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

Camel’s Hump Management Unit
Camel’s Hump State Park, Camel’s Hump State Forest and
Huntington Gap and Robbins Mountain Mountain Wildlife Management Areas

Long Range Management Plan
October 2021

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Mission Statements

**Vermont Agency of Natural Resources**

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

Four Agency goals address the following:

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

**Vermont Department of Forests, Parks, and Recreation**

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 service.

**Vermont Fish and Wildlife Department**

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 Environmental Conservation**

The mission of the Department of Environmental Conservation is to preserve, enhance, restore, and conserve Vermont’s natural resources, and protect human health, for the benefit of this and future generations.
EXECUTIVE SUMMARY

The Camel’s Hump Management Unit (CHMU) is comprised of over 40 square miles of state land. This land unit is located in north-central Vermont in the towns of Duxbury, Huntington, Bolton, Fayston, Buel’s Gore, Waitsfield, Richmond, and Starksboro. The CHMU is made up of approximately 25,909 acres, consisting of Camel’s Hump State Park, Camel’s Hump State Forest, and Huntington Gap and Robbins Mountain Wildlife Management Areas. Actual acreage of CHMU exceeds 25,909 acres. This plan does not include assessments or management strategies for the Dowsville Headwaters property. This ~2085 acre property was acquired in 2016 after assessments for the rest of the unit were completed, and will be incorporated into the LRMP at a later date through the addition of a plan amendment.

Within the CHMU there are in total, or in part, eleven named, and several un-named mountain peaks. Camel’s Hump is the most prominent, at 4,083 feet elevation. There are five other mountains over 3,000 feet elevation and several over 2,000 feet elevation. The lowest point within the CHMU is along the Winooski River on the northern side of the management unit at about 300 feet elevation.

Previous long-range plans for lands within the CHMU were adopted individually by major parcel, between 1991 and 2002. Combining these parcels into one unit plan makes sense for efficiency and a more holistic approach on a larger landscape basis.

Historic and Scenic Values
The lands within the CHMU have a rich and diverse history. These lands have been very significant culturally for many generations and parts of the unit were home to early European settlers, evidenced by stone foundations and walls scattered through the forest. Sites of Native American settlement are more difficult to find and decipher, but still present. Camel’s Hump in particular is iconic to many Vermonters. Careful consideration will be given to all activities on the CHMU to ensure historic, cultural, and scenic values are protected.

Natural Communities
A natural community is an assemblage of biological organisms, their physical environment, and the interactions between them (Thompson et al. 2019). Twenty-six different natural communities were identified on the CHMU including fourteen uncommon types and two very rare types in Vermont. Seventeen of these natural communities are of exceptional ecological quality, and are of statewide significance. Upper elevations of the CHMU are home to conifer-dominated forests, with hardwood-dominated communities at the middle and lower elevations. Within the upland forest communities, smaller patch communities are present including seeps, wetlands, rock outcrops, and cliffs.

Rare, Threatened and Endangered Species
Twenty-six rare or uncommon plant species and three animal species of concern are found on the CHMU. Six of the plant species are state listed as threatened or endangered and legally protected.

Wildlife, Fisheries and Habitats
The CHMU comprises a portion of one of the largest habitat blocks in the state and thereby supports a diverse range of habitats for many wildlife species. In addition to the extensive matrix forest community, there are special wildlife habitat features including wetlands, cliffs, forest openings, and soft- and hard-mast stands. Nearly 100 miles of high-quality streams provide for healthy populations of fish. Managing for habitat diversity and healthy ecosystems encourages robust populations of large and small mammals, birds, reptiles, amphibians, and insects. For many people seeing wildlife in this natural setting adds greatly to their visitation experience.
Forest Products
Forest management for timber and other forest products has been and will continue to be an important aspect of the overall management of the CHMU. More than seven thousand acres of the CHMU are managed in part to furnish high-quality forest products. Some of the best hardwood timber found in Vermont is harvested here on a sustainable basis. A wide range of benefits are provided from careful and thoughtful forest management including improved wildlife habitats, a healthier and more resilient forest, improved recreational access, and economic stimulus. In the next fifteen years, thirty-four timber harvests are scheduled, totaling approximately 3800 acres.

Non-Native Invasive Species
Of increasing concern to land managers is the influx of non-native invasive plants and insects. There are several known invasive plant infestations on the CHMU and control and possible eradication of these plant species is an important part of managing for healthy forests. Several invasive insect pests have already impacted forest health on the CHMU as well as the rest of the Vermont landscape. Several more invasive insect species are known to occur near Vermont’s border. Ongoing efforts to survey for invasive species are critical.

Recreation
The CHMU is a very popular recreation destination for hiking, hunting, cross-country skiing, mountain biking, and many other pursuits. There are nearly 70 miles of trails on the CHMU, with over a dozen parking area access points. Many thousands of people visit every year and experiences range from busy trails and a crowded summit, to solitary experiences in vast woods. The LRMP identifies several opportunities to improve the recreation experience and expand recreation opportunities on state land by re-routing trails, and with the appropriate partnerships, adding new trails and managing backcountry skiing zones. In particular, the management of backcountry skiing represents a new step forward (as well as a renaissance of a foundational public land use) for FPR and its partners in managing this growing use on state land. The LRMP recognizes that trailhead parking capacity is limited at the Burrows and Monroe trailheads, but use of these trails has increased in recent years. The plan does not propose specific measures to address these situations. However, ANR staff are dedicated to finding solutions that are acceptable to the visiting public, neighbors, and town officials.

Management Goals
Broadly speaking, the management goals of the CHMU include protecting natural and cultural resources, providing diverse recreational opportunities, sustainable management for production of forest products, and providing high-quality wildlife habitat for target and general wildlife species. The degree to which one goal is prioritized over another is dependent on parcel ownership, existing features, legal restrictions, as well as other factors. Site-specific management decisions are guided by the Land Management Classification system.

Land Management Classification
After completion of inventories and assessments, the lands, resources, and facilities held by the Vermont Agency of Natural Resources are evaluated and assigned to appropriate Agency Land Management Classification categories based upon knowledge and understanding of the resources and appropriate levels of management. The four categories as applied to the CHMU are Highly Sensitive (36%), Special Management (34%), General Management (30%), Intensive Management (<1%). This enables land managers to allocate use and management by area minimizing conflicts between competing objectives and facilitating a common understanding of the overall use or type of management to occur in particular areas of the Camel’s Hump Management Unit.
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I. PARCEL DESCRIPTION

A. Purposes of State Land Ownership

The Agency of Natural Resources (ANR) and its Department of Forests, Parks, and Recreation (FPR), and Fish and Wildlife Department (F&W) have been legislatively authorized to acquire lands, hold interests in lands, and conduct land management activities for the public benefit, and to manage those lands for a variety of public purposes, ranging from the protection of important natural resources to public uses of the land in appropriate places.

Planning and management of ANR lands is conducted by the local District Stewardship Team (DST). The DST is an inter-disciplinary group of natural resource professionals from the Department of Forests, Parks & Recreation, Fish and Wildlife, and Environmental Conservation. It includes wildlife and fisheries biologists, foresters, recreation managers, the state land ecologist, and a watershed planner. This group commonly seeks input from other ANR professionals. The DST has broad expertise and considers a wide array of resource concerns and public uses when writing and implementing Long Range Management Plans (LRMP).

Natural resources include, but are not limited to biodiversity, wildlife habitat, natural communities, water bodies, wetlands, undeveloped land, scenery, and aesthetic values.

Public uses include, but are not limited to recreation, access to state lands or waters, environment related businesses, education, research, and sustainable use of renewable resources such as forest management, hunting, fishing, and trapping.

State Forests and Parks are managed by the Vermont Department of Forests, Parks and Recreation to meet a variety of conservation and management goals.

Use and Management of Camel’s Hump State Park and Camel’s Hump State Forest is designed to:

- Conserve biological diversity on the parcel and contribute to the diversity of the larger landscape;
- Maintain and enhance forest ecosystem health;
- Maintain and enhance the parcel’s ability to provide ecosystem services such as providing forest products, protecting soil and water resources, and providing recreational opportunities;
- Promote an ethic of respect for the land, sustainable use, and exemplary management;
- Conform to any and all deed restrictions, conservation easements, and legal agreements;
- Maintain or enhance quality rank of significant natural communities and protect habitat of rare, threatened, and endangered species;
- Enhance wildlife habitat through creation of diverse vegetative stages (age classes), protection and enhancement of critical wildlife habitat such as deer wintering areas, and protection of unique habitats;
- Produce a diversity of wood products through sustainable management and harvesting practices;
➢ Maintain or enhance water quality and fisheries habitat;
➢ Control or limit to the extent feasible invasive species populations;
➢ Document, interpret, and protect historic resources;
➢ Provide dispersed recreational opportunities and trail systems where appropriate and compatible with other goals;
➢ Provide safe and enjoyable access for public uses while protecting natural resources and forest access infrastructure.

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

Use and management of Robbins Mountain and Huntington Gap WMA’s is designed to:

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

B. Location Information

The 25,909 acre Camel’s Hump Management Unit (CHMU) is located in the heart of Vermont’s Green Mountains. Approximately 52% is in Chittenden County, 47% in Washington County, and 1% in Addison County. The approximately 40 square miles of land base that make up the CHMU is found in eight towns, Duxbury(32%), Huntington(24%), Bolton(19%), Fayston(13%), Buel’s Gore(8%), Waitsfield(2%), Richmond(1%), and Starksboro(1%).
The CHMU is comprised of approximately 20,858 acres (81%) in Camel’s Hump State Park; 2,561 acres (10%) in Camel’s Hump State Forest; 1,602 acres (6%) in Huntington Gap WMA; and 888 acres (3%) in Robbins Mt. WMA.

The CHMU is accessed from many locations. The main approach points are from Camel’s Hump Road in North Duxbury, Camel’s Hump Road in Huntington, VT Route 17 in Buel’s Gore and Waitsfield, Wes White Hill Road in Richmond, Bassett Hill and Dana Hill Roads in Fayston, Honey Hollow Road in Bolton, and along the Duxbury and River Roads adjacent to the Winooski River. Several parking areas are maintained for the public to access the CHMU. Refer to maps 1,2,3 for a better understanding of the location of the Camel’s Hump Management Unit, and the administrative units within the CHMU.

C. History of Acquisition

The year 2011 marked the centennial of public land ownership in the Camel’s Hump area. Between 1911 and 2011 there were forty-four land transactions including two gifts, forty purchases, one sale, and one swap, involving sixty-five parcels. Refer to Appendix A for a complete listing of these land transactions.

During 1911, Colonel Joseph Battell donated one gift of three parcels totaling 1,147 acres, which included the summit of Camel’s Hump, thus starting a continuing process of land conservation around Camel’s Hump. By the end of 1967 this land unit had grown to over 10,000 acres, or about sixteen square miles. By the end of 1979 it had grown to over 20,000 acres, about thirty-two square miles. Today the land base that makes up the Camel’s Hump Management Unit is over 25,909 acres, just over forty square miles, or roughly the size of an average Vermont township.

Most of these land transactions were fee-simple acquisitions, without any restrictions. Some of the acquisitions are encumbered with easement restrictions, or less than fee-simple purchases. As an example, much of the Huntington Gap Wildlife Management Area is timber reserved; the seller of the land retained rights to the trees on the parcel. Additionally, FPR holds a public access easement on a property adjacent to Phen Basin in the town of Fayston.

D. Land Use History

A report entitled “The Cultural Landscape of the Camel’s Hump Management Unit” was completed for the Agency of Natural Resources by the Department of Social Sciences and Business, University of Maine at Farmington during 2006 and 2007. See Appendix B for this complete report. In summary, the University of Maine report includes a brief history of the CHMU, an environmental overview, historic themes/contexts applicable to the CHMU, and recommendations for managing known and expected historic resources.

In 2003, an archeological sensitivity study was conducted by The Consulting Archeology Program of the University of Vermont that identifies environmental settings conducive to Native American occupation and land use within the CHMU; see Appendix C for this study.

The cultural and historic values of the CHMU are many and have important implications for land management into the future. Recreational use, forest products extraction, and homesteading of the lands found here started long before initiation of state land acquisition.
During the early 1800’s the first trail to the summit of Camel’s Hump was established (Huntington Trail, now the Burrows Trail). In the 1860’s a summit house and observatory were built. Logging of the forests of the Camel’s Hump area was very intense, and much of the forest was cleared during the 1800’s. In the very early 1900’s, two devastating forest fires burned thousands of acres. The first fire lookout in Vermont was established on the summit of Camel’s Hump in 1911. In the 1930’s the Civilian Conservation Corps was active within the CHMU. In 1944 a B-24 Liberator bomber crashed into the south face of Camel’s Hump. In 1968, Camel’s Hump was designated as a National Natural Landmark by the US Department of the Interior.

During the tenure of state ownership of lands within the CHMU, management activities have been undertaken utilizing the multiple-use concept. A wide range of projects have been implemented, including an active, sustainable timber and firewood harvesting program, multiple trails have been established, access roads have been built and maintained, many wildlife habitat projects have been implemented, many special use permits and licenses for use have been formulated, and several partnerships with recreation groups have been adopted.

Another prominent use of the CHMU has been for forest research. In fact, Camel’s Hump plays a starring role in our current understanding of acid deposition and its impacts on forests. Long-term research plots on the west side of Camel’s Hump summit documented the decline in the alpine forest health later attributed to acid deposition. This pioneering research was conducted by Hub Vogelmann, Thomas Siccama and a host of other graduate students and researchers. Vogelmann’s 1982 article “Catastrophe on Camel’s Hump” in Natural History detailed the extent and causes of the acid deposition problem and led to strong reactions among policy-makers, and eventual revisions to the Clean Air Act. Today, the forest research area is named in Hub Vogelmann’s honor.

Appendix J includes historic photos of parts of the CHMU.

E. Management Unit Highlights

The Camel’s Hump Management Unit is a large nearly completely forested land unit. The dominant forest component is northern hardwood, comprised mostly of the sugar maple-beech-yellow birch community. Even though the northern hardwood type covers much of the CHMU, the variety of flora and fauna found here is impressive.

The CHMU is located in the Northern Green Mountains biophysical region, which encompasses the mountains in the north-central portion of Vermont. This region is part of the Appalachian Mountain system that stretches across much of the eastern side of North America. As a result of the relatively high elevations, this region has higher levels of precipitation, lower temperatures, and a short growing season. The terrain is rugged (see map 4) and contains some of Vermont’s tallest peaks. The metamorphic bedrock is acidic and lacks the limey, nutrient rich soils found in neighboring lowlands. Glacial till covers much of the region.

While soil types vary across the CHMU, Lyman-Marlow very rocky loams are dominant. Other soil types found here include the very rocky Hogback-Rawsonville complex, Peru extremely stony loam, and the very rocky Ricker-Londonderry-Stratton complex. Soils along the Winooski River area are of the Limerick-Hadley-Winooski Association, which are loamy soils subject to periodic flooding. Slopes graduate from flat along the Winooski River to extremely steep; generally, steep slopes are a limiting factor for planned activities.
Precipitation amounts over the landscape of the CHMU range from around sixty inches per year in the upper elevations to half that in the lowest elevations. Rain, snow, and cloud intercept all contribute to the precipitation amounts. Within the CHMU there are few open bodies of water; beaver ponds make up this component. The CHMU is within the greater Lake Champlain basin, and as such run-off from this land unit eventually drains into the lake. Main tributaries include the Winooski, Huntington, and Mad Rivers, and Ridley, Preston, Gleason, Brush, Cobb, and Beaver Meadow Brooks.

The landscape diversity found on the CHMU results in a wide variety of natural community types, from Alpine Meadow at the summit, to floodplain forest along the Winooski River. The CHMU is within one of the state’s largest unfragmented habitat blocks, and there is an abundance of wildlife within the CHMU including black bear, white-tailed deer, moose, ruffed grouse, bobcat, beaver, a wide variety of song birds and raptors, brook trout, fox, snowshoe hares, and amphibians and reptiles. Critical wildlife habitats have been identified for many of these species on the CHMU.

Given the challenging terrain on much of the CHMU, past homesteading was somewhat limited. Along river and road corridors can be found remnants of past human habitation. Much of this occurred in the mid to late 1800’s and early to mid-1900’s. Former logging and hunting camp sites are also found here.

Recreational use has long been a tradition within the CHMU. Trails started to be established in the mid 1800’s. The land base of the CHMU is within a day’s drive of several major metropolitan areas in both the United States and Canada, with two-thirds of Vermont’s population living within one hour’s drive of the CHMU. As such, the CHMU attracts many thousands of visitors each year. Hiking, cross country skiing, hunting, primitive camping, snowmobiling, fishing, and wildlife observation are popular pursuits. Even though some of the trails are extremely popular, there are many places within the CHMU that are quite remote, and rarely visited by humans.

There are no developed campgrounds located on the CHMU. In conjunction with the Long Trail there are a few remote shelters and one tenting area. Primitive, off-trail camping is allowed in the lower elevations on some of the CHMU.

F. Relationship to the Regional Context and Other Planning Efforts

When a LRMP is developed for state land, it is important to take a broader view beyond the parcel itself. Part of this effort is to examine the relationship of the planning effort for the state land parcel to regional and town plans. It is important that as plans are made, and management activities are carried out that land managers and users keep in mind the larger picture. The regional plans and town plans for the area within which the CHMU is located are comprehensive, with a substantial amount of effort put into formulating them. These plans are pertinent to the context of the LRMP for the Camel’s Hump Management Unit, and have been considered in the development of this plan.

The Camel’s Hump Management Unit comprises acreage in eight towns and three counties. A comprehensive review of the relevant portions of each town plan is beyond the scope of this section. Suffice it to say, that every county plan and town plan (save Buel’s Gore) identifies the importance of resource protection, wildlife populations and habitat, working landscapes, recreational opportunities, and the scenic character of each community. The Camel’s Hump Management Unit will play an important role for the towns, especially in Duxbury, Huntington, and Bolton where 75% of the acreage lies, and where state-owned land comprises a significant amount of each town’s total acreage.

The Huntington town plan would set out to “ensure adequate protection and preservation of rare, sensitive, or important natural resources and prime agricultural soils.” Among the many natural
resource goals identified in the Bolton town plan is to “protect populations of rare, threatened, and endangered species and associated habitat.” Duxbury’s town plan emphasizes that the town’s “economic base includes a robust working landscape”. It even encourages “responsible logging” specifying that forest harvesting should utilize a professional forester and long-term forest management plans. Fayston’s town plan clearly states the importance of maintaining “Fayston’s recreational opportunities for the young and old for all seasons.”

While it is important that town plans tout the value of natural resources, working landscapes, wildlife habitat and recreation opportunities, it is equally important that town zoning ordinances are written to help achieve these goals. For the most part, the zoning in surrounding town aligns reasonably well with the goals of the CHMU, with some towns delineating zones by elevation. However, additional growth is likely to occur adjacent to the CHMU.

North Duxbury has seen significant development near the CHMU. Portions of the CHMU are bordered by the “Forest Recreation” zone, where 5 acres is the minimum lot size. Fortunately, this zone does not border any Highly Sensitive Management Zones in the CHMU (see Section IV.C.). In Huntington, small portions of the CHMU are bordered by the “Rural-Residential District” (5 acre minimum lot size), but like in Duxbury, none of these areas are considered Highly Sensitive.

In Bolton, the “Rural I” District has 2-acre zoning and borders the CHMU between the Gleason Brook watershed and the Duxbury Road. Again, this zone does not border any Highly Sensitive areas, but is only 400 feet from the Highly Sensitive area comprising the Gleason Brook watershed.

In Fayston, the “Soil and Water Conservation District” has 5-acre zoning and borders significant portions of the CHMU. The “Rural Residential District” has 1-acre zoning and also borders some of the CHMU, including a highly sensitive beaver wetland complex.

In Waitsfield, the “Agricultural Residential District” has 1-acre zoning and lies adjacent to the majority of the Howe Block of Camel’s Hump State Forest, including a deer wintering area. Robbins Mtn. WMA in Richmond is adjacent to the “Agricultural and Residential” zoning district with a minimum lot size of 1 acre.

Widespread and rapid development of the lands adjacent to the CHMU is unlikely. However, the towns and ANR should remain vigilant in monitoring development and reacting appropriately should this development threaten the goals in either the town plans or this plan.
Map 3: CHMU Blocks.
II. PUBLIC INPUT

The citizen participation process for the Camel’s Hump Management Unit (CHMU) Long Range Management Plan (LRMP) was conducted in accordance with Agency of Natural Resources policies, procedures, and guidelines. Public involvement, or citizen participation, is a broad term for a variety of methods by which the people of Vermont have input to public land management decisions. The Agency of Natural Resources, including the Departments of Forests, Parks, and Recreation, and Fish & Wildlife, is committed to a planning process which offers the opportunity for all citizens and stakeholders to participate. Opportunities to participate include letters, surveys, personal comments, telephone calls, e-mails, and more formal methods such as public meetings and workshops. All public input received concerning the future stewardship of the CHMU has been considered in the preparation of this plan.

The formal citizen participation process for the Camel’s Hump Management Unit has involved different techniques. Three online surveys were conducted during 2011. Public scoping meetings were held on June 14, 2011 at Huntington’s Brewster Pierce Elementary School and on June 15, 2011 at Duxbury’s Crossett Brook Middle School. Results from the surveys and summaries of comments from the public meetings can be found in Appendix D.

Following the release of a draft plan in October 2017, ANR conducted four public meetings in three different communities during November and December of 2017. During these meetings ANR staff presented highlights from the plans and took questions from the public. The public submitted more than 700 written comments during two open comment periods in 2017 and 2018 totaling approximately 120 days. The DST reviewed and summarized comments and has issued a “Public Responsiveness Summary” detailing changes made to the plan in response to the public comments. Those changes have been captured in this final draft of the LRMP. The Public Responsiveness Summary can be found in Appendix E.
III. RESOURCE ANALYSIS

A. Legal Constraints

Given that the Camel's Hump Management Unit (CHMU) was assembled over nearly one hundred years involving 44 different transactions, there are many legal constraints on the parcel. These constraints include utility easements, rights-of-way, life-time leases, timber reserve rights, deed restrictions, funding source restrictions, Act 250 permits, spring rights, and town, state and federal legislation. A stand-alone Legal Constraints map was not prepared for this plan.

Summary of Major Legal Constraints on the CHMU:

1. Deed Restrictions
   - Gift from Col. Joseph Battell of 1,147 acres, including the summit of Camel's Hump; includes clauses restricting tree cutting, and preserving the forest in a natural condition.
   - Gift from the Will Monroe estate of 110 acres in North Duxbury was given with the understanding that the land would be used as a bird sanctuary, game refuge, wildflower, fern, shrub and tree preserve, and public park. It also allowed public access with parking, picnic grounds, and trails.
   - Timber rights were reserved in perpetuity on 1,473 acres of the 1,602 acre Huntington Gap Wildlife Management Area.
   - Purchase deed of 462 acres in Bolton from Leo Lafreniere states that the property may be used for agriculture, forestry, educational, non-commercial recreation, and open space purposes in accordance with the Management Plan. No residential, commercial, industrial, or mining activities are permitted. There may be no construction of buildings or structures, nor may any be moved, created, or erected unless it is in accordance with the Management Plan, furthers the public use as a part of the state park, protects the environmental systems, encourages sound utilization and conservation of agriculture and forest resources, or preserves the scenic beauty of the property. The state is to make every effort to keep the property in its current agricultural use. The property may not be subdivided, conveyed into separate parcels, or transferred, unless permission is given by the Easement holder. (Note: The Legislature and the Vermont Housing and Conservation Board (VHCB) approved the sale of a portion of the former Lafreniere homestead parcel including the house and 30 acres of surrounding land. The property sold in 2016 and is subject to various open space and historic preservation restrictions.) Should the property not be used according to the grant agreement then the land will revert back to the VHCB.
   - Purchase deed of the 2,700 acre Phen Basin parcel in Fayston included a complex set of restrictions including designation of an Ecological Protection Zone on approximately 80% of the parcel.

2. Legislation
   - In 1969 the Vermont General Assembly passed Title 10, Chapter 77, further amended in 1973, 1975, and 1993. This legislation created the Camel's Hump Forest Reserve and named the state land base within this area Camel's Hump State Park, so that at least one mountain in the Green Mountain Range should be reserved in its ‘natural’ state. It further directed that this land would
be managed by the Department of Forests, Parks and Recreation and established three Use Districts. The Camel’s Hump Forest Reserve is defined as the area bounded by Winooski River on the north, the Mad River on the east, VT Route 17 on the south, and the Huntington River on the west. The three use districts within the Camel’s Hump Forest Reserve are:

A) Ecological Area- This area is for protection of “scarce and rare plants, to preserve the natural habitat, and to maintain the wilderness aspect” of the area. This area extends from 2500’ elevation to the summit and from 900’ elevation to 2500’ elevation within the Gleason Brook drainage.

B) Timber Management and Wildlife Area- This area shall be for production of “forest products, to protect the ecological area, to encourage wildlife habitat, and to preserve the natural appearance of the region as seen from surrounding areas.” This area extends from 1800’ elevation up to the ecological area. Uses of this area will include sustained production of timber, water conservation, wildlife management, hunting, hiking, cross-country skiing and nature appreciation.

C) Multiple-Use Area- This area is the rest of the land, below 1800’ elevation. Uses of this area include farming and vacation and permanent residences in addition to those uses described in the Timber Management and Wildlife Area.

In addition to the allowed uses described by the legislation, FPR may establish other permitted uses in conjunction with the development and adoption of a comprehensive management plan as long as due consideration is given to the relationship and compatibility of permitted uses with the purposes established for each of the use districts.

3. Funding Restrictions

- The Huntington Gap and Robbins Mountain Wildlife Management Areas were acquired with funds provided by the Federal Aid in Wildlife Restoration Act more commonly known as the Pittman-Robertson Wildlife Restoration Act which provides federal aid to the states for management and restoration of wildlife and respective habitats. This federal aid, funded through an excise tax on sporting arms and ammunition, may be used to support a variety of wildlife projects, including the acquisition of wildlife habitat. Management activities and land uses on parcels funded with Pittman-Robertson funds must be consistent with the objectives of protecting, restoring, or improving habitat for wildlife. Recreational activities may be restricted to those activities which meet stated objectives.

- In Camel’s Hump State Park and State Forest, approximately 9000 acres were conserved in part through funding from the Land and Water Conservation Fund (LWCF). These include large parcels such as the Laird property in Duxbury, the Colgan property in Bolton, former TNC ownerships in Bolton and Duxbury, as well as the Indian Head Plywood company lands in Bolton and Huntington. Several other smaller parcels were also conserved in this fashion for a total of eleven transactions. LWCF funds are used to conserve properties with important outdoor recreational value. Public access for recreational purposes is to be preserved in perpetuity. On these properties, management for other purposes (forest products, wildlife, etc.) is permitted as long as it does not permanently impact the recreational values of the property.
B. Natural Communities and Ecological Assessment

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

The coarse filter assessment begins by describing landscape and climatic factors that characterize the CHMU, such as bedrock geology and water resources. It then details the twenty-six distinct natural community types documented and mapped during inventories of the CHMU. This is followed by a fine filter assessment describing rare species, invasive plants, and wildlife habitats found here.

Coarse Filter Assessment

Biophysical Region and Climate

Vermont is divided into nine biophysical regions where climate, topography, geology, human history, and natural communities tend to be similar (Thompson et al. 2019). The CHMU is located in the Northern Green Mountains biophysical region, which encompasses the mountains in the north-central portion of the state. It is bounded by the lowlands of the Champlain Valley to the west and the rolling terrain of the Northern Vermont Piedmont to the east. This region is part of the Appalachian Mountain system that stretches across much of the eastern side of North America. As a result of the high elevations, the region has high levels of precipitation, low temperatures, and a short growing season. The terrain is rugged, and contains some of Vermont’s tallest peaks, including Camel’s Hump at 4,083’. The metamorphic bedrock is generally acidic, and the region lacks the limey, nutrient-rich soils found in the neighboring lowlands. Glacial till covers much of the region, but other glacial deposits and modern-day alluvium are also present in the valleys.

Bedrock Geology, Surficial Geology, and Soils

The geologic history of an area can have a strong influence on the distribution of natural communities. Bedrock underlying the CHMU is primarily metamorphic sedimentary rock dating to the Cambrian era, roughly 550 million years ago. The most widespread rocks are schist and gneiss of the Underhill, Hazen’s Notch, Fayston, Granville, and Pinney Hollow formations. These folded, erosion-resistant rocks are evident in the many outcrops and cliffs scattered throughout the CHMU. Although both are
generally acidic rocks that do not contribute to soil enrichment, the Hazen’s Notch formation can have lenses of marble which may be responsible for some of the localized enrichment found in the CHMU.

The degree to which this bedrock affects growing conditions in the CHMU 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 CHMU and varies in depth from very shallow to extremely deep. Many of the summits and ridges have large expanses of exposed bedrock; these may never have had a thick layer of till deposited or post-glacial disturbances and erosion may have removed the original till deposits. Glacial till is also present in the valleys, but subsequent depositions of sediments and organic matter have buried much of the till, particularly in the Winooski Valley which has a more complex post-glacial history and therefore a complex surficial geology. Kame terraces, glaciolacustrine deposits of gravel, sand, silt and clay, and modern-day alluvium can all be found at low elevations in the valley.

The soils of the CHMU are primarily the products of these surficial deposits, and as such are mostly till-derived, rocky and stony soils. The most widespread series mapped by the Natural Resources Conservation Service (NRCS) is Lyman-Marlow very rocky loams, which cover over 6,000 acres of the CHMU. Other widespread soil series include the very rocky Hogback-Rawsonville complex, Colonel sandy loam, Peru extremely stony loam, the very rocky Ricker-Londonderry-Stratton complex, and the Tunbridge-Lyman complex. In contrast, the Winooski Valley features sandy and silty loams, including the Berkshire, Hadley, Hartland, Salmon and Stetson series. An area of Cabot silt loam is mapped near Tucker Hill Road on the Howe Block. No peat or muck soils have been mapped by the NRCS in the CHMU, but these organic soils are found in the small wetlands scattered around the parcel.

**Hydrology**

The Northern Green Mountains have on average the highest precipitation levels in Vermont, but the amount any particular site receives is highly dependent on elevation and aspect. The highest elevations on the ridge receive around 60” of precipitation per year, but sites near Duxbury in the Winooski Valley may receive only half that amount. Other than a few small beaver ponds, there are no major water bodies within the CHMU. The terrain is drained by numerous streams which all eventually reach the Winooski River, either directly, or via the Mad River to the east or the Huntington River to the west. Because of high precipitation and shallow-to-bedrock soils, groundwater seepage can be abundant at higher elevations; the larger flowages result in a characteristic seep-adapted wetland flora; smaller flows produce mesic (and productive) forest soil. Surface water also collects in depressions to form vernal pools, and other small wetlands are scattered around the CHMU and 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 CHMU. 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). Natural fires in the absence of human disturbance are infrequent events as well. In many wetlands beaver disturbance is a regular process. Along larger streams and the Winooski River, flooding and ice scouring are frequent disturbances.
Human disturbance has played a major role in shaping the CHMU. Much of the land was very heavily harvested for timber during the late 1800s, with very high demand for red spruce (Picea rubens). As a result, red spruce may be much less abundant in some natural communities now than it was 200 years ago. The extensive logging, and the associated accumulation of slash, led to two very large fires: the first in 1903 burned thousands of acres around the Camel’s Hump summit, and the second in 1908 burned a large area around Robbins Mountain. Thus, many areas of forest were established after these fires. Many locations on the CHMU were utilized for agriculture, including sheep grazing, and maple sugaring. Evidence of these activities can be seen with remains of stone walls and the occasional remnants of a sugarhouse. In places there was also extensive tree planting, and today it is still possible to find non-native Norway spruce (Picea abies) in improbable locations high on Camel’s Hump.

Starting in the 1960s, Camel’s Hump became an important research site for studying the effects of acid rain on forests. University of Vermont researcher Hub Vogelmann and other scientists discovered that red spruce trees were suffering from needle damage, low growth, and high rates of mortality due to acid rain (Vogelmann et al. 1985). These findings were instrumental to the creation of the 1990 Amendments to the Clean Air Act that resulted in reductions in the air pollutants that cause acid rain. Recently, it was shown that red spruce trees have finally been able to recover (Kosiba et al. 2018).

While the threat of acid rain has lessened, the forests of Camel’s Hump are now experiencing other stressors, notably climate change. Using the same long-term study plots on Camel’s Hump that were used to monitor the effects of acid rain, researchers have documented changes in the composition of the forest over time (Beckage et.al., 2008; Pucko et al. 2011, Verrico et. al., 2020). Some of these changes have been attributed to warmer temperatures from climate change, but compositional changes have also occurred because of decades of acid rain and subsequent recovery, and historical land use. For more information on the impacts of climate change see section III.G.

Human disturbances continue to shape the landscape of the CHMU, though the impacts and scale are different than those human disturbances of 100 years ago. Forest and habitat management continue today, providing forest products, diversifying wildlife habitat, and enhancing resilience to a changing climate and natural disturbance regime. In some cases, the roads and trails that are used for forest and habitat management act as recreation corridors. Recreation is a notable form of human disturbance in some parts of the CHMU. Hiking, mountain biking, skiing, hunting, and other activities draw people to practically every part of the management unit. Two activities in particular—the trampling of the alpine zone by hikers and dogs, and the illegal clearing of trees and brush to create informal backcountry ski routes—pose potential threats to sensitive natural communities that are easily damaged but slow to recover. While all of these recent disturbances may be more diffuse and subtle than the past human influences, they nevertheless continue to shape the landscape.

Landscape-Scale Context and Ecological Functions

The CHMU and the contiguous forest surrounding it make exceptional contributions to maintaining Vermont’s ecologically functional landscape. The intact forest—with thousands of acres that are remote from roads and development—provides a diversity of high-quality habitats for plants and animals. This block of forest is well-connected to neighboring forest blocks, providing opportunities for wildlife movement and species dispersal. The CHMU is physically diverse, supporting many species and making it naturally resilient to climate change. The management unit makes an irreplaceable contribution to these
functions at a statewide scale, and the majority of the CHMU is identified as “highest priority” for these functions by Vermont Conservation Design (Sorenson and Zaino, 2018).

**Interior Forest**
The bulk of the CHMU is located within one of Vermont’s largest unfragmented forest blocks. This block is roughly bounded by the Winooski Valley to the north, the Mad River Valley to the east, the Huntington River valley to the west, and Route 17 to the south. Including over 57,000 acres of intact natural habitat, this block provides habitats for myriad species. Large, unfragmented areas of forest habitat provide critical nesting habitat for forest-interior songbirds such as the hermit thrush (state bird), scarlet tanager, and black-throated blue warbler, among others. They also allow wide-ranging mammals such as moose, bobcat, and black bear space to meet their biological needs without encountering roads or built infrastructure.

Large, intact interior forest blocks also provide physical landscape diversity. Species diversity is correlated with the variety of bedrock and surficial geology, landforms (e.g. hills, slopes, valleys, summits), and elevation. The CHMU includes a substantial elevation range—from the summit of Camels Hump (4083’) to the lowlands of the Winooski Valley (310’). It includes many different landforms, from floodplains to foothills to steep mountain ridges. It has bedrock that, while mostly acidic, has calcium-rich inclusions. This diversity within the management unit not only supports a diversity of species at present, but also contributes to the climate resilience of the unit. As species shift their ranges in response climate change, they need to find suitable physical settings. Plants are of course strongly tied to setting and substrate, but many animals are as well. Some examples include peregrine falcons and ravens that depend on cliffs for nesting, invertebrates (such as millipedes and snails) that require a direct source of calcium for their exoskeletons, or species that depend on plants tied to specific physical settings, like the West Virginia white butterfly. The range of habitats present within an intact forest block facilitates long-term shifts in species distribution, making it more likely that natural ecological functions will continue into the future.

**Connectivity**
Connections between habitat blocks or other discrete habitat features serve an important function in maintaining the long-term health and viability of wildlife populations. Wildlife corridors not only allow individual animals (such as dispersing young searching for new home ranges) to move throughout the landscape, but also allow for the transfer of genetic information across the region. Even the occasional movement 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, reducing long-term risks from inbreeding.

At the statewide scale, the CHMU is located in the center of a significant north-south connection formed by the intact forest blocks along the spine of the Green Mountains. While Interstate 89, US Route 2, and the adjacent railroad are major barriers for wildlife movement, the Vermont Fish and Wildlife Department has documented species movement across these barriers at culverts and bridges. To the northeast of the CHMU, intact forest blocks provide a connection to the Worcester Range and into the Northeast Kingdom—and ultimately connecting to the large forest blocks of Maine and maritime Canada. This connection is important not only at a state scale, but regionally.

As noted above, the CHMU is almost entirely without internal fragmentation, providing ample movement opportunities for wildlife that will travel through high-elevation hardwood forests and
spruce-fir forests. Riparian and low-elevation travel corridors are limited within the management unit, although the larger streams (e.g. Preston Brook, Gleason Brook, Cobb Brook, etc.) provide local riparian corridors.

While the Howe Block is not in itself part of a large habitat block, it offers good connectivity to the large, unfragmented areas of the Green Mountains, with narrow German Flats Road in Fayston and Warren as the primary barrier between the Green Mountain spine and the Howe Block. Although the CHMU is more fragmented within the Mad River valley, black bear and other wildlife are still able to use vegetated corridors to cross Route 100 and other town roads. At a local scale, the forest surrounding the Howe Block offers wildlife access directly down to the Mad River, providing opportunities for species to travel from core forest directly down to a major river.

Map 5 depicts the landscape context of the CHMU within the broader region by highlighting the role of the CHMU in the suite of conserved land protecting some of the state’s Highest Priority Forest Blocks.
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 et al. 2019). The 97 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. A type is a description; an occurrence is an actual place on the ground.

Natural communities in the CHMU were identified through field surveys and aerial photograph interpretation. 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 CHMU; 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.

In all, 126 occurrences of twenty-six natural community types were identified and mapped in the CHMU (see table 1). A total of 444 natural community polygons were mapped (see maps 6-9).

Some broad patterns emerged from this mapping effort. First, and not surprisingly, the CHMU is characterized by the extensive matrix forest community types: Northern Hardwood Forest at lower elevations, and then Red Spruce-Northern Hardwood Forest, Montane Yellow Birch-Red Spruce Forest, and Montane Spruce-Fir Forest as elevation increases. These communities combine to form one of the largest unbroken forest blocks in the state, and are all of high ecological quality and of statewide significance. Within this forested matrix are all the other communities, including the very distinctive alpine communities found at the summit of Camel’s Hump. The Alpine Meadow and Subalpine Krummholz are both very rare in Vermont, and restricted to the tops of the highest mountains. The Alpine Meadow in particular hosts numerous rare, threatened and endangered plants, many of which are more commonly found in arctic tundra hundreds of miles farther north. Other communities found in the CHMU include cliffs and outcrops, which are abundant in the mountainous terrain. Small patch wetlands are also common, occurring in both closed basins and as a result of groundwater seepage, but for the most part these are not defining characteristics of the landscape. Groundwater flow can result in open seeps and seepage swamp communities, which have a specially adapted flora component. In addition, numerous Vernal Pools are found throughout the management unit, providing important amphibian breeding habitat. These small wetlands are easily impacted by changes in hydrology or canopy cover.

