streams. Several examples were noted in saddles, including one which appeared to drain down both sides of a low ridge. The most frequent natural disturbance type in this natural community appears to be beaver activity, and several examples were observed with beaver influence. Single-tree blowdowns are also present. Soils consist of deep, moderately decomposed muck, peat, and organic matter, sometimes capped by 'floating' mats of bryophytes and herbs.

The tree canopy in Hemlock-Balsam Fir-Black Ash Seepage Swamp in the VMU was noted to be diverse and variable. The tree canopy is relatively open (55-60%). Balsam Fir (*Abies balsamea*) and Black Ash (*Fraxinus nigra*) are the most common tree species; unlike in other areas, Eastern Hemlock (*Tsuga canadensis*) is absent from these VMU swamps. Yellow Birch (*Betula alleghaniensis*), Red Maple (*Acer rubrum*), Red Spruce (*Picea rubens*) – possibly mixed with or hybridizing with Black Spruce (*Picea mariana*) - and occasionally Northern White-Cedar (*Thuja occidentalis*) are also present. The shrub layer is low in cover (5-20%) and contains saplings of the above tree species as well as Northern Wild Raisin (*Viburnum cassinoides*), Speckled Alder (*Alnus incana*), and occasionally American Honeysuckle (*Lonicera canadensis*). The herb layer is variable in cover (15-45%) and diverse and includes Cinnamon Fern (*Osmundastrum cinnamomeum*), Sensitive Fern (*Onoclea sensibilis*), Foam-Flower (*Tiarella cordifolia*), Slender Wood-Reed (*Cinna latifolia*), and cattail (*Typha* sp.). The bryophyte layer is variable from site to site(forming a dense mat in some areas, only 5% cover in other areas) and contains both sphagnum and non-sphagnum mosses. The herb and bryophyte species are often grouped in small patches based on the microtopography and small scale hydrology of the swamp, which provides nutrients to only some areas. Examples of this natural community in the Victory area probably receive less enrichment than examples found in many other parts of the state, because the granitic substrate is not nutrient-rich.

Beaver sign was noted in many of these swamps. The mixed hardwood-softwood cover in these wetlands may support Canada Warbler, Veery, Golden-crowned Kinglet, Black-Backed Woodpecker, and other birds. Mammals likely include mink and American marten. Various amphibian species are also likely to be present.

Hemlock-Northern Hardwood Forest

Hemlock-Northern Hardwood Forest has a very limited distribution in the VMU – it is only known to occur near Mitchell's Knob. One stand was observed on the northwestern face of Mitchell's Knob and the other along a north-facing gulch with exposed ledges near Cold Brook. Other smaller patches may occur in nearby areas, or in the headwaters of Weir Mill Brook.

Hemlock-Northern Hardwood Forest was not surveyed in detail in the Victory area, but is defined by the presence of Eastern Hemlock (*Tsuga canadensis*) amongst Northern Hardwood Forest species such as Sugar Maple (*Acer saccharum*), American Beech (*Fagus grandifolia*), and Yellow Birch (*Betula alleghaniensis*). Red Spruce (*Picea rubens*) was also observed in low quantities. Hobblebush (*Viburnum*

lantanoides) is present in the understory, with Foam-Flower (*Tiarella cordifolia*) occasionally found along Cold Brook.

The wildlife habitat in this natural community is probably very similar to that of Red Spruce-Northern Hardwood Forest, offering habitat for animals that use both hardwood and conifer forests. Deer and moose forage in this natural community, and black bears utilize beech nuts as a food source. Wide-ranging mammals such as fisher, foxes, and American marten likely uses these communities regularly. Birds found within this natural community include American Woodcock and Chestnut-sided Warbler in young forests and forest edges; Black-throated Blue Warbler in areas of dense Hobblebush undergrowth; Eastern Wood-Pewee in mature forests; Veery near riparian areas; Wood Thrush in older forests with deep leaf litter; Yellow-bellied Sapsucker in forests with standing dead wood and abundant aspen and birch; and Black-throated Green Warbler and Blue-headed Vireo in patches where red spruce is predominant. Cold Brook and adjacent waterways provide amphibian habitat, and the ledges may include suitable denning habitat for bobcats.

Lowland Spruce-Fir Forest

Lowland Spruce-Fir Forest is the dominant upland natural community within Victory Basin, and is also present outside the basin on the edges of beaver wetlands and in cold-air drainage areas. Lowland Spruce-Fir Forest grades into conifer wetland in the lower parts of the basin and Red Spruce-Northern Hardwood Forest on the basin edges. This natural community occurs in three similar but distinct landscape contexts in the VMU - wet, cold hollows and bottomlands; dry sandy surficial glacial deposits such as eskers; and the edges of beaver wetlands. All three of these situations occur in areas of cold air drainage, and the stands along beaver wetlands may also occur because beavers have removed most of the hardwood trees. The soils of Lowland Spruce-Fir Forest are composed of sandy to silty loams, and contain a well-developed E horizon.

The age of the Lowland Spruce-Fir Forest within the mapping area is variable. Most of the area was logged both in the distant and recent past. The Balsam Fir (*Abies balsamea*) in particular is experiencing high mortality, as single-aged stands of this short-lived species reach the end of their life span and die or blow over in storms. Standing or fallen dead Balsam Fir make up significant areas within the Lowland Spruce-Fir Forest. The general trend appears to be for Red Spruce (*Picea rubens*) to increase abundance over fir as forests increase in age, until a natural or human-caused disturbance allows fir to reestablish. Beaver activity is an important natural disturbance in low-lying areas of Lowland Spruce-Fir Forest and can also both increase (by exclusion of hardwoods) and decrease (by disturbance associated with flooding) the extent of this natural community.

Balsam Fir and Red Spruce were noted to be the dominant trees in the Lowland Spruce-Fir Forest within the VMU, with the former more abundant in younger stands and the latter more abundant in older stands. The tree overstory is dense (60-80%). Paper Birch (*Betula papyrifera*) and Quaking Aspen (*Populus tremuloides*) are sometimes present, especially in younger stands, and American Larch (*Larix laricina*) and Black Spruce (*Picea mariana*) occur in wet areas. The understory often consists of dense spruce and fir recruitment, and may also contain Mountain Holly (*Ilex mucronata*), Northern Wild Raisin (*Viburnum cassinoides*), and American Mountain-Ash (*Sorbus americana*). Shrub cover was noted as varying from 10% to 30% cover. Herb cover was noted to be 30%; species may include Canada Dwarf-Dogwood (*Cornus canadensis*), Three-Leaved Goldthread (*Coptis trifolia*), Canada-Mayflower (*Maianthemum canadense*), and Starflower (*Trientalis borealis*), with Bracken Fern (*Pteridium*

aquilinum) in dry areas. Bryophyte cover is often very high – sometimes near 100 percent – and may include Red Stem Moss (*Pleurozium schreberi*), Stairstep Moss (*Hylocomnium splendens*), and Knight's Plume Moss (*Ptilium crista-castrensis*). *Sphagnum spp.* is often present in hollows in the wetter stands. The rare Mountain Cranberry (*Vaccinium vitis-idaea*) was also documented in VMU Lowland Spruce-Fir Forest.