For more detailed information on the natural communities of the CHMU refer to Appendix F.
## Table 1- Natural Communities of the Camel’s Hump Management Unit

<table>
<thead>
<tr>
<th>Natural Community</th>
<th>Vermont Distribution</th>
<th>Example of Statewide Significance?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wetlands</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beaver Wetland</td>
<td>54</td>
<td>very common</td>
</tr>
<tr>
<td>Hemlock-Balsam Fir-Black Ash Seepage Swamp</td>
<td>2</td>
<td>uncommon</td>
</tr>
<tr>
<td>Red Maple-Black Ash Seepage Swamp</td>
<td>5</td>
<td>common</td>
</tr>
<tr>
<td>Red Spruce-Cinnamon Fern Swamp</td>
<td>10</td>
<td>uncommon</td>
</tr>
<tr>
<td>Seep</td>
<td>68</td>
<td>common</td>
</tr>
<tr>
<td>Silver Maple-Ostrich Fern Riverine Floodplain Forest</td>
<td>42</td>
<td>uncommon</td>
</tr>
<tr>
<td>Vernal Pool</td>
<td>1.6</td>
<td>uncommon</td>
</tr>
<tr>
<td>Uplands</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alpine Meadow</td>
<td>5</td>
<td>very rare</td>
</tr>
<tr>
<td>Boreal Acidic Cliff</td>
<td>0.7</td>
<td>common</td>
</tr>
<tr>
<td>Boreal Outcrop</td>
<td>70</td>
<td>common</td>
</tr>
<tr>
<td>Boreal Talus Woodland</td>
<td>1</td>
<td>uncommon</td>
</tr>
<tr>
<td>Hemlock Forest</td>
<td>154</td>
<td>common</td>
</tr>
<tr>
<td>Hemlock-Northern Hardwood Forest</td>
<td>1,051</td>
<td>common</td>
</tr>
<tr>
<td>Lowland Spruce-Fir Forest</td>
<td>61</td>
<td>uncommon</td>
</tr>
<tr>
<td>Mesic Red Oak-Northern Hardwood Forest</td>
<td>56</td>
<td>common</td>
</tr>
<tr>
<td>Montane Spruce-Fir Forest</td>
<td>4,062</td>
<td>uncommon</td>
</tr>
<tr>
<td>Montane Yellow Birch-Red Spruce Forest</td>
<td>4,332</td>
<td>uncommon</td>
</tr>
<tr>
<td>Northern Hardwood Forest</td>
<td>14,175</td>
<td>very common</td>
</tr>
<tr>
<td>Northern Hardwood Talus Woodland</td>
<td>7</td>
<td>uncommon</td>
</tr>
<tr>
<td>Red Spruce-Heath Rocky Ridge Forest</td>
<td>484</td>
<td>uncommon</td>
</tr>
<tr>
<td>Red Spruce-Northern Hardwood Forest</td>
<td>605</td>
<td>common</td>
</tr>
<tr>
<td>Rich Northern Hardwood Forest</td>
<td>392</td>
<td>common</td>
</tr>
<tr>
<td>Softwood Plantation* (Howe Block)</td>
<td>89</td>
<td>n/a</td>
</tr>
<tr>
<td>Subalpine Krummholz</td>
<td>14</td>
<td>very rare</td>
</tr>
<tr>
<td>Temperate Acidic Cliff</td>
<td>0.3</td>
<td>common</td>
</tr>
<tr>
<td>Temperate Acidic Outcrop</td>
<td>25</td>
<td>common</td>
</tr>
<tr>
<td>Temperate Calcareous Cliff</td>
<td>2</td>
<td>uncommon</td>
</tr>
</tbody>
</table>

*Softwood Plantation acreage included for reference only

For more information on these and other natural communities, see Wetland, Woodland, Wildland: a Guide to the Natural Communities of Vermont, by Elizabeth Thompson, Eric Sorenson and Bob Zaino. Information may also be found online at: [http://www.vtfishandwildlife.com/books.cfm?libbase=Wetland,Woodland,Wildland](http://www.vtfishandwildlife.com/books.cfm?libbase=Wetland,Woodland,Wildland)
Fine Filter Assessment

Rare, Threatened, and Endangered Species
The Camel’s Hump Management Unit is home to many rare and uncommon species of plants, and several rare and uncommon animals. These species and their management needs are summarized in the following text and tables.

PLANTS
Twenty-three species of rare or very rare plants have been located within the CHMU, as well as an additional three species of uncommon plants. Of the rare/very rare species, three are listed as “endangered” and another three are listed as “threatened” by Vermont state endangered species statute (Chapter 123 of Title 10 of the Vermont Statutes Annotated). Their occurrence in the CHMU is thus very important on a statewide basis.

Fifteen of the rare or very rare plants occur on the summit of Camel’s Hump, and several of these are dominant species in the Alpine Meadow natural community. Two are state-listed as legally protected: Boott’s rattlesnake root (Nabulus boottii) and bearberry willow (Salix uva-ursi). Trampling by hikers and dogs poses a threat to all of the plant species found on and around the summit. The rattlesnake root is especially threatened as it occurs on both sides of the Long Trail as it approaches the summit from the north. Ongoing monitoring and management, as well as continued public outreach and education, are all necessary to maintain the viability of these plant populations. Through its stewardship and on-site public education, the Green Mountain Club’s (GMC) Summit Caretaker program is likely largely responsible for the gradual recovery of the rattlesnake root population and for the continued presence of the alpine tundra natural community on the summit. The north summit area will remain closed to hikers to allow the alpine vegetation to recover and respond to natural conditions rather than hiker and dog impacts.

Three additional state-listed plants occur on the ridge extending north of the summit. These species are: alpine sweet-grass (Anthoxanthum monticola), lesser pyrola (Pyrola minor), and squashberry (Viburnum edule). The lesser pyrola is one of only two populations extant in the state. This species and the squashberry are associated with a seepy area near the Long Trail; they will be identified and avoided during any trail work or other management activities. The alpine sweet-grass is known here only from historical records, and is associated with bedrock exposures. A search for this species will be conducted prior to any management activities that might impact suitable habitat.

The sixth state-listed species, Eastern Jacob's-ladder (Polemonium van-bruntiae), is found in a seepy old field within the Steven’s Block of Camel’s Hump State Forest. This species is considered globally uncommon; although its range extends from West Virginia to Maine and Quebec, it is listed as rare or uncommon in every state/province in which it occurs. It requires wet, generally seepy soils, and sunlight. At present, the best way to protect the population in the CHMU is to avoid direct impacts, and in particular, to avoid mowing the plants. It may also be necessary to monitor tree growth in the area around the plants, and to consider removing trees if canopy shade is having negative impacts on the population.

The remaining rare and uncommon plants of the CHMU are primarily found on cliffs or in small wetland natural communities scattered around the management unit. Maintaining the ecological integrity (and the hydrological integrity for wetlands) of these communities should allow the species to persist. A few species are found in Montane Spruce-Fir Forest; future trail projects or other management activities in that community will consider the possibility that these species may be present.
<table>
<thead>
<tr>
<th>Species Name</th>
<th>Common Name</th>
<th>Sites Where Found</th>
<th>State Rarity Rank*</th>
<th>Rarity*</th>
<th>Legal Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Nabalus bootii</em></td>
<td>Boott’s rattlesnake-root</td>
<td>Camel's Hump summit; cliffs</td>
<td>S1</td>
<td>Very Rare</td>
<td>Endangered</td>
</tr>
<tr>
<td><em>Pyrola minor</em></td>
<td>lesser pyrola</td>
<td>high-elevation seep</td>
<td>S1</td>
<td>Very Rare</td>
<td>Endangered</td>
</tr>
<tr>
<td><em>Salix uva-ursi</em></td>
<td>bearberry willow</td>
<td>Camel's Hump summit</td>
<td>S1</td>
<td>Very Rare</td>
<td>Endangered</td>
</tr>
<tr>
<td><em>Anthoxanthum monticola</em></td>
<td>alpine sweet-grass</td>
<td>high-elevation outcrops</td>
<td>S1</td>
<td>Very Rare</td>
<td>Threatened</td>
</tr>
<tr>
<td><em>Viburnum edule</em></td>
<td>Squashberry</td>
<td>high-elevation seep</td>
<td>S1</td>
<td>Very Rare</td>
<td>Threatened</td>
</tr>
<tr>
<td><em>Polemonium vanbruntiae</em></td>
<td>Eastern Jacob's ladder</td>
<td>seepy old field</td>
<td>S2</td>
<td>Rare</td>
<td>Threatened</td>
</tr>
<tr>
<td><em>Agrostis mertensii</em></td>
<td>boreal bentgrass</td>
<td>Camel's Hump Summit; hut clearing</td>
<td>S1</td>
<td>Very Rare</td>
<td></td>
</tr>
<tr>
<td><em>Carex bigelowii</em></td>
<td>Bigelow's sedge</td>
<td>Camel's Hump summit</td>
<td>S1</td>
<td>Very Rare</td>
<td></td>
</tr>
<tr>
<td><em>Cystopteris laurentiana</em></td>
<td>Laurentian bladder fern</td>
<td>Appalachian Gap cliffs</td>
<td>S1</td>
<td>Very Rare</td>
<td></td>
</tr>
<tr>
<td><em>Empetrum nigrum</em></td>
<td>black crowberry</td>
<td>Camel's Hump summit</td>
<td>S1</td>
<td>Very Rare</td>
<td></td>
</tr>
<tr>
<td><em>Juncus trifidus</em></td>
<td>highland rush</td>
<td>Camel's Hump summit; cliffs</td>
<td>S1</td>
<td>Very Rare</td>
<td></td>
</tr>
<tr>
<td><em>Minuartia groenlandica</em></td>
<td>mountain sandwort</td>
<td>Camel's Hump summit</td>
<td>S1</td>
<td>Very Rare</td>
<td></td>
</tr>
<tr>
<td><em>Mylia taylorii</em></td>
<td>A Liverwort</td>
<td>Camel's Hump summit</td>
<td>S1</td>
<td>Very Rare</td>
<td></td>
</tr>
<tr>
<td><em>Poa interior</em></td>
<td>inland bluegrass</td>
<td>cliff &amp; outcrop</td>
<td>S1</td>
<td>Very Rare</td>
<td></td>
</tr>
<tr>
<td><em>Solidago leiocarpa</em></td>
<td>Cutler’s goldenrod</td>
<td>Camel’s Hump summit</td>
<td>S1</td>
<td>Very Rare</td>
<td></td>
</tr>
<tr>
<td>Species</td>
<td>Common Name</td>
<td>Location</td>
<td>Rarity</td>
<td>Abundance</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>------------------------------------</td>
<td>------------------------------------</td>
<td>--------</td>
<td>------------</td>
<td></td>
</tr>
<tr>
<td><em>Trichomanes intricatum</em></td>
<td>weft fern</td>
<td>Appalachian Gap cliffs</td>
<td>S1</td>
<td>Very Rare</td>
<td></td>
</tr>
<tr>
<td><em>Vaccinium boreale</em></td>
<td>boreal blueberry</td>
<td>Camel's Hump summit</td>
<td>S1</td>
<td>Very Rare</td>
<td></td>
</tr>
<tr>
<td><em>Dryopteris fragrans</em></td>
<td>fragrant fern</td>
<td>Ledges below summit</td>
<td>S2</td>
<td>Rare</td>
<td></td>
</tr>
<tr>
<td><em>Huperzia appalachia</em></td>
<td>mountain fir clubmoss</td>
<td>Camel's Hump summit</td>
<td>S2</td>
<td>Rare</td>
<td></td>
</tr>
<tr>
<td><em>Schistostega pennata</em></td>
<td>luminous moss</td>
<td>montane forest</td>
<td>S2</td>
<td>Rare</td>
<td></td>
</tr>
<tr>
<td><em>Vaccinium uliginosum</em></td>
<td>alpine bilberry</td>
<td>Camel's Hump summit</td>
<td>S2</td>
<td>Rare</td>
<td></td>
</tr>
<tr>
<td><em>Woodsia glabella</em></td>
<td>smooth woodsia</td>
<td>Camel's Hump summit</td>
<td>S2</td>
<td>Rare</td>
<td></td>
</tr>
<tr>
<td><em>Solidago simplex spp.</em> randii var. monticola*</td>
<td>Rand's mountain goldenrod</td>
<td>Camel's Hump summit</td>
<td>S2?</td>
<td>Apparently Rare</td>
<td></td>
</tr>
<tr>
<td><em>Galium kamtschaticum</em></td>
<td>boreal bedstraw</td>
<td>seeps</td>
<td>S2S3</td>
<td>Uncommon to Rare</td>
<td></td>
</tr>
<tr>
<td><em>Luzula parviflora</em></td>
<td>small-flowered rush</td>
<td>openings in montane forest</td>
<td>S2S3</td>
<td>Uncommon to Rare</td>
<td></td>
</tr>
<tr>
<td><em>Botrychium multifidum</em></td>
<td>Leathery Grape-fern</td>
<td>montane forest</td>
<td>S3</td>
<td>Uncommon</td>
<td></td>
</tr>
<tr>
<td><em>Cryptogramma stelleri</em></td>
<td>fragile rockbrake</td>
<td>cliffs</td>
<td>S3</td>
<td>Uncommon</td>
<td></td>
</tr>
<tr>
<td><em>Sorbus decora</em></td>
<td>showy mountain ash</td>
<td>montane forest</td>
<td>S3</td>
<td>Uncommon</td>
<td></td>
</tr>
</tbody>
</table>

*for a full explanation of these rarity ranks, visit the Vermont Natural Heritage Information Project website: [http://www.vtfishandwildlife.com/wildlife_nongame.cfm](http://www.vtfishandwildlife.com/wildlife_nongame.cfm)*
ANIMALS
Six species of very rare animals were documented at the CHMU, as well as four rare species and ten uncommon animals. Three of these animals are listed as species of concern in the state of Vermont, the Bicknell’s thrush, the rock shrew, and the wood turtle. All of these species vary in their dependence on woodlands, wetlands, riparian areas, and high elevation habitats. Protecting the ecological integrity of these habitat types will likely protect these species as well.

Notably, wood turtle (Glyptemys insculpta) populations suffer from the commercial pet trade as individuals are harvested from the wild. This species nests in open sandy areas, and spends much of its time in and around slow-moving streams with sandy bottoms and over-hanging vegetation. They are considered vulnerable in every state and Canadian province in their range. Wood turtles have been documented in several towns associated with the CHMU including Huntington, Bolton, Duxbury, and Waitsfield, and are presumed present in Richmond (Andrews 2013). Management practices such as providing adequate riparian management zones (RMZs) and limiting tree removal at habitat sites during known nesting season will be implemented to protect this species.

Although the distribution of the Bicknell’s thrush (Catharus bicknelli) in Vermont remains relatively stable (Rimmer 2010), it holds a status of vulnerable and declining by the International Union for Conservation of Nature (IUCN 2013). Monitoring, management, and conservation of its habitat are critical to the species continued presence in Vermont. Preferred and potential nesting sites have been mapped, and are monitored by the Mountain Birdwatch program of the Vermont Center for Ecostudies. In addition, Vermont’s land use laws provide opportunity for review of potential impacts on this species from high elevation projects such as wind towers and ski resorts. CHMU supports some relatively large areas of high elevation spruce/fir forest habitat conditions used for nesting by Bicknell’s thrush and will be protected and monitored as part of this long-range management planning effort.

The elusive long-tailed shrew (Sorex dispar) is rare in Vermont and is listed as a species of greatest conservation concern, but very little information is known about its population. This partially subterranean insectivore prefers higher elevations and cool, moist talus or rock where it forages (Merritt 1987). Restrictions on disturbance to high elevation cliffs with rocky slopes may avoid impacts to this species.

Two invertebrates with ranking of very rare, and very rare to rare were documented on the CHMU: the subarctic darner (Aeshna subarctica) and yellow-banded bumble bee (Bombus terricola), respectively. The darner is a northern latitude species that prefers bog or fen habitats and was identified in the Buel’s Gore region of the CHMU. These habitat types can easily be protected with adequate RMZs. Several individuals of the bumble bee were also located in Buel’s Gore as well as the summit of Camels Hump in montane yellow birch-red spruce forest (Richardson 2013). Recent efforts have been made to list the species as endangered in Vermont due to its population decline throughout its range. It is now listed as threatened within Vermont. Continued conservation of alpine communities and sustained management of wildflower habitat are recommended management strategies for bumble bee conservation (Richardson 2013).

Other rare species in the CHMU may have gone undetected due to their elusive nature including some wetland and forest birds and mammals, as well as various invertebrates, fishes, and reptiles and amphibians. Table 3 lists rare and uncommon animal species identified as those of Greatest Conservation Need in the State Wildlife Action Plan. Some animals that appear on the list may not actually be present on the CHMU, but the list includes those that have been confirmed on or near the CHMU and those that are likely to be found in those habitats present on the unit.
<table>
<thead>
<tr>
<th>Species Name</th>
<th>Common Name</th>
<th>State Rarity Rank*</th>
<th>Global Rank*</th>
<th>State Status*</th>
<th>Federal Status*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catharus bicknelli</td>
<td>Bicknell’s thrush</td>
<td>S2B</td>
<td>G4</td>
<td>SC, SGCN</td>
<td></td>
</tr>
<tr>
<td>Habitat:</td>
<td>dense, stunted stands of balsam fir and red spruce at higher elevations. Threats: loss of habitat</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ardia herodias</td>
<td>Great Blue Heron</td>
<td>S2S3B</td>
<td>G5</td>
<td>SGCN</td>
<td></td>
</tr>
<tr>
<td>Habitat:</td>
<td>Lakes, ponds, swamps, and beaver ponds with standing dead snags for nesting. Threats: Habitat alteration and incompatible recreation.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accipiter gentilis</td>
<td>Northern goshawk</td>
<td>S3B</td>
<td>G5</td>
<td>SGCN</td>
<td></td>
</tr>
<tr>
<td>Habitat:</td>
<td>Forest interior habitat prefers mature forests with large trees and open understories. Threats: Habitat conversion and fragmentation and high road density.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Falco peregrinus</td>
<td>Peregrine falcon</td>
<td>S2B</td>
<td>G4</td>
<td>SGCN</td>
<td></td>
</tr>
<tr>
<td>Habitat:</td>
<td>Open areas for hunting and cliffs for nesting. Threats: Human disturbance around nesting cliffs.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chordeilus minor</td>
<td>Common nighthawk</td>
<td>S1B</td>
<td>G5</td>
<td>SGCN</td>
<td></td>
</tr>
<tr>
<td>Habitat:</td>
<td>Open forests, logged or clearcut areas, cliffs, gravel bars. Threats: Loss of habitat due to forest conversion, succession, reduction of forest clearcutting.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caprimulgus vociferus</td>
<td>Whip-poor-will</td>
<td>S2B</td>
<td>G5</td>
<td>SGCN</td>
<td></td>
</tr>
<tr>
<td>Habitat:</td>
<td>Open forests and montane forests adjacent to open areas such as pastures. Threats: Habitat conversion and fragmentation and high road densities and habitat succession.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buteo lineatus</td>
<td>red-shouldered hawk</td>
<td>S2B</td>
<td>G5</td>
<td>SGCN</td>
<td></td>
</tr>
<tr>
<td>Habitat:</td>
<td>mature woods, riparian forests, extensive forest tracts with wetlands and ponds. Threats: loss of habitat through conversion and alteration.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Euphagus carolinus</td>
<td>Rusty blackbird</td>
<td>S3B</td>
<td>G4</td>
<td>E, SGCN</td>
<td></td>
</tr>
<tr>
<td>Habitat:</td>
<td>Beaver ponds, bogs, and coniferous swamps. Threats: Nest predation and habitat degradation due to development and logging in wet habitats.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3- Rare and Uncommon Animal Species of Greatest Conservation Need of the Camel’s Hump Management Unit and Surrounding Area
### Table 3 - Rare and Uncommon Animal Species of Greatest Conservation Need of the Camel’s Hump Management Unit and Surrounding Area (continued)

<table>
<thead>
<tr>
<th>Species Name</th>
<th>Common Name</th>
<th>State Rarity Rank</th>
<th>Global Rank</th>
<th>Status</th>
<th>Federal Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Sorex palustris</em></td>
<td>Water shrew</td>
<td>S3</td>
<td>G5</td>
<td>SGCN</td>
<td></td>
</tr>
<tr>
<td><strong>Habitat:</strong></td>
<td>Stream and river banks with downed woody debris and rocks. <strong>Threats:</strong> Habitat loss.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Sorex dispar</em></td>
<td>long-tailed or rock shrew</td>
<td>S2*</td>
<td>G4</td>
<td>SC, SGCN</td>
<td></td>
</tr>
<tr>
<td><strong>Habitat:</strong></td>
<td>High elevation, cold and damp coniferous stands with protective crevices. <strong>Threats:</strong> habitat loss due to climate change</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Sorex hoyi</em></td>
<td>Pygmy shrew</td>
<td>S2</td>
<td>G5</td>
<td>SGCN</td>
<td></td>
</tr>
<tr>
<td><strong>Habitat:</strong></td>
<td>Forest, shrub, meadows, and wetlands. <strong>Threats:</strong> Unknown</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Myotis lucifugus</em></td>
<td>Little brown bat</td>
<td>S1</td>
<td>G3</td>
<td>E, SGCN</td>
<td>E</td>
</tr>
<tr>
<td><strong>Habitat:</strong></td>
<td>Caves and mines for winter hibernacula; human-made structures and trees for maternal roosts. <strong>Threats:</strong> White-nose Syndrome, human disturbance at winter hibernacula, human-caused mortality and eviction from roosts in structures, wind-energy development</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Myotis leibii</em></td>
<td>E. Small-footed bat</td>
<td>S1</td>
<td>G4</td>
<td>T, SGCN</td>
<td></td>
</tr>
<tr>
<td><strong>Habitat:</strong></td>
<td>Caves and mines for winter hibernacula; talus slopes and cliffs for maternal roosts. <strong>Threats:</strong> White-nose Syndrome, human disturbance at winter hibernacula, habitat loss.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Myotis septentrionalis</em></td>
<td>Northern long-eared bat</td>
<td>S1</td>
<td>G1G2</td>
<td>E, SGCN</td>
<td>LT</td>
</tr>
<tr>
<td><strong>Habitat:</strong></td>
<td>Caves and mines for winter hibernacula; snags, live trees, and structures for maternal roosts. <strong>Threats:</strong> White-nose Syndrome, wind-energy development, disturbances to winter hibernacula and excessive logging and removal of summer roost trees, human-caused mortality and eviction from roosts in structures.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Lasionycteris noctivigans</em></td>
<td>Silver-haired bat</td>
<td>S2B</td>
<td>G3G4</td>
<td>SGCN</td>
<td></td>
</tr>
<tr>
<td><strong>Habitat:</strong></td>
<td>Prefers mature forest with high density of snags for summer roosting; migrates out of Vermont for winter. <strong>Threats:</strong> Removal of roosting trees from logging, loss of mature forest habitat, wind-energy development.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Perimyotis subflavus</em></td>
<td>Tri-colored bat</td>
<td>S1</td>
<td>G2G3</td>
<td>E, SGCN</td>
<td>E</td>
</tr>
<tr>
<td><strong>Habitat:</strong></td>
<td>Edge habitats often near riparian areas with large trees for summer roosting. Winters in caves and mines. <strong>Threats:</strong> White-nose Syndrome, disturbance at or alteration of conditions within winter hibernacula, development and removal of roost trees during logging.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 3 - Rare and Uncommon Animal Species of Greatest Conservation Need of the Camel’s Hump Management Unit and Surrounding Area

<table>
<thead>
<tr>
<th>Species Name</th>
<th>Common Name</th>
<th>State Rarity Rank</th>
<th>Global Rank</th>
<th>Status</th>
<th>Federal Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Lasiurus cinereus</em></td>
<td>Hoary bat</td>
<td>S3B</td>
<td>G3G4</td>
<td>SGCN</td>
<td></td>
</tr>
</tbody>
</table>

**Habitat:** Roosts mostly in foliage in coniferous forests in the summer and forages over tree canopy, wetlands, openings, lakes, and along edges. Migrates out of Vermont during winter. **Threats:** Wind-energy development, conversion and degradation of habitat.

<table>
<thead>
<tr>
<th><em>Microtus chrotorrhinus</em></th>
<th>Rock Vole</th>
<th>S2</th>
<th>G4</th>
<th>SC, SGCN</th>
<th></th>
</tr>
</thead>
</table>

**Habitat:** Talus slopes, rocky outcrops, and forests with abundant rocks. **Threats:** Unknown.

<table>
<thead>
<tr>
<th><em>Microtus pinetorum</em></th>
<th>Woodland vole</th>
<th>S3</th>
<th>G5</th>
<th>SGCN</th>
<th></th>
</tr>
</thead>
</table>

**Habitat:** Deciduous forests, openings, and apple orchards. **Threats:** Unknown.

<table>
<thead>
<tr>
<th><em>Synaptomys cooperi</em></th>
<th>Southern bog lemming</th>
<th>S3</th>
<th>G5</th>
<th>SGCN</th>
<th></th>
</tr>
</thead>
</table>

**Habitat:** Sphagnum bogs, wet meadows and marshes, and amongst boulders in spruce forests. **Threats:** Conversion of habitat and habitat alteration, and climate change.

<table>
<thead>
<tr>
<th><em>Synaptomys borealis</em></th>
<th>Northern bog lemming</th>
<th>SU</th>
<th></th>
<th>SGCN</th>
<th></th>
</tr>
</thead>
</table>

**Habitat:** Wet forests, bogs, and meadows. **Threats:** Unknown

<table>
<thead>
<tr>
<th><em>Martes americana</em></th>
<th>American marten</th>
<th>S1</th>
<th>G5</th>
<th>E, SGCN</th>
<th></th>
</tr>
</thead>
</table>

**Habitat:** Montane mature spruce-fir and hemlock forests; dens in hollow trees above ground or on the ground, sometimes in underground dens. **Threats:** Large and excessive clearcutting.

<table>
<thead>
<tr>
<th><em>Lynx canadensis</em></th>
<th>Canada lynx</th>
<th>S1</th>
<th>G5</th>
<th>E, SGCN</th>
<th>LT</th>
</tr>
</thead>
</table>

**Habitat:** Dense spruce-fir and mixed forests interspersed with bogs, rock outcrops, and thickets of young softwood forest that attract snowshoe hare. Dens include hollow logs, spruce-fir windfalls, and dense spruce-fir timber. **Threats:** Forest maturation and declining snowshoe hare habitat, development, and increased road and trail construction which increase mortality.
### REPTILES AND AMPHIBIANS

<table>
<thead>
<tr>
<th>Species Name</th>
<th>Common Name</th>
<th>State Rarity</th>
<th>Global Rank</th>
<th>Status</th>
<th>Federal Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambystoma jeffersonianum</td>
<td>Jefferson salamander</td>
<td>S2</td>
<td>G4</td>
<td>SC, SGCN</td>
<td></td>
</tr>
<tr>
<td>Glyptemys insculpta</td>
<td>wood turtle</td>
<td>S3</td>
<td>G3G4</td>
<td>SC, SGCN</td>
<td></td>
</tr>
</tbody>
</table>

**Habitat:** Mature deciduous forests with logs and rocks near vernal pools. **Threats:** Forest fragmentation and damage to vernal pools.

**Habitat:** slow-moving streams with sandy bottoms and overhanging vegetation. **Threats:** development, pollution and commercial collection.

### INVERTEBRATES

<table>
<thead>
<tr>
<th>Species Name</th>
<th>Common Name</th>
<th>State Rarity</th>
<th>Global Rank</th>
<th>Legal Status</th>
<th>Federal Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aeshna subarctica</td>
<td>subarctic darner</td>
<td>S1</td>
<td>G5</td>
<td>SGCN</td>
<td></td>
</tr>
<tr>
<td>Bombus terricola</td>
<td>yellow-banded bumble bee</td>
<td>S2S3</td>
<td>G3G5</td>
<td>T, SGCN</td>
<td></td>
</tr>
<tr>
<td>Somatochlora elongate</td>
<td>ski-tipped emerald</td>
<td>S3</td>
<td>G5</td>
<td>SGCN</td>
<td></td>
</tr>
<tr>
<td>Sympetrum danae</td>
<td>black meadowhawk</td>
<td>S1S2</td>
<td>G5</td>
<td>SGCN</td>
<td></td>
</tr>
</tbody>
</table>

**Habitat:** bogs and fens. **Threats:** pollution, wetland draining or development.

**Habitat:** areas of dense vegetation, milkweed and dogbane species; known to inhabit the Appalachian Gap area. **Threats:** Pests and diseases, habitat loss, pesticides, invasive species.

**Habitat:** small to medium sized streams with moderate flow and little emergent vegetation. **Threats:** pollution, development, and recreation.

**Habitat:** bogs, marshy ponds and lakes. **Threats:** wetland drainage, development, and pollution.

*Abbreviations
Global 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
B = breeding status
Federal Listing and State Listing
SGCN= Species of Greatest Conservation Need as identified in the Vermont Wildlife Action Plan; does not denote legal protection
SC = Special Concern
T = State Threatened
E = State Endangered
LT = Federally listed Threatened
C. Wildlife and Habitat Assessment

Habitats
The CHMU provides myriad habitats for a wide variety of wildlife. The large size and extensive distribution of the unfragmented forest habitat that make up the CHMU are perhaps the most significant wildlife habitat value in that the lands provide a large area for many types of wildlife to live, reproduce and move throughout a wide area. Habitat conditions within CHMU range widely from high elevation spruce/fir krummholz used by several rare songbirds, and remote wetlands used by waterfowl, beaver, otter and moose, to concentrated areas of American beech, red oak, mountain ash, apple, and other mast producing trees used as important feeding areas by black bear and many other wildlife, to name a few.

The following information provides a summary and overview of the various wildlife habitat conditions within CHMU based on recent and historic inventories and assessments. Map 10 depicts selected wildlife habitats within the CHMU.

WETLANDS
Of the 25,909 acres comprising the CHMU, approximately 182 acres (0.7%) have been identified as wetlands. Although somewhat limited in abundance, these wetlands provide significant habitat for species that rely on them for all or part of their life cycle requirements. For instance, moose are often observed feeding in some of the remote beaver influenced wetlands. Black bears use forested wetlands and seeps as feeding sites, particularly during the spring as sedges and other early emerging vegetation appears.

Forested swamps and seeps comprise the majority of this acreage and support a variety of breeding songbirds as well as a number of amphibians. In some cases, wood ducks (Aix sponsa) are supported when swamps are associated with streams and lakes. Softwood swamps may also serve as wintering grounds for white-tailed deer (Odocoileus virginianus). Isolated seeps serve as feeding sites for black bears (Ursus americanus) emerging from hibernation. In the case of CHMU, many of these forested wetland habitats provide some or all of these functions.

Approximately 54 acres of the CHMU are comprised of beaver (Castor canadensis) influenced wetlands. Beaver influence on the landscape is dramatic, particularly in forest-dominated regions where few openings exist. As beaver cut trees to dam water and build lodges, large openings are created. Over time, they consume all available food sources and abandon their engineered wetlands for other suitable locations. Neglected dams eventually collapse and the wetland is drained, resulting in mudflats and the succession of vegetation back to woody stems. Beavers may return to an old site, thereby commencing the cycle over again. Assuming water sources are available and current beaver populations continue to reproduce successfully, it is possible that the number and acreage of beaver wetlands will increase in the CHMU. These wetland habitats that occur on CHMU are considered highly significant for their wildlife habitat functions as they provide an open water wetland condition that is not found in other habitat conditions on the property. These areas on CHMU are used by, and important for, a wide array of wildlife including waterfowl, wading birds, shore birds, songbirds, raptors, mink, otter, muskrat, beaver, white-tailed deer, moose, black bear and more.

STREAMS and RIPARIAN HABITAT
Approximately 100 miles of streams drain or border the CHMU. Many species of wildlife rely on riparian areas for a variety of life-stage requirements. Many amphibians and reptiles nest and forage in and along streams. Of particular note is the wood turtle which has been documented within the CHMU. This species overwinters in streams and may travel up to 1000 feet from aquatic habitat for nesting and
feeding activity (VTANR 2005). Additionally, northern two-lined salamanders (*Eurycea bislineata*) and spring salamanders (*Gyrinophilus porphyriticus*) breed in woodland and shaded streams within CHMU.

Certain migratory birds also spend their breeding period in riparian habitat, including waterfowl. The types of birds supported depend on the width of the riparian management zone (RMZ).

Wide-ranging mammals use riparian areas to travel between habitats within their range. A black bear study in Vermont highlighted the importance of riparian corridors for movement across the landscape (Hammond 2002). Moving from one feeding or breeding area to another is critical to maintaining populations and their genetic diversity. This is particularly apparent when examining the potential for black bears to move across roads within the CHMU and beyond to areas such as Mount Mansfield State Forest. Areas of habitat connectivity within this region align in some cases with riparian habitats.

The *Riparian Management Guidelines for Agency of Natural Resources Lands* and Acceptable Management Practices (AMPs) will be followed when management practices occur near riparian habitat. The width of the RMZ will be determined based on criteria within the guidelines. While timber harvesting within the RMZ can be managed based on time of operations, proximity to the stream, and other factors, it is important to avoid, minimize, or mitigate the impacts of new road, trail, and other infrastructure development across, or in close proximity to these sensitive habitats.

**WINTER HABITAT for WHITE-TAILED DEER and MOOSE**

White-tailed deer and moose have evolved and adapted to survive in northern environments by relying on specific habitat features known as winter habitat, wintering areas, or, in the case of deer, deer wintering area. These areas are comprised of varying age classes of softwood cover (spruce, fir, hemlock, cedar, white pine) that create a canopy resulting in reduced snow depths and higher mean daily temperatures during the winter months. This habitat is essential for the survival of these species in Vermont and throughout the northern part of their range.

There are six areas of deer winter habitat totaling approximately 448 acres documented on the CHMU, based on recent and historic field assessments. This represents a very limited area of the overall 25,909 acre CHMU and as such, will be carefully maintained. Wintering areas will be assessed, and management will follow the *Management Guide for Deer Wintering Areas in Vermont* (VDPR and VDFW 1990) which emphasizes the implementation of area regulation for treatments in a variety of softwood cover types.

Moose winter habitat has not been inventoried on CHMU, however, moose are not as selective in their winter habitat preferences as deer and it is likely that any mature softwood cover above 2000 feet in elevation may support wintering moose.

**MAST STANDS**

Over 15,000 acres of the CHMU is comprised of northern hardwood forest formations of which American beech (*Fagus grandifolia*) is a large component. An additional 56 acres is comprised of red oak (*Quercus rubra*), although red oak is distributed in various regions of the CHMU. Acorns and beechnuts provide essential fats and nutrients to black bear as they prepare for winter hibernation, as well as wild turkey, white-tailed deer, and a host of small mammals and birds. Statewide beechnut productivity is monitored on an annual basis as a long-term measure of cub survival.

Based on historic and recent habitat assessments, there are ten areas of Beech Mast Production Areas (BMPAs) that have been identified and mapped on the CHMU. Recent field assessments of these BMPAs have shown that they comprise 314 acres in total. They range in size from 1 acre to over 160 acres.
BMPAs are widely distributed throughout the CHMU. The two largest BMPAs are located within the Phen Basin block of the CHMU and as such as considered highly important for the conservation and management of the area.

VERNAL POOLS
Vernal pools are important wetland habitats for a variety of wildlife, and in particular as breeding habitat for certain amphibians such as yellow-spotted salamanders, wood frogs, and spring peepers. They are also used by other wildlife as areas to find food and water.

Potential vernal pools have been remotely identified statewide in an effort to accurately map them for conservation planning efforts by a team from the Vermont Center for Ecostudies (Faccio et al. 2013). Based on this mapping effort, six vernal pools have been confirmed within the management unit, while sixteen potential pools require site visits or additional information for verification. One pool directly adjacent to the management unit boundary remains unconfirmed.

GRASSLANDS
Approximately 100 acres of the CHMU are open fields which are generally scattered openings throughout the forest landscape. Three reports of grassland birds were made – one of a savannah sparrow (Passerculus sandwichensis) and two of bobolink (Dolichonyx oryzivorus) – at the CHMU. The savannah sparrow was noted on Duxbury Road and may have been breeding in adjacent agricultural fields which are common in the Winooski River valley. Interestingly, the boblink sightings were at the Appalachian Gap and in the Honey Hollow region of the CHMU. However, it is unlikely that the open fields associated with the CHMU are large enough to support a breeding population of these grassland birds or others such as upland sandpiper (Bartramia longicauda), grasshopper sparrow (Ammmodramus savannarum), and eastern meadowlark (Sturnella magna). Nonetheless, continued management of the open fields is likely to support foraging, bedding, or birthing habitat for white-tailed deer, and hunting sites for red fox (Vulpes vulpes) or burrow sites for woodchuck (Marmota monax).

RAPTOR NESTING TREES
Six species of raptors were documented within the CHMU (eBird 2012). Trees that host viable raptor nests are generally preferred sites for repeated breeding success. Inventories of these sites will be completed during forest stand inventory, as well as during planning and implementation of management activities. These surveys will be a routine part of preparing for timber harvest or other activities within the CHMU.
<table>
<thead>
<tr>
<th>HABITAT</th>
<th>APPROXIMATE ACREAGE</th>
<th>SOME ASSOCIATED WILDLIFE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern Hardwood Forest</td>
<td>14,600</td>
<td>white-tailed deer, black bear, chipmunk, porcupine, hermit thrush, ovenbird, eastern newt, spotted salamander</td>
</tr>
<tr>
<td>Montane Yellow Birch-Red Spruce Forest</td>
<td>4,300</td>
<td>moose, winter wren, blackburnian warbler</td>
</tr>
<tr>
<td>Montane Spruce-Fir Forest</td>
<td>4,000</td>
<td>Red squirrel, blackpoll warbler, yellow-rumped warbler, Bicknell’s thrush</td>
</tr>
<tr>
<td>Hemlock-Northern Harwood Forest</td>
<td>1,100</td>
<td>white-tailed deer, ruffed grouse, black bear, squirrels, spotted salamander, hermit thrush</td>
</tr>
<tr>
<td>Other Softwood Forest</td>
<td>300</td>
<td>white-tailed deer, red squirrel, pileated woodpecker, barred owl, turkey, black bear</td>
</tr>
<tr>
<td>Red Spruce-Northern Hardwood Forest</td>
<td>700</td>
<td>fisher, black bear, Canada warbler, hermit thrush</td>
</tr>
<tr>
<td>Red Spruce-Heath Rocky Ridge Forest</td>
<td>500</td>
<td>red squirrel, snowshoe hare, dark-eyed junco, ruffed grouse</td>
</tr>
<tr>
<td>Open Fields</td>
<td>100</td>
<td>white-tailed deer, fox, woodchuck, small mammals, many bird species</td>
</tr>
<tr>
<td>Boreal/Alpine/Krummholz Communities</td>
<td>90</td>
<td>deer mice, meadow voles, northern juncos, white-throated sparrow, snowshoe hare, rock shrew</td>
</tr>
<tr>
<td>Red Oak-Northern Hardwood Forest</td>
<td>60</td>
<td>Southern flying squirrel, pileated woodpecker, barred owl, turkey, black bear, white-tailed deer</td>
</tr>
<tr>
<td>Seeps/Vernal Pools</td>
<td>70</td>
<td>wood frog, eastern red damsel, common green darner</td>
</tr>
<tr>
<td>Beaver Wetland/Swamps</td>
<td>50</td>
<td>beaver, green frog, painted turtle, red-winged blackbird, belted whiteface, Harris’ checkerspot</td>
</tr>
<tr>
<td>Silver Maple-Ostrich Fern Riverine Floodplain Forest</td>
<td>40</td>
<td>otter, mink, muskrat, beaver, veery, Eastern wood peewee, twelve-spotted tiger beetle</td>
</tr>
<tr>
<td>Cliffs/Rock Outcrops</td>
<td>35</td>
<td>raven, peregrine falcon, northern junco, rock shrew, bobcat, many bird species</td>
</tr>
</tbody>
</table>
Wildlife

BIRDS
Observations of breeding and migratory birds were extracted from the eBird listserve where birders can submit their sightings. Only entries vetted by professional biologists were used in this plan. Records date as far back as 2009. Of the nearly 117 species observed, eight are state-ranked as uncommon and six as rare or very rare. None are listed as state or federally threatened or endangered. Five of the State-ranked species were noted as a species of greatest conservation need (SGCN) and thus are part of Vermont’s Wildlife Action Plan.

A species’ conservation status is merely one measure of its importance on the landscape. There are dozens of bird species present in the CHMU, with varying habitat requirements. Bicknell’s thrush, Canada warbler, black-throated blue warbler and chestnut-sided warbler are particularly emblematic of the habitats of the CHMU. Canada warbler and black-throated blue warbler both benefit from dense understory and increased structural complexity, while chestnut-sided warbler requires larger patches of young forest. These species, along with nine others comprise the “Birder’s Dozen,” a list of species created by the Foresters for the Birds Initiative which was created and is spear-headed by Audubon Vermont and FPR. The initiative focuses on maintaining high-quality habitat for songbirds through active habitat management. Managing for the habitat requirements of the Birder’s Dozen represents a way of managing habitat for a much broader array of species, which is why these particular species are highlighted here.

A breeding denizen of high-elevation montane spruce-fir forests, the Bicknell’s thrush was observed on several occasions. This species is ranked as rare in Vermont and maintains status as a species of concern, which does not denote legal protection.

Two non-native species were identified at CHMU: rock dove (Columba livia), and the house sparrow (Passer domesticus). The house sparrow observation was made in the Honey Hollow block, likely adjacent to human structures or feeders. A single rock dove sighting was made at the summit. Neither of these species is likely to cause any significant impacts to native breeding bird populations within the CHMU.

AMPHIBIANS AND REPTILES
Twenty-one species out of 33 reptiles and amphibians known to occur in Vermont have been documented within the management unit including seven frogs, six salamanders, five snakes, and three turtles. Records were acquired from the Vermont Amphibian and Reptile Atlas database and include both systematic and incidental observations. A single uncommon species was observed – the wood turtle. The wood turtle is also listed as a Species of Concern in Vermont and identified as SGCN in the Wildlife Action Plan. Reptiles that are commonly found within CHMU include garter snake, green snake, and painted turtle. Amphibians that are commonly found within CHMU include red-backed salamander, green frog, wood frog, bull frog, American toad, spring peeper, yellow-spotted salamander.

BATS
Vermont is home to nine bat species, five of which are listed as threatened or endangered due in large part to the emergence of white nose syndrome. They include the federal- and state-endangered Indiana bat (Myotis sodalis), the state-endangered little brown bat (Myotis lucifugus), and tri-colored bat (Perimyotis subflavus), the state-threatened eastern small-footed bat (Myotis leibii), and the state-endangered and federal-threatened northern long-eared bat (Myotis septentrionalis).

Bat surveys have recently been conducted within the CHMU and in nearby locations (all within eight miles of CHMU in the towns of Starksboro, Jericho, and Moretown). These surveys show the presence of
reproductive little brown, big brown (*Eptesicus fuscus*), and northern long-eared bats as well as Indiana and tri-colored bats. Small-footed bats are also suspected to be present based on the availability of preferred cliff habitat (approximately 35 acres). All three species of migratory tree bats are widespread in Vermont and assumed to be present in the area. A nearby mine hosts a hibernating colony of little brown, big brown, northern long-eared, and tri-colored bats.

**DEER AND MOOSE**

Moose are the largest member of the deer family (cervidae), and also Vermont’s largest mammal, weighing up to 1400 pounds and standing up to a height of 6.5 feet tall at the shoulder. In Vermont, moose are typically found in the northeast boreal forests and the spine of the Green Mountains where large stretches of habitat are available. They frequent ponds for feeding and cooling during hot summer months when they also seek shaded lowland softwood stands. Clearcuts are used throughout and hardwoods located near softwood cover are preferred in the fall where more winter food-types are usually available. Softwood shelter is preferred when snow depths reach 35 inches, a crust develops over the snow, or when conditions are extremely cold or windy. Well adapted for low temperatures, moose often winter at higher elevations.

The CHMU provides a large area of contiguous forest habitat that is important to support a strong moose population as well as movement across the landscape. Since the implementation of the regulated moose hunt in 1993, ten moose have been harvested from the CHMU. Evidence of moose has been observed throughout the CHMU. Scattered clearcuts combined with perpetuation of softwood stands as wintering habitat are important management strategies for moose. A combination of even-age and uneven-age forest management while maintaining the overall forest health and connectivity within the entire CHMU is the best guide for moose habitat management and will serve the needs and interests of many other wildlife that use the area.

White-tailed deer are one of the more common species of mammals found throughout the state. Evidence of deer throughout the CHMU is abundant, including tracks, browse, beds, and rubs. It is unknown how many deer have been harvested from the CHMU, but the entire parcel is open to hunting and provides high-quality habitat for this species throughout the year. Nonetheless, deer density at higher elevations is lower than in lowland areas where fields and forests are interspersed and a greater diversity and quality of food sources is available (VDFW 2010). Deer wintering habitat, characterized by softwood stands with typically southward aspect, are limited at the CHMU. Much of the CHMU is mid- and upper elevation land and as such provides suitable spring, summer and fall habitat for deer. Deer winter habitat is fairly limited, however, on the management unit, largely due to the elevation of much of the property. It does support six important areas of deer winter habitat distributed throughout the state land, and is adjacent to larger areas of deer winter habitat on adjoining private land. These seven deer wintering areas cover approximately 448 acres.

**BLACK BEAR**

Although rarely seen, black bears are common within CHMU and rely on the extensive, remote forest habitats and abundance of food resources. As noted above, beech mast stands are important bear feeding habitat in the fall. Also important is wetland habitat in early spring, when bears can be dependent on the early fresh growth of herbs and sedges found in wetlands.

In recent years, black bears have become an occasional nuisance at several campsites in the CHMU including Hump Brook Tenting Area and Montclair Glen Lodge. These are both very popular campsites and bears are attracted to food scents. Secure food storage boxes were installed at several campsites in 2015 by the Green Mountain Club.

**RUFFED GROUSE AND AMERICAN WOODCOCK**
Both ruffed grouse (*Bonasa umbellus*) and American woodcock (*Scolopax minor*) are closely associated with early successional habitat and have been documented on the CHMU. Grouse prefer areas of approximately 40 acres or more comprised of three age classes (0-10, 10-25, and 25+ years) of aspen and white birch. Grassy openings, apple trees, and patches of softwood forest also contribute to their habitat needs. Grouse have been documented on the CHMU, however, forest age classes and species compositions vary greatly. Further assessment is necessary to determine the extent of current and potential habitat availability through natural occurrences and management strategies. However, there is currently only limited young forest habitat conditions within the CHMU.

American woodcock habitat typically contains young speckled alder or gray dogwood, as well as abandoned brushy fields and open fields for courtship displays, feeding, nesting, and brood-rearing. Approximately 100 acres of the CHMU is open fields. Management practices have been implemented in portions of the CHMU including Robbins Mountain WMA to enhance woodcock and grouse habitat. Habitat that supports these game species also supports a wide range of non-game species such as chestnut-sided warbler, rufous-sided towhee, yellow warbler, and provides feeding areas for raptors due to the abundant small mammal populations that these areas of young forest support.

**WILD TURKEY**

Due to their high mobility, wild turkeys (*Meleagris gallopavo*) exploit a wide array of forest types. High-quality turkey habitat includes varying forest types and age classes dominated by mast-producing species such as oak and beech. Open understory, interspersed clearings, groups of conifers, large open grown trees bordering fields for roosting and cultivated land are also important features for turkeys. Dense cover for nest-concealment, grassy clearing for brood-rearing, and winter food sources such as sensitive fern or burdock, complete the mosaic of habitats utilized by this species.

**FURBEARERS**

Habitat elements at the CHMU are such that a variety of furbearer populations are supported including: beaver, eastern coyote (*Canis latrans*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), fisher (*Martes pennant*), mink (*Neovison vison*), and bobcat (*Lynx rufus*). Mink are members of the weasel family and are aggressive carnivores preying primarily on fish, but also on muskrats and waterfowl. They are associated with marshes, and will take advantage of streams while favoring any forested wetlands available in the CHMU. Due to their diet, mink are susceptible to toxin accumulation in a watershed, thus making water quality an important habitat concern.

Coyote, fox, fisher, and bobcat are more wide-ranging species that use the CHMU to meet habitat needs as part of their range.

**Other Important Habitat Features**

**Snags, Den Trees, and Downed, Dead Wood**

Standing and dying trees and downed, dead trees are vital components of the forest structure that provide food and shelter for wildlife ranging from mammals to invertebrates. With the declining statewide bat population, dead and dying trees could play a critical role in preventing further collapse of threatened and endangered species. More common species also depend on these features, and a full range of wildlife species is best accommodated by variation in size, species, location, aspect, and condition of tree and wood. Forest inventory methods incorporate data collection on frequency of snags and den trees. The presence of these features is an important consideration when creating silvicultural prescriptions.
D. Timber Resource Assessment

While the majority of forest products in Vermont are derived from private lands, state lands such as the CHMU are a locally important part of the wood products sector and are capable of growing some very high-quality timber. The management of timber on the CHMU focuses on silvicultural methods for exemplary forest management, longer rotations, and demonstrations that can be used or adapted to private lands.

During the last management cycle, spanning the period between 1991 and 2015, there have been twenty-three separate commercial timber harvests treating approximately 1993 acres. Total revenue for these timber harvests exceeds $2 million (in inflation adjusted 2014 dollars). Total volume exceeds 5.3 million board feet of sawtimber and 8,700 cords of pulp and firewood. Most of the treatments have been geared toward transitioning over-stocked 2-aged and even aged stands toward a more uneven-aged condition. In all, 1701 acres of forest have been treated with single-tree and group selection harvests since 1991. In addition, 117 acres of softwood plantation have been thinned, and 73 acres have experienced an overstory removal treatment to release established softwood regeneration. Finally, approximately 97 acres of young forest have been created through the use of patch cuts.

While it is helpful to reference revenue and volume figures when evaluating the extent of past forest management, it is important to recognize that forest stands on the CHMU are managed for a range of reasons including improved forest health and forest structure, better tree vigor and quality, improved wildlife habitats, demonstration projects, and providing high quality forest products to society. This management is undertaken utilizing sustainable forest management methods, and abiding by the State’s Acceptable Management Practices (AMPs) for Maintaining Water Quality on Logging Jobs in Vermont, The Riparian Management Guidelines for Agency of Natural Resources Lands, and all other laws and regulations pertaining to logging operations in Vermont. Sustainable forestry is the production and use of resources to meet the needs of present generations without compromising the ability to meet the needs of future generations.

Of the 26,275 acres of the CHMU, approximately 7,500 acres are suitable, and available for timber management. Subtracted from the total land base acreage are the timber reserved land, natural area, brooks, rivers, wetlands, seeps, vernal pools and associated Riparian Management Zones (RMZs), cliffs, exceedingly steep, rocky, and inaccessible areas, intensively used recreational areas, easement restricted lands, and agricultural lands. Table 5 includes a breakdown of lands within the CHMU with regard to whether they are available for commercial timber and wildlife management. Map 11 is a visual depiction of the CHMU based on the categories in Table 5.

The vast majority of the forests of the CHMU available for timber production are second growth hardwoods. Most of these lands were heavily harvested in the mid to late 1800’s, into the early 1900’s. Much of the land acquired for the CHMU was logged quite extensively prior to state ownership. The land that is determined to be operable and available for commercial timber and wildlife management lies towards the periphery of the CHMU at relatively low elevations as can be seen in map 11. The operable land consists primarily of Northern Hardwood forests, but does include other types as well (table 6). While most of the operable land is Northern Hardwood forest, there are still large areas of Northern Hardwood forest that are ineligible for timber management. Table 7 is a list of all natural communities that comprise more than 100 acres of the CHMU and a breakdown of the proportion of each community that is classified as either available or unavailable for commercial timber and wildlife management.
In preparation for completing the Long Range Management Plan (LRMP) for the unit, a timber assessment was conducted. A traditional timber assessment might have included “cruising” every forest stand on the property, a daunting task for a parcel of this size. Instead, utilizing existing inventory data, GIS data layers, and local knowledge, a timber cruise was conducted on a subset of forest stands, focusing on those areas that are accessible to timber management from both a physical and site perspective as well as a regulatory perspective. This forest inventory data was used to create a timber harvesting schedule (see section IV.D). Forest inventory data and maps can be found in Appendix H.
### Table 5- Classification of Lands with Regard to Potential for Timber Management

<table>
<thead>
<tr>
<th>Land Category</th>
<th>Total Acreage</th>
<th>Additional Acreage</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land Available for Commercial Timber and Wildlife Management</td>
<td>7,481</td>
<td>7,481</td>
<td>Lands where timber harvesting is both legally and practically appropriate.</td>
</tr>
<tr>
<td>Legislatively Protected Land</td>
<td>8,908</td>
<td>8,908</td>
<td>The Camel’s Hump Natural Area and the Camel’s Hump Ecological Area. Includes all lands over 2,500’ elevation, all lands over 900’ elevation in the Gleason brook watershed, and the Ecological Protection Zone (EPZ) within Phen Basin.</td>
</tr>
<tr>
<td>Highly Sensitive Habitat Outside the Natural Area/Ecological Area</td>
<td>186</td>
<td>186</td>
<td>Includes beaver-maintained wetland complexes and exemplary cliff communities below 2,500’ elevation, outside the Gleason Brook watershed, and outside of the Phen Basin EPZ.</td>
</tr>
<tr>
<td>Easement or Deed Restricted Land</td>
<td>3,530</td>
<td>307</td>
<td>Lands where timber harvesting has been precluded by deed restriction or other negotiated easement/agreement. Includes the original 1911 Col. Batell grant, the Phen Basin Ecological Protection Zone, the Hub Vogelmann-UVM Research Area, and lands donated by the Green Mountain Club for trail corridors. Most of this land is also <strong>Legislatively Protected</strong>.</td>
</tr>
<tr>
<td>Timber Reserved Land</td>
<td>1,482</td>
<td>1,227</td>
<td>Lands owned by the State, where timber rights were reserved by the grantor at the time of acquisition. Includes most of Huntington Gap WMA.</td>
</tr>
<tr>
<td>Steep, Wet, Poor Access, etc., outside of Legislatively Protected Land</td>
<td>7,671</td>
<td>7,671</td>
<td>Areas below 2500’ elev. where the ability to harvest timber is severely limited by terrain, hydrology, access, or other practical considerations.</td>
</tr>
<tr>
<td>Intensive Recreation Areas</td>
<td>26</td>
<td>26</td>
<td>Includes high-use recreation trailheads, parking areas, and immediately adjacent lands.</td>
</tr>
<tr>
<td>Agricultural Land and Maintained Openings</td>
<td>103</td>
<td>103</td>
<td>Includes fields licensed for agricultural use and other permanently maintained openings.</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>25,909</strong></td>
<td></td>
</tr>
</tbody>
</table>

2 Categories may overlap. For instance, land that is protected by deed, may also be protected by the legislature. Acreage figures in this category reflect land not already included in a category higher in the table.
Map 11 - Classification of Lands with Regard to Potential for Commercial Timber and Wildlife Management.
### Table 6- Land Available for Commercial Timber and Wildlife Management

<table>
<thead>
<tr>
<th>Timber Type</th>
<th>Approximate acreage</th>
<th>Approximate % of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern Hardwood</td>
<td>6275</td>
<td>84%</td>
</tr>
<tr>
<td>Mixed Hardwood/Softwood</td>
<td>1071</td>
<td>14%</td>
</tr>
<tr>
<td>Softwood</td>
<td>135</td>
<td>2%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>7481</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Table 7- Most Abundant Natural Community Types with Regard to Timber Management

<table>
<thead>
<tr>
<th>Natural Community Type</th>
<th>% acreage unavailable for commercial timber and wildlife management</th>
<th>% acreage available to commercial timber and wildlife management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern Hardwood Forest</td>
<td>52%</td>
<td>48%</td>
</tr>
<tr>
<td>Montane Yellow Birch-Red Spruce Forest</td>
<td>89%</td>
<td>11%</td>
</tr>
<tr>
<td>Montane Spruce-Fir Forest</td>
<td>99%</td>
<td>1%</td>
</tr>
<tr>
<td>Hemlock-Northern Hardwood Forest</td>
<td>34%</td>
<td>66%</td>
</tr>
<tr>
<td>Red Spruce-Northern Hardwood Forest</td>
<td>55%</td>
<td>45%</td>
</tr>
<tr>
<td>Red Spruce-Heath Rocky Ridge Forest</td>
<td>98%</td>
<td>2%</td>
</tr>
<tr>
<td>Rich Northern Hardwood Forest</td>
<td>54%</td>
<td>46%</td>
</tr>
<tr>
<td>Hemlock Forest</td>
<td>72%</td>
<td>28%</td>
</tr>
</tbody>
</table>
E. Water and Fisheries Assessment

The Camel's Hump Management Unit is within the Winooski River watershed, which drains to the Lake Champlain Basin. The nearly 100 miles of rivers and streams in the CHMU drain either east towards the Mad River or west to the Huntington River. A smaller section drains north directly to the Winooski River where it has about 1 ¼ miles of frontage, including parts of the river corridor. Beaver ponds, seeps and vernal pools make up the rest of the water bodies. The water resources are protected by the predominately forested landscape and limited conflicts with human infrastructure.

Most of the streams are the head waters of steep gradient streams that have good to excellent water quality. These forested headwater streams are the defining water feature of the unit. Riparian area forests, adjacent to water bodies, are complex ecosystems vital to the protection of headwater streams, as well as ponds, seeps, wetlands, and vernal pools. Riparian forests function as sources of food for wildlife, and are transformers of nutrients and are nutrient sinks. They also hold back storm runoff to reduce erosion.

As these streams feed into larger streams, they are in turn able to provide protection to both the water quality, habitat and overall condition downstream. Although still in good condition, streams lower down in the watershed do experience some impairment or alteration: Both the Mad and the Huntington Rivers have impaired sections due to excessive bacteria. Both rivers are also subject to high sediment loads, both from land erosion and channel erosion as the streams work towards a state of equilibrium. Roads within the mountainous landscape as well as agricultural land use are significant sources of sediment. The Winooski River basin as a whole carries significant phosphorus and sediment loads to Lake Champlain. The ANR Winooski River Basin Plan (2012) focuses on these pollutants through implementation of best management practices.

ANR collects limited water quality data for headwater streams, but instead assumes that a predominately forested watershed will result in very good to excellent water quality. Information more specific to the tributaries within and downstream of the CHMU boundaries follow:

Mad River Watershed

At the southern end of the CHMU, the Stark Mountains drain east to the Shepard and Mill Brooks. Based on water quality data collected below the CHMU boundary, both brooks rate very good to excellent; however, on Mill Brook hydrology is altered at river mile 2.1, due to water withdrawal from snowmaking at Mad River. Both streams provide habitat for wild brook trout as well as rainbow and brown.

As small area of Camels Hump State Forest at Dana Hill Road drains to the Mad River.

Huntington River Watershed

The CHMU’s western slope of the Stark Mountains drains directly to the Huntington River and includes 2 miles of the river corridor.

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3 River Corridors identify the area that the stream or river needs to maintain physical / geomorphic equilibrium. These dynamic areas are also where a great deal of damage occurs during flooding disasters.

4 All data associated with water quality can be found at the DEC Watershed Data Portal, http://anrintra.vt.gov/DEC/WDP/
Heading north, the CHMU encompasses the headwaters of Jones, Cobb and Brush Brooks on the western flanks of the Green Mountain. Below the CHMU boundary, these streams run through an agricultural landscape with steep unpaved roads. The *E. coli* levels on Brush Brook, measured by the Friends of the Huntington River, can be high during rain events.

**Winooski River Direct**
Unlike the previously described streams, the CHMU covers a significant portion of the streams and their watersheds on the north side of the unit. These steep gradient streams, Ridley, Gleason and Preston Brooks, are predominantly forested and drain directly to the Winooski.

The eastern most stream, Ridley Brook, is confined by Camel’s Hump road and associated driveways as well as a steep valley walls. The runoff from tropical storm Irene in 2011, resulted in substantial movement of Ridley Brook, damaging roads and bridges. Subsequent work to increase culvert sizes has helped to reduce future conflicts with infrastructure as well as protect aquatic organism passage. The water quality of Ridley Brook is rated very good to excellent based on 2010 results at river mile 1.7.

Further west is Gleason followed by Preston Brook. The headwaters of Gleason Brook are not confined by roads. Preston Brook follows the Honey Hollow Road. At the mouth of Preston Brook, significant sediment load has been dropped due to the stream’s erosional processes. Conflicts with the road as well as a berm on state land both results in an energized stream, causing deepening of the channel and subsequent bank failures. The existing mature trees on the berm also provide some stability to the stream, making idea of its removal less beneficial.

**Ponds and Wetlands**
Other than beaver ponds, there are no major water bodies within the CHMU, although a small section of the Gillette Pond watershed is contained on the northwest corner of the CHMU.

The beaver ponds cover approximately 54 acres of the CHMU. These ponds are typically remote and at mid to upper elevations. Ponds are located at the headwaters of Ridley and Hump Brooks in North Duxbury, Cobb Brook in Huntington, Beaver Meadow Brook in Buel’s Gore, Mill and French Brooks within the Phen Basin Block in Fayston, near the Huntington River on the Stevens Block, with the largest complex located on a bench on the west side of the Camel’s Hump ridge in the headwaters of Gleason Brook. All told there are about fifteen beaver-maintained ponds within the CHMU, ranging in size from less than an acre to about 2 ½ acres. These ponds fluctuate over time with the ebb and flow of active beaver colonies. Wetland complexes commonly associated with these beaver ponds provide significant ecological functions and values including water quality filtration, vital habitat for a wide range of plants and animals, and enjoyment by visitors.

Small patch wetlands also exist, occurring in both closed basins and as a result of groundwater seepage. Groundwater flow can result in open seeps and seepage swamp communities, which have a specially adapted flora component. In addition, numerous Vernal Pools are found throughout the management unit, providing important amphibian breeding habitat. These small wetlands are easily impacted by changes in hydrology or canopy cover. Please refer to Table 1- Natural Communities of the Camel’s Hump Management Unit for additional descriptions and the [ANR Environmental Atlas](#).

**Fisheries**
Brook trout is the dominant salmonid species within the CHMU, while rainbow and brown trout inhabit some of the lower elevations of brooks near the Winooski and Huntington Rivers.

Below is a listing of fish species associated with the various water features within the Camel’s Hump Management Unit.

<table>
<thead>
<tr>
<th>WATER FEATURE</th>
<th>FISH SPECIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winooski River</td>
<td>brown and rainbow trout, landlocked Atlantic salmon, rock and smallmouth bass, fall fish, creek chub, white sucker, walleye, black nosed dace, common shiner, and other species of minnows</td>
</tr>
<tr>
<td>Huntington River</td>
<td>brook, brown, and rainbow trout, landlocked Atlantic salmon, fall fish, creek chub, white sucker, black nosed dace, common shiner, and other species of minnows</td>
</tr>
<tr>
<td>Brooks</td>
<td>brook, rainbow, and brown trout, slimy sculpin, black nosed dace, long nosed dace</td>
</tr>
<tr>
<td>Beaver Ponds</td>
<td>brook trout, northern red bellied dace, creek chub, black nosed dace</td>
</tr>
</tbody>
</table>

Management Considerations

The forests associated with the headwater streams found on the CHMU are complex ecosystems vital to the protection of headwater streams, as well as ponds, seeps, wetlands, and vernal pools. Riparian forests remove pollutants and reduce erosion. They function as sources of food for wildlife, and are transformers of nutrients and are nutrient sinks. Riparian area size depends on soils, slope, forest cover type, and type of water feature. To protect these features, it is important to maintain minimum levels of shade provided by the forest canopy. The Riparian Management Guidelines for Agency of Natural Resources Lands call for limited cutting in the Riparian Management Zones and a focus on managing for continued and enhanced riparian function.

Headwater streams are prone to rapid changes in water-flow conditions in response to precipitation events. Climate change models predict more intensive precipitation events in the future, and qualitatively, managers have already seen the impact of more frequent heavy storm events in the CHMU. In each summer of 2011, 2013, and 2015, the area was hit by one, or a series of heavy storms that caused streams to overflow their banks leading to damage of road infrastructure—plugged and dislodged culverts, washed out bridge abutments, washed out roads, etc.

Coupled with these headwater streams that are prone to high flows, is the fact that portions of the CHMU have “legacy” skid roads and undersized culverts that are not built to proper standards. In response to the storm events of the past decade, ANR land managers have embraced the lens of “flood resilience” when planning activities in the forest. The importance of properly sizing culverts, bridges, and constructing roads outside of riparian areas is growing more and more obvious every year.
In 2014, FPR replaced a 6-foot culvert in Honey Hollow that had been washed out twice in three years with a 40-foot truck bridge. Additionally, 5-foot double culverts were replaced in Duxbury with a 30-foot bridge. ANR will continue to make necessary improvements to undersized stream crossing infrastructure as funding allows.

The health and quality of the water features found on the CHMU are a highly important aspect of management of the CHMU. Very strong consideration will be taken in all activities undertaken on the CHMU to ensure a continuing priority to water quality.

F. Forest Health Assessment

1. General Forest Health:

History of CHMU Forest Health Issues
Historically, abiotic factors including weather and climate, have played a more significant role in impacting forest health in the CHMU than biotic factors such as insects and diseases. However, like forests themselves, forest health conditions are complicated and influenced not only by individual biotic or abiotic factors, but the combination of weather, climate, insects, and disease.

The present-day forest composition of the CHMU- particularly the paper birch at the mid and upper elevations- owes much to large fires that burned many thousands of acres in 1903 and 1908. However, it is important to note that conditions in 1903 and 1908 were uniquely suited to large fires, and very different conditions prevail in the present day. Since then forest fires have been very small and rare on the CHMU.

Acid rain has had a significant and well documented impact on forest health in the CHMU. In fact, some early groundbreaking research tying acid rain to declines in forest health was conducted on the western side of Camel’s Hump. During the height of the acid rain crisis, high elevation spruce and fir trees were dying at a rapid rate. In the past 30 years, the direct impact of acid rain in the northeast has eased, and there is evidence that the health of red spruce is on the rise, regionally. But the impacts of acid rain on soil, tree health, and plant regeneration continue to reverberate. Base cation depletion, particularly at high elevation, continues to limit the ability of trees to uptake nutrients from the soil with reductions in cold hardiness and increases in winter injury.

In 1998, Vermont experienced a severe ice storm that took its toll on the CHMU. Today, one can still see evidence of the ice storm in certain landscape positions. Hit particularly hard were the mid and upper elevation paper birch, which suffered extensive limb breakage. Much of the mid and upper elevation paper birch had regenerated after fires at the turn of the 20th century. The fact that the birch was already relatively old for its species, combined with poor soil nutrition caused by acid rain hampered the ability of birch to properly recover from the ice storm. Paper birch continues to decline in overall health and their weakened state leaves them susceptible to insect and disease agents that may not have been a concern in otherwise healthy paper birch.

Over time the forests of the CHMU have been, and in some cases, continue to be impacted by biotic factors like forest pests and diseases. Some of these have significantly altered the composition of our forests such as butternut canker and Dutch elm disease. During the 1980’s large populations of the native forest tent caterpillar defoliated thousands of acres of forest within the CHMU. A smaller
outbreak occurred between 2004-2006. Very small areas of gypsy moth defoliation have been seen in the past, but have been very limited due to the small areas of preferred food sources such as oak and poplar.

During the late 1980s, pear thrips had a significant impact on the health of sugar maple resulting in thin foliage and extensive dieback. This insect pest is believed to be partly responsible for a general decline in sugar maple health in parts of the CHMU. The North American Maple Project (NAMP) plot in Huntington has experienced greater crown dieback than the statewide average in recent years, likely due to a combination of factors including insect defoliation, weather events, and nutrient depletion.

Oystershell scale is an insect pest which most commonly impacts beech, but can also affect sugar maple and yellow birch. A particularly heavy infestation impacted the Camel’s Hump area in the mid-1990s. Small infestations continue to impact the forests of the CHMU on a 4-5-year cycle.

Other common forest pests and diseases have been found throughout the CHMU, as in most other forests in Vermont, including beech bark disease (BBD), Eutypella canker on maples, and Nectria canker on a host of hardwoods. Other examples of common forest pests and diseases include anthracnose disease on leaves of maples, and birch leaf miner on birches. Usually these pests and diseases are not a large problem, but run their course with minimal impacts on the forest.

One notable example of a disease which has had a significant impact on Vermont’s forests, including the CHMU, is beech bark disease. Beech is a primary component of the northern hardwood forests on the CHMU. BBD occurs from a combination of a scale insect and two species of fungi. The disease leads to widespread decline and death of beech trees. The “killing front” of BBD came through the CHMU in the 1970s and 1980s. Some trees display a resistance to the disease. The death of overstory beech trees often leads to aggressive root sprouting of beech saplings. Beech is very shade tolerant and the prolific sprouting can depress the natural regeneration of other associated species such as sugar maple and yellow birch. In this way, beech bark disease is having a significant impact on both the overstory and understory of the forests of the CHMU.

Current Forest Health Conditions
Each year, forest health specialists from FPR conduct aerial forest health surveys to document and map the extent of certain tree diseases and insect species. In recent years, surveyors have continued to document the lingering impacts of beech bark disease, as well as the decline of birch at the upper elevations. Forest health monitoring plots in several locations within CHSP were established to track trends in tree health, forest stressors, and regeneration over time.

Moving forward, the impacts of drought and frost damage loom large as climate change casts a shadow of uncertainty. Earlier bud break as a result of shorter, milder winters has been well documented, making many species susceptible to late spring frosts. Meanwhile, total precipitation is expected to increase under most climate change scenarios, but the timing and distribution of that precipitation will grow less certain. It is anticipated that drought may be a larger issue in the future than it has been to this point. (For additional information on climate change impacts, see section III.G).

2. Invasive Species Assessment:

Non-native invasive plants and insects pose some of the larger threats to forest health conditions in the CHMU, and one which ANR is only recently beginning to take an active approach in controlling. Invasive species can have a wide variety of negative impacts on ecosystem health and forest productivity
including displacing native species and reducing biodiversity, interrupting natural succession, degrading
genome habitat and disrupting the food chain, precluding commercial timber regeneration, and changing
the ways ecosystems function by altering nutrient, water, or light availability, hasten erosion and alter
soil chemistry.

The CHMU was largely protected from invasive plant species for a long time, because its forested habitat
was largely unfragmented, while most invasive plants in the region prefer exposed edge habitats. Small
populations of invasive plants have been present for a long time in the forest interior around old cellar
holes and were planted there by early settlers. These occurrences were isolated and posed little threat
to the surrounding forest health. However, in recent years ANR staff have seen a proliferation of
invasive plant species along roads, parking areas, and log landings, even within the interior portions of
the unit. Invasive plant species follow disturbance, thus areas that have a history of intensive land use
are more likely to host invasive species. (See table 9 for locations of invasive plant species populations).

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

Perhaps of even greater concern than invasive plants is the threat posed by invasive insect species, such
as the emerald ash borer (EAB) and the Asian longhorned beetle (ALB). ALB was first identified in the US
in 1996 in Brooklyn, and Long Island, NY. Emerald ash borer was first identified in the US in southeast
Michigan in 2002. Since then, Vermont foresters have been monitoring the spread of both species.
There have been several ALB outbreaks in the Northeast and the beetle has had a devastating impact on
communities such as Worcester, MA. The beetles feed on maples, elm, ash and poplar, among others.
EAB has spread steadily since its arrival in Michigan and is now established in every surrounding state
and province to Vermont. EAB has been found in several areas in Vermont, including Richmond, Bristol,
and Montpelier, which are only a short distance from the CHMU.

Hardwoods potentially impacted by EAB and ALB make up a significant portion of the CHMU and the
arrival of either species would have a serious impact on forest health as well as planned management
activities. At this time, no specific management adjustments will be made on the CHMU in anticipation
of ALB. In 2012, VTFPR produced guidance on how landowners could manage forests in response to
potential threats posed by EAB. These guidelines will assist ANR in responding should an outbreak of
EAB occur near or within the CHMU. One needn’t look too far in the past to see the potential impacts of
invasive insect species. Dutch elm disease, butternut canker, chestnut blight, and beech bark disease are
all of non-native origin and each has effectively modified the role its host plays in the forest ecosystem.

Hemlock woolly adelgid is another non-native pest that has the potential to spread throughout
Vermont. Current populations are restricted to southeastern counties. Birds can carry the insect, so
distribution may be difficult to predict. Currently there are no plans to alter management of hemlock in
CHMU.

3. **Browse Sensitivity Assessment:**

During the forest inventory for CHMU and while conducting other daily management activities, foresters
made qualitative observations of browse pressure. For the most part, browse pressure on the CHMU is
low to moderate. In recent years, foresters have observed elevated browse pressure in stands that have
been treated through timber harvesting. ANR will continue to monitor browse pressure and may need to adjust silvicultural methods should deer densities increase.

### Table 9- Invasive Exotic Plants of the Camel’s Hump Management Unit

<table>
<thead>
<tr>
<th>Species Name</th>
<th>Common Name</th>
<th>Distribution</th>
<th>Estimated % Cover</th>
<th>Sites Where Found</th>
<th>Present Threat to Native Plant Communities</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Rosa polyantha</em></td>
<td>multiflora rose</td>
<td>Isolated</td>
<td>80%</td>
<td>Bombardier Forest Road, Bolton</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Scattered along roadsides, landings</td>
<td>1%</td>
<td>Honey Hollow Town Road, Bolton</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Isolated</td>
<td>1%</td>
<td>Honey Hollow Forest Roads, Bolton</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Isolated to landings</td>
<td>5%</td>
<td>Wilson/Connally/Marshall Forest Roads, Duxbury</td>
<td>Moderate</td>
</tr>
<tr>
<td><em>Lonicera, spp.</em></td>
<td>honeysuckle</td>
<td>Isolated to lower roadside</td>
<td>10%</td>
<td>Bombardier Forest Road, Bolton</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Scattered along roadsides, landings</td>
<td>1%&gt;</td>
<td>Honey Hollow Forest Roads, Bolton</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Scattered along roadsides, landings</td>
<td>5%</td>
<td>Wilson/Connally/Marshall Forest Roads, Duxbury</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Isolated to woods surrounding parking area</td>
<td>5%</td>
<td>Robbins Mt WMA</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Scattered along roadsides, landings</td>
<td>1%&gt;</td>
<td>Robbins Mt WMA Forest Roads, Richmond, Bolton</td>
<td>Low</td>
</tr>
<tr>
<td><em>Berberis thunbergii</em></td>
<td>Japanese barberry</td>
<td>Isolated to woods surrounding parking area</td>
<td>20-30%</td>
<td>Bamforth Ridge Trailhead, Bolton</td>
<td>Moderate</td>
</tr>
<tr>
<td><em>Rhamnus spp</em></td>
<td>Buckthorn</td>
<td>scattered through small area of woods</td>
<td>20-50%</td>
<td>Bombardier Road, Bolton</td>
<td>High</td>
</tr>
<tr>
<td><em>Rhamnus spp</em></td>
<td>Buckthorn</td>
<td>Scattered along roadsides</td>
<td>1%&gt;</td>
<td>Robbins Mt WMA Forest Roads, Richmond, Bolton</td>
<td>Low</td>
</tr>
<tr>
<td><em>Phragmites australis</em></td>
<td>common reed</td>
<td>Isolated to roadside ditch</td>
<td>1%&gt;</td>
<td>Honey Hollow Forest Roads, Bolton</td>
<td>Low</td>
</tr>
<tr>
<td><em>Reynoutria japonica</em></td>
<td>Japanese knotweed</td>
<td>Small Isolated patch</td>
<td>100%</td>
<td>Long Trail, Winooski Riverside, Bolton</td>
<td>Moderate</td>
</tr>
<tr>
<td><em>Celastrus orbiculatus</em></td>
<td>oriental bittersweet</td>
<td>Small Isolated patch</td>
<td>5%</td>
<td>Long Trail, Winooski Riverside, Bolton</td>
<td>Moderate</td>
</tr>
</tbody>
</table>
G. Climate Change Assessment and Anticipated Impacts

There are many lines of evidence to show that Vermont’s climate is changing. Because climate affects nearly all aspects of ecosystem processes, climate change may impact Vermont’s forest communities including those found in the Camel’s Hump Management Unit. For example, changes in the climate at CHMU could alter water and nutrient cycling, plant health, timber productivity, wildlife, insects and diseases, invasive species, timing of seasonal events, and recreational opportunities.

The entire northeastern United States has experienced substantial changes in temperature and precipitation over the past 100 years (Janowiak, et al. 2018). While there is considerable variability from year-to-year, long-term records from weather stations around Vermont show that all regions within the state are experiencing higher air temperature and changing precipitation patterns (Galford, et al. 2014). Because of Vermont’s mountainous terrain, lakes, and other geographic features that can affect weather patterns, the observed changes have not been uniform throughout the state.

According to the Vermont Climate Assessment (Galford, et al. 2014) the following changes have been observed since 1960:

- Vermont’s mean annual temperature has increased by 1.3°F, with larger changes observed at higher elevations.
- Winter temperature has warmed at a faster rate than summer temperature.
- Spring has started 3-4 days earlier per decade, resulting in a longer growing season.
- Annual precipitation has increased about an inch per decade. Some parts of the state have experienced larger increases, particularly in mountainous regions.
- Rainfall records show that heavy rainfall events are becoming more common.

The rate and degree of future climate change depends on whether anthropogenic greenhouse gas emissions decline. According to the Vermont Climate Assessment (Galford, et al. 2014), the following trends are projected for Vermont’s future climate if there are not significant declines in human emissions.

- The mean annual temperature will continue to rise in the next few decades, with projected increases of an additional 2°F by 2050 and 5°F by 2100.
- Precipitation will continue to increase, with the largest increases occurring in mountainous regions. In the next 25 years, much of this precipitation will fall as snow, but as air temperature continues to increase, winter precipitation is projected to shift to rainfall in the next 50 years and beyond. Intense precipitation events are expected to continue to become more frequent.

Table 10 outlines the projected changes in the climate in New England and northern New York. While it is not known for certain how climate change will affect all forest ecosystem processes, like the response of insects and disease pests, the New England and Northern New York Forest Ecosystem Vulnerability Assessment and Synthesis compared projections from multiple models and lines of evidence to provide a confidence assessment for each projected change.
Table 10. Projected Changes to the Climate in New England and Northern New York\(^5\).

<table>
<thead>
<tr>
<th>Projected change</th>
<th>Confidence(^a)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperatures will increase</td>
<td>Robust evidence, high agreement</td>
<td>All global climate models agree that temperatures will increase with continued increases in atmospheric greenhouse gas concentrations.</td>
</tr>
<tr>
<td>Growing seasons will lengthen</td>
<td>Robust evidence, high agreement</td>
<td>There is strong agreement that projected temperature increases will lead to longer growing seasons in the assessment area.</td>
</tr>
<tr>
<td>Winter processes will change</td>
<td>Robust evidence, high agreement</td>
<td>There is strong evidence that temperatures will increase more in winter than in other seasons across the assessment area, leading to changes in snowfall, soil frost, and other winter processes.</td>
</tr>
<tr>
<td>The amount and timing of precipitation will change</td>
<td>Robust evidence, high agreement</td>
<td>There is strong agreement that precipitation patterns will change across the assessment area. Total precipitation is generally expected to increase during winter and spring, but summer and fall projections are more uncertain.</td>
</tr>
<tr>
<td>Intense precipitation events will continue to become more frequent</td>
<td>Robust evidence, high agreement</td>
<td>Climate models generally project that the number of heavy precipitation events will continue to increase in the assessment area. If they do increase, damage from flooding and soil erosion may also become more severe.</td>
</tr>
<tr>
<td>Soil moisture patterns will change in response to temperature and precipitation</td>
<td>Medium evidence, high agreement</td>
<td>Warmer temperatures and altered precipitation will interact to change soil moisture patterns throughout the year, but there is uncertainty about the direction and magnitude of the changes.</td>
</tr>
<tr>
<td>Forest vegetation may face increased risk of moisture deficit and drought during the growing season</td>
<td>Medium evidence, medium agreement</td>
<td>Studies show that climate change will affect soil moisture, but there is some disagreement among climate and impact models on how soil moisture and drought will change during the growing season.</td>
</tr>
<tr>
<td>Certain insect pests and pathogens will increase in occurrence or become more damaging</td>
<td>Medium evidence, high agreement</td>
<td>Evidence indicates that increases in temperature will lead to increased threats from insect pests and pathogens, but research to date has examined relatively few species.</td>
</tr>
<tr>
<td>Many invasive plants will increase in extent or abundance</td>
<td>Medium evidence, high agreement</td>
<td>Evidence indicates that increases in temperature, longer growing seasons, and more frequent disturbances will lead to increases in many invasive plant species.</td>
</tr>
</tbody>
</table>

\(^a\)”Confidence” was determined by Janowiak et al. 2018 by gauging the level of evidence and the level of agreement among information where “evidence” refers to the body of information available based on theory, data, models, expert judgment, and other sources. Evidence was considered robust when multiple observations or models, as well as an established theoretical understanding to support a statement, were available. “Agreement” refers to the agreement among the multiple lines of evidence. If theories, observations, and models tended to suggest similar outcomes, then agreement was high.