This matrix natural community provides some of the most unique wildlife habitat and the most rare wildlife species in the Victory Management Unit. Lowland Spruce-Fir stands over 35 feet high and with generally closed canopies provide the foundation for the large and important deer wintering area in and around the Victory Basin. Porcupine, red fox, and fisher also known to use Lowland Spruce-Fir Forest, and the listed American Marten and Canada Lynx both prefer spruce-fir forests. Rare boreal birds including Black-backed Woodpecker, Gray Jay, Spruce Grouse, and Rusty Blackbird rely on these communities. Other birds, including Black-throated Green Warbler, Blue-headed Vireo, and White-throated Sparrow all require habitat rich in conifer species and likely occur here. A rare Southern Bog Lemming was observed in Lowland Spruce-Fir Forest near the main wetland area. Standing dead trees and downed wood provide important habitat functions in these communities, supporting foraging and nesting Black-backed woodpeckers, foraging American Marten, denning Canada lynx, and other species.

Montane Spruce-Fir Forest

Montane Spruce-Fir Forest is a high-elevation natural community, and in the VMU it only occurs on the peaks and slopes of Burke Mountain, Umpire Mountain, and Kirby Ridge in Victory State Forest and Darling State Park, usually above 2200 feet. At lower elevations, this natural community transitions into Montane Yellow Birch-Red Spruce Forest. Soils are generally shallow (around 1' or less). Natural disturbance is an important influence of this natural community, which occurs in a very harsh environment. Icing and heavy snow are common, and can lead to tree mortality. Strong winds are common, and the Hurricane of 1938 was reported to have blown down many trees (as well as a fire observation tower) on Burke Mountain. Fires also occur – records exist of an intense fire on Burke Mountain in 1907, though the fire may have burned through recently logged areas with abundant slash and downed wood. Lightning strikes can lead to individual tree mortality or small fires. Rockslides may also occur in steep areas. The soils in Montane Spruce-Fir Forest are relatively shallow in most cases. In one case, silty soil was observed without a significant E layer, but in another example a well-developed E layer was present.

Canopy cover is dense in the Montane Spruce-Fir Forest – in the VMU, tree cover was measured to be 80% in two cases. Balsam Fir (*Abies balsamea*) and Red Spruce (*Picea rubens*) were noted as the dominant tree species in this natural community type. However, Heart-Leaved Paper Birch (*Betula cordifolia*) is common and is locally dominant, especially on Burke Mountain. The birch appears to be senescing, and is probably present at such high numbers due to past disturbance (perhaps the fire of 1907 and/or the hurricane of 1938). Both the shrub and herb layers were noted to be low in cover (each less than 5%). The understory is composed of fir saplings, American Mountain-Ash (*Sorbus americana*) and occasionally Mountain Maple (*Acer spicatum*). The herb layer may include Yellow Blue-Bead Lily (*Clintonia borealis*) and Flat-Branched Tree-Clubmoss (*Dendrolycopodium obscurum*). Mountain Wood Fern (*Dryopteris campyloptera*) is often seen in this natural community but was not documented during field work. Bryophyte cover varies from absent to 25%. The rare to uncommon plant Small-Flowered Wood Rush (*Luzula parviflora*) was also documented in this natural community.

Montane Spruce-Fir Forest provides habitat for a variety of animals. Raven and moose sign are abundant. Porcupines, bobcats, and American marten likely utilize this habitat. Black-throated Green Warbler often occurs in spruce-fir forests, and montane specialists including the Blackpoll Warbler, Dark-eyed Junco, and the rare Bicknell's Thrush are known to occur on Burke Mountain.

Montane Yellow Birch-Red Spruce Forest

Montane Yellow Birch-Red Spruce Forest is a high elevation forest that occurs at somewhat lower elevations than Montane Spruce-Fir Forest. Like Montane Spruce-Fir Forest, within the mapping area it is restricted to the slopes of Burke Mountain, Umpire Mountain, and Kirby Ridge in Darling State Park and Victory State Forest. It mainly occurs from 2000 to 2700 feet of elevation. At its upper elevations this natural community intergrades with Montane Spruce-Fir Forest. In the VMU, Montane Yellow Birch-Red Spruce Forest contains two forms – the more common forest form and a less common open 'glade' form (not mapped separately). The glades extend to a higher elevation than the forested regions, and occur on less steep areas, especially saddles and draws. They are sometimes associated with seeps, but sometimes are rather dry. In particular, a large open area occurs on the western ridge of Umpire Mountain. While Montane Yellow Birch-Red Spruce Forest occurs in less exposed areas than in Montane Spruce-Fir Forest, individual tree blowdowns and ice and snow damage to trees are still important natural disturbance events, and lightning strikes and small fires may occur. Heavy moose browsing may also influence tree recruitment, especially in the glade areas. Soils consist of sandy loam with a well-developed E layer, and were measured at around 2 feet deep.

Montane Yellow Birch-Red Spruce Forest was measured as having a relatively open (65% cover) canopy, with much lower cover (<10%) in glade areas. It is dominated by an overstory of Yellow Birch (*Betula alleghaniensis*), Red Spruce (*Picea rubens*), Balsam Fir (*Abies balsamea*), and Heart-Leaved Paper Birch (*Betula cordifolia*). In some areas, especially on the northern slope of Burke Mountain and in glades, stunted, weathered Sugar Maple (*Acer saccharum*) trees are also present, perhaps as a manifestation of the Montane Yellow Birch-Sugar Maple-Red Spruce Forest variant. The understory was observed to make up around 30% cover, though it may be higher in glades. It contains saplings of the above trees as well as Striped Maple (*Acer pensylvanicum*) and sometimes large amounts of Hobblebush (*Viburnum lantanoides*). Beaked Hazelnut (*Corylus cornuta*) and Mountain Maple (*Acer spicatum*) were observed in some of the glades. The herb layer in forested areas is relatively open (30% cover) and mainly contains wood ferns (*Dryopteris* spp.) and Shining Firmoss (*Huperzia lucidula*). In the glades, Eastern Hay-Scented Fern (*Dennstaedtia punctilobula*) is locally dominant, with Wood Ferns also abundant. Bryophyte cover is sporadic (measured at 10% cover but patchy) in the forested areas and includes Knight's Plume Moss (*Ptilium crista-castrensis*). Some of the glades included small seepy areas with *Sphagnum* spp.