The projected changes outlined in Table 10 may have varied impacts to Vermont’s forests; some impacts may be positive and others negative. These impacts are listed in Table 11. By understanding how the climate has changed and how it is projected to change in the future, forest managers can anticipate the possible impacts and manage accordingly. Adaptation management can be used to promote ecosystem resilience to climate change by minimizing stressors and allowing forests to respond and adapt to change. The following factors are anticipated to affect the capacity of forests to adapt to a changing climate (Janowiak, et al. 2018):

- Forests with low species diversity may be more vulnerable to negative impacts from climate change. Studies have consistently shown that high-diversity forests are more resilient to disturbance.
- Tree species in isolated or fragmented landscapes will have reduced ability to migrate to new areas in response to climate change.
- Ecosystems that have greater tolerance to disturbance may have less risk of declining on the landscape due to climate change.
- Species or systems that are limited to particular environments will have less opportunity to migrate in response to climate change. The current ecological understanding indicates that migration to new areas will be particularly difficult for tree species and forest communities with narrow habitat requirements.

Table 11 - Potential Impacts of Climate Change on Forests in New England and Northern New York

<table>
<thead>
<tr>
<th>Potential impact</th>
<th>Confidence</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Many northern and boreal tree species will face increasing stress from climate change</td>
<td>Medium evidence, high agreement</td>
<td>Ecosystem models agree that northern and boreal tree species will have reduced suitable habitat and biomass across the assessment area, and that they may be less able to take advantage of longer growing seasons and warmer temperatures than warm-adapted, temperate forest species.</td>
</tr>
<tr>
<td>Habitat will become more suitable for southern species</td>
<td>Medium evidence, high agreement</td>
<td>Ecosystem models agree that longer growing seasons and warmer temperatures will increase suitable habitat and biomass for many temperate species across the assessment area.</td>
</tr>
<tr>
<td>Forest composition will change across the landscape</td>
<td>Medium evidence, high agreement</td>
<td>Although few models have specifically examined how forest communities may change, model results from individual species and ecological principles suggest that recognized forest community assemblages will change.</td>
</tr>
<tr>
<td>Shifts in forest composition will take at least several decades to occur in the absence of major disturbance</td>
<td>Medium evidence, medium agreement</td>
<td>Although some models indicate major changes in habitat suitability, results from spatially dynamic forest landscape models indicate that a major shift in forest composition across the landscape may take 100 years or more in the absence of major disturbances.</td>
</tr>
<tr>
<td>Conditions affecting tree regeneration and recruitment will change</td>
<td>Medium evidence, high agreement</td>
<td>Seedlings are more vulnerable than mature trees to changes in temperature, moisture, and other seedbed and early growth requirements.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Forest productivity will increase during the next several decades in the absence of significant stressors</th>
<th>Medium evidence, medium agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some studies have examined the impact of climate change on forest productivity within the assessment area, but they disagree on how multiple factors may interact to influence productivity. The diversity of forest conditions across the assessment area suggests that changes will be spatially variable.</td>
<td></td>
</tr>
</tbody>
</table>
H. Historic and Cultural Assessment

The lands of the CHMU have a rich and varied historic and cultural context. From the Native Americans to today’s citizens this area has held, and continues to hold significance to the enrichment of our lives.

Mountainous terrain dominates much of the land area of the CHMU, which limited areas for settlement by both Native Americans and early European settlers. Most of the soils are rocky and quite steep, making tillage challenging, and is classified as least favorable for farming on the State’s land classification map. Due to this, homesteading was short lived and not very prevalent within most of the CHMU.

An area’s sensitivity to the potential for a Native American site, also known as a pre-contact site, is heavily influenced by its proximity to water. Given this, the area of greatest potential are the lands along the Winooski River, Huntington River and around small mountain water bodies and their tributaries. Other areas of significant importance to the Native Americans included mountain tops; the Waubanakee called Camel’s Hump Tah-wak-be-dee-esso wadso, or Tahwahbodeay wadso, which meant ‘the mountain that is like a seat,’ or ‘resting place.’

Locations of some of the Native American and Euro-American sites within the CHMU are known, but a complete survey has not been conducted. As projects are proposed an analysis is done using established criteria for ranking potential to encounter these types of sites. If it is determined that the potential exists for a Native American or Euro-American site, further analysis would be done. Typically, sites of interest include areas adjacent to a water body, flat, level ground, the confluence of streams or rivers, unique features such as caves or hill/mountain tops, remote ponds, springs, quarries, floodplains, natural travel corridors, and wetlands. If a site exhibits the potential to be archeologically sensitive, further studies by trained professionals would be warranted.

For more information on the cultural history and archeological sensitivity refer to Appendices B & C.

According to the F. W. Beers Atlas done during 1869-1873 for the lands within the CHMU, there were shown 49 homesteads, four sawmills, and one school. Most of these were located near streams and town roads, a few were in more remote locations. The largest sawmill complex was in Huntington, located near the present day Forest City Trail close to Brush Brook, called Forest Mills. Most of the homesteads were abandoned by the end of the 1800’s, as families moved west. Some of the old stone cellar holes, stone foundations, and field edge stone walls can still be found. Only one of the homes, and associated barns, remains today. Built in 1820 by the Preston family, the structures are located in Bolton, at the junction of Honey Hollow and Duxbury Roads. Photo-documentation, measurements and assessments were done on many of the old cellar hole locations in the past ten years.

Recreational use of the lands surrounding Camel’s Hump has a long-standing tradition. The first hiking trail was the Old Huntington Trail, called the Burrows Trail today, established in the early 1800’s. Also during the mid-1880’s Sam Ridley established an opportunity for visitors from down country to visit the area. Visitors would travel to North Duxbury via train, take a horse drawn carriage part way up the mountain, then continue on horse or pony to near the summit, where a hotel of sorts had been established. During the early 1900’s the GMC started clearing of the Long Trail, a section of which goes over the top of Camel’s Hump, and other mountain peaks within the CHMU. Other types of trails, snowmobile, cross-country ski, and mountain bike, were established in the late 1900’s.
Other highlights of historic interest for the CHMU include:

- Most the CHMU was logged over in the 1800’s and early 1900’s; there are only relatively small areas that were undisturbed or minimally disturbed.
- 1860- Observatory built on the summit, bridle path established on the North Duxbury side to near the summit.
- 1865- Sam Ridley’s hotel built in what is now known as the Hut Clearing; burned down in 1877.
- 1908- Huts built at the location of the former hotel by the Camel’s Hump Club.
- 1911- First fire lookout in Vermont established on Camel’s Hump summit; phone line established to Hut Clearing.
- early 1900’s- large tree planting effort of about 400,000 tree seedlings including Norway spruce, white cedar, white pine, and Scots pine, primarily to replant areas burned over in 1903; almost total failure, very few of these trees remain today.
- 1944, October 15- B-24J Liberator bomber crashed just below the summit of Camel’s Hump, killing nine servicemen, one survivor.
- 1965- Camel’s Hump natural area established.
- 1968- Camel’s Hump designated as a National Natural Landmark.

I. Recreation Assessment

Many thousands of people visit the CHMU every year. Most visitors are from the northeastern United States, but this landmark attracts people from all over the world. The primary reason to visit is to recreate. Most visitors come to hike, while still others come to cross-country ski or hunt. A wide range of other activities occur here as well, including wildlife observation, snowmobiling, mountain biking, hunting, fishing, trapping, wildlife viewing, and swimming. For many years one of the primary focuses of management on the CHMU has been recreation, and will continue to be into the future.

During 2011, most of the trails on the CHMU were analyzed in detail for trail maintenance and improvement needs. All of this data was recorded digitally, including longitude/latitude coordinates from a hand-held GPS unit. This analysis will better prepare us for trail work planning into the future. The focus of trail work is public safety, erosion control and environmental quality, user enjoyment, and providing access to interesting places.

Over the years, the trails on the CHMU have received a lot of attention from various trail crews, volunteers, contractors, and staff. Trail improvements have focused on improving the hiking experience and protecting adjacent natural resources. Trail maintenance activities include:

- Installation of proper erosion control structures such as grade dips and rock steps
- Installation of drainage structures such as ditches
- Clearing brush and tree blow-downs
- Building bridges over streams
- Constructing benches
- Refurbishing old shelters and cabins
- Building parking areas and clearing them of snow in the winter
- Maintenance of trailhead bulletin boards and register boxes
Trail improvements are necessary and ongoing. Thanks in great part to the federal Recreational Trails Program grant funding, and generous support and volunteerism from a variety of recreation partners, the trails on the CHMU are in good shape overall. More work does remain, however. A listing of the trails and associated structures on the CHMU can be found in tables 11-13.

In addition to the numerous trails that begin and end on ANR land, it is important to recognize that just as the CHMU exists in a landscape context when it comes to wildlife habitat connectivity, it does so too in relation to recreational pursuits. There are multiple trails that begin on private land and provide access to the CHMU. The Catamount Trail and the Long Trail have significant mileage in the vicinity that is not on the CHMU, therefore many people enter the property from surrounding private lands. Importantly there are adjacent properties that are conserved or accessible for public recreation. One such parcel is the former Lathrop parcel to the north of the Phen Basin Block and depicted on map 12. The state has a public access easement on this property that allows visitors to enter from state land and use the forest access roads.

While many visitors experience the CHMU without ever leaving the busiest summit trails, other users regularly venture off trail exploring more remote areas. Backcountry skiers, for instance, utilize trails to climb into the upper reaches of the CHMU, and often descend through the woods off trail. Backcountry skiing is an allowed use on the CHMU. In some cases, however, some users are illegally cutting vegetation to make skiing easier. It is important to recognize that unauthorized cutting of trees and shrubs can have a significant adverse impact on wildlife, forest structure, and ecosystem health. It is also important to note that cutting or damaging vegetation without authorization is a crime (Chapter 77 of Title 13 of the Vermont Statutes Annotated). ANR is in the process of revising and improving the management of backcountry skiing on Agency lands. FPR is working with the Catamount Trail Association to develop a Backcountry Ski Handbook and assisted in the creation of the first Leave No Trace “Backcountry Ethic” that specifically addresses backcountry skiing.

Another growing use of the CHMU is rock climbing. ANR recently created a new policy for rock climbing and related activities on Agency lands. The goal of the policy is to guide use so that this activity occurs in an appropriate way and in appropriate locations. Cliff plant communities are often sensitive and rock climbing can have an adverse impact if done in certain areas and without regard to the natural resources at hand. The policy on FPR lands is that climbing is allowed unless otherwise stated through the creation of a “cliff reserve.” Section IV of this plan establishes two cliff reserves within the CHMU. On WMAs—which are owned by FWD- climbing remains prohibited, unless otherwise stated.

Hunting, fishing, and trapping are also popular activities on the CHMU and are allowed in all parts of the unit in accordance with applicable state laws regulating these activities. Increasingly, there is interest in remote, backcountry hunting separate from trail-based activities.

While most visitors have a safe and enjoyable experience on the CHMU, occasionally visitors get injured or lost, and a search and rescue operation is initiated. The Department of Public Safety (DPS), in cooperation with The Vermont State Police, is responsible for all search and rescue operations. They coordinate with local town rescue squads, Fish and Wildlife Game Wardens, and sometimes call on FPR staff for access and information.

For a better understanding of how many people visit the CHMU each year refer to Appendix G.
### Table 12- Trails Within The Camel’s Hump Management Unit

<table>
<thead>
<tr>
<th>Trail</th>
<th>Type</th>
<th>Use Level</th>
<th>Length (miles)</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allis</td>
<td>Hiking</td>
<td>Low</td>
<td>0.3</td>
<td>South of Camel’s Hump summit, near Montclair Glen Lodge</td>
</tr>
<tr>
<td>Alpine</td>
<td>Hiking</td>
<td>Low</td>
<td>1.7</td>
<td>Around east side of Camel’s Hump; upper elevations</td>
</tr>
<tr>
<td>Baird in the Bush</td>
<td>Mountain biking</td>
<td>Low</td>
<td>1.4</td>
<td>Phen Basin Block, Fayston</td>
</tr>
<tr>
<td>Beane</td>
<td>Hiking</td>
<td>Low</td>
<td>1.5</td>
<td>Access to the LT east of Hanksville</td>
</tr>
<tr>
<td>Burrows</td>
<td>Hiking</td>
<td>Very high</td>
<td>2.1</td>
<td>West side of Camel’s Hump</td>
</tr>
<tr>
<td>Burrows-Forest City Connector</td>
<td>Hiking</td>
<td>High</td>
<td>0.1</td>
<td>West side of Camel’s Hump</td>
</tr>
<tr>
<td>Busternut</td>
<td>Mountain biking</td>
<td>Medium</td>
<td>0.9</td>
<td>Howe Block</td>
</tr>
<tr>
<td>Camell’s Hump View</td>
<td>Accessible</td>
<td>Medium</td>
<td>0.8</td>
<td>East side of Camel’s Hump</td>
</tr>
<tr>
<td>Catamount (sections of)</td>
<td>X-C ski</td>
<td>Medium</td>
<td>14.5</td>
<td>CHSP and Hunt. Gap WMA</td>
</tr>
<tr>
<td>Chain Link</td>
<td>Mountain biking</td>
<td>Low</td>
<td>1.4</td>
<td>Phen Basin Block, Fayston</td>
</tr>
<tr>
<td>Clinic</td>
<td>Mountain biking</td>
<td>Medium</td>
<td>1.5</td>
<td>Howe Block</td>
</tr>
<tr>
<td>Cyclone</td>
<td>Mountain biking</td>
<td>Medium</td>
<td>0.8</td>
<td>Howe Block</td>
</tr>
<tr>
<td>Cyclone Connector</td>
<td>Mountain biking</td>
<td>Medium</td>
<td>0.5</td>
<td>Howe Block</td>
</tr>
<tr>
<td>Dean</td>
<td>Hiking</td>
<td>Medium</td>
<td>1.0</td>
<td>East side of Camel’s Hump</td>
</tr>
<tr>
<td>East Loop</td>
<td>Mountain biking</td>
<td>Low</td>
<td>0.5</td>
<td>Phen Basin Block, Fayston</td>
</tr>
<tr>
<td>Enchanted Forest</td>
<td>Mountain biking</td>
<td>Medium</td>
<td>1.4</td>
<td>Howe Block</td>
</tr>
<tr>
<td>Forest City</td>
<td>Hiking</td>
<td>High</td>
<td>2.2</td>
<td>South of Camel’s Hump</td>
</tr>
<tr>
<td>GS</td>
<td>Mountain biking</td>
<td></td>
<td>0.8</td>
<td>Howe Block</td>
</tr>
<tr>
<td>Hemlock Hill</td>
<td>Hiking</td>
<td>Low</td>
<td>1.0</td>
<td>Phen Basin Block, Fayston</td>
</tr>
<tr>
<td>Jerusalem</td>
<td>Hiking</td>
<td>Low</td>
<td>2.4</td>
<td>South of Stevens Block, CHSF</td>
</tr>
<tr>
<td>Lion’s Ridge</td>
<td>X-C ski</td>
<td>Low</td>
<td>2.0</td>
<td>Upper Honey Hollow, CHSP</td>
</tr>
<tr>
<td>Long (sections of)</td>
<td>Hiking</td>
<td>Med. to high</td>
<td>14.6</td>
<td>From Winooski River to just south of Mad River ski area</td>
</tr>
<tr>
<td>Lower Cyclone</td>
<td>Mountain biking</td>
<td>Medium</td>
<td>1.0</td>
<td>Howe Block</td>
</tr>
<tr>
<td>Monroe</td>
<td>Hiking</td>
<td>Very high</td>
<td>3.1</td>
<td>East side of Camel’s Hump</td>
</tr>
<tr>
<td>Ridley Crossing</td>
<td>X-C ski</td>
<td>Low</td>
<td>1.5</td>
<td>East side of Camel’s Hump</td>
</tr>
<tr>
<td>Winooski Riverside</td>
<td>Hiking</td>
<td>Low</td>
<td>1.0</td>
<td>North side of Camel’s Hump</td>
</tr>
<tr>
<td>VAST 17</td>
<td>Snowmobile</td>
<td>High</td>
<td>6.0</td>
<td>South of Camel’s Hump</td>
</tr>
<tr>
<td>VAST 17A</td>
<td>Snowmobile</td>
<td>Medium</td>
<td>1.9</td>
<td>South of Camel’s Hump</td>
</tr>
<tr>
<td>VAST 100A</td>
<td>Snowmobile</td>
<td>High</td>
<td>7.5</td>
<td>South and east of Camel’s Hump</td>
</tr>
</tbody>
</table>

**TOTAL: 75.2 miles**

### Table 13- Trail Mileage by Primary Use

<table>
<thead>
<tr>
<th>Trail Type</th>
<th>Mileage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hiking</td>
<td>31.6</td>
</tr>
<tr>
<td>Cross-Country Ski</td>
<td>18</td>
</tr>
<tr>
<td>Snowmobile</td>
<td>15.4</td>
</tr>
<tr>
<td>Mountain Bike</td>
<td>10.2</td>
</tr>
<tr>
<td>Total</td>
<td>75.2</td>
</tr>
<tr>
<td>Structure</td>
<td>Type</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Bamforth Ridge Shelter</td>
<td>3 sided frame</td>
</tr>
<tr>
<td>Bamforth Ridge Tenting</td>
<td>Wooden platforms</td>
</tr>
<tr>
<td>Birch Glen Camp</td>
<td>4 sided log</td>
</tr>
<tr>
<td>Hump Brook Tenting</td>
<td>Wooden platforms</td>
</tr>
<tr>
<td>Montclair Glen Lodge</td>
<td>4 sided log</td>
</tr>
<tr>
<td>Montclair Glen Tenting</td>
<td>Wooden platforms</td>
</tr>
<tr>
<td>Theron Dean Shelter</td>
<td>3 sided log</td>
</tr>
</tbody>
</table>
Map 12 - Current Recreation Infrastructure on the CHMU
Recreation Opportunity Spectrum

Recreation Opportunity Spectrum (ROS) is a process designed to allow land managers to understand existing settings and identify desired settings that a recreational user can expect to find on a parcel of land. Developed by the USDA Forest Service for application in the western United States (More et al. 2003), use of the system will result in the public being given consistent messages on the types of recreation experiences to expect in various areas, regardless of being on state or federal lands.

There are six ROS categories. These categories lie on a spectrum (figure 1) from urban (highly developed) to primitive (undeveloped). The characteristics used to map these ROS categories are based on:

1. Physical setting – remoteness, type of access, size of the area and evidence of humans.

2. Social setting – the amount and type of contact between individuals and groups (with a caveat that more people are likely to be seen at points of interest, such as Camel’s Hump Summit and trails leading to it.)

3. Managerial Setting – the amounts and kinds or restrictions placed on people’s actions, facilities and site management, and evidence of visitor impacts and/or other land management activities.

Seasonal Classification: Four of the six ROS categories exist in the CHMU. They include semi-primitive non-motorized, semi-primitive motorized, semi-developed natural, and developed natural. Recreational use of the CHMU varies from summer season to winter season as some trails become motorized by snowmobiles in winter, road sections go unplowed or Mad River Glen Ski Area begins operating, to name a few examples. Conversely, as winter season transitions to summer season, roads re-open and trails become busier. These seasonal changes can lead to a shifting in the classification of a given area depending on the recreational use. For the intent of this management plan, “Winter” will be defined as mid-November to Memorial Day Weekend and “Summer” will be defined as Memorial Day Weekend to mid-November.
1. **Semi-primitive non-motorized areas** are characterized by a predominantly natural or natural-appearing environment of relatively medium to large size of at least 1,000 acres. Areas may be smaller if they are contiguous to other private or public lands that are protected and managed in a complementary manner. Interactions between users are low, but there is often evidence of other users. There is a high probability of experiencing independence, closeness to nature, and self-reliance by applying outdoor skills in an environmental that offers challenge and risk. Users can expect a higher number of parties at designated concentration points, such as summits. There is a moderately high probability of experiencing isolation from human development, use and impact. The areas are at least 1/2 mile from maintained roads or trails designated for motorized or mechanized use, although there may be unimproved roads, and skid trails within the area. These areas may be closer to a maintained road if there are natural barriers, screening, or other relevant features of local topographic relief, and vegetative cover. Timber harvesting and vegetation management may occur on a short-term basis. Structures are rare and isolated. Road and trail density is low. On-site restrictions and controls are present but subtle.

   a. Portal sub-class describes a heavily used, but minimally modified setting that acts as a gateway to more popular remote areas. They are in the semi-primitive non-motorized ROS class, however the social setting is more typical of semi-developed natural areas.

2. **Semi-primitive motorized areas** are characterized by being or being contiguous to a predominantly medium-to-large size (at least 1,000 acres) natural or natural appearing environment. Interaction between users is low, but there is often evidence of other users and there may be a higher number of parties at designated concentration points. The area is managed so that on-site controls are subtle. Motorized uses are restricted to designated corridors. Timber harvesting and vegetation management are compatible activities for this class. These areas provide an opportunity for a high degree of interaction with the natural environment and structures are rare and isolated. The areas are at least 1/2 mile from maintained roads. These areas may be closer to a maintained road if there are natural barriers, screening, or other relevant features of local topographic relief, and vegetative cover. There is low road and trail density.

3. **Semi-developed natural areas** are characterized by a natural appearing environment where the sights and sounds of people are moderate. Interaction between users may be low to moderate, but evidence of other users is prevalent. Construction standards and facility design accommodate conventional motorized and mechanized uses. This creates opportunities for both motorized and non-motorized recreation. The opportunity for challenge and risk is generally not important. Areas are within 1/2 mile of improved roads. Many timber harvesting and vegetation management practices are compatible. Road and trail density is moderate. On-site restrictions and controls are noticeable but harmonize with the natural environment.

4. **Developed natural areas** are characterized by a substantially modified natural environment. Sights and sounds of people are readily evident. Interaction between users is often moderate to high because site/activity access is convenient. The opportunity to experience challenges, risk taking, and testing of outdoor skills generally are unimportant. Road and trail density is moderate. Many timber harvesting and vegetation management practices are compatible. Motorized and mechanized uses may be permitted. Structures are readily apparent and may range from scattered to small clusters that could dominate the landscape. These areas include pastoral, agricultural, intensively managed wildland resource landscapes, or utility corridors. On-site restrictions and controls are obvious and may be numerous, though they are largely in harmony with the developed environment.
The CHMU does not currently comprise any land that would be categorized as “Primitive,” “Semi-Primitive Motorized,” or “Highly Developed.”
J. Road Infrastructure, Public Access, and Structures Assessment

There are sixteen miles of gravel forest access truck roads within the CHMU. Associated with these roads are six substantial bridges and twelve large (over 4’ diameter) culvert crossings, and numerous smaller culverts. There are also several bridges and large culverts associated with recreational trails beyond these roads. Controlling access to this valuable investment are nineteen gates. These gates are closed and locked most of the time to protect the associated roads.

Over the years a substantial investment has been made to build and maintain these roads. Continuing upgrades and routine maintenance are critical. Due to changes in logging equipment and methods, former standards are commonly inadequate. Securing adequate funding for road improvements and maintenance is and will continue to be a challenge. Funding sources include the regular State Forest And Parks Access Roads appropriation, special capital funds appropriations, FPR’s Lands and Facilities Trust Fund, and federal grants, such as FEMA storm damage repair funds. Occasionally storm events cause substantial damage such as during Tropical Storm Irene in 2011, and a series of severe storms in June/July of 2013.

Within the CHMU are two gravel pits, one on the Duxbury Road in Bolton, and a smaller one on the Connally forest access road in Duxbury. Gravel from these pits has been used extensively in repairing and maintaining roads on the CHMU and after Tropical Storm Irene, by nearby towns. The gravel pit on Duxbury Road has been closed out and stabilized and will no longer be used.

Also, on the CHMU in addition to the road infrastructure are eighteen parking areas with an approximate capacity of 170 vehicles. Six of these parking areas are plowed during the winter.

Within the CHMU are four cabins/shelters and associated tent platforms adjacent to the Long Trail, one ‘ranger’ cabin, a tent platform area with eight tent platforms, and two barns. The trail associated structures are largely maintained by GMC in cooperation with FPR.

K. Scenic Values

The importance of scenic values of the Camel’s Hump Management Unit to the public is very high (see appendix D). The forest and mountains in and around the CHMU are viewed daily by commuters traveling the interstate and other roads, by numerous people out their front windows, by travelers as they fly over on their way to distant destinations, and by hikers on the summit ridges. Camel’s Hump and the associated lands within the management unit are iconic to the vast majority of Vermonters.

Whether the site distance is far, medium, or close, scenic values are vital to visitors to the land unit and viewers from afar.

Given the high importance of the scenic values to the public, future management decisions will take aesthetics into consideration.
IV. MANAGEMENT GOALS, STRATEGIES, AND ACTIONS

A. Management Goals for the Camel’s Hump Management Unit

Utilizing the “multiple-use” concept, management of the CHMU embraces several priorities in achieving the goals set forth for this land base. The top priorities of management for the CHMU are to protect and conserve the natural, cultural and scenic resources present, to provide a range of recreational opportunities, to continue to harvest forest products sustainably, and to maintain and enhance diverse wildlife habitats. The relative importance of these goals will vary based on several factors including designation: State Park, State Forest, or WMA. On the two Wildlife Management Areas within the CHMU the primary focus of management is to provide wildlife-based recreation including hunting, fishing, trapping, and wildlife observation by creating and maintaining high-quality wildlife habitats. Management priority will also vary depending on the Land Management Classification (LMC) (see Section IV.C, below).

Unit-Wide Goals:

Protect the natural and cultural resources of the Camel’s Hump Management Unit. The protection of the natural and cultural resources of the CHMU is of the utmost importance and the goal of resource protection is incorporated into everything we do on the CHMU. The natural qualities found here must be retained to protect and conserve aesthetic values, recreational opportunities, watershed values, timber, wildlife, and rare, threatened and endangered species for present and future generations. Proper consideration must also be given to protect important cultural and historic resources. Most of the protection strategies will be directed toward limiting certain activities. Some management activities will be undertaken to enhance this aspect of the CHMU.

Provide diverse recreational opportunities and trail systems where appropriate and compatible with other goals. Recreation is a primary and perhaps the most visible use of the CHMU. Management activities will maintain and enhance recreational opportunities. Most of the recreational pursuits on the CHMU are pedestrian based activities, primarily concentrated on trails but with increases in dispersed, non-trail recreation. Recreation management strategies are designed to provide an outstanding user experience while minimizing environmental degradation.

Produce a diverse array of forest products through sustainable management and harvest practices. Much of the CHMU is productive forest land that lends itself to the sustainable harvesting of forest products. In fact, much of the CHMU has been designated by statute (10 V.S.A §2353) as areas where management for forest products is among the primary purposes. A range of forest vegetation management techniques will be implemented on lands within the management unit. Forest management strategies are designed to produce high-quality forest products while still providing for habitat, biodiversity, healthy and vigorous forests, protection of water resources, opportunities for research, and the demonstration of forest management techniques to the public.

Provide high-quality habitat for target and general wildlife species. Utilizing a combination of commercial and non-commercial forest management practices, the CHMU will continue to provide some of the best wildlife habitats found in the area. Management operations will promote retention and enhancement of special wildlife related features. Old field openings will be maintained, large contiguous blocks of forest will remain, streams and wetlands will be protected, softwood cover will be enhanced, mast producing trees will be retained and released from competition from other trees, and
critical habitats will be conserved. Within areas prescribed for active management, areas of late-successional forest, which provide special wildlife habitats such as large snags, coarse woody debris, large tip-up mounds, and other related features will be managed to conserve, promote, and expand those features. Outside of areas prescribed for management, natural disturbance regimes will continue to be the dominant force shaping wildlife habitat.

B. General Management Strategies and Actions

Section A above identifies in a broad context the four primary management goals, informally referred to as Resource Protection, Recreation, Forest Products, and Wildlife. This section will describe some broad management strategies and actions that will help achieve each of these goals. These are intended to be broad-brush and relevant across the entire management unit. Section C below will consist of the Land Management Classification for the CHMU and will have more site-specific priorities, and management actions.

Resource Protection Management- Protect the natural and cultural resources of the Camel’s Hump Management Unit

Resource protection is incorporated with practically every management action conducted on the CHMU. The goal of resource protection is in the forefront of our minds when considering any new or existing activity on the CHMU. When one considers a management action, what typically comes to mind is a discrete activity—building a trail, ditching a road, etc. As such, there are few management “actions” conducted that can be thought of as furthering the goal of “protection.” Some of these actions are listed below, along with general strategies and points to consider that serve to further resource protection efforts:

- Promote an ethic of respect for the land, sustainable use, and exemplary management;
  - Continue to improve public outreach and education efforts aimed at educating users about appropriate uses of state land. Utilize a variety of information outlets including internet, social media, mailings, trailhead signs and others.
  - Conform to all deed restrictions, conservation easements, and legal agreements.
  - Ensure proper waste management at all facilities including trail shelters and parking areas.
  - Limit special use permits and licenses to appropriate activities and locations.

- Conserve biological diversity on the parcel and contribute to the diversity of the larger landscape;

- Maintain and enhance forest ecosystem health;
  - Conduct annual forest health surveys.
  - Consider invasive plant, insect, and disease conditions when determining the timing of various management activities.
  - Work with town forest fire wardens to provide for forest fire control as needed.

- Maintain or enhance quality rank of significant natural communities and protect habitat of rare, threatened, and endangered species;
  - Control or limit invasive species populations to the extent feasible.
Monitor impacts from other uses, including recreation and forest product management.

- When appropriate, allow natural processes and disturbance regimes to prevail.

- Document, interpret, and protect historic resources;
  - Identify and buffer known and discovered cultural and historic sites.
  - When appropriate, install interpretive signage about historic resources along roads and trails.

- Promote resilience and adaptation to address climate change scenarios;
  - Retain and enhance the amount and distribution of coarse and fine woody material for nutrient cycling and soil protection.
  - Manage for tree age diversity and forest structural complexity across the landscape with particular attention to landscape-level management, in order to moderate impacts of severe disturbances.
  - Enhance forest cover in riparian areas and adjacent upland forests and wetland buffers to maintain natural stream temperatures, wildlife corridors, and to mitigate flooding impacts.
  - Maintain and enhance forest species diversity including trees, shrubs, herbaceous plants, and bryophytes to aid in maintaining forest processes.
  - Maintain rare and sensitive natural communities as potential refugia.
  - Promote landscape connectivity by considering management actions on nearby properties when enacting management on the CHMU.

- Enhance water quality, fisheries habitat, flood resilience, and wetland function;
  - Improve existing road and trail infrastructure to minimize soil erosion.
  - Adhere to Riparian Management Guidelines for Agency of Natural Resources Lands.
  - Follow state and federal permit requirements and conditions related to wetlands, stream alterations, storm water runoff, wastewater management, etc.
  - Plan water crossings on roads and trails to withstand increasing frequency and intensity of storm events, thereby enhancing flood resilience and mitigating downstream impacts.

**Recreation Management - Provide diverse recreational opportunities and trail systems where appropriate and compatible with other goals.**

The intent of recreation management on the CHMU is to provide a variety of experiences for the visiting public within the capabilities of the resource following state policies, rules and regulations and with regard to easement and other restrictions. While there are many different recreational opportunities to enjoy on the CHMU, this land base cannot provide everything, and certain recreational activities are not compatible anywhere on the unit. Listed below are various strategies and tactics that are employed on a broad scale within the CHMU to meet the goal of providing diverse recreational opportunities:

- Protect and improve public access;
o Provide for special use permits and licenses for activities that are compatible with the goals of the property and ANR policies through review by the District Stewardship Team (DST).

o Evaluate the capacity of parking areas and identify and implement management strategies to address parking challenges.

o Enhance opportunities for wildlife-based recreation, particularly hunting, trapping, and wildlife viewing.

• Maintain existing trail system;
  o Continue ongoing maintenance to trails and associated facilities utilizing volunteers, trail crews, contractors, available staff, and continuing to work with established recreation partners.
  o Continue to allow camping in the GMC maintained structures (see map 12)
  o Continue to allow primitive tent camping, in portions of the CHMU in accordance with the FPR’s Primitive Camping Guidelines.
  o Partner with organizations including the GMC, Vermont Association of Snow Travelers (VAST), the Catamount Trail Association (CTA), and the Vermont Mountain Bike Association (VMBA) to provide enjoyable and safe trail user experiences, and an ecologically sound trail system.
  o Continue to monitor trail usage using trailhead registers, electronic counters, GMC caretakers, and other appropriate means. Usage data is critical as a basis for management decision-making and justifying continued and enhanced funding for recreation management.
  o Explore options to expand funding for recreation management.

• Explore opportunities to expand recreation where appropriate and compatible with other goals;
  o Evaluate new recreational use requests in the context of total recreational use of the parcel (degree of use, numbers of trails), the Recreational Opportunity Spectrum, and other management goals for the parcel.
  o Partner with organizations including the GMC, VAST, CTA, and VMBA to provide enjoyable and safe recreation experiences, and an ecologically sound trail system.
  o Ensure proper planning for and implementation of new trails where appropriate. Planning should include expected changes as a result of climate change including extended hiking seasons, increased cost of maintenance, and the need for more robust infrastructure related to water crossings.
  o Be proactive in recognizing emerging and growing recreational pursuits such as rock climbing, backcountry skiing, winter mountain biking, etc. Work with partnering organizations to ensure sustainable accommodation of emerging recreational pursuits.
  o Engage in proactive education campaigns to inform users of the importance of strong backcountry ethics on public land.

ANR works with partnering organizations to better serve the public with recreation related projects and activities on the CHMU. From time to time these organizations propose changes or refinements to their respective trail systems. The Agency has Cooperative Agreements with VAST, CTA, and VMBA, and a Memorandum of Agreement with GMC. The Agency also receives ideas and formal proposals from individuals and small groups, and develops proposals within the Agency staff as well.
Within the context of this Long Range Management Plan (LRMP), recreation project proposals have been submitted to ANR by partnering organizations and individuals during public scoping phase and the public comment period following release of the initial draft of the LRMP in October 2017. Some of these projects have the preliminary support of the DST and are included in the LRMP as possible projects for implementation. These can be found in the Land Management Classification Section (section IV.C) and are depicted on maps 16 and 17. These project proposals will undergo further review by the DST prior to implementation.

FPR recently developed a comprehensive approach to be used in evaluating all recreation proposals on FPR lands. Recreation partners and other interested parties are invited to submit a pre-proposal that briefly describes the project and where the new use/trail would be located. The DST evaluates the proposal for its consistency with department policies, property management goals, and the Long Range Management Plan. If the DST determines that the project is consistent with the LRMP, the applicant would be invited to submit a more detailed project plan. The DST would review the detailed proposal evaluating its sustainability, resource impacts, and user impacts. We anticipate this process to be a collaborative one between the applicant and ANR, and will likely require site visits and many refinements. It is anticipated that many proposals simply may not be feasible, however, this process will set clear expectations of both the applicant and ANR, including for locations where projects may be feasible.

Additional recreation proposals are likely to be submitted after approval of the LRMP. These will be evaluated as described above. Those proposals that have support of the DST but are not already included in the LRMP may require an amendment to the LRMP in accordance with Section VI of the LRMP.

This plan does not include a specific implementation schedule for recreation projects. Maintenance projects are conducted on an as-needed basis and are impacted by use levels, weather conditions and other factors. New projects typically include collaboration with partnering organizations and the timing of these projects often depends on factors that are external to ANR.
Map 17: Planned Recreation, Howe Block.
Timber Management- Produce a diverse array of forest products through sustainable management and harvest practices

Within the Camel’s Hump Management Unit there are approximately 7,500 acres available, accessible, and appropriate for vegetation management activities by the State. The timber rights on an additional 1,467 acres of the Huntington Gap WMA are owned by the Eaton family and managed by the A. Johnson Company. Timber management activities include commercial timber and firewood sales, roadside firewood lots, and will increasingly involve the control of invasive plants and insects.

ANR firmly believes that forests can and should be managed to produce a variety of benefits for people and wildlife. Vermont is home to a vital forest products industry, of which ANR lands are a small, yet important component. While revenue generation is never the primary reason to conduct forest harvesting activities on ANR land, it is still an important consideration as timber-derived revenues are reinvested in public lands and facilities (including trails, parking areas, and habitat enhancements) and they also support the operation of Vermont State Parks. Furthermore, commercial timber harvests are often the only affordable way to accomplish certain types of wildlife habitat management and to achieve management objectives related to landscape diversity and resilience. Listed below are various strategies and tactics that are employed on a broad scale within the CHMU to meet the goal of sustainable production of forest products:

- Utilize a range of suitable silvicultural techniques;
  - Consider a broad range of peer-reviewed silvicultural guides.
  - Determine the most appropriate cutting regime on a site-specific basis. Such cutting regimes include but are not limited to: single tree and group selection, irregular shelterwood, regular shelterwood, seed tree, patch cutting, and crown thinning.
  - Consider the timing of silvicultural treatments (winter vs. summer) in regard to soil and water protection, and desired regeneration.
  - Match the harvest system and type of equipment used with location and site conditions of a given timber sale project.

- Design silvicultural prescriptions that consider likely climate change scenarios and focus on resilience and complexity;
  - Follow Agency guidelines as they relate to assisted migration.
  - Where possible, release softwood regeneration from competition from other trees to enhance the softwood component of the forest.
  - Ensure that advance regeneration is abundant prior to overstory removal when conducting even-age management.
  - Monitor harvests and temporarily halt operations as needed to protect soil, water, and access infrastructure.
  - Match equipment to terrain and harvest objective to reduce soil and stand impacts.
  - Monitor for early detection and removal of invasive plant species. Where invasive plant populations are already established, include aggressive management as a component of any silvicultural technique.
  - Plan silvicultural activities to help control invasive plant populations. Ensure all earth-moving equipment is free of soil and plant material prior to entering ANR land.

- Maintain an adequate road access system;
  - Schedule road maintenance to coincide with upcoming harvesting activities when possible.
- Maintain roads recognizing that likely climate change scenarios suggest more frequent and intense storm events in the future.
- Replace and enlarge inadequate culverts and stream crossing structures thereby enhancing flood resilience.
- Minimize number of skid roads and trails.
- Properly close out poorly built historic skid roads that are within and nearby operating timber harvests.

- Follow a strategy of rotating harvesting projects around the CHMU to enable a sustainable harvest in all forest blocks;
  - Undertake periodic forest inventories to assist with guiding future plans and developing proper silvicultural prescriptions.
  - Focus timber production on better growing sites where ecologically appropriate.

- Improve public outreach about the purposes, outcomes, and importance of timber management.
  - Install educational signage in the vicinity of timber sales describing the goals of the harvest and expected impacts to wildlife habitat.
  - Utilize press releases and outreach to communities to inform the public about the goals of each harvest and expected impacts to wildlife habitat.
  - Host in-person tours of active timber and wildlife management projects.

- Incorporate FPR published Acceptable Management Practices and Riparian Management Guidelines for Agency of Natural Resources Lands into all harvesting projects to ensure a continuing high level of protection of water quality and soils.

ANR has a robust process for planning and implementing forest products harvests. Prior to the initiation of a timber sale, a pre-sale cruise, or inventory of the forest is conducted. This inventory includes gathering data related to forest health, species composition, soil characteristics, wildlife habitat considerations, wood product quality and value, and a separate review by an ecologist trained to identify resource constraints, especially as they relate to rare, threatened, and endangered species and significant natural communities. This information is used to develop formal silvicultural prescriptions consistent with the management goals for a given parcel of land. Silvicultural prescriptions are reviewed by the DST as well as central office staff. Current silvicultural guides are referenced to formulate appropriate strategies for treatment. A variety of silvicultural treatments will be utilized depending on the information gathered and opportunities for demonstration projects.

Over the next fifteen years thirty-four commercial timber sales are planned with an average of 251 acres treated per year involving an approximate total of 3,764 acres. These treatments range in size from 24 acres to 231 acres, with the average sale size of 107 acres. Many of the larger timber sales will take two seasons to complete. Most of the timber sales on the CHMU are conducted in the winter months to reduce impacts to sensitive natural resources and commercial tree regeneration, however summer logging is suitable in some instances when ground conditions allow and soil scarification benefits tree regeneration. Virtually all commercial timber sales are put out to bid. Generally, the high bidder is awarded the contract, with significant conditions and stipulations. Foresters from FPR are responsible for all aspects of sale development and administration.

Access to some stands can be challenging on certain parts of the CHMU. As such, it is important for ANR to work closely with neighbors to keep them informed of planned harvesting. ANR is dedicated to
improving the quality of our access roads but has no authority or revenues for town or state highways. Timber sales are often an opportunity to make improvements to forest access roads and shared rights-of-way alike.

The treatment schedule may at times need to be flexible due to unforeseen circumstances. Examples of this include road washouts, disease or insect infestations, poor conditions for logging such as extended wet periods or lack of cold weather and/or inadequate snow cover. See section IV.D below for an implementation schedule of commercial timber harvests on the CHMU. The “Treatment” column represents a preliminary determination of the type of silvicultural treatment that will be utilized on a given sale. The treatment type will be further refined after completing the pre-sale cruise referenced above.

In addition to commercial timber sales, ANR also offers a small number of so called “off-road firewood lots.” These lots range in size from ten to one hundred cords of firewood. These small operations can serve as an opportunity to improve the timber quality or wildlife habitat of an area that might otherwise be too small to warrant a “typical” timber sale contract. Additionally, they help engage smaller operators on state land who otherwise would not be able to compete with larger mechanized operators. As opportunities arise the plan is to continue these sales.

Over the past four decades ANR has provided opportunities to the public to cut firewood for home heating on the CHMU. These small firewood lots have ranged from three to six cords each along forest access roads. These firewood lots are dependent on good forest access roads, and the presence of firewood trees that are safe for felling near the road. With time, the availability of firewood trees near the road has declined and this program was suspended in 2016. With time, it is possible that a small number of lots may become available in future years.

Control of invasive plant species will be a priority for staff. Strategies for control will include the use of herbicides and manual/mechanical methods such as mowing, pulling, and burning with a torch.

**Wildlife Habitats Management- Provide high-quality habitat for target and general wildlife species**

High priorities of management on the CHMU are special wildlife habitat projects and the incorporation of wildlife related management into other activities. Some of the important wildlife habitats found in the CHMU are classified in this plan as land use classification 1.7: *exceptional water resources*, and 2.2: *critical plant and wildlife habitat*. These areas include beaver wetlands, beech mast production areas, deer wintering areas, red oak stands, soft mast production areas (e.g. apple trees), and maintained fields. Specific management strategies aimed at maintaining and enhancing these resources, are listed in section IV.C. Land Management Classification.

There are, however, many other important habitat features found on the CHMU. Examples include vernal pools, small wetlands, seeps, aspen and birch stands, young forest, bobcat denning habitat, raptor nesting trees, snags and cavity trees, and late successional (old) forest. Many of these features are found at a scale that is too small to be useful in the LMC or are of an ephemeral nature. Management activities will be designed to maintain and improve wildlife habitat wherever possible, using a combination of active and passive management.

Aside from habitat management actions listed in the LMC section, specific wildlife management strategies and tactics that will be regularly implemented on the CHMU are:
• Protect and enhance unique wildlife habitats and features for both general and target wildlife species;
  o Adhere to management guidelines for bats in Vermont prepared by the Vermont Fish and Wildlife Department. Review all timber harvests that are proposed within the CHMU for potential effects on these species, and adjust prescriptions and timing of operations accordingly.
  o When timber management may affect moose winter habitat (mature softwood above 2000 feet in elevation), use Vermont Fish and Wildlife habitat management guidelines for moose.
  o Release from competition and maintain where possible important mast producing trees and shrubs such as beech, apple, cherry, serviceberry, oak, and alders.
  o Avoid or minimize impacts to Bicknell’s thrush and its habitat.
  o During management activities, monitor for the presence of important wildlife habitat, such as bobcat denning sites, raptor nest trees, etc., and provide a buffer adequate to prevent disturbance to these features.
  o Management strategies should promote adequate numbers of snags, cavity trees, and dead and downed wood, in accordance with the best available science. In the long-term a site would contain four to six each of snags and cavity trees >12” diameter per acre, with one to two each of snags and cavity trees >20” in diameter per acre. When the volume of downed woody material is inadequate, managers will attempt to recruit a total of 3-5 stems >18” in diameter, and 10 stems >14” in diameter per acre, all at least 16’ long. Achieving these targets may not be possible on all managed sites after one entry.

• Protect and enhance wildlife habitat through management of all vegetative stages;
  o Use timber harvesting to increase the proportion of young forest (early successional habitat) found in the CHMU. On the CHMU there are approximately 7500 acres available for commercial vegetation management by ANR. Throughout this area, ANR will attempt to maintain 2-5% of the total in young forest (1-15 years), which is consistent with goals for maintaining the state significant northern hardwood forest community. This will be achieved by creating and/or maintaining patches from two acres up to fifteen acres in size for a target of 150-375 acres within the next 15 years. A target of 2-5% is within the natural range for this biophysical region and in approximate agreement with the regional target established by the Vermont Conservation Design effort. Young forest will be created near existing access roads, already disturbed areas and forest openings, and when possible, target those forest types that are already dominated by short-lived pioneer species.
  o Use a combination of passive and active management to promote development of old forest (late successional forest) and structurally complex forest habitats in the CHMU. At present 65% of the CHMU is not available for timber harvesting and will naturally age into older forest and more complex structure. This includes 91% of the Spruce-Fir Northern Hardwood forest types, and 50% of the Northern Hardwood forest types, including forests at lower and mid-elevations (see map 11 and table 7). This is consistent with Vermont Conservation Design (Sorenson and Zaino 2018) which identifies the ecological importance of old forests and sets a target of allowing 10% of Vermont’s forest to develop and maintain old forest structures and functions.

• Assess management activities for impacts to wildlife at the landscape level;
  o Document, maintain, and enhance known and suspected travel corridors to enable wildlife movement across the broader landscape.
- Maintain the unfragmented character of the CHMU.
- Maintain the high quality of the surface waters within the CHMU to protect aquatic habitat;
  - Identify appropriate Riparian Management Zones in accordance with the Riparian Management Guidelines for Agency of Natural Resources Lands to protect riparian function around all wetlands, seeps, streams, and vernal pools. Activities that might result in disturbance or displacement of wildlife from these features will be avoided or minimized.
  - Design roads, trails, and other infrastructure to allow for aquatic organism passage and riparian connectivity.

Implementing the strategies above can be a herculean and perpetual task. As such, ANR will capitalize on the efforts of volunteers, hire individuals or crews using grant funds, attach work of this nature to a timber sale contract, and create special work days for Agency staff. Occasionally the State will utilize a controlled burn to manage forest openings.

Large unfragmented areas of forest are valuable, and necessary to some species of wildlife. As such, ANR intends to retain large areas without development of permanent roads, trails or structures.

While there is no established specific timeline for wildlife habitat projects on the CHMU, when and where opportunities are identified, management activities shall incorporate specific actions to protect or improve habitat. Typically, old field mowing is done on an annual to five-year schedule. Mast tree release is accomplished on a regular basis as a component of commercial timber sales, by utilizing the services of contractors, and by coordinating volunteers.

C. Land Management Classification - Site Specific Management Actions

While sections A and B above identify broad management goals, strategies, and actions for the CHMU, ANR recognizes that sometimes two goals can be partially incompatible. It is impossible-- and inappropriate -- to prioritize and maximize recreation, timber production, and wildlife habitat on every acre of land. Instead, ANR utilizes the resource assessments, public input, and local knowledge to decide where to focus certain efforts. Site-specific management decisions for the CHMU are guided by the ANR Land Management Classification system. Additionally, management of Camel’s Hump State Park must also follow the legislatively mandated system of Use Districts defined by the Vermont Legislature in 1969 in Title 10, Chapter 77, Sections 2351-2354.

The Agency Land Classification system utilizes four management categories. These categories are:

1) Highly Sensitive Management
2) Special Management
3) General Management
4) Intensive Management

As part of the planning process the lands, resources, and facilities held by ANR are evaluated and assigned to the appropriate management category. Assignment of land management areas for each parcel is based on a thorough understanding of the resources identified and the application of land management standards. As time goes on, and additional information is gathered, the State will take an adaptive management approach with the potential for modifications or revisions to the Land
Management Classification for the CHMU. Maps 18 & 19 depict the location of each Land Management Classification.

1) Highly Sensitive Management Category:
This is defined as an area with uncommon or outstanding biological, ecological, geological, scenic, cultural, or historic significance where protection of those values is the primary consideration for management. Human activities and uses should not compromise the exceptional feature or features identified. In general, these areas will develop under natural processes and natural disturbance regimes and will not be subject to active forest or habitat management. In some limited cases vegetation may be manipulated for natural community restoration; management or specific habitats for rare, threatened, and endangered species; and to maintain safe and enjoyable recreation access.

Within the CHMU there are 9127 acres classified as Highly Sensitive Management. These include:

1.1: Rare or exemplary natural communities or species (80 acres)

   A) Camel's Hump Summit (14 acres) – The Camel’s Hump Summit is an iconic landmark and offers a unique alpine experience and is thus deserving of a very high degree of protection. The Alpine Meadow and Subalpine Krummholz natural communities are both very rare in Vermont and restricted to the tops of just the three highest mountains. The Alpine Meadow hosts numerous rare, threatened, and endangered plants, many of which are more commonly found in arctic tundra hundreds of miles further north. The Boreal Acidic Cliff community found just to the south of the summit is a designated cliff reserve. While it is essential to protect the resources found here, still, it is important to recognize that recreational use can be compatible. The Camel’s Hump Summit is a highly visited area with over 16,000 people a year signing in at trail registers, most with the goal of reaching the top. Many more visitors do not take the time to sign in. Damage to the alpine zone due to the high visitation is a real concern. The balancing of resource protection with recreational interests is of utmost concern here.

   Management Actions:
   - Confine use to designated trails and area of bare rock on summit.
   - Continue GMC seasonal caretaker presence on summit. The seasonal caretaker can be found almost daily on the summit in the summer months and regularly interacts with visitors and reinforces resource protection.
   - Continue with closure of north summit area to visitors. Closure is identified by wooden signs.
   - Compile alpine area research and consider experimental approaches to small areas to retain and restore alpine vegetation.
   - Continue research to characterize and document summit area flora and fauna.
   - This area is designated as Cliff Reserve per FPR policy, with a goal of maintaining species and ecological functions undisturbed by recreational climbing.
   - Recreational rock and ice climbing is not allowed on these cliffs.

   B) Cliffs adjacent to Appalachian Gap (64 acres)- These cliffs provide continuity and connection with adjacent ridges of montane spruce-fir and the spruce-fir-yellow birch natural communities. Three rare plants are located here. This area is very accessible as it lies adjacent to a parking area at Appalachian Gap. The Long Trail also traverses the cliff community. There is evidence that the cliffs are used by rock climbers. Due to the sensitivity of the area and the valued scenic resource, ANR was pleased that in accordance with stipulations of their license agreement,
American Tower decided to remove the telecommunications tower from the high point of Route 17. This area was restored in the summer of 2014.

Management Actions:

- Monitor cliff communities for impacts from rock climbing activities.
- Consider designation as a cliff reserve should monitoring of natural communities deem it necessary. Such a designation would entail a prohibition on rock climbing.
- Work with CRAG-VT on education and outreach to climbers emphasizing the sensitivity of cliff communities and the importance of low impact climbing practices.

C) Rare plant located on the Stevens Block of CHSF (~2 acres) Jacob’s Ladder (*Polemonium vanbruntiae*) is found in an opening.

Management Actions:

- Monitor the population to detect any changes in abundance and health of the plant species.
- Develop strategies to enhance and maintain this population.

1.7: Exceptional water resources (166 acres)

D) Beaver maintained wetland complexes outside of the defined Natural Area (149 acres)- There are at least seven beaver complexes located outside the Natural Area (see 1.8, below). Beaver wetlands are the only open water features in the uplands of the CHMU and are thus critically important habitat for a variety of wildlife species.

Management Actions:

- Prohibit new trail development, unless new trail reduces impact from existing or unregulated use.
- Manage for riparian functions and values in a minimum 100’ zone around all wetland areas.
- Explore opportunities to relocate existing trails to avoid beaver wetlands.

E) Riparian Management Zone (100’) along the Winooski River (17 acres) - In four separate spots, ownership extends all the way to the Winooski River. These areas of floodplain forest are limited in extent, but very important for flood attenuation, wildlife habitat, and many other riparian functions. In one area, adjacent to agricultural fields, the Long Trail has been relocated and briefly crosses into the Winooski River Corridor and Riparian Management Zone. The Winooski River RMZ will be managed in accordance with guidance provided in the *Riparian Management Guidelines for ANR Lands*. The exception to this is a small portion of the 92-acre agricultural license that uses the extreme outer edge of the RMZ (see LMC 2.8L).

Management Actions:

- Utilize low-impact trail maintenance techniques
- Minimize permanent trail infrastructure in accordance with consultation from DEC Watershed Management Division.
- Respond appropriately to changes in flood regimes or sediment impacts from trail.
- Plant trees to add functionality as riparian habitat and floodplain forest.
Monitor for the existence and proliferation of invasive plant species as these areas are likely to be entry points for various invasive plants including knotweed.

1.8: Camel’s Hump Natural Area and the Camel’s Hump Ecological Area (6,876 acres). This land management classification consists of two separate, but overlapping land designations.

I. The Camel’s Hump Ecological Area was created and defined through Vermont Statute (10 V.S.A §2353). This Area includes all land above 2500’ in elevation and extends down to 900’ elevation in the Gleason Brook Drainage. This area was designated in order to protect rare plants, preserve natural habitats and to maintain the wilderness feel.

II. The Camel’s Hump Natural Area was originally designated in 1965 and expanded in 1997. Natural Area designation is defined by Vermont Statute (10 V.S.A §2607). Natural Areas are lands that have retained their “wilderness” character or have rare or vanishing species of flora or fauna. These areas may include unique ecological, geological, scenic, and recreational features.

Because these two designations are similar in nature, they have been combined into one land management classification for any lands that are part of both the Natural Area and the Ecological Area.

F) Camel’s Hump and Bald Hill Summit Ridge (1851 acres)- As noted above in LMC 1.1A, The Camel’s Hump Summit is a highly visited area with unique geological and ecological features. The Camel’s Hump and Bald Hill Summit Ridge is traversed by several trails leading to the summit and has a relatively high trail density. The high visitation of this particular area is the reason that it is not lumped in with the rest of the Natural Area and Ecological Area (see LMC 1.8G below).

Management Actions:

- Continue GMC seasonal caretaker presence.
- Continue to prohibit primitive camping.
- Evaluate any new recreation development for consistency with a forthcoming policy update about allowed uses within Natural Areas.
- Monitor the use levels, extent of, and impacts from unauthorized cutting of trees and shrubs. Some users have been cutting vegetation to make skiing through the woods easier. FPR will work with Catamount Trail Association to raise awareness of the backcountry ethic and with law enforcement on prosecution of illegal activities.
- Consider options for management of existing backcountry skiing use, ongoing maintenance of existing skiable lines, and the addition of new lines in the vicinity of Bald Hill. The Bald Hill area is popular with backcountry skiers. Many areas are already home to natural and human made skiable lines that have been in existence for some time. ANR recognizes the growing popularity of this sport and believes that this use could be sustainable through management of a backcountry ski zone, and

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7 The Ecological Protection Zone (EPZ) of Phen Basin Block of Camel’s Hump State Park was added to the Natural Area in May of 1997. Because most of the EPZ would not have been part of the Ecological Area based on the elevation thresholds in 10 V.S.A §2353, it is included in its own LMC. See LMC 1.10.

8 For purposes of this document a ski “line” is the path taken by a skier as they ski through trees and around obstacles.

9 For purposes of this document a ski “zone” is a landscape-scale area designated and managed in part, for tree skiing. Zones may consist of one or more skiable lines for descending and one or more trails for ascending through the zone.
potentially in cooperation with the Catamount Trail Association or another capable
group. This arrangement is successfully being demonstrated on other units of ANR
land (Wiloughby State Forest, e.g.). Backcountry ski management is compatible with
the purposes established for the Ecological Area and Research Area. The level of
management will be commensurate with the existing use and expected future use
of the area. The health of the alpine forest, integrity of the forest research area, and
the implications of management on Act 250 jurisdiction will all be important
considerations when identifying management options for new or existing skiable
lines. FPR will seek a partner for the purpose of monitoring and researching the
impacts of backcountry skiing on forest health and wildlife habitat.

- **Continue to strengthen protection and education efforts focused on the health of the alpine zone.** Ever expanding visitor numbers poses a concern to the health of the summit ridge and the summit itself. ANR will work with GMC to implement creative solutions aimed at minimizing visitor impacts to the alpine zone.

- **Designate the Camel’s Hump Challenge Cross Country Ski Trail.** The trail circumnavigates Camel’s Hump and has been used for a special fundraising event once a year for over twenty years. The trail may now be marked and open all winter for use. Trail designation is compatible with the purposes established for the Ecological Area. A portion of this trail may also be co-incident with a re-routed section of the Catamount Trail. The bulk of the newly designated trail will traverse land management classifications 1.8F, however it will also traverse portions of 1.8G, 1.9H and 2.5J. Recreational use is in high demand in this part of the CHMU and proactive management should help it develop in a sustainable way. Non-motorized winter use will cause negligible site disturbance. Small re-routes to the existing trail may be necessary to mitigate impacts, reduce maintenance efforts, and to avoid existing long-term research plots.

- **Consider options for management of existing backcountry ski use, ongoing maintenance of existing skiable lines, and the addition of new lines in the vicinity of the old Callahan Trail.** See LMC 2.5J for details.

**G) Cliff Reserve within the Natural Area (391 acres)**- This area shares nearly all of the same characteristics as LMC 1.8F. The distinguishing feature is a set of Boreal Acidic Cliffs that are of high ecological quality and mostly undisturbed by human activities. In contrast to other large cliffs in the vicinity (such as those in Bolton Notch or on Bone Mountain) which are frequented by rock climbers, these sizeable examples in an intact landscape and with little history of climbing use are notable. Several, particularly the summit cliff (see LMC 1.1A), support significant populations of rare plant species. Maintaining the ecological quality of these cliffs and limiting human disturbance provides an opportunity to protect all the associated species, habitats, and processes and functions of the natural community, including those that are not well understood.

**Management Actions:**

- **This area is designated as Cliff Reserve per FPR policy, with a goal of maintaining species and ecological functions undisturbed by recreational climbing.**

- **Recreational rock and ice climbing is not allowed on these cliffs.**

- **Continue GMC seasonal caretaker presence.**

- **Continue to prohibit primitive camping.**
- Monitor the use levels, extent of, and impacts from unauthorized cutting of trees and shrubs to create skiable lines. Work with Catamount Trail Association to raise awareness of the backcountry ethic.
- Evaluate any new recreation development for consistency with a forthcoming policy update about allowed uses within Natural Areas.
- Consider options for management of existing backcountry skiing use, ongoing maintenance of existing skiable lines, and the addition of new lines in the vicinity of the old Callahan Trail. See LMC 2.5J for details.
- Continue to strengthen protection and education efforts focused on the health of the alpine zone. Ever expanding visitor numbers poses a concern to the health of the summit ridge and the summit itself. ANR will work with GMC to implement creative solutions aimed at minimizing visitor impacts to the alpine zone.
- Designate the Camel’s Hump Challenge Cross Country Ski Trail. See LMC 1.8F for details.

H) Other Parts of the Natural Area and Ecological Area (4635 acres) - These high elevation areas (>2500’) and the greater part of the Gleason Brook Drainage are relatively remote and largely trail-less. They range in size from 2 acres to over 1600 acres. While the Long Trail traverses some of these areas, these are places where one is more likely to find solitude.

Management Actions:

- Continue GMC seasonal caretaker presence.
- Prohibit new trail development, unless new trail reduces impact from existing or unregulated use. The only exception to this would be the possibility that a small portion of the Long Trail re-route will traverse the extreme lower edges of the Gleason Brook drainage. This re-route is further described in LMC 3.0A.
- Continue to prohibit primitive camping.

1.9: Research Natural Area (303 acres)

I) Hub Vogelmann Research Natural Area (303 acres)- This portion of the designated forest research area encompasses portions of both the Natural Area and Ecological Area. This research area has been in continuous use since 1962 for critical forest research primarily related to acid deposition and forest dynamics.

Management Actions:

- Continue to prohibit primitive camping.
- Evaluate any new recreation development for consistency with a forthcoming policy update about allowed uses within Natural Areas.
- Designate the Camel’s Hump Challenge Cross Country Ski Trail. See LMC 1.8F for details.
- Relocate the Catamount Trail. See LMC 2.6K for details.
- Maintain conditions for ongoing and future forest research in a natural setting with reduced or little human disturbance.
- Monitor the use levels, extent of, and impacts from unauthorized cutting of trees and shrubs to create skiable lines. Work with Catamount Trail Association to raise awareness of the backcountry ethic.
Consider options for management of existing backcountry skiing use, ongoing maintenance of existing skiable lines, and the addition of new lines in the vicinity of Bald Hill. See LMC 1.8F for details.

1.10: Areas Protected by Deed Restriction or Conservation Agreements (1703 acres)

J) Phen Basin Ecological Protection Zone (1703 acres\textsuperscript{10}) - The Vermont Housing and Conservation Board (VHCB) and Vermont Land Trust (VLT) co-hold an easement on the Phen Basin Block of Camel’s Hump State Park. The easement has specific requirements and restrictions as they relate to a part of the property known as the Ecological Protection Zone (EPZ). This area was also added to the Camel’s Hump Natural Area in May of 1997. The EPZ is host to sensitive ecological features, and the area shall be managed primarily for the purpose of protecting the health and viability of plants, animals, natural communities, and the ecological processes which support them. Wildlife habitat management is meant to focus on maintaining or enhancing biological diversity and old growth forest. The easement precludes certain activities, including timber harvesting. Recreation management is a secondary goal of the management of the EPZ, however the easement does permit a variety of non-commercial recreational activities. This area is traversed by the Catamount Trail and VAST trail, as well as portions of two mountain bike trails—East Loop and Chain Link trails, all of which are permitted under the easement.

Management Actions:

- Assess forest condition and old growth status.
- Evaluate any new recreation development for consistency with a forthcoming policy update about allowed uses within Natural Areas.
- Consider expansion of mountain bike trails in cooperation with the Mad River Riders—the local mountain bike club. Any new trails would be in the vicinity of the already existing trail network and serve primarily to enhance recreation connectivity in the area. These new trails would add to the trail base of entry-level and intermediate trails, which are reportedly lacking on state land and in the Mad River Valley in general. Any new trails will need to be carefully planned to comply with primary purposes of the EPZ and to avoid impacts to the myriad sensitive ecological features located in Phen Basin. New trail proposals would be reviewed by the District Stewardship Team, VHCB, VLT, and through the Act 250 amendment process. Additional mountain bike trails may also traverse LMC 3.0.
- Collaborate with VHCB and VLT to meet the requirements of the easement.

2) Special Management Category:

An area with 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 habitat management, roads, and recreational activities should not compromise the unique or special resources identified. Timber harvesting and wildlife habitat management as well as recreation are considered to be complementary uses within this classification to the extent that they do not negatively impact special features.

\textsuperscript{10} Total acreage of the Ecological Protection Zone is greater. Some parts of the EPZ are already incorporated into other LMC categories, including 1.8H, 1.7D, and 2.2A.
Within the CHMU there are 9006 acres in the Special Management classification. These include:

2.2: *Critical Plant and Wildlife Habitat* (1464 acres)

A.) Beech Mast Production Areas (391 acres) - These areas have been identified as places where American beech makes up a significant portion of the tree canopy and show evidence of feeding activity by bears. Beech nuts are a very important food source for a variety of wildlife species. While beech trees are present throughout the forests of the Camel’s Hump Management Unit, this land classification applies only to identified “Beech Mast Production Areas.” Principles of beech management will be incorporated into all aspects of forest management; however, these areas are unique in the sheer density of beech and the importance of the food source.

*Management Actions:*

- *Within beech stands that are scheduled for timber management, follow the VT ANR Management Guidelines for Optimizing Mast Yields in Beech Mast Production Areas.* Examples of key management strategies include a) identifying disease-resistant, and mast-producing trees and protecting these individuals, and b) application of uneven-aged management in the mast stand and 200 foot buffer.
- *Limit or restrict vehicle access to the mast stand during critical feeding periods.*
- *Limit new trail development that would lead to increased use during critical feeding periods, unless new trail reduces impact from existing or unregulated use.*

B.) Deer Wintering Area (446 acres) - Due to the elevation, there is limited deer wintering habitat on the CHMU. Those areas that do exist need to be carefully managed to continue providing habitat that is critical to deer at this latitude. Deer wintering areas are those in which softwood trees are the major component of the overstory, but must lie at an elevation that is favorable to overwintering deer.

*Management Actions:*

- *Within deer wintering areas that are scheduled for treatment, comply with Management Guide for Deer Wintering Areas in Vermont (VDFPR and VDFW 1990).* Examples of key management strategies are a) perpetuate softwood cover, b) maintain deer mobility and access, and c) provide preferred, accessible browse.
- *Discourage new trail development that would lead to increased use during the winter unless new trail reduces impact from existing or unregulated use.* A portion of the re-routed Long Trail (see LMC 3.0A) may traverse a small deer wintering area near Honey Hollow. This area was evaluated in 2019 and receives relatively little deer use. The low level of anticipated winter use on this re-route would not significantly impact this resource.
- *Explore opportunities to relocate existing winter trails to avoid deer wintering areas, specifically on the Catamount Trail between Camel’s Hump Road and Stagecoach road.*

C.) Old Fields/Maintained Openings (23 acres) - Old fields and maintained openings provide valuable landscape diversity and critical habitats for certain early successional wildlife species. These are predominantly located near existing roads and at lower elevations on the CHMU.
Management Actions:

- Maintain openings by mowing on a 2-5 year cycle.
- Delay mowing of maintained fields until after August 15 to provide habitat for birds, as well as wildflowers that support bees and other pollinator species.

D.) Soft mast Production Areas (23 acres) - Soft mast production areas are important for their landscape diversity and for their supply of food for a diversity of wildlife. The soft mast production areas represented in this category are all areas where old apple trees are growing. Soft mast-producing trees appear throughout the forest and include cherry and serviceberry, however this category consists only of areas that have a high density of apple trees. Principles of mast production will be incorporated throughout the CHMU.

Management Actions:

- Release apple trees by cutting competing vegetation thereby allowing more light to reach the apple trees
- Prune apple trees to increase mast production

E.) Oak Stands (80 acres) - Oak forests are relatively uncommon in the CHMU. These stands represent a unique habitat type and wildlife food source. Additionally, as the climate warms in coming decades, oaks are expected to be a more competitive species, and as such, these areas could serve as an important seed source in the future. While oak trees may be present at low densities throughout the forests of the CHMU, this land classification applies only to identified oak stands. Maintaining oak as a component will be of importance throughout the CHMU when present; however, these areas are unique in the sheer density of oak and the importance of the food source.

Management Actions:

- Within red oak stands scheduled for treatment, maintain and enhance the red oak component.
- Discourage new trail development, unless new trail reduces impact from existing or unregulated use.

F.) Alder Stand (~3 acres) - Alder stands represent an important and unique opportunity to create habitat for woodcock. Woodcock use alder stands for feeding cover and nesting habitat. There is only one alder stand on the unit.

Management Actions:

- When possible, maintain alder cover for woodcock habitat by cutting on a 10-20 year cycle.

G.) Robbins Mountain Interior Forest Habitat (498 acres) - Management of this area is focused on providing a diversity of wildlife habitats that range from early successional forest characteristics to mature late successional forest.

Management Actions:
- Manage for forest patch openings that range in size from one half acre to five acres to develop a mixed age structure and vertical diversity throughout the forest. Where feasible, locate patches larger than 1 acre in areas that are currently even-aged forest.
- Provide a soft mast component available to a variety of wildlife species during the late summer to early fall period.
- Manage areas for late successional forest characteristics that include high residual basal areas, coarse woody debris, and large snags.
- Allow for dispersed wildlife-based pedestrian recreation.
- Manage vegetation to optimize wildlife habitat for a variety of common and target wildlife species.

2.4: Wildlife and Forestry Demonstration Areas (163 acres)

H.) Steven’s Block Demonstration Area (163 acres) - Management of this area has been a collaboration between FPR and the Orvis Volunteer Group. This active group of volunteers has a long history of working with FPR staff and maintains a regular presence on the Stevens Block of Camels Hump State Forest through implementing a suite of projects which maintain and enhance diverse wildlife habitats. Habitat projects are coordinated by a District Forester and directed by an annual work plan to accomplish desired outcomes.

Management Actions:

- Construct a new parking area, with approximately 5 vehicle capacity. At present parking is extremely limited, and does not adequately accommodate the public.
- Maintain the historic orchard and areas with concentrated apple trees through continued release and pruning to encourage soft mast production.
- Increase the percentage of early successional habitat by implementing small patch clear cuts (<5 acres). These treatments will ideally regenerate aspen for ruffed grouse habitat and provide hardwood browse for white-tailed deer, moose, and beaver.
- Expand the overall softwood component. Softwood trees provide winter cover and food for a variety of wildlife species, including white-tailed deer. Release of advanced regeneration of spruce, fir, hemlock, and pine, and subsequent control of hardwood competition will help bolster the softwood component.
- Recruit and retain soft and hard mast producing species. Red oak, serviceberry, black cherry and others provide a valuable food source for wildlife and will benefit from release from competing hardwood.
- Maintain grassland and old field habitat types through regular mowing and/or brush-hogging.
- Establish supplemental high value herbaceous food plots in areas being maintain as old field or grassland.

2.5: Special Protection Areas (designated for protection by deed restrictions or conservation easements). (7,119 acres)

J.) Timber Management and Wildlife Area (7119 acres) - These areas lay within the legislatively designated Timber Management and Wildlife Area, defined as all lands below the Ecological Area (LMC 1.8) down to 1800’ elevation. This area is meant to be a buffer to the Natural Area, with somewhat reduced activities compared to the General Management Category.
areas. Purposes of this area include management for forest products and wildlife habitat, protection of the Natural Area, and to preserve the aesthetic values of the region. Allowed uses also include hunting, hiking, cross-country skiing, and nature appreciation. While this area is eligible for timber harvests, difficult terrain, lower quality growing sites, and reduced timber quality have precluded a history of logging and associated access roads. For that reason, some of these areas are the most remote on the entire CHMU. Still others are home to hiking, snowmobiling, and cross-country ski trails.

Management Actions:

- Utilize diverse types of forest management in order to create structurally diverse wildlife habitat
- Designate the Camel’s Hump Challenge Cross Country Ski Trail. See LMC1.8F for details.
- Consider expansion of cross-country ski trails originating at the Camel’s Hump Nordic Ski Area (CHNSA). CHNSA is a not-for-profit organization that maintains ski trails in the Honey Hollow and Bald Hill areas. They have expressed interest in expanding their trail network further onto Camel’s Hump Management Unit. Such expansion could be appropriate given the presence of ski trails already in the area. Such a use would comply with the legislative designation of the Timber Management and Wildlife Area. At this point, the proposal is conceptual. Actual siting of trails on the ground will need to take into account site details. In evaluating subsequent proposals, the DST will carefully consider the potential impacts of increased access to the adjacent LMCs including 1.8, 1.9, 2.2, and 2.6. Furthermore, groomed trails would require a higher level of scrutiny given the increased access groomed trails afford skiers.
- Consider options for management of existing backcountry skiing use, ongoing maintenance of existing skiable lines, and the addition of new lines in the vicinity of the old Callahan Trail. The old Callahan trail is a popular route for backcountry skiers. ANR recognizes the growing popularity of this sport and believes that this use could be sustainable through management of a backcountry ski zone, and potentially in cooperation with the Catamount Trail Association or another capable group. This arrangement is successfully being demonstrated on other units of ANR land (Wiloughby State Forest, e.g.). Backcountry ski management is compatible with the purposes established for the Timber Management and Wildlife Area. The level of management will be commensurate with the existing use and expected future use of the area. The health of the alpine forest, and the implications of management on Act 250 jurisdiction will all be important considerations identifying management options for new or existing skiable lines. The Callahan Trail will not be managed for summer use. Management of backcountry skiing in the vicinity of the old Callahan trail may also include LMC 1.8F, 1.8G, and 3.0A.
- Consider a proposal for a hut in the vicinity of the Lion’s Ridge Trail. A hut could be appropriate in this area in cooperation with another organization such as VTHuts Association or the Camel’s Hump Nordic Ski Association. A hut would be allowed in either LMC 2.5J or in LMC 3.0A in the Honey Hollow area, but not both.
- Consider accommodating the planned Velomont Trail. See LMC 3.0A for additional details.

2.6: Research Monitoring Areas (134 acres)
K.) Hub Vogelmann Research Area (134 acres)- This area represents the portion of the designated forest research area not within the Natural Area or Ecological Area (see 1.9H for the balance of the Research Area). This research area has been in continuous use since 1962 for critical forest research primarily related to acid deposition and forest dynamics.

Management Actions:

- Continue to prohibit primitive camping.
- Maintain conditions for ongoing and future forest research in a natural setting with reduced or little human disturbance.
- Monitor the use levels, extent of, and impacts from unauthorized cutting of trees and shrubs to create skiable lines. Work with Catamount Trail Association to raise awareness of the backcountry ethic.
- Consider options for management of existing backcountry skiing use, ongoing maintenance of existing skiable lines, and the addition of new lines in the vicinity of Bald Hill. See LMC 1.8F for details.
- Relocate the Catamount Trail. The CTA has proposed to relocate a section of the Catamount Trail in the Huntington area off of private land and onto adjoining state land. Some scouting has been done for options for a route. The re-route will utilize existing skid trails whenever possible and will traverse LMC 3.0A, 2.6K, and 1.9I before joining the Camel’s Hump Challenge Trail and then re-joining the existing Catamount Trail. While a good portion of the re-location is in the designated Research Area, we anticipate that non-motorized winter use will cause negligible site disturbance.

2.8: Agricultural Land (126 acres)

L.) Winooski Riverside Agricultural Lease (92 acres)- This area is located between the Duxbury Road and the Winooski River and was acquired by the state in 1991 along with the rest of the “Lafreriene Parcel.” This land has been farmed for a very long time and continued agricultural use is required by the deed. In 2015 the Long Trail was relocated off Duxbury Road and onto the agricultural land (as well as a small portion of LMC 1.7E). For years GMC has been collaborating with FPR and other partners to relocate the Long Trail in the Winooski River Valley. This section represents a small portion of the larger effort and allows the trail to avoid nearly a mile of road-walk on the Duxbury Road. The newly designated trail utilizes portions of the existing Riverside Trail. The trail largely sticks to the inside and outside edges of the agricultural lease, adjacent to the existing fence. The trail fords Preston brook and a bypass of the ford is available for use during high water periods. The route for the relocation was decided upon through consultation with GMC, the licensee, and DEC specialists. Other potential routes were considered and ultimately, this was identified as the best route. This re-route creates a unique trail experience as it traverses agricultural land, an under-represented land use on the Long Trail.

Management Actions:

- Continue to manage as licensed agricultural lands with a focus on sustainable, low-impact farming. Follow ANR policy for “Agricultural Activities on Land Owned by the Agency of Natural Resources.”
- Arrange licenses with qualified farmers for use of these lands.
Add educational signage along the Long Trail detailing the importance of the working landscape.

Strategically plant trees to enhance shade for Long Trail hikers along field edge.

Explore opportunities to add functionality as floodplain forest while still maintaining a land base for a viable agricultural operation. This area is bisected by Preston Brook, a very active headwater stream that has experienced two severe floods in the course of several years - 2011 and 2013. There may be a way to add flood resiliency to the agricultural land and minimize sediment discharge to the Winooski River from Preston Brook. FPR will consult with DEC and the licensee before making any changes that would affect the agricultural values of the land.

M.) Howe Block Sugarbush (34 acres) - This area has been sugared since 1979 and consists of approximately 1700 taps.

Arrange license with qualified sugarmakers for use of these lands and in accordance with current Guidelines and Licensing Requirements for Tapping and Collecting Sap from Maple Trees on Department of Forests, Parks and Recreation Lands, July 2010 (or equivalent updated standard).

3) General Management Category:
An area where the dominant uses are sustainable timber harvesting, wildlife habitat management, trail networks, dispersed recreation, and other general land uses. In these areas a primary management consideration is minimizing conflict between 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, such as vernal pools or seeps.

Within the CHMU there are 7,744 acres within the General Management category.

3.0: Multiple Use Area. These areas correspond with the legislatively designated “Multiple-Use Area.” This area is similar to LMC 2.5J but does not have an elevation threshold. These areas are not defined by their ecologically sensitive features or important wildlife habitat. At the same time, small areas of ecologically significant features and critical wildlife habitat are undoubtedly embedded in this category, and will be managed accordingly. The majority of the timber management on the CHMU will take place in this LMC. (7,744 acres)

A.) Contiguous Portion of Multi Use Area (7,441 acres) - This portion of LMC 3.0 constitutes the contiguous portion of the CHMU. It does not include the Howe Block of Camel’s Hump State Forest.

Management Actions:

Utilize strategies described in section IV.C- Vegetation Management to optimize production of forest products.

Utilize strategies described in section IV.C. Wildlife Habitats Management to optimize habit for a variety of general and target wildlife species.

Utilize strategies described in section IV.C. Recreation Management- to optimize recreation opportunities.

Re-locate Long Trail near the crossing of Gleason Brook to cross Duxbury Road in the vicinity of the Winooski River Access Area. This re-route ties in with the larger efforts to re-route the Long Trail in the Winooski River Valley. This particular section will
avoid approximately .8 miles of road walk along Duxbury Road, hopefully creating a safer and more enjoyable hiking experience. This re-route is still in the conceptual stage. A route has not yet been identified on the ground.