Porcupine, Fisher, and White-tailed Deer utilize this habitat. Moose sign is abundant, especially in glade areas. Black-throated Green Warbler (*Dendroica virens*), Blackburnian Warbler, and the rare Gray Jay and Black-backed Woodpecker may nest in this natural community.

Northern Conifer Floodplain Forest

Northern Conifer Floodplain Forest is a variable floodplain forest that occurs in Vermont's coldest river valleys, including the VMU. In the mapping area, this natural community occurs along the Moose River and to a lesser extent along its lower tributaries. Because this natural community type is limited in its

Vermont range, it is not well understood. Despite the name, some examples in the VMU appear successional and have little if any conifer cover at present. In the mapping area, the species composition ranges from strong conifer dominance to an unusual open forest dominated by Black Cherry (*Prunus serotina*). Conifer dominates in areas higher in the watershed or away from the immediate river, while low-lying natural levee deposits in the main wetland area are lined with black cherry forest supporting few or no conifers. As the transition to low-lying wetland continues, the cherry gives way to the Alluvial Shrub Swamp natural community. Some of the areas dominated by Black Cherry appear to have been pasture as late as the mid-1940s, and these stands may be a poorly-understood seral stage of Northern Conifer Floodplain Forest. The natural disturbance regime is influenced by beaver activity, migration of the river channel, flooding, and ice scour. Soils are generally silty, with a soil core in a cherry-dominated area revealing 3 inches of organic loamy soil over thick silt. At 18" of depth the silt gave way to saturated sand. The pH of the silty layer was measured at around 5.0.

The plant composition of this natural community is variable, with forests dominated by Balsam Fir (*Abies balsamea*) and White Spruce (*Picea glauca*) transitioning into Black Cherry open forest and woodland. Much of the natural community consists of a mix of conifer and cherry in the canopy. American Elm (*Ulmus americana*) is often present at low numbers, and Black Ash (*Fraxinus nigra*) is present and rarely dominant near the transition to Alluvial Shrub Swamp. Canopy cover was noted to be low – around 25% cover – in two cherry stands, but was observed to be higher in other areas. The shrub layer is dense (around 75% cover in two stands) and diverse, with Northern Wild Raisin (*Viburnum cassinoides*), Mountain Holly (*Ilex mucronata*), Speckled Alder (*Alnus incana*), and saplings of Black Cherry all present. The herb layer is also diverse, though cover is low (10% or less), and includes Virginia Virgin's-Bower (*Clematis virginiana*), Spotted Joe-Pye Weed (*Eutrochium maculatum*), Dwarf Raspberry (*Rubus pubescens*), woodgrass (*Brachyletrum* sp), and Manna Grass (*Glyceria* sp.) The bryophyte layer is sparse but contains patches of *Sphagnum* sp. in conifer-dominated areas. Wiegand's Wild-rye (*Elymus wiegandii*), an uncommon plant, has also been documented in VMU Northern Conifer Floodplain Forest.

Northern Conifer Floodplain Forest offers habitat for a wide range of wildlife. Black Bears (*Ursus americanus*) have been observed foraging in the cherry stands. Veery (*Catharus fuscescens*) and Canada Warbler (*Wilsonia canadensis*) frequently occur in riparian areas, and Blue-headed Vireo (*Vireo solitarius*) utilizes wet conifer forests. Other animals likely to utilize the river and adjacent riparian forests include Beaver (*Castor canadensis*), Northern River Otter (*Lontra canadensis*), Mink (*Neovison vison*), Great Blue Heron (*Ardea herodias*), Wood Duck (*Aix sponsa*), and Wood Turtle (XXXXX). In addition, floodplains and the adjacent river openings provide foraging habitat for many bats. An unusual insect – the Harpoon Clubtail (*Gomphus descriptus*) has also been reported in this natural community type.

Northern Hardwood Forest

Northern Hardwood Forest is the most common forest type in Vermont. In the cold Victory Basin area it is not present in the deep cold air drainage basins or on the higher peaks, but is the dominant natural community on moderate to steep slopes, mainly between 1300 and 2300 feet of elevation. This natural community intergrades with Red Spruce-Northern Hardwood Forest, especially at its lower elevations. Seeps and patches of Northern Seepage Forest occur scattered throughout, especially on the Colonel-Cabot soil complex. Vernal pools occasionally occur on saddles and terraces. Additional seeps and vernal pools that were not detected during inventory may be present within the Northern Hardwood

Forest. The natural disturbance regime most commonly is influenced by death or windthrow of individual trees or small groups of trees. Because this natural community is so expansive and variable, soil composition varies, but soils generally consist of fairly acidic sandy to silty loams without a well-developed E layer.

The size class of the Northern Hardwood Forest in the mapping area varies from pole-sized saplings in recent patch cuts to forests of large trees of varied size class in the saddle and adjacent slopes between Burke Mountain and Kirby Ridge. In that mature forest, impressive Yellow Birch (*Betula alleghaniensis*) and Sugar Maple (*Acer saccharum*) trees are present.

Although Northern Hardwood Forest is variable in species composition within the mapping area, Sugar Maple and Yellow Birch are nearly ubiquitous throughout VMU examples of this natural community. American Beech (*Fagus grandifolia*) is present in steeper, drier areas, and is most abundant in the understory. White Ash (*Fraxinus americana*) is present in wetter areas. Red Spruce (*Picea rubens*) and Balsam Fir (*Abies balsamea*) are present at low concentrations – areas with significant cover of these species were instead mapped as Red Spruce-Northern Hardwood Forest. Early-succesional areas often contain Paper Birch (*Betula papyrifera*) and Quaking Aspen (*Populus tremuloides*). The Northern Hardwood Forest in Victory Basin is mostly devoid of some tree species common in this natural community elsewhere, including Eastern White Pine (*Pinus strobus*); Eastern Hemlock (*Tsuga canadensis*); and American Linden (*Tilia americana*). Canopy cover in Northern Hardwood Forest was measured to be 60 to 80 percent. The shrub layer is often dominated by Hobblebush (*Viburnum lantanoides*), with Striped Maple (*Acer pensylvanicum*) also common. Shrub cover is variable, and was measured as 30% cover in one area and up to 60% cover in another area. The herb layer often contains Evergreen Wood Fern (*Dryopteris intermedia*) and Shining Clubmoss (*Lycopodium lucidulum*). Foam-Flower (*Tiarella cordifolia*) is common in wetter areas. The bryophyte layer in this natural community is generally not extensive, but mosses are often present on rocks and downed wood.