- **Relocate the Catamount Trail.** See LMC 2.6K for details.
- **Consider expansion of cross-country ski trails originating at the Camel’s Hump Nordic Ski Area (CHNSA).** See LMC 2.5J for details.
- **Enhance access to Phen Basin Block in North Fayston.** Currently the parking at the end of Bassett Hill Road in Fayston is on an old log landing, and is not readily accessible due to the poor road condition of the road leading to it. FPR would like to work with the town of Fayston to improve this section of town road, and the short section of road beyond the town road to the log landing, and gravel a portion of the log landing.
- **Consider expansion of mountain bike trails in cooperation with the Mad River Riders—the local mountain bike club.** See LMC 1.10J for details.
- **Consider proposals from qualified sugarmakers to license portions of the area for production of maple sap and in accordance with current Guidelines and Licensing Requirements for Tapping and Collecting Sap from Maple Trees on Department of Forests, Parks and Recreation Lands, July 2010 (or equivalent updated standard).** Preliminary scouting has shown four areas that could potentially be appropriate. These are in Honey Hollow Block in Bolton, the former Carse and Salvas Parcels in Huntington, and in Appalachian Gap Block in Buel’s Gore.
- **Consider options for management of existing backcountry skiing use, ongoing maintenance of existing skiable lines, and the addition of new lines in the vicinity of the old Callahan Trail.** See LMC 2.5J for details.
- **Consider accommodating the planned Velomont Trail.** FPR has been working closely with several recreation groups on planning for a four-season, non-motorized, trail corridor between Killington and Stowe. The trail will be managed for mountain bikes, cross-country skiing and other pedestrian uses. The Velomont Trail would connect the Mad River Valley to the Duxbury and Waterbury area. The trail could run co-incident with the VAST trail from Dowsville to Camel’s Hump Road or River Road in Duxbury but may also be built off the existing VAST trail within LMC 3.0. The trail would also traverse LMC 2.5J.
- **Consider a proposal for a hut in the vicinity of the above-mentioned Velomont Trail.** A hut could be appropriate in association with the Velomont Trail.
- **Consider a proposal for a hut in the Honey Hollow area.** A hut could be appropriate in this area in cooperation with another organization such as VTHuts Association. A hut would be allowed in either LMC 3.0A or in LMC 2.5J near the Camel’s Hump Nordic Ski Area, but not both.
- **Consider managing portions of timber sales to enhance ephemeral use as a backcountry ski zone.** While backcountry skiing is already an allowed use, areas identified as appropriate for timber management may also be appropriate for enhancing backcountry skiing terrain. FPR foresters will cooperate with CTA when conducting timber harvests in the vicinity of winter use trails such as the Catamount Trail and VAST trails. Foresters will include in their forest inventory a qualitative assessment of the terrain to evaluate the possibility of enhancing the area specifically for backcountry skiing. When possible, skid trails will be closed out in a way to provide improved access to these areas.
B.) Howe Block Multi-Use Area (303 acres) - The Howe Block of Camel’s Hump State Forest is a popular mountain biking destination. It is located in Waitsfield and Fayston, and is a stand-alone piece of the State Forest.

Management Actions:

- Continue to cooperate with the Mad River Riders to maintain the mountain bike trails to a high standard.
- Consider re-routes and potential additional trails.
- Utilize strategies described in section IV.C- Vegetation Management to optimize production of forest products.
- Utilize strategies described in section IV.C. Recreation Management- to optimize recreation opportunities.

4) Intensive Management Category:
An area that is 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.

Within the CHMU there are 30 acres in the Intensive Management category.

4.4: Trailhead Parking Areas (26 acres)

Management Actions:

- Continuing maintenance and upgrades to existing parking areas. Periodically ANR will brush out around parking lots and remove hazard trees in close proximity. Ongoing maintenance includes periodic shaping, drainage, and gravel addition.
- Consider options for improved human waste management as associated with the use of the more popular access points, such as the Monroe and Burrows trail heads.
- Remove parking area at Robbins Mountain WMA. The existing parking area that is just south of the Chittenden Fish and Game Club entrance poses safety concerns related to the nearby shooting range. Other parking alternatives will be considered.
- Evaluate the capacity of parking areas and respond accordingly to growing need. ANR is aware that popular trailhead parking areas (specifically the Burrows Trailhead and Monroe Trailhead) can fill up quickly on weekends, holidays, foliage season, and other times. Full parking areas often lead to unsafe parking and congestion on the adjacent town road. ANR staff are exploring solutions to alleviate these problems and will continue to engage with town officials to identify possibilities. ANR is committed to providing public access to the CHMU and recognizes that decisions to expand or limit parking are driven not only by the carrying capacity of a parking area or associated infrastructure, but also the social and ecological carrying capacity of the trail network, nearby community, and the summit itself.

4.6: Other Infrastructure (4 acres) - The two gravel pits (Duxbury Road and Connally Road) have historically been valuable in helping ANR repair and maintain roads.
Management Actions:

- **Permanently close and stabilize the gravel pit on Duxbury Road** - This gravel pit has been used extensively in the past for repairing state park access roads as well as town roads in the aftermath of Tropical Storm Irene and again after the storms of July 2013. Because of its proximity to the Winooski River and the decreasing quality of the gravel FPR is in the process of stabilizing and re-vegetating the gravel pit.

- **Continue to extract small amounts of gravel from the Connally Road pit for use on state lands only.**
Map 18: Land Management Classification Map. Management Class Codes reference descriptions in section IV.C.
Map 19 – Land Management Classification, Howe Block Map. Management Class Codes reference description in section IV.C.
D. Implementation Schedules

Implementation of management actions identified in section IV.B and IV.C above is often carried out as opportunities arise and on an as-needed basis, or when particular financial or volunteer resources are available to ANR. Certain activities are conducted according to a flexible schedule. These include timber management and road maintenance. On the following pages are maps and charts that describe the proposed timber harvests and road/access projects for the coming 15-year period. The exact implementation schedule may need to be adjusted based on funding availability, extreme weather events, and other unforeseen factors.
Map 20
Planned Timber Management.
Map 21- Planned Timber Management, Howe Block.
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<td>341</td>
<td>Group Selection with patches</td>
<td>Improve road and landing.</td>
</tr>
<tr>
<td>3</td>
<td>CHSP (Phen Basin)</td>
<td>7/1/1</td>
<td>86</td>
<td>2023</td>
<td>86</td>
<td>Overall thinning and softwood release</td>
<td>Improve road and landing.</td>
</tr>
<tr>
<td>4</td>
<td>Hunt. Gap WMA</td>
<td>1/2/1,2,4</td>
<td>81</td>
<td>2024</td>
<td></td>
<td>Thinning and patches</td>
<td>Develop access and landing.</td>
</tr>
<tr>
<td>5</td>
<td>CHSP (Honey Hollow)</td>
<td>2/3/1,5,7</td>
<td>92</td>
<td>2024</td>
<td>173</td>
<td>Single Tree and Group Selection</td>
<td>Adjacent to Catamount Trail.</td>
</tr>
<tr>
<td>6</td>
<td>CHSF (Howe)</td>
<td>2/2/4; 2/3/1,2,3</td>
<td>87</td>
<td>2025</td>
<td></td>
<td>Thin plantations, NH stand-selection harvest and small patches</td>
<td>Summer harvest.</td>
</tr>
<tr>
<td>7</td>
<td>CHSP (Duxbury)</td>
<td>1/10/1,2,4,5</td>
<td>86</td>
<td>2025</td>
<td>173</td>
<td>Single Tree and Group Selection</td>
<td>Improve road and landing.</td>
</tr>
<tr>
<td>8</td>
<td>CHSP (Honey Hollow)</td>
<td>2/7/2,3,5</td>
<td>107</td>
<td>2026</td>
<td></td>
<td>Overall thinning and patches</td>
<td>Improve road and develop landing.</td>
</tr>
<tr>
<td>9</td>
<td>CHSP (App. Gap)</td>
<td>6/2/1,2</td>
<td>76</td>
<td>2026</td>
<td>183</td>
<td>Single Tree and Group Selection</td>
<td>Determine and develop access.</td>
</tr>
<tr>
<td>10</td>
<td>CHSP (Honey Hollow)</td>
<td>2/4/1,2,3,4,5,7</td>
<td>201</td>
<td>2027</td>
<td></td>
<td>Single Tree and Group Selection</td>
<td>Catamount Trail through harvest area.</td>
</tr>
<tr>
<td>11</td>
<td>CHSP (Duxbury)</td>
<td>1/3/2,3,4,5,7,8</td>
<td>108</td>
<td>2027</td>
<td>309</td>
<td>Single Tree and Group Selection</td>
<td>Improve landings. VAST trail through harvest area.</td>
</tr>
<tr>
<td>12</td>
<td>CHSP (Duxbury)</td>
<td>1/6/1,6; 1/7/1,2</td>
<td>231</td>
<td>2028</td>
<td></td>
<td>Single Tree and Group Selection</td>
<td>Replace bridge on truck road. VAST trail through harvest area.</td>
</tr>
<tr>
<td>13</td>
<td>CHSP (Honey Hollow)</td>
<td>2/6/1</td>
<td>68</td>
<td>2028</td>
<td>299</td>
<td>Single Tree and Group Selection</td>
<td>Develop road and landing.</td>
</tr>
<tr>
<td>14</td>
<td>CHSP (Forest City)</td>
<td>4/4/1,2,3</td>
<td>166</td>
<td>2029</td>
<td></td>
<td>Thinning with patches/sugarbush</td>
<td>Develop new access road and landing. Catamount Trail through harvest area.</td>
</tr>
<tr>
<td>15</td>
<td>CHSF (Howe)</td>
<td>2/1/1,4</td>
<td>124</td>
<td>2029</td>
<td>290</td>
<td>Selection harvest with small patches</td>
<td>Summer harvest.</td>
</tr>
<tr>
<td>16</td>
<td>Robbins Mt. WMA</td>
<td>1/1/5,8,9,12,13</td>
<td>209</td>
<td>2030</td>
<td></td>
<td>Thinning with patches</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>CHSP (Honey Hollow)</td>
<td>2/2/10,12,14</td>
<td>60</td>
<td>2030</td>
<td>269</td>
<td>Single Tree and Group Selection</td>
<td>Develop better landing. Catamount Trail through harvest area.</td>
</tr>
<tr>
<td>18</td>
<td>CHSP (Duxbury)</td>
<td>1/8/2,4,6</td>
<td>96</td>
<td>2031</td>
<td></td>
<td>Shelterwood – Even-age</td>
<td>Develop new access road and landing.</td>
</tr>
<tr>
<td>19</td>
<td>CHSP (Cobb Brook)</td>
<td>5/1/2,3</td>
<td>94</td>
<td>2031</td>
<td></td>
<td>Single Tree and Group Selection</td>
<td>Catamount Trail through harvest area.</td>
</tr>
<tr>
<td>20</td>
<td>CHSP (Honey Hollow)</td>
<td>2/4/1,2,3,4</td>
<td>96</td>
<td>2031</td>
<td>286</td>
<td>Single Tree and Group Selection</td>
<td>Catamount Trail through harvest area.</td>
</tr>
<tr>
<td>21</td>
<td>CHSP (Phen Basin)</td>
<td>8/1/1,6,7</td>
<td>66</td>
<td>2032</td>
<td></td>
<td>Overall thinning with softwood release</td>
<td>Improve road.</td>
</tr>
<tr>
<td>22</td>
<td>CHSP (Duxbury)</td>
<td>1/1/1</td>
<td>121</td>
<td>2032</td>
<td></td>
<td>Overall thinning with small patches</td>
<td>VAST Trail through harvest area.</td>
</tr>
<tr>
<td>23</td>
<td>CHSP (Duxbury)</td>
<td>1/4/2,3,4,13,14</td>
<td>24</td>
<td>2032</td>
<td>211</td>
<td>Clear-cut and thinning of plantation</td>
<td>VAST Trail adjacent.</td>
</tr>
<tr>
<td>24</td>
<td>CHSF (Stevens)</td>
<td>1/1/1,4,5</td>
<td>40</td>
<td>2033</td>
<td></td>
<td>Overall thinning with small patches</td>
<td>Establish access and landing.</td>
</tr>
<tr>
<td>25</td>
<td>CHSP (Duxbury)</td>
<td>1/4/4,5,6,7,16</td>
<td>115</td>
<td>2033</td>
<td></td>
<td>Overall thinning with small patches</td>
<td>Upgrade road. VAST trail adjacent.</td>
</tr>
<tr>
<td>26</td>
<td>CHSP (Honey Hollow)</td>
<td>2/1/2,3,7</td>
<td>46</td>
<td>2033</td>
<td>201</td>
<td>Softwood release and patches</td>
<td>Catamount Trail adjacent.</td>
</tr>
<tr>
<td>27</td>
<td>CHSF (Howe)</td>
<td>2/1/2,3; 2/3/5,6,8</td>
<td>77</td>
<td>2034</td>
<td></td>
<td>Thinning in softwood plantations</td>
<td>Summer harvest.</td>
</tr>
<tr>
<td>28</td>
<td>CHSP (Duxbury)</td>
<td>1/8/2,3,4,6</td>
<td>136</td>
<td>2034</td>
<td></td>
<td>Single Tree and Group Selection</td>
<td></td>
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<tr>
<td>29</td>
<td>CHSP (Duxbury)</td>
<td>1/4/4,5,6,7,</td>
<td>73</td>
<td>2034</td>
<td>286</td>
<td>Single Tree and Group Selection</td>
<td>Upgrade road and landing. VAST trail adjacent.</td>
</tr>
<tr>
<td>30</td>
<td>CHSP (Duxbury)</td>
<td>1/2/3</td>
<td>108</td>
<td>2035</td>
<td></td>
<td>Single Tree and Group Selection</td>
<td>VAST trail through harvest area.</td>
</tr>
<tr>
<td>31</td>
<td>CHSP (Honey Hollow)</td>
<td>2/2/7,8,9</td>
<td>86</td>
<td>2035</td>
<td></td>
<td>Single Tree and Group Selection</td>
<td>Catamount Trail through harvest area.</td>
</tr>
<tr>
<td>32</td>
<td>CHSP (Honey Hollow)</td>
<td>2/5/1,2,3,4</td>
<td>139</td>
<td>2035</td>
<td>333</td>
<td>Single Tree and Group Selection</td>
<td>Catamount Trail adjacent.</td>
</tr>
<tr>
<td>33</td>
<td>CHSP (Forest City)</td>
<td>4/1/1,2,3,5,6</td>
<td>143</td>
<td>2036</td>
<td></td>
<td>Shelterwood – Even-age</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>CHSP (Duxbury)</td>
<td>1/10/1,2,4</td>
<td>47</td>
<td>2036</td>
<td></td>
<td>Uneven-age with patches</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>CHSF (Howe)</td>
<td>2/2/1,3</td>
<td>134</td>
<td>2036</td>
<td>324</td>
<td>Selection harvest with small patches</td>
<td>Summer harvest.</td>
</tr>
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Map 23 - Transportation Plan - Honey Hollow & Forest City Blocks.
Table 16- Camel’s Hump Management Unit Transportation/Access Needs Plan

<table>
<thead>
<tr>
<th>#</th>
<th>Location (parcel/town)</th>
<th>Classification</th>
<th>Length</th>
<th>Current Uses</th>
<th>Needs</th>
<th>Est. Cost</th>
<th>Target Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CHSP- Duxbury</td>
<td>Culvert</td>
<td></td>
<td>Truck road, VAST trail</td>
<td>Replace large culvert</td>
<td>$86,000</td>
<td>2021</td>
</tr>
<tr>
<td>2</td>
<td>CHSP- Bolton</td>
<td>Bridge</td>
<td></td>
<td>Truck road, VAST trail</td>
<td>Re-build truck bridge</td>
<td>$50,000</td>
<td>2022</td>
</tr>
<tr>
<td>3</td>
<td>CHSP-Starksboro</td>
<td>Parking area</td>
<td></td>
<td></td>
<td>Build new parking area</td>
<td>$8,500</td>
<td>2022</td>
</tr>
<tr>
<td>4</td>
<td>HGWMA- Buel’s Gore</td>
<td>Access and landing</td>
<td>0.1 mi.</td>
<td>Old access, low use</td>
<td>Establish access and landing for harvest #4</td>
<td>$8,000</td>
<td>2022</td>
</tr>
<tr>
<td>5</td>
<td>CHSP- Duxbury</td>
<td>Timber access</td>
<td>0.1 mi.</td>
<td>Truck road, VAST trail</td>
<td>Re-build truck road, establish landing for harvest #7</td>
<td>$8,000</td>
<td>2023</td>
</tr>
<tr>
<td>6</td>
<td>CHSP- Bolton</td>
<td>Access road, landing</td>
<td>0.2 mi.</td>
<td>Old farm road</td>
<td>Establish access and landing for harvest #8</td>
<td>$10,000</td>
<td>2024</td>
</tr>
<tr>
<td>7</td>
<td>CHSP- Huntington</td>
<td>Access and landing</td>
<td>0.2 mi.</td>
<td></td>
<td>Establish access and landing for harvest #9</td>
<td>$10,000</td>
<td>2024</td>
</tr>
<tr>
<td>8</td>
<td>CHSP- Duxbury</td>
<td>Log landings</td>
<td></td>
<td></td>
<td>Establish two new log landings for harvest #11</td>
<td>$5,000</td>
<td>2025</td>
</tr>
<tr>
<td>9</td>
<td>CHSP- Duxbury</td>
<td>Bridge</td>
<td></td>
<td>Truck road</td>
<td>Replace bridge for VAST Trail and access to harvest #12</td>
<td>$50,000</td>
<td>2026</td>
</tr>
<tr>
<td>10</td>
<td>CHSP- Duxbury</td>
<td>Road upgrade</td>
<td>0.5 mi.</td>
<td>Truck road, VAST trail</td>
<td>Re-build road, gravel, new culverts for harvest #12</td>
<td>$30,000</td>
<td>2026</td>
</tr>
<tr>
<td>11</td>
<td>CHSP- Bolton</td>
<td>New access road</td>
<td>0.15 mi.</td>
<td></td>
<td>Build new access road and landing for harvest #13</td>
<td>$10,000</td>
<td>2026</td>
</tr>
<tr>
<td>12</td>
<td>CHSP- Huntington</td>
<td>New access road</td>
<td>0.5 mi.</td>
<td></td>
<td>Build new access road and landing for harvest #14</td>
<td>$30,000</td>
<td>2027</td>
</tr>
<tr>
<td>13</td>
<td>CHSP- Duxbury</td>
<td>Bridge</td>
<td></td>
<td>Truck road</td>
<td>Build new bridge for access to harvest #18</td>
<td>$60,000</td>
<td>2029</td>
</tr>
<tr>
<td>14</td>
<td>CHSP- Starksboro</td>
<td>Access road, landing</td>
<td></td>
<td></td>
<td>Establish access and landing for harvest #24</td>
<td></td>
<td>2031</td>
</tr>
<tr>
<td>15</td>
<td>CHSP- Duxbury</td>
<td>Upgrade road</td>
<td>0.7 mi.</td>
<td>Truck road</td>
<td>Gravel and additional culverts for harvest #25</td>
<td>$12,000</td>
<td>2031</td>
</tr>
<tr>
<td>16</td>
<td>CHSP- Duxbury</td>
<td>New access road</td>
<td>0.25 mi.</td>
<td>X-C ski trail</td>
<td>Build new access road and landing for harvest #28</td>
<td>$15,000</td>
<td>2032</td>
</tr>
</tbody>
</table>
V. MONITORING AND EVALUATION

During the life of the Long Range Management Plan for the Camel’s Hump Management Unit periodic monitoring and evaluation will be conducted to ensure that public values and resources are protected from fire, insect and disease, encroachments, or unforeseen problems that may occur within the CHMU. 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 CHMU continues, inventory, monitoring, assessment, and research are necessary to assess progress toward achieving stated goals, and determine the effectiveness of management actions and activities. Obtaining quality information is critical to making informed decisions and conducting sound, thoughtful management actions.

Ecological/Wildlife
Maintaining the biological diversity of the CHMU requires long-term research and monitoring projects in several areas. Some of the efforts at meeting these goals include:

- Continue ongoing inventory and assessment projects including forest inventory, and aerial and ground insect and disease surveys, to better assess and evaluate management of the CHMU.
- Monitor rare, threatened, and endangered species and natural communities.
- Consider and support appropriate, credible research project proposals which further the understanding of ecological elements and wildlife habitat on the CHMU and the positive and negative impacts of use and management activities.

Timber and Wildlife Habitat Management
An effective monitoring and assessment program is essential for ensuring the long-term sustainability of a high-quality timber management program. Careful analysis of the forest, its capabilities, potential impacts on other important management goals, protection of rare and/or threatened and 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 completed within the CHMU will be periodically reviewed by the stewardship forester and the district stewardship team to determine how well management objectives are being met. If monitoring results indicate that there is a significant difference between the outcomes predicted by the plan and actual conditions, changes to the plan may be recommended and adaptive management activities may be implemented.

- Continue to support ongoing inventory and mapping efforts (e.g. forest inventory, aerial insect and disease surveys).
- Conduct periodic, standardized post-sale inventories 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.
**Infrastructure**

Infrastructure monitoring has been an ongoing process and largely informal. Advances in field data collection methods and data management should make this easier and more effective. There are many miles of roads, and numerous culverts and bridges, in variable conditions that need to be documented to effectively maintain, repair, and replace infrastructure to ensure adequate access by users and improve water quality. Proper documentation of infrastructure and its condition can help ANR make a stronger case for increased funding to address legacy issues.

- Working with other districts and ANR IT, standardize data collection and long-term data storage in relation to roads, gates, culverts, bridges, etc.

**Recreation**

Public recreation will be periodically monitored across the property by the district stewardship team and partners to identify recreation trends, changing public demands, infrastructure improvement needs, user conflicts, unauthorized and illegal activity, and areas where recreation use may be damaging natural resources. Changes in recreational uses may be implemented including new management strategies designed to minimize or eliminate conflicts. Game wardens will be asked to assist with maintaining compliance with state laws. To appropriately monitor recreation, ANR will:

- Establish standardized inventory and documentation of any 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**

The CHMU contains archaeological remains dating back thousands of years. 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 CHMU and surrounding areas. To further the conservation of historic resources, ANR will:

- 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 CHMU.

**Invasive Species**

Invasive plant species are known to be a problem in many areas of the state including within the CHMU, negatively impacting wildlife habitat, timber management, natural community composition, recreation, and economics. The district stewardship team will monitor the CHMU for the presence of invasive species and work with cooperating partner organizations to develop a monitoring protocol. The district stewardship team will work to identify populations of invasive species and implement control measures where feasible. Monitoring strategies include:

- Identify invasive species when populations are small. Set control goals.
• Assess and document levels of introduction of invasive exotic pests.
• Monitor timber sale areas before and after timber sale activities.
• Control invasive species as necessary and practical.
• Evaluate invasive species control projects for effectiveness.

Climate Change
The CHMU is experiencing and will continue to experience impacts from climate change (Janowiak et al. 2018). These changes may result in alterations to nutrient and water cycling, forest health, habitat, forest disturbances, biodiversity, and recreation. Many of the long-term monitoring efforts listed above -- for timber, wildlife, natural communities, invasive species, pests and pathogens, and recreation -- will also capture the effects of climate change.

• Continue ongoing projects promoting the collection and documentation of long-term information critical to the assessment and evaluation of management on the CHMU.
• Collect data in a consistent format and manner to allow for evaluation of long-term trends and patterns.
• Support appropriate research project proposals which further understanding of climate change on the CHMU.
VI. NEW USES AND PLAN AMENDMENT PROCESS

The Long Range Management Plan (LRMP) 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 and Wildlife and Forests, Parks, and Recreation undertake an amendment or plan update process when significant changes to the LRMP 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) Permanent closure of existing trails and/or permanent creation of new recreation corridors not identified in the current plan;

4) Major rerouting, reclassification, permanent closing or creation of new roads within state land boundaries not identified in current plan;

5) Major land acquisitions added to the existing parcel;

6) Major capital expenditures for new projects;

7) Facility closures;

8) Transfers in fee ownership;

9) Leasing of new acreage; and

10) 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 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 and the corresponding departmental commissioner.

Interim Stewardship Plans

When a major land acquisition adds new lands to a state land unit, the Department may enter into an Interim Stewardship Plan for the new parcel. This Interim Stewardship Plan will be in effect until an amendment process can occur, or the LRMP is updated. Often times, the Interim Stewardship Plan is required as part of the land acquisition process, especially if a third party is involved in the transaction.
VII. FUTURE ACQUISITIONS/DISPOSITIONS

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 in-holdings 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.

Any future disposition of land from the CHMU will follow ANR policies and practices, as well as any statutory requirements of the overseeing Department that owns the land itself.

In 2016, the Trust For Public Land, with the help of ANR acquired the 2085 acre Dowsville Headwaters Property using federal funds through the Forest Legacy Program. This property, commonly referred to as “Dowsville” was then conveyed to the Department of Forests, Parks, and Recreation for inclusion as part of Camel’s Hump State Park. The parcel is adjacent to CHSP and visited by hikers, skiers, snowmobilers, and mountain bikers. Because of this active use, FPR completed an Interim Stewardship Plan for the property that identified current recreation uses that will be allowed to continue, and those activities that would need to wait until a comprehensive amendment was created. Because the property was acquired after the completion of assessments and public scoping meetings for the rest of the lands within the Camel’s Hump Management Unit, management strategies and actions for the Dowsville property are not included in this LRMP. In time, a full amendment/addendum will be made to the CHMU LRMP utilizing the required assessments.

All future acquisitions to the CHMU will require an amendment to this comprehensive Long Range Management Plan prior to active management of the newly acquired parcel.
VIII. APPENDICES

A. Land Transactions History
B. Cultural Landscape Report
C. Archeological Sensitivity Study
D. Public Involvement- Scoping
E. Public Involvement- Public Responsiveness Summary
F. Natural Communities Information
G. Recreation Use Data
H. Forest Stand Data and Maps
I. Assessment of the Native Bee Diversity of CHMU
J. Photo Gallery
K. Literature Used in Writing the CHMU LRMP
<table>
<thead>
<tr>
<th>YEAR</th>
<th>TRANSACTION</th>
<th># PARCELS</th>
<th>ACRES</th>
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<td>1932</td>
<td>Purchase</td>
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<td>Wallace W. &amp; Hattie Howe</td>
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</tr>
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<td>Alvah Stevens</td>
<td>CHSF, CHSP</td>
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<td>Gift</td>
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<td>110</td>
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THE CULTURAL LANDSCAPE OF THE CAMEL'S HUMP MANAGEMENT UNIT

IN THE TOWNS OF DUXBURY AND FAYSTON, WASHINGTON COUNTY AND BOLTON, RICHMOND AND HUNTINGTON, CHITTENDEN COUNTY, VERMONT:

HISTORIC RESOURCE SUMMARY, HISTORIC CONTEXT DEVELOPMENT AND PRIORITIZATION OF KNOWN AND EXPECTED HISTORIC RESOURCES

by

Stephen R. Scharoun, M.A.
and
Ellen R. Cowie, Ph.D.

A report prepared for the Vermont Agency of Natural Resources under the direction of Dr. Ellen R. Cowie, Principal Investigator and Director, Archaeology Research Center, Department of Social Sciences and Business, University of Maine at Farmington, Farmington, Maine 04938

March 2006
(Revised January 2007)
Cover photo: Historic view of lookout tower (cement map stand) on summit of Camel's Hump (Brigham 1915).
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ABSTRACT

This report consists of a cultural resource summary, historic context development and prioritization of known and expected historical resources in the Camel's Hump Management Unit (CHMU). This work was undertaken by the University of Maine at Farmington Archaeology Research Center (UMF ARC) on behalf of the Vermont Agency of Natural Resources in November and December 2005. The results of this study will be incorporated into the long-range management plan of the Camel's Hump Management Unit. Archival research indicates that both Native American and historic Euroamerican cultural resources are present within the CHMU. The potential for additional site identification in both contexts is high. Prioritizing known and expected historic resources at this preliminary level of analysis can only be done in the most general of terms. However, the report serves as an initial step towards meeting the historic preservation goals in the CHMU's long-range management plan.
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THE CULTURAL LANDSCAPE OF THE CAMEL'S HUMP MANAGEMENT UNIT

INTRODUCTION

The purpose of this report is to present the Vermont Agency of Natural Resources (ANR) with a short cultural resource inventory, historical context development and prioritization plan for the Camel’s Hump Management Unit, including Robbins Mountain WMA and the Huntington Gap WMA (Figure 1). The management unit is located in the Winooski River drainage in Washington and Chittenden counties and encompasses portions of the towns of Duxbury, Bolton, Richmond, Huntington and Fayston. Camel’s Hump is one of the major peaks in the Green Mountains and is the approximate center of the management unit. The region of the Camel’s Hump Management Unit represents a dynamic cultural landscape. As such, the management unit potentially preserves significant historical resources and their preservation should receive high priority in the ANR’s long range management plan. ANR staff has identified a limited number of these resources, while others await future investigation. Known and expected resources correspond to themes, contexts and property types which are summarized in Vermont’s Preservation Plan (Vermont Division For Historic Preservation 1997). This study should be considered an initial step towards a continuing process of historic resource identification, preservation, interpretation and public education.

One of the goals of this study is to provide recommendations regarding the prioritization and management of specific historic resources within the study area (hereafter referred to as the CHMU). The identification of relevant themes and historic contexts allow for many perspectives and interpretations. Some interpretations may be obvious, such as those offered in contexts such as farming, logging and lumbering, overland transportation and outdoor recreation, while others are much less apparent; such as those potentially associated with the Native American cultural landscape, which is frequently masked by later human activities, but potentially visible in the archaeological record and is possibly extant in the memories and oral traditions of today’s Native American people in Vermont.

The body of this text is formed primarily from archival research. Research methodology included examination of printed and manuscript documents deposited with the Vermont Division for Historic Preservation (VT DHP), specifically, the Vermont Archaeological Inventory (VAI) and various Cultural Resource Management (CRM) reports that provide context for better understanding the Camel’s Hump region, Vermont Historical Society, Vermont State Archives, Vermont State Library and the Vermont BGS-Reference Research Library. Primary sources such as, agricultural and industrial censuses, historic
Figure 1. Map showing area of the Camel's Hump Management Unit.
maps, first hand accounts and local histories contributed substantially to this historic resource study.

Prioritizing historic resources without an archaeological assessment/survey of the study area and without a thorough understanding of the study area’s places, settings and historic contexts leads to errors in judgment and interpretation. Prioritizing known and expected historic resources at this preliminary level of analysis can only be done in the most general of terms. Priorities may shift as more is learned about specific places. Such factors as site integrity, positive identification of “expected” resources and the identification of previously unexpected sites affect the prioritization process.

The results of this study include the identification of historic farming/saw mill communities on Ridley and Preston brooks, several individual nineteenth century farmsteads, a late nineteenth century steam powered mill hamlet, abandoned segments of two early regional roads, the Huntington Gap Road and the Stagecoach Road, and numerous historic sites and features related to nineteenth and early twentieth century tourism, the development of outdoor recreation and the formation of the Camel’s Hump Management Unit. Among the most significant of this latter set of resources are the carriage road and former summit house site, Vermont's first fire lookout, the Long Trail and a New Deal era CCC camp. The study provides a context for documenting historic regional trends relating to the early settlement period, the evolution of the logging and lumbering industry and farm abandonment, in forest conservation and in the recreational development of public land.
A BRIEF HISTORY OF THE CAMEL’S HUMP MANAGEMENT UNIT

A more detailed history of the formation of the Camel’s Hump Management Unit (CHMU) is presented elsewhere in the ANR’s Long Range Management Plan, however a brief overview is offered here as an aid in situating the management unit in a landscape with a long history of human use. The gift of 1,000 acres to the State of Vermont by Joseph Battell, in 1911, was the initial step towards the formation of the Camel’s Hump Management Unit. Recreational use of the summit area began in the early part of the nineteenth century and by the 1860s, a summit house, observatory and hiking trails had been established, while at the same time much of the area was being logged with increasing intensity. As a member of the State Legislature of 1882, Joseph Battell introduced a resolution to appoint a committee, under the jurisdiction of the Vermont Board of Agriculture, to investigate and report on the state of forests in Vermont (Merrill 1959). The creation of the Vermont Forest Service, State Forests, fire lookout system and forest tree nurseries followed, in the first decade of the twentieth century. Forest conservation was given more urgent attention after 1903, when devastating fires destroyed large sections of Vermont woodland, including 1,900 acres in Huntington and Duxbury and much of the summit area on Camel’s Hump. In this decade, the Camel’s Hump Club (1908) and the Green Mountain Club (GMC) (1910) were organized. Construction of the Long Trail was begun by the GMC in 1910 making it the oldest long-distance hiking trail in the country. During the same year as the Battell Gift (1911), the first fire lookout in Vermont was erected on the summit of Camel’s Hump (see Front Cover). It was a simple construction consisting only of a cement map stand. A telephone line to the lookout station was installed the same year (Merrill 1959).

Gradual acquisition of additional land for the purposes of expanding the state forest continued throughout the twentieth century. The Civilian Conservation Corps (CCC) were active in portions of the CHMU in the 1930s and aided in management of the timber reserves and in the further development of the historic park. In 1965, Camel’s Hump was designated as a National Natural Landmark. The following year, the Camel’s Hump Forest Reserve was created. The forest reserve is bounded on the north by the Winooski River, on the south by Route 17, the west by the Huntington River and the east by the Mad River. In 1969, the State Legislature decided that all state-owned land within the forest reserve would be known as Camel’s Hump Management Unit. This designation was modified so as to distinguish the CHMU from the Camel’s Hump State Forest. The CHMU currently contains approximately 24,000 acres.
ENVIRONMENTAL OVERVIEW

The Camel’s Hump Management Unit is located in the Green Mountains physiographic region and has a predominant natural forest cover of Zone 1, Spruce-Fir-Northern Hardwoods. The hardwoods are divided into two subdivisions with higher elevations supporting stands of white birch, aspen and red maple and lower elevations stands of beech, yellow birch and sugar maple. Softwoods and alpine vegetation are the principal cover type in highest elevations. White birch is the dominant forest cover type in areas of the park most affected by the fire of 1903. Lower elevations of the CHMU are composed of a forest cover of Zone 2, Northern Hardwoods-Hemlock-White Pine. Old fields and pastures in Zone 1 have a predominant forest cover of red and white spruce and balsam fir, while former fields and pastures in Zone 2 are more often forested in white pine, with some hemlock and spruce (Westveld et al. 1956).

The CHMU is located in the Winooski River drainage, or Basin 8, which is part of the St. Lawrence River drainage area (Vermont Agency of Environmental Conservation 1986). The Winooski River forms the northern border of the CHMU. Two important tributaries, the Mad and Huntington rivers form valleys that drain the east and west slopes, respectively, of this section of the Green Mountains. With the exception of streams in northern-most portions of the management unit which empty directly into the Winooski, most of the streams in the park are directed towards these two tributaries.

Mountainous terrain dominates the entire land area of the CHMU. Some of Vermont’s highest peaks are located in the management unit – Camel’s Hump (4,083 ft.), Mt. Ethan Allen (3,688 ft.), Mt. Ira Allen (3506 ft.) and Burnt Rock Mountain (3168 ft.). The narrow, steeply sloped valleys of several mountain streams increase the rugged unevenness of the terrain, but also provide, in limited instances, a foothold for human habitation. A major portion of the CHMU is on bedrock of the Underhill Formation and consists of phyllite, some metagraywacke, with minor amounts of greenstone and schist. Eastern margins of the Camel’s Hump area are composed of graphitic and quartz schists, with some quartzite, of the Hazens Notch Formation (Christman and Secor 1961). The boundary between the two formations begins a short distance east of Ridley Brook and runs on a north-south axis and is parallel with the Underhill Formation.

The soils of the Green Mountains and associated foothills are primarily of the Lyman-Marlow association in the highest elevations, with soils of the Peru-Marlow association on the side slopes of the main range of the mountains. Interspersed are areas of Rockland and poorly drained Cabot soils. All upper elevation soils are very rocky and were formed in glacial till. Nearly the entire land area of the CHMU is composed of land designated as least favorable for farming on the State’s, Land Classification Map (Vermont Agricultural Experimental Station 1940). Northern margins of the CHMU bordering the Winooski River contain soils of the Hadley and Hartland series. The Hadley Series forms the dominant soil type in the floodplain and Hartland soils are related to terraces above the floodplain (USDA 1989). This corridor through the Green Mountains is built on the alluvial depositions of the Winooski River and littoral and lake bottom sediments deposited when northern margins of the CHMU and the greater Winooski Valley were submerged by Lake Vermont (Doll 1970).
HISTORIC THEMES/CONTEXTS APPLICABLE TO THE CAMEL’S HUMP MANAGEMENT UNIT

The historic landscape approach is based on the assumption that historic resources are the result of cultural interaction between individuals, groups of people and third parties, such as the state and federal government, churches, schools and other applicable institutional entities. The Native American and historic Euroamerican landscapes provide the framework for a number of thematic and historic contexts identified during the course of this study. Information regarding the Native American context is presented in a narrative that is accompanied by a map which locates all known, or recorded sites in and around CHMU. Much of the information gathered for the historic Euroamerican context is presented in maps and tables, which is meant to facilitate management decisions and overall ease in locating specific categories of information.

NATIVE AMERICAN CONTEXT

The locations of Native American sites in the Camel’s Hump area are shown in Figure 2. The following brief discussion provides context for Native American cultural resources known or expected to be within the CHMU. The Consulting Archaeology Program of the University of Vermont has completed an archaeological sensitivity study (2003) that identifies environmental settings conducive to Native American occupation and land use within the CHMU and will be integrated into the Long Range Management Plan of the park. Our summary of Native American sites is organized by drainage. The Winooski River has been an east-west “trunk line” (Crockett 1921:66) through the mountains for thousands of years. The Huntington and Mad rivers are two important north-south trending tributaries entering the Winooski River on opposite sides of the mountain. The valleys of both these rivers were also travel corridors of regional importance.

The Winooski River forms sections of the northern boundary of the CHMU in Bolton and Duxbury. The river is well known in the archival record as an important travel corridor used extensively by French Canada and her Native American allies in making war against the English settlements in the Connecticut River valley and points east. There has been limited archaeological study of the Winooski River valley east of Williston. In the Camel’s Hump area, a bridge replacement project and the construction of an I-89 Interchange included two professional archaeological investigations that succeeded in identifying five Native American sites. Two Bolton sites, VT-CH-644 and VT-CH-652, are located on the north side of the river. Chert and quartzite flakes and two projectile points, including a Meadowood-like point that probably dates to the Early Woodland period (1000 B.C. – 100 B.C.) were recovered. These followed the earlier identification of sites, VT-CH-358 and VT-CH-359, located when surveying an alternative alignment of the I-89 Interchange (Doherty et al. 1997b). During the replacement project of the Jonesville Bridge, in Richmond, archaeologists identified site, VT-CH-627, from which was recovered chert and quartzite bifaces and quartzite flakes (Doherty et al. 1997a). Three other sites, VT-CH-639, VT-CH-691 and VT-CH-864, were identified as a result of other small-scale consulting projects along the Winooski River, all
Figure 2. Map showing distribution of recorded Native American and historic Euroamerican sites within the general area of the Camel's Hump Management Unit.
producing lithic flakes. From site, VT-CH-691 were recovered two projectile points including an Orient Fishtail point, attributed to the transition period between the Late Archaic and Early Woodland periods (Frink 1996).

Three other sites, VT-WA-2, VT-WA-8 and VT-CH-296, are located on the south side of the river in Duxbury and Bolton. One site is described as a “water cave” (VAI) and two sites are rock shelters. At the Bolton Falls site, VT-WA-2, artifacts were surface collected from a water cave which represent temporal contexts that date potentially to the Archaic period, with other evidence of occupation dating to the Late Woodland and Contact periods (ca. 7000 B.C. – A.D. early 1700s). This site has not been professionally surveyed, but is identified in historic accounts, as in Crockett (1921). Nearby is the Bolton Falls Portage Rock Shelter, VT-WA-8. Two rock shelters comprise this site and they are located on the south side of the Winooski River on the portage route around the falls. A field inspection conducted by Giovanna Peebles (VT DHP) corroborated local informant information that Native Americans were present at the site during the Pre-contact period. One Native American site has been identified and recorded by VT DHP staff that is located within the boundaries of the CHMU. This site, VT-CH-296, known as the Camel’s Hump Rock Shelter, consists of six to eight rock overhangs. Local informants relate that Native American artifacts have been recovered from one or more of these shelters. No archaeological excavations have been conducted at this site, but a field inspection of the site by VT DHP staff resulted in the surface collection of a probable flake at one of the rock overhangs (VAI). Extensive outcroppings of ledge occur elsewhere within the CHMU and it is expected that additional Native American sites will be identified in these settings.

Find spots (FS) are recorded near the confluence of Preston Brook and the Winooski River. Historical accounts allude to other locations along the Winooski. A ceramic vessel, called an “Indian Jar”, measuring 20 inches in circumference and on display at the Fleming Museum was found along the river in the CHMU vicinity in 1800 (Historic Records Survey 1939). Tools and flakes were surface collected by local collectors at the mouth of Preston Brook, at FS-CH-106. Another find spot, FS-CH-104, is identified on the VAI map in the general location of the Burroughs Trail on Camel’s Hump.

The Huntington River and Mad River drainages contain the western and eastern borders of the CHMU. In the Huntington River drainage, site VT-CH-619 is located on an upland terrace overlooking the confluence of the Huntington and Winooski rivers. From the recovery of numerous artifacts, including projectile points, a wide range of other tool types, pottery and carbonized food remains, archaeologists were able to identify a Late Woodland period (A.D.1000 – 1600) occupation at this site (Thomas et al. 1997). The Robbins Mountain WMA is a large tract of about 2,600 acres directly south of this confluence area. Portions of the WMA contain similar upland settings. Archaeological studies further up the Huntington River drainage are limited to a phase I survey conducted prior to the construction of a housing subdivision. Here, flakes and one pottery sherd represent site, VT-CH-839, the first Native American site identified on the upper Huntington River. The site is located on a high glacial outwash terrace near an intermittent drainage. There is a historical reference also of an “Indian Encampment” in Richmond about one-half mile up the Huntington River (Crockett 1921:59). Geological studies suggest that the
“straight-line topographic low occupied by Gillett Pond” and extending “northeast to the Winooski Valley and southwest to Huntington...represents the position of an old superimposed stream which drained the Winooski to the southwest at sometime during the complex glacial history when the mouth of the river was blocked by ice” (Christman and Secor 1961:68).

This occurrence potentially increases the overall sensitivity of high terrace formations overlooking the Huntington Valley.

Few archaeological studies have been conducted in the Mad River Valley. Prior to a phase I survey of a Route 100 improvement project, only two find spots were recorded in this valley. The first find spot, FS-WA-7, was recorded by the Vermont Fluted Point Survey (Loring 1980). Another find spot is identified as FS-WA-11 and is represented by a chert projectile point. Both sites were discovered some time ago and actual site location is approximate. A general archaeological resource assessment of the Mad River Valley was conducted on behalf of the Mad River Valley Planning District (Dowd and Trubitt 1990). No new Native American sites were identified, however this study assembled a great deal of useful information regarding historic Euroamerican sites and contexts bordering eastern sections of the CHMU.

The phase I survey that preceded the Route 100 improvement project succeeded in identifying four Native American sites along an important travel corridor that marks the drainage divide between Crossettt Brook and Mad River. The survey crew recovered lithic flakes at sites, VT-WA-115, VT-WA-116, VT-WA-117 and VT-WA-118 (Corey and Petersen 1998).

**HISTORIC EUROAMERICAN CONTEXT**

The following discussion is arranged by town and is intended as an aid in using the industrial census, agricultural census and historic resource tables (Tables 1-3) found at the end of this section of the report. The town sketches are meant only to show how sections of the CHMU related to surrounding mill villages, farms and transportation routes. Noted also are the location of recorded historic Euroamerican sites in the vicinity of the CHMU (see Figure 2).

The focus of this section is concerned with identifying historic contexts and resources within the preservation themes of *Industry and Commerce, Agriculture and Transportation* (VT DHP 1989; VT DHP 1990). This set of inter-related themes originated with the early settlement of the region, which began immediately after the American Revolution and is represented by the historic contexts of logging and lumbering, water powered mills, diversified and specialty farming and overland transportation routes. Other themes and contexts apply, as indicated in the previous section on Native American activity in the Camel’s Hump area, and in the historic resource table, or Table 3, a summary of resources with an Euroamerican context. Notable among these are historic resources directly and indirectly related to the formation of the Camel’s Hump Management Unit where the themes of *Culture and Government, and Tourism* (VT DHP 1989; VT DHP 1991) are represented by a set of historic resources which includes the former site of a nineteenth century ‘summit house’, the forest conservation preserves of Battell and Monroe, Vermont’s first fire lookout, the Long Trail and a New Deal-era CCC camp.
Table 1 presents selected information from available Industrial Census records between the years 1850 and 1880. Mills listed in the table provide a partial context for understanding the scope of logging and lumbering in large sections of the management unit. This table identifies some of the mills known or expected to be within the CHMU boundaries or which are close enough in proximity to warrant field identification and archaeological assessment to determine whether site boundaries of any of these mills extend into portions of the CHMU.

Table 2 presents selected Agricultural Census records for the years 1850 and 1870 on farms known to be within or in close proximity to boundaries of the CHMU. This table helps one visualize the management unit’s historic agricultural landscapes and provides clues for property type identification, site boundaries, field patterns and the agricultural contexts of farm-based processing and craft/cottage industries.

Table 3 summarizes information gathered in archival research. Historic maps, census material from Tables 1 and 2, historical accounts and other printed material are the main sources used in this study. Publications such as, Guidelines for Evaluating and Documenting Rural Historic Landscapes (National Park Service 1984) and National Register Multiple Property Documentation Forms (MPDF) on resources including early roads and schools (Callum and Sloma 2002; VT DHP 1993) were also consulted. Historic resources related to Historic Park Landscapes and the work of the Civilian Conservation Corps is presented in both an MPDF listing on the National Register and is considered a “Priority Context” in the Vermont Historic Preservation Plan. Table 3 also offers recommendations concerning each of the identified resources and attempts to prioritize these resources as they relate to similar ones elsewhere in the management unit.

The Walling and Beers maps used throughout the text are not geo-referenced. The boundaries of the CHMU, as shown on these maps are approximate. As historic resources are documented in the field and are shown to correspond to place names on nineteenth century maps, the superimposed boundary of the CHMU on historic maps becomes more reliable. It is also important to note that comprehensive background research limits the effect of potential inaccuracies of historic mapping. Historic maps act as a guide for indicating the spatial organization of the historic landscape and help the archaeologist locate and interpret historic resources.

**Duxbury**

Duxbury was chartered in 1763 and first settled in 1786. The earliest recorded saw mill in Duxbury began operating in the early 1820s. The Corss mill was located on Crossett Brook and remained an active mill site throughout the nineteenth century. Proximity to Waterbury and to the junction of regionally important transportation routes caused this section of Duxbury to be settled more densely than most other areas of the town (Figures 3, 4 and 5). Route 100 provided a north/south overland route that crossed the Winooski-Mad River drainage divide. Route 2, or the Winooski River corridor was an early and well-traveled east/west route. Mountainous sections in western and southern parts of town were either uninhabitable, or settled later in time. On Ridley Brook, the Shurtleff mill, built in 1854, is the earliest mentioned development of water power on Ridley Brook (Child 1889). Completion of the Central Vermont Railroad, ca. 1850, and the establishment of a rail station at the mouth of Ridley Brook resulted
Figure 3. Map of the Camel's Hump Management Unit with a key showing areas of detail covered by historic maps.
Figure 4. Walling’s map of the Crossett Brook area in the State Hospital Block, Duxbury (Walling 1858).
Figure 5. Beers’ map of the Crossett Brook area in the State Hospital Block, Duxbury (Beers 1873).
in the development of the village of North Duxbury. Most of the mill activity was concentrated in the village and historic resources associated with most of the mills as well as other village-based historic contexts are generally not expected to be identified within the boundaries of the CHMU, however the proximity of North Duxbury to the park suggests that there is a potential for some degree of archaeological sensitivity (Figures 6, 7 and 8; see Figure 3). The Walling map (Walling 1858) locates an unidentified saw mill on upper Ridley Brook. Historic resources related to this mill are expected to be within the management unit’s boundaries. The J.A.& L.J. Durkee steam powered saw mill operated in the same area as the earlier mill beginning in the late nineteenth century. Between them, the Durkee brothers owned 1400 acres of timberland, five houses, a blacksmith shop and a 100-acre farm. The mill produced barrel staves, shingles and clapboards (Child 1889).

Agricultural statistics indicate why upper Ridley Brook was called “Hardscrabble” (Figure 9). Rugged terrain limited the amount of improved acres on most of the farms. The agricultural census shows that the farms in this area were diversified and that livelihoods were derived from a variety of crops and types of livestock. Apples, maple sugar, butter and forest products were the principal cash crops and remained so into the late nineteenth and early twentieth centuries. Apple and maple sugar production supported the W.R. Elliot box factory, the Durkee steam mill and the Crossett distillery, cider and provender mills, located in the general vicinity. Proximity to rail transportation encouraged all possible forms of local resource utilization. Other industries affecting life on the farm included hemlock bark extraction for the tanning industry in Richmond and cordwood and railroad tie production for the construction and maintenance of the railroad.

The Ridley Brook area supported early Tourism beginning as early as the stagecoach era. The Ridley ‘summit house’ site and carriage road, on Camel’s Hump, are significant property types associated with this preservation theme. Another set of historic contexts worthy of notice relates to the themes of smuggling, counterfeiting and “money digging” (Child 1889; Hemenway 1868-91). Historical evidence supports the idea that all three activities were pursued in the Camel’s Hump area. The practice of money digging was widespread in New England during the early 1800s and a novel was written based on an episode of money digging in the Ridley Brook area, entitled *May Martin* (Thompson 1852). Also, a counterfeiter’s ring active in the Camel’s Hump area was alleged to have had a camp/furnace on the south slope of Camel’s Hump (Child 1889) in the early 1800s.

During the first decade of the twentieth century, a very different trend began to emerge in the Camel’s Hump area. It was, in part, an outgrowth of Tourism and equally an effort to conserve forest resources. The first resulted in forms of recreation such as long-distance hiking, camping and outdoor life. The second, the inception of forest conservation and the development of public land into state parks and forests (see Huntington discussion for further details). On Ridley Brook and its headwaters, two sections of former logging tracts were acquired by Joseph Battell and Professor Will Monroe, who in turn gave the two parcels to the state. These gifts, particularly the 1,000-acre Battell Gift were the impetus for the formation of the Camel’s Hump Management Unit.

Eleven historic sites are recorded in the VAI for the town of Duxbury (see Figure 2). There are no recorded sites in the inventory that are within the boundaries of Duxbury sections of the CHMU. The V.
Figure 6. Walling's map of the Ridley Brook area in the Duxbury Block, Duxbury (Walling 1858).
Figure 7. Beers' map of the Ridley Brook area in the Duxbury Block, Duxbury (Beers 1873).
Figure 8. State-ANR map of the Ridley Brook area in the Duxbury Block, Duxbury (State-ANR, no date).
Blodgett site, VT-WA-94 is in close proximity to the outlet of Ridley Brook and is represented by a light artifact scatter of window glass, whiteware, brick and nails. In the vicinity of the State Hospital Block of the CHMU is the Ozias Atherton site, VT-WA-38. This small, urban-farmstead is represented by house foundation, well, possible barn foundation and several other features (Carder et al. 1998). Three historic sites (VT-WA-119, VT-WA-120 and VT-WA-121) were identified during the University of Maine at Farmington Archaeology Research Center’s phase I survey for the Vermont Agency of Transportation’s Route 100 road improvement project (Corey and Petersen 1998). Finally, six sites (VT-WA-45 to VT-WA-50) were identified in the upper Dowsville Brook area and represent components of an historic mill hamlet/farming community. Historic resources represented by these sites include the W.E. & H.O Ward saw and clapboard mill, Andrews sugar house and three farmsteads (see Figure 2).

Industrial and Agricultural Census information for Ridley and Crossett brooks, or sections of the CHMU known as the Ridley Brook Block and the State Hospital Block may be found in Tables 1 and 2. Historic resources, and related information, within or in close proximity to CHMU boundaries are listed in Table 3.

**Bolton/Richmond**

Bolton was chartered in 1763 and the first settlers began arriving in the early 1780s. Early settlement was largely confined to farming and water powered mill sites along both sides of the Winooski River,
with concentration of these industries near the confluences of streams feeding into the river. Agricultural production of maple sugar, apples and dairy products formed the staples of the upland farms on Preston Brook. Proximity to Jonesville and rail connections likely influenced the choices farmers made. To a large extent agricultural production supported the dominant industry of logging and lumbering with some farms on Preston Brook owned and operated by saw mill operators. Similar to Ridley Brook, the activity on Preston Brook saw the evolution of a small rural community, or neighborhood, of sufficient size to support a school and undoubtedly a number of craft-based cottage industries.

Pre-industrial (before ca. 1850 and completion of the Vermont Central Railroad) historic contexts also relate to the theme of Transportation. The historical significance of the Winooski River valley as a natural travel corridor is well documented. This corridor forms sections of the northern boundary of the CHMU in Bolton and Duxbury. Historic contexts of significance which are potentially extant within this section of the management unit include contexts within the theme, War and Peacetime and specifically, the French and Indian War and the American Revolution. The use of the Winooski River as a water and overland route by French and Indian raiding parties was of such frequency that it was known as the French River. This route is documented in the writings of English captives and in accounts of military reconnaissance and encounters (e.g. Wright’s expeditions in the early 1700s and the attack on John Barnet’s company by Indians and Tories during the Revolution). After the Revolution the Winooski River was an important migration route into the interior, less settled regions of the state and was traveled by inhabitants of the Lake Champlain lowlands and the Connecticut River valley.

Proximity of the Preston Brook community to Jonesville and the Vermont Central Railroad indicates historic ties between the inhabitants on Preston Brook and the rail station village of Jonesville. The theme, Culture and Government, in addition to the Education context, include other historic contexts germane to the CHMU tract on Preston Brook. For example, the context of Religious Trends is represented at the confluence of Preston Brook and the Winooski River by a unique geological formation that was used as an open-air church by the Methodists as early as 1800. Camp meetings hosted by the church were also held in the vicinity (Hemenway 1868-91). Further research is required to determine the location of property types associated with this religious activity. An earlier Native American cultural context may be present in the archaeological record of this site. The rock formation contains a feature known as the “Indian Kettle” (Child 1882) and consequently may identify a site with a long history of human use. The other context with a Culture and Government theme relates to an incident known as the “Bolton War”. This conflict arose from issues surrounding labor unrest, railroad construction (working conditions which took seventeen lives) and ethnicity. Irish workers, living in the shanty towns of Dublin and Cork, VT-CH-107, were not paid for their work. Their response was to lay siege to the Jonesville Hotel, VT-CH-656, where railroad officials were staying. Their threat was successfully met by militia action. Prisoners were taken to Burlington and others escaped to the mountains (Child 1882). It may be noted that on both Ridley Brook (Duxbury) and Preston Brook there are a number of inhabitants of Irish descent. Further research may establish a relationship between participants in the Bolton War and the rural communities that evolved on these two brooks.

Historic resources related to three saw mills and at least two farmsteads are expected to be within or
in the immediate vicinity of the CHMU. As with the Ridley Brook neighborhood, the saw mills were initially water powered and engaged in the production of lumber, clapboards and shingles. The farms practiced a diverse agriculture and nearly all kept a variety of livestock and raised small amounts of corn, oats, hay and potatoes. Most of the farms also produced maple sugar, butter and apple crops. Forest products supplemented farm income. On the I. & G. Jewell farm and on the S. Devitt farm, dairying included the production of substantial amounts of cheese. Both farms were also honey and bees wax producers. Towards the end of the nineteenth century, logging and lumbering intensified. Steam powered mills gained access to greater amounts of timberland and wood manufacturing became more diverse with the production of butter tubs, cheese boxes, apple crates, shingles, staves and headings and furniture stock. Proximity to the railroad facilitated both farm and saw mill production. Farmers on Preston Brook were likely also engaged in hemlock bark extraction for the extensive tanning industry carried on in Richmond and also the cutting of firewood and railroad ties for the Vermont Central Railroad.

Two historic sites are recorded in the VAI for Bolton and three are listed for Richmond which are either within the boundaries of the CHMU or nearby (see Figure 2). One site, VT-CH-553, was assigned to remnant house and barn foundations on Preston Brook. The Preston Brook Historic Sites Survey was privately conducted in 1993 and was not under the jurisdiction of the VT DHP, or any other state or federal agency. An attempt to contact the person responsible for this survey was not successful. It is highly likely that some of the resources identified in this survey are within the boundaries of the management unit. On the north side of the Winooski River, at the outlet of Pinneo Brook is the site of two Irish railroad worker camps known as Dublin and Cork. Their location has been assigned site number, VT-WA-107 (also listed in the VAI as, VT-WA-790). The worker camps are associated with one of the historic sites located in Richmond, the Jonesville Hotel site, VT-CH-656. The hotel was the scene of a worker’s revolt during which Irish railroad workers laid siege to the hotel where Vermont Central of ficials were headquartered.

The two remaining historic sites in Richmond that are also in the general vicinity of the CHMU include VT-CH-658 and VT-CH-299. Site, VT-CH-658 is represented by a stone foundation belonging to the Vermont Central rail station complex and site VT-CH-299 is described on the basis of surface observation, as an open-ended, tunnel-like stone built structure, whose function was not determined at the time of its recording.

A significant portion of the town of Bolton, south of the Winooski River, forms the northwest section of the CHMU (Figures 10, 11 and 12). Considered with the Bolton tract is the extreme northeast corner of Richmond, where the Robbins Mountain WMA is located. Three areas containing historic resources have been identified through archival research. Of the three areas, Preston Brook contains the major portion of historic resources in this part of the CHMU. Industrial and Agricultural Census material related to Preston Brook is presented in Tables 1 and 2. Known and expected historic resources within the Preston Brook (Honey Hollow Block), Gleason Brook (Gleason Block) drainages and the Robbins Mountain Block, whose Richmond section is drained by a tributary of the Huntington River, can be found in Table 3.
Figure 10. Walling's map of the Preston Brook area in the Honey Hollow Block of Bolton, together with the Robbins Mountain WMA in the town of Richmond (Walling 1857).
Figure 11. Beers' map of the Preston Brook area in the Honey Hollow Block of Bolton, together with the Robbins Mountain WMA in the town of Richmond (Beers et al. 1869).
Figure 12. State-ANR map of the Preston Brook area in the Honey Hollow Block of Bolton, together with the Robbins Mountain WMA in the town of Richmond (State-ANR, no date).
Huntington

Together with Bolton, Huntington contains that portion of the CHMU west of the main ridge of the Green Mountains. A number of streams drain the western slopes of this section of the mountains. Among the ones considered in this report are Brush, Cobb and Jones brooks, all of which empty into the Huntington River which flows north to join the Winooski River, in Richmond, opposite the Bolton village of Jonesville. Huntington was chartered in 1763 and first settled in 1786. The short, rapid descent of the mountain streams provided water power for several mills. Most of these were located outside the boundaries of the CHMU in lower portions of each of the smaller drainages. Two exceptions have been archivally identified – the saw mill complex/mill hamlet above the headwaters of Brush Brook, under the ownership of Forest City, or Forest Mills Lumber Company (Beers et al. 1869), and a saw mill site in the upper Jones Brook drainage, near the Huntington Gap. The Walling map (Walling 1857) depicts two saw mills on upper portions of Brush Brook (Figures 13, 14 and 15). The Ambler saw mill seems to be particularly close to the CHMU boundaries.

Agricultural production reflects the constraints of mountain farming, however it is interesting that all of the farms in this area produced relatively large amounts of flax seed and three of the five farms made substantial quantities of molasses (maple syrup), ca. 1870 (see Table 2). The Forest City Lumber Company operated a steam saw mill a short distance up slope of the water powered mills on Brush Brook (see Table 1). The Beers map indicates a relatively large woods operation with a number of buildings and extensive tracts of timberland. It is expected that a portion of the agricultural production on neighboring farms helped support the mill operation. Industrial Census data (1850-1880) is not available for the saw mill on upper Jones Brook (Figures 16, 17 and 18), however the Agricultural Census of 1870 records that the J. Dearborn farm produced $400 dollars worth of forest products. Production on this farm was well above local norms. On 300-acres of improved land, the Dearborn family managed a dairy herd of 40 cows and had substantial acreage in wheat, corn, oats and hay. Potatoes, wool, maple sugar and butter were also produced on the farm, and most impressive, was the 7,000 pounds of cheese manufactured annually by the Dearborn family (see Table 2).

Other themes and historic contexts are identified in Huntington sections of the CHMU. Transportation-related resources include two abandoned secondary roads and the Huntington Gap Road, also abandoned. The Huntington Gap Road was an overland wagon road through the Green Mountains linking upper Shepard Brook, in North Fayston with the Huntington River valley. A section of this road passes through the Huntington Gap Block of the CHMU into Fayston. In comparing the Walling and Beers (and later maps) the road appears to have been abandoned in the 1860s (see Figure 9). There may be extant features of the original road and other property types directly associated with the historic context of early nineteenth century Overland Transportation within the CHMU. Further research may determine that the Huntington Gap Road was used as a smuggling route during the embargo period and War of 1812. This trade was active throughout the northern border country and less conspicuous routes through the Green Mountains, such as the one through Smugglers’ Notch, were used for these purposes, making the Huntington Gap Road a potential candidate for similar activity.
Figure 13. Walling's map of the Brush Brook area in the Forest City Block of Huntington (Walling 1857).
Figure 14. Beers' map of the Brush Brook area in the Forest City Block of Huntington (Beers et al. 1869).
Figure 15. State-ANR map of the Brush Brook area in the Forest City Block of Huntington (State-ANR, no date).
Figure 16. Walling's map of the Huntington Gap Road area in the Huntington Gap WMA, Huntington (Walling 1857, 1858).
Figure 17. Beers' map of the Huntington Gap Road area in the Huntington Gap WMA, Huntington (Beers et al. 1869). Fayston section of road not shown on this map.
Figure 18. State-ANR map of the Huntington Gap Road area in the Huntington Gap WMA, Huntington (State-ANR, no date).
The themes of Tourism and Culture and Government are identified in Huntington sections of the CHMU. The Beers map and local accounts indicate an early tourist industry as indicated by the Camel's Hump House in Huntington Center and a western approach from the village center, by way of a tote road/farm road to the summit. The building symbol near the summit that is drawn on the Beers map is not identified, but may be a property type associated with the context of Outdoor Recreation (see Figure 8). Two early twentieth century historic contexts are particularly significant in this section of the management unit. One has agricultural ties and is concerned with forest practice reform, a late nineteenth-early twentieth century trend that included the introduction of nurseries, tree plantations and well managed timber reserves, all in direct response to the damaging effects of intensive industrialization of the forest industry and the effects of forest fire. Forest planting crews and mountain camps were organized to plant spruce seedlings on land burned in the 1903 fire (Figure 19). Of particular importance to the CHMU were the reform-minded ideas of Joseph Battell, whose 1,000-acre gift of the Camel’s Hump summit area to the State of Vermont signaled the transfer of a large privately owned timber tract to the public domain. Reform trends during this period resulted in the formation of the Vermont Forest Service, fire tower-fire patrol system, state financed nurseries, plantations and public parks. Some years later, during the New Deal era of the 1930s, the Civilian Conservation Corps (CCC) was active in the construction of the infrastructure and buildings of state and national parks. The CCC camp at the former Forest City Lumber Company saw mill complex is an example of a set of potentially significant historic resources. The New Deal-CCC historic context is discussed in a Multiple Property Description Form (MPDF), entitled Historic Park Landscapes in National and State Parks and is listed on the National Register of Historic Places (National Park Service 1990). This context is given high priority in Vermont’s Preservation Plan and in standards and guidelines established by the Department of Interior (Figure 20).

One historic site, VT-CH-638, is recorded in the VAI for the town of Huntington (see Figure 2). The Melville site is identified as an industrial site represented by a dry laid stone foundation and cellar hole (Skinas 1997). There are currently no historic sites recorded in the VAI that are within Huntington sections of the CHMU.

**Fayston**

A recent addition (1995) to Camel’s Hump Management Unit is located in western portions of the town of Fayston and is designated by the ANR as the Phen Basin Block (Figures 21, 22 and 23). Together with Duxbury, Fayston contains that portion of the CHMU east of the main ridge of the Green Mountains. The Phen Basin Block is situated in the headlands of two important tributaries of the Mad River. Southern portions of the management unit are in the Mill Brook drainage and northern portions are on streams that are tributaries to Shepard Brook, which empties into the Mad River in Waitsfield.

Fayston was chartered in 1782. Eastern sections of the town were first settled in 1798. The first settlers on upper Shepard Brook (North Fayston) arrived, ca. 1808 (Child 1889). As with all the towns in the Camel’s Hump area, the theme of Industry and Commerce is represented principally by the historic context of Logging and Lumbering and secondarily, by the theme of Agriculture. Water powered sawmills were erected at several locations on both Mill and Shepard brooks, however historic resources
Figure 19. Hauling spruce seedlings by ox cart up to the burned land on Camel's Hump (Brigham 1915) (Top); Camp of the forest planting crew on Camel's Hump, Spring 1915 (Brigham 1915) (Bottom).
Figure 20. Late 19th - early 20th century historic views of the summit of Camel's Hump. a) Summit House, b) Camel's Hump Clubhouse, c) Cairn, d) Observatory (Courtesy of the Bailey Howe Library, Williston Historical Society and the Landscape Change Program, University of Vermont.)
Figure 21. Walling's map of the Stagecoach Road area in the Phen Basin Block, located in the town of Fayston (Walling 1858).
Figure 22. Beers’ map of the Stagecoach Road area in the Phen Basin Block, located in the town of Fayston (Beers 1873).
Figure 23. State-ANR map of the Stagecoach Road area in the Phen Basin Block, located in the town of Fayston (State-ANR, no date).
related to these are not expected to be within CHMU boundaries, although it is expected that steam powered saw mills and logging camps were located within the management unit at various times. Preliminary field inspection by ANR staff have identified three sets of historic resources and make reference to a fourth in their research on the Phen Basin Block. Structural remains and other features of two farmsteads are known to be within CHMU boundaries. These and other historic resources are briefly described in Table 3 and the locations of two farmsteads are shown on the Land Classification map drawn by ANR staff (see Figure 12). Property types relating to the “Phen Place” are not recorded on the map, however, according to ANR research, the homestead (ca. 1847) was situated off the end of Phen Road.

Industrial and Agricultural Census information helps in building a general historic context for this remote section of Fayston (see Tables 1 and 2), but is not very helpful in supplying details pertaining to historic resources known to be within CHMU boundaries. The Agricultural Census records two individuals named, “J. Baird”. As one is only found in the 1850 census and the other in the 1870 census, it is tempting to conclude family continuity on the same farm. However, a brief look at the Beers map suggests that there may have been as many as seven family members with the name, “J. Baird”. The site documented by the ANR appears to have been the farm of J. Baird the 5th. The saw mill operated by the Baird Brothers, ca. 1880 (see Table 1) was located on Mill Brook and further aids in characterizing activities in which the family was involved, though it is not likely that resources directly related to this mill are within CHMU boundaries. In the northern part of the Phen Basin Block, the ANR staff has identified the stone foundation of a barn, located on French Brook, a tributary of Shepard Brook. The J.Baird farm and the barn foundation were located on the Stagecoach Road, which connected Irasville (on lower Mill Brook) to North Fayston (on upper Shepard Brook). This overland route has added significance due to its junction in North Fayston with the Huntington Gap Road. The Stagecoach Road facilitated settlement in western parts of Fayston and likely contributed to the development of Tourism in the Camel’s Hump area.

One historic site, VT-WA-40, is recorded in the VAI for the town of Fayston (see Figure 2). The site is represented by a talc (soapstone) mine with main shaft, secondary shaft, tunnel and various pieces of metal equipment. Soapstone, or steatite was a valued lithic material utilized by Native Americans, however investigations did not establish a Native American context at this site (Dowd and Trubitt 1990). Soapstone deposits are known elsewhere in the general vicinity (Hitchcock and Hager 1861) and cannot be ruled out as potential property types in both Native American and historic Euroamerican contexts.
Table 1. Selected mills in the vicinity of the Camel's Hump Management Unit. From Vermont industrial censuses (State of Vermont 1850-1880). Note: Saw mills marked by a ‘star’ denote mills located within or in close proximity to the CHMU.

<table>
<thead>
<tr>
<th>Town</th>
<th>Drainage</th>
<th>Name of Company</th>
<th>Type of Mill</th>
<th>Power:</th>
<th># of Workers</th>
<th>Raw Material: Species and Kilnage</th>
<th>Production: Kind and Quantity</th>
<th>Year</th>
<th>Demands</th>
</tr>
</thead>
<tbody>
<tr>
<td>J. Ridley and Brothers</td>
<td>clapboard mill</td>
<td>water power: 1 clapboard machine</td>
<td>1</td>
<td>400 spruce logs</td>
<td>100,000 ft. clapperboards</td>
<td>1860 Original mill built, ca 1840, saw timber transferred to Winooksi Lumber Co and then to E.L. White, 1885, 1,300 acres timbered, 15 employees, 500,000 ft. lumber annually.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>John Ridley and Bros.</td>
<td>saw mill</td>
<td>water power: 1 clapboard mill</td>
<td>1</td>
<td>2000 spruce logs</td>
<td>400,000 ft. boards</td>
<td>1860 Original mill built, ca 1854, Rehabilte by Wm. Eliot. See Eliot saw mill below.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>*Mosse Shurtiff</td>
<td>clapboard mill</td>
<td>water power: 1 clapboard mill</td>
<td>2</td>
<td>1800 spruce logs</td>
<td>750,000 clapperboards</td>
<td>1860 10 h.p., 20 ft. head, Beesens Map shows ft. structures throughout drainage, including 1 near summit.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>*Wilson and Co.</td>
<td>saw mill</td>
<td>water power: 30 in. Tyler wheel, 40 in. circular saw</td>
<td>4</td>
<td>3,000 logs</td>
<td>375,000 ft. boards, equine timber</td>
<td>1870 10 h.p., 32 ft. head, 12 months per year in operation, did not do own logging. Ca. 1889, 11 employees, 1 1/3 million ft. clapperboards.</td>
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<tr>
<td>Wm. Eliot</td>
<td>clapboard mill</td>
<td>water power: 1 Tyler wheel</td>
<td>4</td>
<td>not recorded</td>
<td>600,000 ft. lumber</td>
<td>1880 10 h.p., 20 ft. head, operates 9 months full time, 3 months 1/2 time. Sold to E.L. White 1885, 1,350 acres timber.</td>
<td></td>
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<tr>
<td>Duxbury</td>
<td>saw mill</td>
<td>water power: 1 narrow, 1 circular saw</td>
<td>4</td>
<td>not recorded</td>
<td>600,000 ft. lumber</td>
<td>1870 10 h.p., 20 ft. head, operates 9 months full time, 3 months 1/2 time. Sold to E.L. White 1885, 1,350 acres timber.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>*Ebenecor Criss</td>
<td>saw mill</td>
<td>water power: 1 saw</td>
<td>2</td>
<td>1,000 spruce logs, 1,000 hemlock logs, 1,000 other logs</td>
<td>1,000 spruce boards, 1,000 hemlock boards, 1,000 other boards</td>
<td>1869 Early mill mid 1820's, Cresa to Ferrand 1869.</td>
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<tr>
<td>*David Ferrand</td>
<td>saw mill</td>
<td>water power: 1 Russell wheel, 1/42 in. circular saw</td>
<td>2</td>
<td>1,500 logs</td>
<td>250,000 ft. boards</td>
<td>1870 Ferrand replaces undretched wheel and hale mill, Ferrand to Wiserley to Frisbie 1872.</td>
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</tr>
<tr>
<td>*Foster</td>
<td>clapboard mill</td>
<td>water power: 1 Tyler wheel</td>
<td>2</td>
<td>1,500 logs</td>
<td>150,000 ft. clapperboards</td>
<td>1870 Burned 1868, Foster to Hunley, now mill, 8 men broached lumber, chair stock, hard-wood pricing.</td>
<td></td>
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<tr>
<td>Crossfield</td>
<td>saw mill</td>
<td>water power: 1 saw</td>
<td>1</td>
<td>500 logs, spruce, hemlock, and hardwood</td>
<td>100,000 ft. sawed lumber</td>
<td>1850 See also agricultural census for Jewell Brook Farm.</td>
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<tr>
<td>Preston</td>
<td>saw mill</td>
<td>water power: 1 saw</td>
<td>1</td>
<td>1,100 spruce logs, 50 other logs</td>
<td>30,000 ft. floor boards, 80,000 ft. spruce lumber, 3,000 ft. other lumber</td>
<td>1860 In operation 7 mos. per year.</td>
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<tr>
<td>Glasco Brook</td>
<td>saw mill</td>
<td>water power: 1 saw</td>
<td>1</td>
<td>900 logs, spruce, hemlock and hardwood</td>
<td>150,000 ft. lumber</td>
<td>1860 H. Eaton leased 1200 acres from Capt. Glasco ca. 1865.</td>
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<tr>
<td>Forest City Lumber Co</td>
<td>saw mill</td>
<td>wood manufacturing</td>
<td>7</td>
<td>not recorded</td>
<td>300,000 ft. lumber, 200,000 shingles, 250,000 select heads</td>
<td>1860 Company logs on corn land.</td>
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<tr>
<td>Huntington</td>
<td>saw mill</td>
<td>water power: 1 saw</td>
<td>1</td>
<td>600 logs-spruce, 200 ft. hemlock, 50 other lumber</td>
<td>50,000 ft. spruce lumber, 32,000 ft. hemlock lumber, 8,000 ft. other lumber</td>
<td>1860 In operation 8 mos. per year.</td>
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<tr>
<td>Bruce Brook</td>
<td>saw mill</td>
<td>water power: 1 saw</td>
<td>1</td>
<td>200 bu. Wheat, 890 bu. corn, 1,000 bu. oats</td>
<td>flour, commiss, oatmeal</td>
<td>1860 May have been located elsewhere; however, a number of farms in the vicinity, in operation 4 mos. per year.</td>
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<tr>
<td>Fayston</td>
<td>saw mill</td>
<td>water power: 2 Giant wheels 22&quot;, 1 gang of 4 saws, 1 circular saw</td>
<td>2</td>
<td>not recorded</td>
<td>350,000 ft. lumber, 160,000 ft. shingles</td>
<td>1870 In operation 6 mos. per year.</td>
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</table>
Table 2. Selected farms within or in close proximity of the Camel's Hump Management Unit From Vermont agricultural censuses, 1850 and 1870 (USDA 1850; USDA 1870).

<table>
<thead>
<tr>
<th>Selected Farms on Ridley Brook within or in the immediate vicinity of Camel's Hump Management Unit</th>
<th>Improved Acres</th>
<th>Unimproved Acres</th>
<th>Horses</th>
<th>Cows</th>
<th>Oxen</th>
<th>Other Cattle</th>
<th>Sheep</th>
<th>Swine</th>
<th>Wheat (bu.)</th>
<th>Rye (bu.)</th>
<th>Corn (bu.)</th>
<th>Oats (bu.)</th>
<th>Wool (lbs.)</th>
<th>Potatoes (bu.)</th>
<th>Orchard ($)</th>
<th>Butter (lbs.)</th>
<th>Cheese (lbs.)</th>
<th>Hay (ton)</th>
<th>Maple Sugar (lbs.)</th>
<th>Homemade products ($)</th>
<th>Miscellaneous</th>
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</thead>
<tbody>
<tr>
<td>Edw. Roberts</td>
<td>1850: 100</td>
<td>1870: 100</td>
<td>1</td>
<td>5</td>
<td>2</td>
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<td>2</td>
<td>20</td>
<td>16</td>
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<td>200</td>
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<td>12</td>
<td>buckwheat-30 bu.</td>
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<td>Aaron Noyes</td>
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<td>1870: 25</td>
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<td>4</td>
<td>2</td>
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<td>D. Montgomery</td>
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<td>1870: 150</td>
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<td>6</td>
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<td>10</td>
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<td>300</td>
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<td>500</td>
<td>300</td>
<td>600</td>
<td>market garden-$15.00</td>
<td>forest products-$74.00</td>
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<td>E. Pape</td>
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<td>1870: 100</td>
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<td>2</td>
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<td></td>
<td></td>
<td></td>
<td>forest products-$400.00</td>
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<tr>
<td>J. Dailey</td>
<td>1870: 70</td>
<td>1850: 30</td>
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<td>7</td>
<td>3</td>
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<td>market garden-$5.00</td>
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<td>Wm. Dailey</td>
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<td>1870: 25</td>
<td>1</td>
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<tr>
<td>M. Maroney</td>
<td>1850: 52</td>
<td>1870: 53</td>
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<td>5</td>
<td>3</td>
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<td>1870: 15</td>
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<td>15</td>
<td>15</td>
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<td>market garden-$5.00</td>
</tr>
<tr>
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<td>1870: 150</td>
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<td></td>
<td>forest products-$580.00</td>
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<td>J. O'Neill</td>
<td>1870: 75</td>
<td>1850: 600</td>
<td>1</td>
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<td>10</td>
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<tr>
<td>Wilson and Co.</td>
<td>1870: 100</td>
<td>1850: 600</td>
<td>4</td>
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<td>forest products-$580.00</td>
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</table>
Table 2 (continued). Selected farms within or in close proximity of the Camel's Hump Management Unit. From Vermont agricultural censuses, 1850 and 1870 (USDA 1850; USDA 1870).

<table>
<thead>
<tr>
<th>Farm Name</th>
<th>Year</th>
<th>Improved Acres</th>
<th>Unimproved Acres</th>
<th>Horses</th>
<th>Cows</th>
<th>Oxen</th>
<th>Other Cattle</th>
<th>Sheep</th>
<th>Swine</th>
<th>Wheat (bu.)</th>
<th>Rye (bu.)</th>
<th>Corn (bu.)</th>
<th>Oats (bu.)</th>
<th>Wood (lbs.)</th>
<th>Potatoes (bu.)</th>
<th>Orchard ($)</th>
<th>Butter (lbs.)</th>
<th>Cheese (lbs.)</th>
<th>Hay (ton)</th>
<th>Maple Sugar (lbs.)</th>
<th>Homemade Products ($)</th>
<th>Miscellaneous</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Jewell</td>
<td>1850</td>
<td>75</td>
<td>150</td>
<td>1</td>
<td>12</td>
<td></td>
<td>5</td>
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<td>100</td>
<td>37</td>
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<td>28</td>
<td>150</td>
<td>bees wax/ honey-25 lbs.</td>
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<tr>
<td></td>
<td>1870</td>
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<td>bees wax/ honey-25 lbs., probably same farm as G. Jewell</td>
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<td></td>
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Table 2 (continued). Selected farms within or in close proximity of the Camel's Hump Management Unit. From Vermont agricultural censuses, 1850 and 1870 (USDA 1850; USDA 1870).

| Selected Farms on Upper Brush Brook within or in the immediate vicinity of the Camel’s Hump Management Unit | Improved Acres | Unimproved Acres | Horses | Cows | Oxen | Other Cattle | Sheep | Swine | Wheat (bu.) | Rye (bu.) | Corn (bu.) | Oats (bu.) | Wool (lbs.) | Potatoes (bu.) | Orchard ($) | Butter (lbs.) | Cheese (lbs.) | Hay (ton) | Maple Sugar (lbs.) | Miscellaneous |
| O. Gorton | 1850 | 50 | 37 | 2 | 3 | 2 | 9 | 2 | 100 | 50 | 27 | 50 | 17 | 100 | 20 | 80 | flax-20 lbs. |
| | 1870 | 50 | 176 | 1 | 3 | 2 | 4 | 13 | 1 | 25 | 50 | 100 | 60 | 100 | 30 | 450 | 15 | | flax seed-500 bu. molasses-2,000 gal forest products-$20.00 |
| J. Rollins | 1850 | 75 | 100 | 1 | 2 | 7 | 12 | 1 | 15 | 25 | 125 | 50 | 125 | 5 | 100 | 25 | 250 | buckwheat-16 bu. |
| | 1870 | 117 | 80 | 3 | 16 | 7 | 11 | 2 | 20 | 20 | 60 | 800 | 2000 | 40 | | | | forest products-$30.00 flax seed-80 bu. |
| E. Cobb | 1850 | 50 | 60 | 4 | 2 | 3 | 1 | 15 | 10 | 20 | 200 | 26 | | | | | | flax seed-175 bu. forest products-$12.00 |
| H. Dyke | 1850 | 15 | 45 | 1 | 3 | 2 | 5 | 1 | 15 | 30 | 70 | 150 | 100 | 720 | 30 | | | | | flax seed-600 bu. molasses-2000 gal. wine-3 gal. |
| Wm. Johns | 1850 | 10 | 47 | 2 | 1 | 2 | 4 | | | | | | | | | | | | | flax seed-100 bu. molasses-1,000 gal. |
Table 2 (continued). Selected farms within or in close proximity of the Camel's Hump Management Unit. From Vermont agricultural censuses, 1850 and 1870 (USDA 1850; USDA 1870).