As the matrix forest throughout most of Vermont, Northern Hardwood Forest is important to a wide range of animal species. Black bears make extensive use of beech stands, and bear claw marks were observed on many of the larger beech trees. Deer sign was observed in many areas. Ruffed Grouse are common, and areas of Northern Hardwood Forest adjacent to vernal pools and seeps are important foraging and overwintering habitat for amphibians such as the Spotted Salamander and Blue-spotted Salamander. Birds found within this natural community include American Woodcock and Chestnut-sided Warbler in young forests and forest edges; Black-throated Blue Warbler in areas of dense Hobblebush undergrowth; Eastern Wood-Pewee in mature forests; Veery near riparian areas; Wood Thrush in older forests with deep leaf litter; and Yellow-bellied Sapsucker in forests with standing dead wood and abundant aspen and birch.

Northern White Cedar Swamp

Northern White Cedar Swamp occurs in wetlands with significant nutrient input from groundwater and/or overland water flow. In the VMU, where granitic and metamorphic rock offer very little nutrient input to groundwater, most of these swamps occur in wetlands adjacent to the Moose River and its tributaries (especially Bog Brook). Northern White Cedar Swamp transitions into Spruce-Fir-Tamarack Swamp where overland flooding is less common. Northern White Cedar Swamp is sometimes separated from upland or floodplain forest by a ‘lagg’ of alder or mixed, stunted wetland including Black Ash (*Fraxinus nigra*) trees. The most common source of natural disturbance in Northern White Cedar

Swamp appears to be beaver activity, but localized windthrow is also a factor. Soils often consist of a layer of peak over relatively well-decomposed muck. In Victory Basin the least acidic pH observed was 6.2 – mildly acidic but still less so than other wetland types in the area. Northern White Cedar Swamp in other parts of Vermont tend to exist on areas of nutrient enrichment and pH-neutral soils.

Northern White-Cedar (*Thuja occidentalis*) was noted to be the dominant tree species in Northern White Cedar Swamp, with Balsam Fir (*Abies balsamea*) and American Larch (*Larix laricina*) also present. In some cases, Paper Birch (*Betula papyrifera*), Red Maple (*Acer rubrum*), and Black Ash (*Fraxinus nigra*) occur at low concentrations. The tree canopy ranges from dense to open (45% to 80% cover). Shrub cover is fairly low (5 to 15% cover); shrubs include Speckled Alder (*Alnus incana*), White Meadowsweet (*Spiraea alba*), and Northern Wild Raisin (*Viburnum cassinoides*). The herb layer is often very diverse. Some of the herbs observed within this natural community include Cinnamon Fern (*Osmundastrum cinnamomeum*), Creeping Snowberry (*Gaultheria hispidula*), Three-Leaved Goldthread (*Coptis trifolia*) , Swamp Yellow-Loosestrife (*Lysimachia terrestris*), Three-Seeded Sedge (*Carex trisperma*) , Bristly Blackberry (*Rubus hispidus*), and Foam-Flower (*Tiarella cordifolia*). Herb cover was noted to be low (<5% cover) in a stand with dense canopy but significantly higher (25% cover) in a stand with an open overstory. The bryophyte layer is well developed (30-40% cover), and includes *Sphagnum* spp. and stairstep moss (*Hylocomium splendens*). Several records of the rare Swamp Honeysuckle (*Lonicera oblongifolia*) were observed in VMU Northern White Cedar Swamp.

Moose sign is common in Victory Basin's cedar swamps. Beaver also frequently utilize these areas, and the cycle of flooding associated with beaver disturbance is part of the ecology of this natural community. Deer utilize Northern White Cedar Swamp for food and winter shelter. Canada Warbler is known to utilize cedar swamps during breeding season, and Black-backed Woodpeckers and Golden-crowned Kinglets may be present year-round.

Open Talus

Open Talus includes areas of talus that are too unstable and/or large to have accumulated soil and vegetation cover. This natural community occurs in small patches on the eastern slope of Umpire Mountain and the southwestern slope of Burke Mountain. On Umpire Mountain it intergrades with Cold Air Talus Woodland. Natural disturbance consists of frequent rockslides as well as freeze-thaw activity. Soils are mostly absent except in a few more stable crevasses.

Open Talus was not surveyed in detail, but was observed from adjacent areas. It was noted to be free of vegetation aside from scattered bryophytes on the rocks and a few stunted Red Spruce (*Picea rubens*) and Heart-Leaved Paper Birch (*Betula cordifolia*) where conditions permit small accumulations of soil to persist for relatively long periods of time.

The abundant rock cavities in this natural community could offer bobcat and porcupine denning habitat, and the rare Rock Vole may use these communities.

Poor Fen

Poor Fens are peatlands that occur in areas of very little nutrient input from groundwater or overland flow. Two areas of Poor Fen were documented in the VMU, both to the west of the main wetland complex. Beaver activity was noted in both areas and composes the only known significant natural disturbance. Soils in the northern fen consisted of 5 inches of poorly decomposed peat over at least four

feet of decomposed peat and muck. The surface is 'quaking' and may be a floating mat, which could buffer it from changes in water level associated with beaver activity.

The shrub layer of the northern Poor Fen is dominated by Leatherleaf (*Chamaedaphne calyculata*) with Labrador Tea (*Ledum groenlandicum*) and Bog-Rosemary (*Andromeda polifolia*) also present. A few stunted trees of Black Spruce (*Picea mariana*) and American Larch (*Larix laricina*) are scattered through the fen especially near its upland edge. Herbs include Tawny Cottonsedge (*Eriophorum virginicum*), Three-Seeded Sedge (*Carex trisperma*), and Creeping Snowberry (*Gaultheria hispidula*). The bryophyte cover is dense and largely consists of various species of *Sphagnum*.

The rare Southern Bog Lemming has been documented in Victory Basin, and Poor Fens represent possible habitat. White-throated Sparrow, Lincoln's Sparrow, and the rare Palm Warbler are known to nest in shrubby peatlands. In addition, Spruce Grouse may use fens for summer foraging and Rusty Blackbirds may use fens for foraging or nesting.

Red Spruce-Heath Rocky Ridge Forest

Red Spruce-Heath Rocky Ridge Forest occurs on dry rock outcroppings and steep slopes where shallow, dry soils and low nutrient levels allow conifers to gain a foothold. This natural community, which is found at mid elevations of the mapping area, supports Red Spruce (*Picea rubens*) and Balsam Fir (*Abies balsamea*), but lacks the landscape context or understory species of Lowland Spruce-Fir Forest and Montane Spruce-Fir Forest. Unlike in some areas, the Red Spruce-Heath Rocky Ridge Forest in the VMU contains a sparse understory without significant amounts of heath vegetation. The spruce trees are notably larger than in most other parts of the mapping area, and these stands may be dominated by spruce in part because they were difficult to log - spruce was historically selectively cut in Victory area forests. The sparse, shaded understory and landscape context also somewhat resemble those of Hemlock Forests in warmer areas of Vermont. Because of the exposed landscape context and shallow soils, Red Spruce-Heath Rocky Ridge Forest is exposed to a variety of natural disturbances, including rockslides, windthrow, icing, lightning, and associated fires. A soil core was not conducted in this natural community, but soils are shallow and probably are well drained with a significant E layer.

Because the Red Spruce-Heath Rocky Ridge Forest in the mapping area often consists of islands within hardwood forests, it offers habitat for a large number of animals that utilize both habitat types. Black-throated Green Warbler and Blue-headed Vireo are two species known to favor small spruce stands surrounded by hardwood forest. In addition, rocky forest floor may provide cover and thermal refuge for amphibians. Bobcat and the rare Rock Vole may also be found in this community type.

Red Spruce-Northern Hardwood Forest

Red Spruce-Northern Hardwood Forest is similar to Northern Hardwood Forest, but also contains significant amount of conifer cover. In the Victory Basin area this natural community occurs on lower, gentle slopes and in areas of moderate cold air drainage, especially below 1200 feet. Seeps and patches of Northern Seepage Forest occur scattered throughout, especially on the Colonel-Cabot soil complex. Vernal pools occasionally occur on saddles and terraces. Additional seeps and vernal pools that were not detected during inventory may be present within the Red Spruce- Northern Hardwood Forest. Red Spruce-Northern Hardwood Forest intergrades with Northern Hardwood Forest at higher elevations and Lowland Spruce-Fir Forest as it approaches the basin floor, with increasing conifer cover at lower elevations. In many cases, the understory contains heavy conifer recruitment, raising the possibility that

red spruce will increase in abundance over time. Soils are generally sandy loams and an E horizon is usually present.

The size class of the Red Spruce-Northern Hardwood Forest in the mapping area varies from pole-sized saplings in recent patch cuts to forests of large trees of varied size class. The best example of mature Red Spruce-Northern Hardwood Forest observed during this survey occurs in Victory State Forest just east of Victory Hill Road.

Red Spruce-Northern Hardwood Forest within the VMU was observed to support a tree canopy of Yellow Birch (*Betula alleghaniensis*), Balsam Fir (*Abies balsamea*), Red Spruce (*Picea rubens*), and Sugar Maple (*Acer saccharum*). Canopy cover is high and was measured at 80%. The understory contained American Beech (*Fagus grandifolia*), Balsam Fir (*Abies balsamea*), and Red Spruce (*Picea rubens*). Hobblebush (*Viburnum lantanoides*) is the most common shrub species, with Striped Maple (*Acer pensylvanicum*) also often present. In one area, a 15% cover of understory trees and a 15% cover of low shrubs was observed. Herbs observed include Three-Leaved Goldthread (*Coptis trifolia*), Yellow Blue-Bead Lily (*Clintonia borealis*), Evergreen Wood Fern (*Dryopteris intermedia*), Canada-Mayflower (*Maianthemum canadense*), and Canada Dwarf-Dogwood (*Cornus canadensis*). Herb cover was measured at less than 5% cover. Liverworts and mosses may occur in the bryophyte layer at low cover (<1%).

Red Spruce-Northern Hardwood Forest offers habitat for animals that use both hardwood and conifer forests. Deer and moose forage in this natural community, and some stands may provide sufficient canopy cover to function as deer wintering area. Black bears utilize beech nuts as a food source and American marten likely exist throughout these communities. Birds found within this natural community include American Woodcock and Chestnut-sided Warbler in young forests and forest edges; Black-throated Blue Warbler in areas of dense Hobblebush undergrowth; Eastern Wood-Pewee in mature forests; Veery near riparian areas; Wood Thrush in older forests with deep leaf litter; Yellow-bellied Sapsucker in forests with standing dead wood and abundant aspen and birch; and Black-throated Green Warbler and Blue-headed Vireo in patches where red spruce is predominant.

Rich Northern Hardwood Forest

Rich Northern Hardwood Forest occurs in areas of hardwood forest where abundant nutrients are available in the soil. This natural community type is rarely found in areas of nutrient-poor soil such as the VMU. One example of Rich Northern Hardwood Forest was documented on the lower eastern slopes of Umpire Mountain in Victory State Forest, where water leaching through cliffs and talus above provide nutrient enrichment. The forest is young to moderate in age. Unlike most examples of Rich Northern Hardwood Forest in Vermont, Sugar Maple (*Acer saccharum*) is the only significant tree in the canopy. The forest appears to be relatively young. Natural disturbance in this forest probably consists mainly of individual tree blowdowns and mortality. Soils consist of a deep layer of dark, silty organic soil over sandy loam with rock at 18" of depth. The pH is 6.0 – more acidic than some examples of this natural community in other parts of the state, but less acidic than most areas where soil pH was measured in the VMU.

Sugar Maple dominates the canopy of the Rich Northern Hardwood Forest that was observed in the VMU, which is dense at 85% cover, but a few American Beech (*Fagus grandifolia*), Yellow Birch (*Betula alleghaniensis*), Balsam Fir (*Abies balsamea*), and Red Spruce (*Picea rubens*) are present in the

understory as pole-sized or sapling trees. Red Elderberry (*Sambucus racemosa*) was the only shrub species observed – understory woody cover was measured at 40%, but mostly consisted of tree saplings. The herb layer is diverse, patchy but often dense (10% cover), and includes Northern Maidenhair Fern (*Adiantum pedatum*), Broad-Leaved Sedge (*Carex platyphylla*), Blue Cohosh (*Caulophyllum thalictroides*), and White Baneberry (*Actaea pachypoda*). Bryophytes were observed to be at very low cover (<5%) in the surveyed area.

Rich Northern Hardwood Forest provides similar wildlife habitat to Northern Hardwood Forest. This natural community often contains significant populations of spring ephemeral wildflowers, which may offer early spring food for bears, deer, and moose.

River Sand or Gravel Shore

River Sand or Gravel Shores are sand and gravel bars that form along rivers. In the VMU, these features occur along the Moose River, especially north of its confluence with Hay Hill Brook, where it enters the basin, slows, and drops sediment. Only sand and gravel bars that appeared to be relatively stable features on the landscape were mapped, but more transitional examples may also be present along the river. This natural community is highly affected by natural disturbance associated with river erosion and deposition, and is strongly affected by flooding and ice scour. Over time, as the river changes course, these natural communities will move as well. They are also submerged during times of high water flow. The substrate consists of sand and gravel.

River Sand or Gravel Shores in Victory Basin were not surveyed in detail, but plants that were observed in this natural community include Bugleweed (*Lycopus* sp.), Panic Grass (*Panicum* sp.), Mad Dog Skullcap (*Scutellaria lateriflora*), Swamp Yellow-Loosestrife (*Lysimachia terrestris*), and Saint John's Wort (*Hypericum* sp.)

The rare tiger beetle (*Cicindela hurticollis*) is known to utilize sand or fine gravel habitat near bogs and adjacent to conifer forest, and is known to occur in the Northern Highlands bioregion (VFW, 2005). Thus the River Sand or Gravel Shore within the VMU may offer suitable habitat for this species. Otherwise, these natural habitats are utilized by the same animals that use Open Water habitat.

Rivershore Grassland

Rivershore Grassland consists of grasses and other herbaceous plants that grow along rivershores. In the VMU, these natural communities occur along the Moose River, primarily downstream from Victory Basin to the mapping area boundary near the Victory village center. Rivershore grasslands are kept open and free of taller vegetation by repeated flooding and ice scour. The latter is likely to be especially prevalent downstream from Victory Basin, where thick ice forms on the slow-moving river during the winter and is pushed into this higher-gradient river area by spring floods. Small examples of this natural community are likely to be present beyond the mapped boundaries, and individual floods and ice scour events can form new examples of Rivershore Grassland at any time. Soils were noted to consist of approximately 2 feet of undifferentiated, sandy sediment deposits.

The Rivershore Grassland in the VMU was noted to be dominated by herbaceous plants, including Common Wrinkle-Leaved Goldenrod (*Solidago rugosa*), Foam-Flower (*Tiarella cordifolia*), Nodding Sedge (*Carex* cf.*gynandra*), Slender Wood-Reed (*Cinna latifolia*), Sensitive Fern (*Onoclea sensibilis*), Rough Bedstraw (*Galium asprellum*), and Spotted Joe-Pye Weed (*Eutrochium maculatum*). Herb cover

was measured to be 90%. A few scattered shrubs (10% cover) such as Speckled Alder (*Alnus incana*) and Pin Cherry (*Prunus pensylvanica*) were also observed.

Moose, black bear, and deer may forage in these small openings, and otters and mink may utilize these areas to travel along the river. Veeries are likely to occur in this riparian natural community. Green Frog, Northern Leopard Frog, and Wood Turtle are known to occur in the area and to utilize Rivershore Grassland.

Sedge Meadow

Sedge Meadows are wetland natural communities dominated by sedges (*Carex* spp.). In the VMU they primarily occur in the lowest areas of the wetland complex, especially in old oxbow wetlands and in a large patch just north of the main road and east of Bog Brook. These sedge meadows intergrade with Alder Swamp and also have characteristics of Shallow Emergent Marsh in wetter areas. Sedge Meadows also occur in beaver-influenced areas as part of their natural successional cycle, but these areas were generally mapped as Beaver Wetland. The natural disturbance regime in Sedge Meadows may include beaver activity, flooding, and erosion. Many of the sedge meadows in the VMU also appear to have been pasture as late as 1944, and this previous land use may also have affected their distribution. Soils may consist of organic muck, river sediment, or layers of both depending on location.

The Sedge Meadow that was surveyed within the VMU was within a beaver-influenced area. This meadow, along with most others observed in the mapping area, contains scattered Speckled Alder (*Alnus incana*) shrubs. White Meadowsweet (*Spiraea alba*) and Rosy Meadowsweet (*Spiraea tomentosa*) are also present. Shrub cover was measured at 25% cover, but appears to be lower in some other VMU sedge meadows. Herb cover was measured to be high – 65% cover – and included Common Woolsedge (*Scirpus cyperinus*), Common Wrinkle-Leaved Goldenrod (*Solidago rugosa*), Purple-Stemmed American-Aster (*Symphyotrichum puniceum*), and Fringed Sedge (*Carex crinita*). The large sedge meadow near Bog Brook may be dominated by Tussock Sedge (*Carex stricta*), as is the case for many examples of this natural community (Thompson, 2005). A substantial (40% cover) bryophyte layer including several species of *Sphagnum* was also observed in the surveyed area.

Animals likely to utilize this natural community include Beavers, mink, Swamp Sparrow, Northern Leopard Frog, and Blue-spotted salamanders. The rare to uncommon Harlequin Darner and the rare Ocellated Emerald have been observed in Sedge Meadow habitat in the VMU. These communities also provide insect-rich openings for bats to forage in.

Seep

Seeps are small areas where groundwater is forced to the surface, usually by an impervious layer under the soil and/or changes in topography, creating a small pocket of wetland habitat amongst upland habitat. In the Victory Basin area, these small natural communities are most common in Northern Hardwood Forest, but also occur in most other upland natural communities. As such, their species composition and soil characteristics are variable. Because they are small and often defined only by understory plants, seeps are sometimes not detected during inventory projects, and as such there are likely to be many seeps that are not mapped, especially in areas of the Colonel-Cabot soil complex.

Seep vegetation is usually similar to that of Hardwood Seepage Forest, but on a much smaller scale. Black Ash (*Fraxinus nigra*) is often found in or near seeps, especially in hardwood-dominated areas.

Seeps in conifer-dominated areas may support Balsam Fir (*Abies balsamea*) and American Larch (*Larix laricina*). Foam-Flower (*Tiarella cordifolia*) is present in the herb layer in most seepy areas; other herbaceous plants associated with seeps in the mapping area include Spotted Touch-Me-Not (*Impatiens capensis*), American Marsh-Pennywort (*Hydrocotyle americana*), mannagrass (*Glyceria* sp.) and Canada Wood-Nettle (*Laportea canadensis*). Moss and liverworts are often present in the bryophyte layer, and *Sphagnum* spp. may occur at high-elevation seeps.

The numerous small pools of open water and saturated soils in Seeps offer high-quality habitat for many amphibians, such as the Northern Two-lined Salamander. The abundant and diverse herb layer, which may sprout earlier in the spring than adjacent areas due to groundwater seepage, offers important early spring forage for black bears, deer, turkey and other animals. These habitats may also be important foraging areas for Rusty Blackbirds.

Spruce-Fir-Tamarack Swamp

Spruce-Fir-Tamarack Swamps occur in the colder parts of Vermont, generally in areas with little surface water movement. Nutrient availability is low, but not as low as in Black Spruce Swamps. In the VMU, Spruce-Fir-Tamarack Swamp occurs both as part of the main wetland complex and in smaller pockets outside the main wetland. Spruce-Fir-Tamarack Swamps often intermix with other wetland types as well as Lowland Spruce-Fir Forest. Beaver disturbance can be an important part of this wetland's natural succession cycle, and blowdowns and windthrow are also important natural disturbances. Soils consist of a relatively thin layer of peat over mineral soils – in one area the peat was underlain by layers of saturated sand and silt with rock at 2' of depth.

Balsam Fir (*Abies balsamea*) is the most abundant tree in Spruce-Fir-Tamarack Swamps within the VMU, with Red Spruce (*Picea rubens*), Black Spruce (*Picea mariana*), and American Larch (*Larix laricina*) also common. Tree canopy cover is variable, but is sometimes dense, and was measured as 70% cover in one case. The shrub layer is relatively sparse (measured as <5% cover) and includes Mountain Holly (*Ilex mucronata*), Northern Wild Raisin (*Viburnum cassinoides*), Rhodora (*Rhododendron canadense*), and Sheep American-Laurel (*Kalmia angustifolia*). Speckled Alder (*Alnus incana*) is present in openings. Herbs include Cinnamon Fern (*Osmundastrum cinnamomeum*), Three-Leaved Goldthread (*Coptis trifolia*), Canada Dwarf-Dogwood (*Cornus canadensis*), and Canada-Mayflower (*Maianthemum canadense*), and herb cover was documented to be 10% in one surveyed swamp. Bryophyte cover is often high (70%), consisting of several species of *Sphagnum*, liverworts, and other species of moss on the hummocks. The uncommon Mountain Honeysuckle (*Lonicera villosa*) has been documented in VMU Spruce-Fir-Tamarack Swamp.

One wetland was observed that had characteristics of both Spruce-Fir-Tamarack Swamp and Red Spruce-Cinnamon Fern Swamp. This wetland was in an early seral stage and difficult to classify but was noted to contain a wide range of conifer species with an understory containing significant amounts of cinnamon fern.

Blue-headed Vireo, Blackburnian Warblers, and White-throated Sparrows may all occur in Spruce-Fir-Tamarack Swamps. Deer may use this natural community for winter shelter. Rare animals that may occur here include Gray Jay, Black-backed Woodpecker, bay-breasted warbler, the state endangered Spruce Grouse, Southern Bog Lemming, and American marten. The uncommon insect Ski-Tipped Emerald has also been observed in VMU Spruce-Fir-Tamarack Swamp.

Vernal Pool

Vernal pools are small areas where a natural depression occurs above impervious soil or rock, creating a pool of water that fills during times of heavy rain and snowmelt. Vernal pools are dry for at least a short period during most years, which excludes fish (a predator of many amphibians) from inhabiting them. In the Victory Basin area, these small natural communities are most common in Northern Hardwood Forest, but also occur in many other upland natural communities. Because they are small and often partially shaded by trees, vernal pools are difficult to detect remotely, and there may be additional examples not included on the VMU natural communities map. Likely locations for these features include saddles, gradual ridgetops, and terraces of shallow bedrock.

Because vernal pools are inundated for much of the year, they generally contain little or no vegetation, though they may be shaded by adjacent trees. Most of the Vernal Pools in the mapping area are surrounded by Northern Hardwood Forest or Red Spruce-Northern Hardwood Forest but at least one pool occurs amidst Lowland Spruce-Fir Forest.

Vernal pools are typically described by their amphibians and arthropods rather than plants, and vernal pools in the Victory Basin area are known to support breeding populations of Wood Frogs, Spotted Salamanders, and Blue-Spotted Salamanders. Of particular importance is the movement of blue-spotted salamanders (a VMU focal species) across River Road south of Damon's Crossing to wetlands and vernal pools in the spring. If salamander migrations coincide with high traffic volumes, significant mortality can result. Fairy shrimp and caddis flies were also observed. Eastern Newts were observed in one semi-permanent pool. Birds such as Wood Duck and Great Blue Heron may also feed on amphibians and arthropods within vernal pools.

Appendix D: Public Responsiveness Summary and Final Revisions

The following is a summarized list of comments received during the public comment period (November 2016 to February 2017), including two public meetings. Public comments are shown in italics, and have been grouped and summarized, in many cases, to cover themes of multiple comments. Agency of Natural Resources responses follow each of the comment groups, including any changes made to the LRMP.

Wildlife

1. *The Wildlife Management Area should be managed more for game species, particularly upland game birds. / The higher level of early successional habitat target for WMA hardwood is good idea / Could you explain why the 2% figure was chosen for young forest?*

   The Stewardship Team feels this LRMP balances the needs of priority wildlife species, both game and nongame, and that no change to game or early successional management is required. The early-successional targets were generally chosen based on scientific estimates of natural disturbance levels in the different matrix forest natural communities. Providing early-successional habitat at these levels, in additional to natural disturbances occurring on the landscape should support the range of native species present. In addition, DFW manages a number of openings in the VMU and increased the early-successional target in the WMA, to help support a variety of wildlife.

2. *There is too much hare hunting in the area, since hare are required for bobcat and lynx. / Much of the VMU is not hunted for hare and there are no data on the impacts of hare hunting in the area. / Add more detailed hare habitat management prescriptions to the LRMP.*

   The importance of snowshoe hare as prey for other species, particularly Canada lynx which was recently confirmed in the area, has brought more attention to this species. In addition, anecdotal observations of ANR staff indicate some areas of the WMA are hunted extensively for hare, particularly with the extension of hare season in this WMU. It is also likely, however, that large areas are not hunted for hare. Ongoing studies of hare at the Silvio Conte National Wildlife Refuge and other locations throughout New Hampshire and Maine may provide more information to assist with assessing hare populations and making decisions based on quantitative data.

   Specific prescriptions of silvicultural treatments are developed by Foresters and Biologists in collaboration as stands are inventoried in greater detail. There may be opportunity for prescriptions tailored to snowshoe hare, though, typically our harvests do not target single species of wildlife, and it is believed the natural communities present and planned level of harvesting will be sufficient for hare to persist.

3. *Moose "damage to ecosystems" phrase should be changed.*

This terminology was changed to "damage to forest regeneration."

Fisheries

4. *The LRMP should consider fish habitat improvement projects.*

   Fisheries Biologists have recommended "Strategic Wood Addition" as the main possibility for improving fish habitat in the VMU. That is already in the LRMP.

5. *Consider trout stocking within the WMA.*

   Fish stocking decisions are made by the Fisheries Division, separately from the state land LRMP process.

Forestry

6. *The LRMP should not designated "reserve" areas, except inoperable ground.*

   Reserve areas that host forest that is allowed to grow to biological maturity and experience natural disturbances with minimal intervention provide important habitat and ecological functions (including large woody material and snags, small early-successional openings, carbon sequestration). These forests are extremely rare throughout the northeast, so providing them is one of many priorities ANR attempts to balance in its management.

7. *ANR should harvest more forest products for revenue. / ANR should harvest more because blowdowns are occurring. / It is good the LRMP plans for more timber harvest here than in the past.*

   The level of harvest specified in this LRMP is higher than in recent state management, due largely to the ongoing blowdowns in the spruce-fir and the assessment that harvesting now may help maintain this natural community in the long term. Harvest levels are determined based on expert opinion of the natural resource conditions present and are not made for economic reasons.

8. *Forests should be managed to maintain carbon sequestration.*

   ANR recognizes the importance of forests for carbon sequestration. While specific management practices to enhance carbon sequestration are still under investigation, practices specified in this LRMP including maintaining forests as forests and allowing some stands to grow past typical rotation ages should promote carbon sequestration in the area.

9. *Logging contracts should be less than 2 years, with no possibility of extension, to avoid slowing down the process.*

   Logging contracts are set by FPR policy and are not the purview of the LRMP.

10. *Softwood regeneration techniques should include even-aged management. / Deer yards should be treated with shelterwood harvests.*

    Specific prescriptions of silvicultural treatments are developed by Foresters and Biologists in collaboration as stands are inventoried in greater detail. Both these types of treatments are allowed in the LRMP.

Public access

11. *Recreational planning seems reactive. Could it be more pro-active?*

    Recreational planning on state lands is typically driven by proposals and involvement from recreational organizations. With a small staff, the District Stewardship Team finds it more efficient and effective to allow organizations to propose ideas, rather than trying to anticipate needs that we may not perceive accurately. We hope the LRMP public process is a time to plan more proactively for the foreseeable future of the management unit.

12. *Get more public input on trail developments once the state has specific proposals. Should be required for any new trail.*

    New language was added to the LRMP: "Where trail proposals are only described in concept in this LRMP, ANR will seek additional public comment on the projects if and when full, detailed proposals are ready."

13. *Change reference in plan that Burke Mountain hosts the Circum-burke, in fact Kingdom Trails and Conservation Collaboratives host the event.*

    Text in the LRMP was changed.

14. *Maintain all current hunting, trapping, fishing opportunity.*

    This LRMP does not change any opportunities.

15. *Consider allowing an ATV connector for local clubs.*

    ATV connector trails are allowed on state lands, in accordance with strict criteria. Currently there are no known areas where the criteria for these trails could be met.

16. *The Kirby Mtn trail proposal is mapped slightly wrong. It should extend past the summit, to the overlook 0.3 miles to the south.*

    This error was changed in the text.

17. *Reroute railroad bed trail to adjacent uplands if it's a management problem. / Maintain RR bed trail – it is unique access to habitat for birding and viewing.*

    As stated in the LRMP, ANR will seek to maintain the existing trail over the railroad bed for the foreseeable future, but maintains the possibility to close or relocate the trail (likely to the adjacent uplands, as suggested) if maintenance becomes untenable.

18. *Reroutes needed on wet sections of Golden Trail. / Need sign at lean-to on Golden Trail / Need bridge to allow bikes on Weir Mill Brook trail.*

These are needs for approved uses and will be implemented in collaboration between ANR and trail organizations as a part of routine management.

19. *Adding ski access trails will increase off-trail ski use and increase disturbance of moose and deer in winter. / Fat biking should be added as part of backcountry ski proposal. / Consider opening former cross-country ski trails for summer and winter use. / Hold off glade skiing request for at least a few years until impacts at Mt. Hor are evaluated.*

    The proposal from for ski glades and trails has been withdrawn by the proposing organization. ANR will evaluate the user experience and resource impacts of the glades being created on Mt. Hor, as part of its normal duties. Future proposals for skiing trails or glades will be evaluated with public input and natural resource considerations, as with all proposals.

20. *Create a singletrack connector for bikes from Bennett Road to Weir Brook Road / Reclaim Macdonald Road Trail, Parrs Meadow Trail, Big Mac Trail, and Four Hills Trails for biking and skiing / Add possibility of future grooming/packing of trails in winter of skiing and fatbiking.*

    No new singletrack connector is planned at this time it is believed the Fire Road provides a suitable path. The former ski trails are not planned to be reclaimed, without a proposal from an organization to manage the use. Future grooming/packing may be considered on existing trails when that use is proposed for certain trails.

21. *Intensive recreation: Focus public use on dispersed, low-impact activities. / Consider limiting intensive recreational use to a footprint of 1% of the area. / Keep trails out of the WMA. / Wild areas are becoming more rare. Manage to preserve these places from concentrated recreation. / Trail access needs to be in compliance with goals for wildlife habitat and connectivity. Keep in mind cumulative impacts and fragmentation. / State lands should have minimal development of recreational, or other, infrastructure. Undeveloped land is a finite resource. / Trail plans should avoid deer and moose wintering habitats. / Confine biking trails to Darling State Park, so it doesn't increase impact throughout VMU.*

    In recognition of the value of both intensive recreation and large areas for dispersed recreation and remote experiences, this final LRMP lays out an area where intensive recreational proposals will be considered as well as a large area of the VMU where dispersed uses will be the focus and intensive recreational proposals will be discouraged.

22. *Any new or improved logging roads should be closed for public access once operations are complete, to prevent disturbance of habitats.*

    This was added as a management strategy pertaining to public vehicular access. Public pedestrian access will not be limited.

<u>Other</u>

23. *Effects of sugaring leases on vegetation management, large animal movement, habitat elements (such as woody material and snags), and both concentrated and dispersed recreation in the area should be considered.*

Clarified language in LRMP.

24. Large-scale energy infrastructure should be prohibited.

No large-scale energy infrastructure is contemplated for the VMU, nor would it likely be allowed in many areas due to existing legal restrictions and Department missions and policies.

25. ANR needs to treat knotweed moving downriver from Gallup Mills bridge.

ANR will evaluate knotweed's distribution along the Moose River within the VMU and upstream, and will consider the potential to treat infestations in the area. Language added in Forest Health section.

Changes noted by ANR staff

- The Acquisition History was changed to recognize the hancock acquisition 1995. (2603 acres in concord and victory).

- The contributions of Fred Mold to the conservation of Victory Basin were recognized in the Acquisition History section.

- Maps were changed to show all of Darling State Park.

- The "Charles Damon Rd" name was added in the Victory Basin.