<table>
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<tr>
<th>Selected Farms on Huntington Gap Road within or in the immediate vicinity of Camel's Hump Management Unit</th>
<th>Improved Acres</th>
<th>Unimproved Acres</th>
<th>Horses</th>
<th>Cows</th>
<th>Working Oxen</th>
<th>Other Cattle</th>
<th>Sheep</th>
<th>Swine</th>
<th>Wheat (bu.)</th>
<th>Rye (bu.)</th>
<th>Corn (bu.)</th>
<th>Oats (bu.)</th>
<th>Wool (lbs.)</th>
<th>Potatoes (bu.)</th>
<th>Orchard ($)</th>
<th>Butter (lbs.)</th>
<th>Cheese (lbs.)</th>
<th>Hay (ton)</th>
<th>Maple Sugar (lbs.)</th>
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<table>
<thead>
<tr>
<th>Selected Farms on or in the vicinity of Stagecoach Road in the Phcen Basin Block of the Camel's Hump Management Unit</th>
<th>Improved Acres</th>
<th>Unimproved Acres</th>
<th>Horses</th>
<th>Oxen</th>
<th>Other Cattle</th>
<th>Sheep</th>
<th>Swine</th>
<th>Wheat (bu.)</th>
<th>Rye (bu.)</th>
<th>Corn (bu.)</th>
<th>Oats (bu.)</th>
<th>Wool (lbs.)</th>
<th>Potatoes (bu.)</th>
<th>Orchard ($)</th>
<th>Butter (lbs.)</th>
<th>Cheese (lbs.)</th>
<th>Hay (ton)</th>
<th>Maple Sugar (lbs.)</th>
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RECOMMENDATIONS FOR MANAGING KNOWN AND EXPECTED HISTORIC RESOURCES

A variety of management goals and recommendations are presented in Table 3 and discussed below with the assumption that these be considered objectives for consideration. Obviously, there are many factors that may impede the goals and recommendations outlined below, the first being economic considerations. Prioritization of goals and objectives becomes essential to ensure important preservation outcomes. In general, historic resource identification, preservation, interpretation and public education is the recommended process by which significant properties and landscapes are managed. Known and expected historic resources within the Camel’s Hump Management Unit vary widely in age and historic context. In prioritizing these, based on their relative historical significance, UMF ARC follows guidelines established by the VT DHP in Vermont’s Preservation Plan (VTSHPO 2002). A graphic summary of the results of this study is presented in Table 3. Within each historic context (Industry and Commerce, Agriculture, etc.) the VT DHP lists property types and provides a set of research questions which help the archaeologist organize and interpret information gathered in the field and through archival review. Technical services provided by the National Park Service, Department of Interior, and other agencies, facilitate this process and also supply important guidelines, as in the Planning, Treatment and Management of Historic Landscapes (Birnbaum 2001).

Prioritizing historic resources without an archaeological assessment/survey of the study area and without a thorough understanding of the study area’s places, settings and historic contexts leads to errors in judgment and interpretation. Prioritizing known and expected historic resources at this preliminary level of analysis can only be done in the most general of terms.

Only one Native American site has been identified within the Camel’s Hump Management Unit, however given the proximity of known Native American sites to the CHMU, a high priority should be given to specific areas that possess moderate to high sensitivity, as indicated by the UVM CAP sensitivity study. In most cases, when a Native American site is identified, priorities shift to place highest significance on these resources, at least until their overall significance can be determined. Similarly, if “expected” historic Euroamerican resources, or unexpected resources of historical significance are identified within Camel’s Hump Management Unit, priorities may shift to reflect their importance relative to other resources in the cultural inventory of the park. As known and expected archaeological sites are presently not well documented, field investigation and a more focused background research agenda is necessary before an assessment of their historical significance and specifically, before their eligibility for inclusion in the National Register of Historic Places (NRHP) can be considered.

Historic resources of several preservation themes are known or expected to be within the boundaries of the CHMU. Four important themes are, Agriculture, Industry and Commerce, Transportation and Tourism. From an agricultural perspective, it has been shown that the farming areas identified in this report practiced similar forms of farming and by inference, had similar configurations, or layouts of farm houses, barns and outbuildings, fields and roads, etc. However, variations among farm-type and degree
and type of cottage/craft industry (as demonstrated in agricultural censuses, for example) are factors which, upon closer analysis distinguish isolated farming communities and individual farms from one another. In some areas of the management unit, such as on Preston and Ridley brooks, these similarities and differences may be preserved archaeologically and in the extant landscape, making it possible to evaluate the significance of these resources as evidence of patterns of change in historic working landscapes.

“As changing agricultural methods and new land uses destroy more and more of these characteristics, isolated communities and individual farmsteads retaining the historic configuration may be become eligible for National Register listing” (National Park Service 1984:12).

LOGGING AND LUMBERING

The historic context of Logging and Lumbering represents the major land use in the Camel’s Hump area throughout the nineteenth century. It was initially well-integrated into the system of farming, but towards the end of the century, logging and lumbering practices tended to develop independently, frequently to the detriment of farming, and expanded into industrial operations that eliminated upland diversified crop and livestock farms altogether. During much of the nineteenth century, water powered mills were responsible for milling lumber and manufacturing wood products. The saw mill, like the grist mill, was frequently the impetus for the establishment of village and hamlet. As such, these resources are often found to contribute to Patterns of Town Development and they may also be understood in terms of their contribution to understanding patterns of change in historic working landscapes.

TRANSPORTATION

The secondary and regional roads in the Camel’s Hump area directly relate to the theme of Transportation. The contexts of overland, water and rail forms of transportation are particularly significant in three areas of the CHMU. Through Huntington and Fayston runs the Huntington Gap Road. A section of this overland route passes through the Huntington Gap Block of the CHMU. A historic stage and freight route runs north-south through the Phen Basin Block. Perhaps the most significant of the regional roads in the Camel’s Hump area is the road and bridge system, waterway and rail corridor of the Winooski River. Its passage through the Green Mountains marks one of the most historically significant transportation corridors in the region. Farm locations, levels and types of production, mill locations and many aspects of rural life in general are largely determined by the geography of the local and regional transportation network. Trace remains of the Huntington Gap and Stagecoach roads are likely to exist in fragmented and disturbed contexts. Once they were abandoned as long distance routes, the resulting road segments served local exchange/production routes. As farms were abandoned in the latter part of the nineteenth century and logging and lumbering became more industrialized, these old roads and other secondary roads were either used as logging roads or were abandoned. Two historic sites, the J. Baird place and the barn foundation on the outskirts of North Fayston, are aligned on the Stagecoach Road. Documentation of road segments and historic sites along both the Huntington Gap Road and the Stagecoach Road are significant preservation goals. Research gaps posed in the State Historic Preservation Plan’s Transportation theme
ask questions such as, where were Vermont’s early stage routes, toll and post roads? Why were vigorous hill top routes chosen for early road locations? Who built the early roads? Who lived on these roads? How were the roads used and why were they abandoned? (VT DHP 1989).

**TOURISM**

Finally, the preservation theme of *Tourism* introduces a set of historic contexts and corresponding resources that are well-represented in the CHMU. Two time periods are particularly important – the early to mid-nineteenth century Spa-Hotel-era when entrepreneurs in small towns and villages began building hotels, trails and carriage/bridle roads in an effort to attract tourists to the dramatic scenery and natural resources offered in the Camel’s Hump area. Since the early 1900s, *Tourism* has developed within the context of public parkland. In the contexts of forest conservation and the formation of Camel’s Hump Management Unit are the origins of the Green Mountain Club and the construction of the Long Trail, the Vermont Forest Service and progressive agricultural views that advocated the conservation of forest resources. Arguably, the time period of most significance in the context of *Tourism* is during the initial developmental stages of what was to become the Camel’s Hump Management Unit, ca. 1890-1920. The CCC was active on Camel’s Hump in the 1930s. A CCC “Spike Camp” is shown on the ANR-State map. Archaeological and structural remains of this camp are assessed as highly significant in the State’s Historic Preservation Plan. Full documentation of this camp is a desirable research goal.

**HISTORIC RESOURCE MANAGEMENT SUMMARY**

Given the relatively recent interest in historical archaeology, upland sites and landscapes such as are described in this report are not well known, archaeologically, and frequently are underrepresented in Vermont history. These historic resources are likely to yield important information that will contribute significantly to the State’s Preservation Plan and to the long-range management of Camel’s Hump Management Unit. The development of a methodology that defines the full extent and nature of these historic resources is a necessary goal and it is also one that can be integrated into a public education program that focuses on relating historic resources to our cultural heritage. This work will result in greater awareness of this heritage and a more informed sense of how historic landscapes are formed.

More specific recommendations for the management of the historic resources are provided in Table 3 and in a more general way, by the following suggestions:

- Site identification and detailed mapping of all known historic resources should be a long-term priority. Historic resources should be assigned site numbers and entered into the Vermont Archaeological Inventory (VAI). This work should be accompanied by additional background research, which will provide a basis for further evaluating site significance. Site coordinates and site file information should be established for each historic resource and made available to ANR staff working in the park.

- Field investigation is a desired goal and one required in instances where proposed
projects may adversely affect the integrity of known or expected historic resources. Field investigation is also a necessary goal in the establishment of the vertical and horizontal boundaries of the site, or historic district and the degree of integrity such resources possess.

- Develop minimal public education signage to inform the public of the CHMU’s cultural heritage. A brochure with a map highlighting the areas discussed in this report, together with the inclusion of relevant historic sites in the Camel’s Hump area is an efficient means of informing the public of the history of places and events in the local landscape.

- Maintain sections of the historic landscape within the CHMU.

  - Management practices should include the placement of a buffer zone around all known historic resources within the CHMU, specifically as an assurance against the adverse affects of ongoing forest management projects, such as timber harvesting, road building, road elimination, the creation of yarding areas, and all other projects entailing ground disturbance and other potential encroachments upon site integrity.

  - The removal of secondary growth and the establishment of perennial grasses that help define and stabilize farmstead and former dwelling sites may be a desirable preservation goal. Such sites are also enhanced by the release of apple trees which helps restore integrity to historic farmsteads. Maple sugar groves (sap orchards), where they are discernible, can be maintained by thinning, and the clearance of dead wood, undergrowth and competing species.

  - Though reforestation and proper management of this resource may be the desired goal, generally within the Camel’s Hump Management Unit, it may be desirable in future interpretations of the landscape to restore representative examples of nineteenth century upland field systems, as a means of providing a more meaningful context for understanding farming districts such as have been identified on Ridley and Preston brooks and to better appreciate the local agricultural heritage. The management of historic plantations (such as, the Battell and Monroe Gifts), orchards and maple sugar groves may require consultation with specialists in conservation forestry, wildlife biology and agricultural history.

  - Consideration should be given to all known and expected cultural resources (bridges, abutments, culverts, corduroy, etc.) associated with historic roads in the CHMU, specifically, the Huntington Gap and Stagecoach roads. Field investigation, mapping and archival research concerning these routes should receive a high priority in the management plan. Sections of these roads and other secondary roads that fall within CHMU boundaries and which have been abandoned are as a result subject to modification by current and future land use practice. Historic corridors such as these should be placed within a buffer zone, in instances where they can be identified, and any project that would potentially have an adverse affect
on the corridor would require, minimally, an archaeological resource assessment as stipulated in the VT DHP Guidelines (VTSHPO 2002).

- Maps and other primary source material should be inventoried and catalogued. High priority should be given to the location of all historic manuscript and printed maps, photographs, journals, survey notes and other primary source material relevant to the cultural history of the Camel’s Hump Management Unit.

Guidelines set out by the ANR’s Department of Forests, Parks and Recreation publication, Stonewalls and Cellarholes: A guide for landowners on historic features and landscapes in Vermont’s forests covers many of the practices which should be followed in the CHMU (Sanford et al. 1994). For example, the CHMU will choose a forester and method of logging sensitive to cultural resources and their protection. This sensitivity should also be reflected in all future lease agreements and in areas where timber rights are not held by the CHMU. It is recommended that the CHMU consult with the VT DHP to determine the extent to which known and potential historic resources can be protected in instances where forest practices do not adhere to guidelines favorable to historic preservation. The locations of cultural resources (cellar holes, wells, stone walls, cultivated plants, dumps, roads, etc.) should be mapped and a clearly discernable buffer zone established around them. Logging may be permitted within the buffer zone, but is to be done at times when the ground is frozen to minimize soil disturbance and compaction. In such instances, vulnerable resources must be flagged so that the logger does not inadvertently run over, or land a tree on any of the historic features judged to be vulnerable to such treatment. The logger must avoid placing slash and other debris in cellar holes, wells and depressions within the buffer zone. If stone walls must be crossed, use existing openings if possible. Where openings are lacking, make a passage through the wall as clean and as narrow as possible, placing the removed stone near the wall for future restoration (Sanford et al. 1994). Another publication which may be useful in making management decisions is the Guide to Sustainable Earthworks Management (National Park Service 1998). Although this publication is a reference for the long-term management of earthworks associated with historic fortifications, several topics including selective forest thinning, establishing native herbaceous cover and the enhancement of selected historic resources through planting and mowing may apply in various areas of the CHMU.

Other recommended practices include; a management strategy of in-place preservation of archaeological sites, yearly monitoring of known archaeological sites, consultation with the VT DHP and a continuing effort in identifying as many historic sites and gathering as much contextual information as possible on known and expected resources.
<table>
<thead>
<tr>
<th>County</th>
<th>Town, ANR Block &amp; Drainage</th>
<th>Known or Expected</th>
<th>Historic Resource</th>
<th>Preservation Theme</th>
<th>Historic Context</th>
<th>Maps*</th>
<th>Property Types</th>
<th>Comments</th>
<th>Significance/Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wash., Co.</td>
<td>Duxbury, State Hospital Block, Crosett Brook</td>
<td>E</td>
<td>Upland farms</td>
<td>Agriculture</td>
<td>Diversified and Specialty Farms, Agricultural Processing, Small Craft &amp; Cottage Industry (ca. 1820-1900)</td>
<td>Walling Beers Child</td>
<td>Cellar holes, barn and farm-related structures and features, inc. well, sugar house(s), stone walls, dumps, orchard, and others</td>
<td>Farms (or portions) w/in or in close proximity to CHMU inc., C. Wells, J. Atkins (Walling) and W. Allans, C. McGrath, G. Crosett (Beers)</td>
<td>No historic resources currently identified. High potential for historic sites with agricultural and village contexts. Highest priority to cellar holes and their immediate surroundings. Recommended - Archaeological Resource Assessment/Phase I survey; site numbers assigned to each dwelling site (minimally). Protect all identified sites w BUFFER of 100m to safeguard known and other archaeological resources potentially present.</td>
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<td></td>
<td></td>
<td>E</td>
<td>Saw mill</td>
<td>Industry and Commerce</td>
<td>Water powered mill (ca. 1820-1870)</td>
<td>Walling Beers Child</td>
<td>Saw mill site and structural remains, dam, abutments, flume/penstock, mill pond, logging slip, portable forge</td>
<td>The Curran Mill (ca. 1820s) first recorded mill in Duxbury near CHMU boundary. Historic saw mill resources may be in close proximity to CHMU. Historic maps and accounts indicate a complex industrial sequence, and includes the development of the village of Duxbury.</td>
<td>No historic resources currently identified. High potential for historic sites with primary and/or secondary features associated with water powered mills. Highest priority to mill foundation/dam complex. Field inspection is necessary to determine the location of this saw mill and others in the mill sequence relative to CHMU boundaries. Positive identification of resources will require documentation and assigned site number(s). Protect site with a buffer that includes all components of a water powered mill site. Curran Mill has a higher priority than subsequent mill operations, however all mill sites possess historical significance.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E</td>
<td>Logging camp(s)</td>
<td>Industry and Commerce</td>
<td>Logging and Lumbering (ca. 1820-1900)</td>
<td>Logging camp(s)-structural remains, roads (skidways, sled roads, burriers, snubbing tree), cribbed log landings, sled bridges, hollows, dumps and other timber-related constructions</td>
<td>Logging and lumbering and water powered mills dominated industry on Crosett Brook. Logging camps are expected in the vicinity of all mills in the area</td>
<td>No logging camps currently identified. Logging camps and features associated with logging are frequently adversely affected by subsequent logging operations, non-related land use and natural causes, such as fire. Extant resources, particularly those of the water powered mill era have a higher priority than those related to the steam mill period. Protect all structural remains with a buffer.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>K</td>
<td>Upland farming community</td>
<td>Agriculture</td>
<td>Diversified and Specialty Farms (ca. 1850-1900) possibly earlier</td>
<td>Walling Beers Child State</td>
<td>12 cellar holes in drainage - 8 w/in CHMU; stone walls, old fields</td>
<td>Community known historically as, “Hardscrabble”. Cellar holes possibly identify - T. Kennedy, W.H. White, A.G. Noyes, P.B. Swift and others (Walling); M. Wilson &amp; Co., T. Kennedy, G. Pepe, Shurtleff, W. Davis, E. Callahan, M. Marrion and others</td>
<td>High priority as historic district. Contributes to State's Preservation Plan and National Register's Multiple Property Listing (MPLP) on Vermont Agriculture. Recommended - Archaeological Resource Assessment/Phase I survey; site numbers assigned to each dwelling site (minimally). Protect all known sites w BUFFER of 100m to safeguard known and other archaeological resources potentially present.</td>
</tr>
</tbody>
</table>

** Maps: Chittenden Co. - Walling (1857), Beers (1869), Child (1882), State (no date); Washington Co. - Walling (1858), Beers (1873), Child (1889); USGS (Lincoln Mtn. Quad, 1921; Camel's Hump Quad, 1924)
Table 3 (continued). Historic resources within or in close proximity of the Camel's Hump Management Unit.

<table>
<thead>
<tr>
<th>County</th>
<th>Town, ANR Block &amp; Drainage</th>
<th>Historic Resources</th>
<th>Preservation Theme</th>
<th>Historic Context</th>
<th>Maps*</th>
<th>Property Types</th>
<th>Comments</th>
<th>Significance/Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Upland farms</td>
<td>Agriculture</td>
<td>Diversified and Specialty Farms; Agricultural Processing, Small Craft &amp; Cottage Industry (ca. 1850-1900)</td>
<td>Walling-Beers Child State</td>
<td>Subsurface structural remains and features of barns, outbuildings; wells, dumps, discarded farm equipment, orchards, sugar processing sites, stone walls of above-noted farms and possibly others</td>
<td>Barns/sheds for hay storage and small milking herds, horses, oxen, other cattle, sheep, pigs, milkhouse, spring, granary, corn crib, orchard, garden (market garden). Most farms supplemented income from manuf. of unspecified forest products</td>
<td>Expected property types relate to farmlands noted in row above and form part of recommended archaeological study. Highest priority is given to those resources that reflect patterning of vernacular landscape and variations within it. The extent to which this occurs helps establish the boundaries of the potential ‘historic district’. Primary source research (population censuses, probate records, Grand Lists, business directories) to assist in property type identification.</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>Cemetery</td>
<td>Historic Architecture and Patterns of Town Development</td>
<td>Physical Patterns of Communities</td>
<td>State</td>
<td>Graves, markers, tombstones, boundary fence, gate, ornamental plantings, commemorative objects</td>
<td>Identified as cemetery associated w/ Couching Lion Farm (Prof Wil Monroe)</td>
<td>High priority historic resource. Recommended - Determine age, type and boundaries of cemetery, and eligibility for inclusion on National Register. Until an archaeological assessment has been completed, a buffer of 50m should surround existing cemetery.</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>Carriage Road, Ridley House site</td>
<td>Tourism</td>
<td>Spa-Hotel (ca. 1845-1875)</td>
<td>State</td>
<td>Ridley House site and all structural remains, features and deposits associated with this “summit house”; Carriage Road road segment; stonework, abutments, culvert, dyke, markers and other road features</td>
<td>Built by Samuel Ridley prior to completion of the Vermont Central Railroad, when North Duxbury was on stage route</td>
<td>The site and immediate environs of the Ridley House potentially contains historic resources of archaeological significance. As a contributing resource to the National Register MPDF, Historic Park Landscapes in State and National Parks, the Ridley House site is a high priority historic resource, requiring field identification and an assigned site number. The Carriage Road corridor and any extant features associated with it are high priority historic resources. Management goals dependent on degree of historic integrity retained by the road.</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>Historic hiking trails, lodge and associated features</td>
<td>Tourism</td>
<td>Outdoor Recreation (ca. 1900-1950)</td>
<td>State</td>
<td>Long Trail, Callahan and Forest trails and trail features such as historic stonework, markers, timber constructed features; Montclair Glen (lodge); Monroe Gift and portions of Battell Gift - boundary markers, plantings</td>
<td>Long Trail is oldest long-distance hiking trail in country. Monroe Gift included Couching Lion Farm (contains cemetery described above)</td>
<td>All property types are high priority resources and contribute to National Register MPDF, Historic Park Landscapes in State and National Parks. Battell and Monroe gifts are high priority resources and should be maintained according to benefactors’ requests. Best practices of conservation forestry. The pre-1920 trail system has a higher priority than later trail building. Integrity of earlier trails and extant features should be assessed prior to any trail attention.</td>
<td></td>
</tr>
</tbody>
</table>

** Maps: Chittenden Co. - Walling (1857), Beers (1869), Child (1882), State (no date); Washington Co. - Walling (1858), Beers (1873), Child (1889); USGS (Lincoln Mt. Quad, 1921; Camel’s Hump Quad, 1924)
Table 3 (continued). Historic resources within or in close proximity of the Camel's Hump Management Unit.

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<tr>
<th>County Town, ANR Block &amp; Drainage</th>
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<th>Historic Context</th>
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<th>Property Types</th>
<th>Comments</th>
<th>Significance/Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Saw mill</td>
<td>Industry and Commerce</td>
<td>Logging and Lumbering, Water powered mills (ca. 1850-1890)</td>
<td>Walling Child</td>
<td>Saw mill site and structural remains, dam, dam remains, flume/penstock, mill pond</td>
<td>Located on upper Ridley Brook on Walling map and referred to in Child's Gazetteer. Possibly the Shurtleff Mill</td>
<td>No historic resources currently identified. Highest priority to mill foundation/dam complex. This unidentifed mill (Walling) is the first recorded mill on upper Ridley Brook and may be wholly or partially w/n the CHMU. The mid 19th century mill site has a higher priority than subsequent mill operations. Field inspection is necessary to determine the location of this saw mill. Positive identification of resources will require further documentation, an assigned site number and a buffer zone determined by the extent and historic integrity of the site.</td>
</tr>
<tr>
<td>E</td>
<td>Steam powered saw mill</td>
<td>Industry and Commerce</td>
<td>Logging and Lumbering (ca. 1880s)</td>
<td>Child</td>
<td>Portable steam mill and associated features, boarding house, company farm</td>
<td>J.A. &amp; L.J. Durkee Mill - 1800 acres timberland, 5 houses, blacksmith shop, 100 acre farm</td>
<td>Durkee Mill formed nucleus of late 19th century mill hamlet. Earier farms/dwelling sites and their resources predating this development should receive a higher priority. However, if archeologically intact, the Durkee mill neighborhood may warrant more intensive study.</td>
</tr>
<tr>
<td>E</td>
<td>Logging camp(s)</td>
<td>Industry and Commerce</td>
<td>Logging and Lumbering (ca. 1890-1900)</td>
<td>Officer</td>
<td>Logging camps, structural remains, roads (skidways, roads, bridges, sawmill), buildings (sawmill, blacksmith shop), other timber-related constructions</td>
<td>Extensive logging and lumbering throughout Ridley Brook drainage (mid 19th to late 20th centuries)</td>
<td>No logging camps are currently identified. Although ubiquitous property types in the rural working landscape, logging camps and features associated with them are frequently adversely affected by subsequent logging operations. Intact resources, particularly those of the water powered mill era have a higher priority than those related to the steam mill period.</td>
</tr>
<tr>
<td>E</td>
<td>School house site</td>
<td>Culture &amp; Government</td>
<td>Education (ca. 1890s)</td>
<td>Officer</td>
<td>Durkee School-Structural remains, well, school yard, privy, other deposits</td>
<td>Older school house site elsewhere on Ridley Brook (see Figure 5)</td>
<td>School house was part of the Durkee Mill hamlet. Archival documentation of school provides context for assessing historic significance of this hamlet and potentially introduces themes related to ethnicity and class. Recommended - Field identification and assessment w/ 50m buffer established around site location.</td>
</tr>
<tr>
<td>E</td>
<td>Pits, mounds, camp sites</td>
<td>Culture &amp; Government</td>
<td>Popular Culture (ca. 1800)</td>
<td>Officer</td>
<td>Pits, mounds, cabin/camp sites, furnace, slag pile, dump and other deposits</td>
<td>Countermilling and money-digging were activities occurring in vicinity of Ridley Brook and the Camel's Hump area</td>
<td>No historic resources currently identified. Archaeological evidence of &quot;money-digging&quot; activity and counterfetring is very rare and would be of great significance if identified. Recommended - Background research and field inspection. Documentation, site number and buffer zone established with positive identification.</td>
</tr>
</tbody>
</table>

** Maps: Chittenden Co. - Walling (1857), Bees (1869), Child (1882), State (no date); Washington Co. - Walling (1858), Bees (1873), Child (1889); USGS (Lincoln Mtn. Quad, 1921; Camel's Hump Quad, 1924)**
**Historic Resource Summary of the Camel's Hump Management Unit, Washington and Chittenden Co, Vermont**

**Table 3 (continued). Historic resources within or in close proximity of the Camel's Hump Management Unit.**

<table>
<thead>
<tr>
<th>Property Type</th>
<th>Maps*</th>
</tr>
</thead>
</table>
| Camel site, ornamental, commercial places | Chittenden Co. - Walling (1857), Beers (1869), Child (1882)
| Washington Co. - Walling (1858), Beers (1873), Child (1889)
| USGS (Lincoln Mtn. Quad, 1921; Camel’s Hump Quad, 1924) |

<table>
<thead>
<tr>
<th>Historic Context</th>
<th>Preservation Theme</th>
<th>Comments</th>
</tr>
</thead>
</table>
| WWI              | Industry and Commerce | Activity area associated with this period: 
|                  |                   | Located on ridge, near Scarboro Wildlife Management Area. |

<table>
<thead>
<tr>
<th>Historic Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camel's Hump Management Unit LRMP - Appendices</td>
</tr>
</tbody>
</table>

**Maps: Chittenden Co. - Walling (1857), Beers (1869), Child (1882); Washington Co. - Walling (1858), Beers (1873), Child (1889); USGS (Lincoln Mtn. Quad, 1921; Camel’s Hump Quad, 1924).**
Table 3 (continued). Historic resources within or in close proximity of the Camel's Hump Management Unit.

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<th>Comments</th>
<th>Significance/Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Logging camp(s)</td>
<td>Industry &amp; Commerce</td>
<td>Logging and Lumbering (ca. 1850-1900)</td>
<td>Walling Beers</td>
<td>Logging camp(s)-structural remains, dump sites, roads, landings, timber-related constructions. Potential also for portable steam saw mill, sluice ways, driving dams</td>
<td>There are no logging camps currently identified. Logging camps and features associated with them are frequently adversely affected by subsequent logging operations and non-related construction and land use. Intact resources, particularly those of the water powered mill era have a higher priority than those related to the steam mill period.</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>School house site</td>
<td>Culture &amp; Government</td>
<td>Education (ca. 1850-1900)</td>
<td>Walling Beers</td>
<td>School house site, school yard, privy, dump, well</td>
<td>3 potential sites w/in or in close proximity to CHMU boundaries</td>
<td>High priority resources contributing to National Register MPDF; Educational Resources of Vermont.</td>
</tr>
<tr>
<td>E</td>
<td>Historic hiking trail</td>
<td>Tourism</td>
<td>Outdoor Recreation (ca. 1910-1950)</td>
<td>Walling Beers</td>
<td>Section of Long Trail through Honey Hollow (Prescott Brook). Trail related features inc. stone work, foot-bridge, Honey Hollow Tent Site</td>
<td>Constructed, ca. 1910, this segment of the Long Trail may preserve features significant to the early history of the trail and the GMO</td>
<td>This section of the Long Trail is abandoned, however existing remains of these resources contribute to the historic significance of the Long Trail. Trail segments containing stone work or examples of other trail-related construction should be documented and buffered.</td>
</tr>
<tr>
<td>K</td>
<td>Upland farm</td>
<td>Agriculture</td>
<td>Diversified and Specialty farm (ca. 1870-1900)</td>
<td>Beers State</td>
<td>Cellar hole</td>
<td>Probable site of farmstead or feature of Gleason saw mill. Wiley House site also in general vicinity of cellar hole</td>
<td>Field inspection and additional background research will determine function and age of site. Saw mill (water powered and steam powered), farmstead or Wiley House site, or combination of one or more of these property types are all possible. Since high priority is given to farms on Preston and Ridley brooks, the Whipple and Gleason saw mill should receive highest priority in Gleason Block. Archaeological remains of the Wiley House warrant an equally high priority should these resources be identified.</td>
</tr>
<tr>
<td>E</td>
<td>Saw mill</td>
<td>Industry &amp; Commerce</td>
<td>Water powered mill (ca. 1850-1880)</td>
<td>Walling</td>
<td>Saw mill site, mill pond, dam, head/tail race, log slip, outbuildings, saw dust pile</td>
<td>Whipple &amp; Gleason saw mill (Walling). Gleason leased 1,200 acres to H. Eaton (ca. 1882). Only developed water power recorded for Gleason Brook.</td>
<td>High priority should be given to this site, once it has been located. Documentation, site number and buffer zone established. It may be possible to document additional contexts (e.g. company farm) in the vicinity of the mill.</td>
</tr>
<tr>
<td>E</td>
<td>Logging camp(s)</td>
<td>Industry &amp; Commerce</td>
<td>Logging and Lumbering (ca. 1850-1900)</td>
<td>Walling</td>
<td>Logging camp(s)-structural remains, dump sites, roads (skidway, sled, tole, others) cribbed landings, timber-related constructions. Potential also for portable steam saw mill and driving dams</td>
<td>Probably associated with Whipple and Gleason saw mill, or later steam saw mill operations</td>
<td>There are no logging camps currently identified. Logging camps and features associated with them are frequently adversely affected by subsequent logging operations, non-related land uses and natural causes such as fire. Intact resources, particularly those of the water powered mill era have a higher priority than those related to the steam mill period.</td>
</tr>
</tbody>
</table>

** Maps: Chittenden Co. - Walling (1857), Beers (1889), Child (1882), State (no date), Washington Co. - Walling (1858), Beers (1873), Child (1889); USGS (Lincoln Mtn. Quad, 1921; Camel's Hump Quad, 1924)
Table 3 (continued). Historic resources within or in close proximity of the Camel's Hump Management Unit.

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<th>Historic Context</th>
<th>Maps*</th>
<th>Property Types</th>
<th>Comments</th>
<th>Significance/Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>Historic trail</td>
<td>Tourism</td>
<td>Outdoor Recreation (ca. 1910-1950)</td>
<td>State</td>
<td>Long Trail (Bolton Trail) and trail features such as historic stonework, markers, timber constructed features</td>
<td>All trail features and historic resources associated with the Long Trail are high priority resources and contribute to National Register MPDF. Historic Park Landscapes in National &amp; State Parks. The pre-1920 trail system has a higher priority than later trail building.</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>Historic lodges</td>
<td>Tourism</td>
<td>Outdoor Recreation (ca. 1910-1950)</td>
<td>State USGS</td>
<td>Wiley House, Buchanan Lodge (former site)</td>
<td>All features and archaeological deposits associated with the Wiley House and Buchanan Lodge are high priority resources that contribute to National Register MPDF. Historic Park Landscapes in National &amp; State Parks. Documentation, site number(s) and buffer zone represent minimum preservation goals.</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Upland farm</td>
<td>Agriculture</td>
<td>Diversified and Specialty Farms (ca. 1850-1900)</td>
<td>Wailing Beers</td>
<td>Potential agricultural resources related to farm(s) outside CHMU include, maple sugar grove, former fields, roads, dumps</td>
<td>Historic maps show a few farms between Gillett Pond and the Winooski River. There are no farmsteads identified in the Robbins Mountain Block, however some property types are possible</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Logging camp(s)</td>
<td>Industry and Commerce</td>
<td>Logging and Lumbering (ca. 1850-1900)</td>
<td></td>
<td>Logging camp(s)-structural remains, dump sites, roads (skidway, slide, tote, others) cribbed landings, timber-related constructions. Potential also for portable steam saw mill and driving dams</td>
<td>None currently identified. Logging camps and features associated with them are frequently adversely affected by subsequent logging operations and non-related construction and land use. Intact resources of the water powered mill era have a higher priority than those related to the steam mill period.</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Upland farms</td>
<td>Agriculture</td>
<td>Diversified and Specialty Farms (ca. 1850-1900) possibly earlier</td>
<td>Beers Child</td>
<td>Subsurfaces structural remains and features of barns, outbuildings; wells, dumbs, discarded farm equipment, orchards, sugar processing sites, granary (flax seed) stone walls, and others</td>
<td>2 farmsteads likely within boundaries of CHMU. This portion of the Forest City Block may inc. portions of Tomlinson, Wright and O. Gorton farms (Beers) and Wright, Cobb and Gorton farms (Walling)</td>
<td>High priority resources that may contribute to State's Preservation Plan and National Register's Multiple Property Listing (MPDF) on Vermont Agriculture. Recommended - Archaeological Resource Assessment Phase I survey; site numbers assigned to each farmstead site (minimally). Protect all identified resources with buffer of 100m to safeguard known and other archaeological resources potentially present.</td>
</tr>
<tr>
<td>E</td>
<td>Forest City Lumber Co.</td>
<td>Industry &amp; Commerce</td>
<td>Logging and Lumbering (ca. 1850-1900)</td>
<td>Beers</td>
<td>Steam powered mill site, boarding house, barn(s), other buildings, logging camps, logging roads, sluice ways</td>
<td>Manuf. Of staves, chair stock, dimension and common lumber. 1,000 acres of mountain land. Employed 10 men, ca. 1892 (Child).</td>
<td>Resources associated with Forest City Lumber Co. are significant and should be considered high priority historic resources contributing to our knowledge of high elevation 19th century steam saw mill complexes.</td>
</tr>
</tbody>
</table>

** Maps: Chittenden Co. - Walling (1857), Beers (1869), Child (1882), State (no date); Washington Co. - Walling (1858), Beers (1873), Child (1889); USGS (Lincoln Mtn. Quad, 1921; Camel's Hump Quad, 1924)
<table>
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<tr>
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<th>Historic Context</th>
<th>Significance/Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Historic park/reserve</td>
<td>Recreation (ca. 1900-1950)</td>
<td>- Highest priority for resource and documentation of historic State Park, National Register of Historic Places, and Natural Resources Conservation Districts.</td>
</tr>
<tr>
<td>Camel's Hump Trails</td>
<td>Conservation and education</td>
<td>- High priority for trail maintenance and preservation.</td>
</tr>
<tr>
<td>Beers</td>
<td>Habitat preservation</td>
<td>- High priority for habitat preservation and management.</td>
</tr>
<tr>
<td>Tourist</td>
<td>Historic interpretation</td>
<td>- High priority for interpretation and visitor education.</td>
</tr>
</tbody>
</table>

**Maps:**
- Chittenden Co. - Walling (1857), Beers (1869), Child (1882), State (no date)
- Washington Co. - Walling (1858), Beers (1873), Child (1889)
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**Camel's Hump Management Unit LRMP - Appendices**

<table>
<thead>
<tr>
<th>County</th>
<th>Park</th>
<th>K</th>
<th>Historic Resources/Known Exploits</th>
</tr>
</thead>
</table>
| Lincoln | Forest | E | - Forest management, including logging and recreation
| Trask | CCC Camp | K | - CCC Camp, known exploitation of timber and forest products
| Addison | Paris Skiway | K | - Paris Skiway, known exploitation of ski industry and tourism
| Addison | Upland Farm | E | - Upland Farm, known exploitation of agriculture and forestry
| Lamoille | Cob Brook | E | - Cob Brook, known exploitation of water resources

**Threats:**
- Roadway expansion and development
- Forest management practices
- Habitat fragmentation
- Water quality issues

**Recommendations:**
- Implement best management practices for recreation and tourism
- Enhance habitat conservation and restoration efforts
- Monitor water quality and maintain clean waters
- Conduct regular assessments of forest health and sustainability
Table 3 (continued). Historic resources within or in close proximity of the Camel’s Hump Management Unit.

<table>
<thead>
<tr>
<th>County Town, ANR Block &amp; Drainage</th>
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<th>Preservation Theme</th>
<th>Historic Context</th>
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<th>Property Types</th>
<th>Comments</th>
<th>Significance/Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Huntington, Huntington Gap Block, John's Brook</td>
<td>Upland farms</td>
<td>Agriculture</td>
<td>Diversified and Specialty farms (ca. 1850-1900)</td>
<td>Walling &amp; Beers Child</td>
<td>Portions of 19th century farms and related structures may be within boundaries of CHMU, including features associated with fields, orchards, maple sugar processing, fences, roads and dumps</td>
<td>D.B. Tucker, C. Dearborn, J. Joslin (Walling), J. Brown, J., &amp; C. Dearborn (Beers)</td>
<td>None currently identified. High priority farmlands given their location on or within the vicinity of the Huntington Gap Road and their potential contribution to the State's Preservation Plan and the National Register's MPDF on Vermont Agriculture. Identification and documentation of these potential resources should be a priority. Site numbers should be assigned and a 100m buffer should be placed around these resources following positive field identification.</td>
</tr>
<tr>
<td>E</td>
<td>Historic Town Road</td>
<td>Transportation</td>
<td>Overland Transportation (ca. 1850-1880) possibly earlier</td>
<td>Walling &amp; Beers Child</td>
<td>Road segment, road bed, abutments, culverts, corduroy, landing areas w/ timber work, stone work, markers</td>
<td>Links lower Cobb Brook to upper Jones Brook.</td>
<td>Early roads are given high priority in State's Preservation Plan. Roads of local significance are less of a priority than segments of regional road system. Road traces and features should be identified and mapped and corridor assessed for additional resources.</td>
</tr>
<tr>
<td>E</td>
<td>Huntington Gap Road</td>
<td>Transportation</td>
<td>Overland Transportation (ca. 1840-1860) possibly earlier</td>
<td>Walling</td>
<td>Road segment, road bed, abutments, culverts, corduroy, landing areas w/ timber work, stone work, markers</td>
<td>Important mountain gap travel route between Huntington and Fayston, abandoned some time before 1889.</td>
<td>High priority resource. Early roads are given high priority in State's Preservation Plan. Segment of regional road system. Road traces and features should be identified and mapped and corridor assessed for additional resources. Additional background research recommended.</td>
</tr>
<tr>
<td>E</td>
<td>Saw mill</td>
<td>Industry and Commerce</td>
<td>Water powered mill (ca. 1850-1880)</td>
<td>Walling &amp; Beers</td>
<td>Saw mill site, mill pond, dam, head/tail race, outbuildings, saw dust pile</td>
<td>Located on an abandoned section of the Huntington Gap Road. May have been operated by J. Joslin (Walling), Dearborn (Beers)</td>
<td>Resources have not been identified. High priority historic resources as a saw mill site and as a potential contributing property type of the Huntington Gap Road. Recommend: Archaeological Resource Assessment/Phase I survey; site number assigned to mill site, if location can be determined.</td>
</tr>
<tr>
<td>E</td>
<td>Logging camp(s)</td>
<td>Industry and Commerce</td>
<td>Logging and Lumbering (ca. 1860-1880)</td>
<td>Walling &amp; Beers Child</td>
<td>Logging camp(s)-structural remains, roads (skidways, sled roads, bunters, snubbing trees), cribbed log landings, sled bridges, logging camps, dumps and other timber-related constructions</td>
<td>None currently known. Logging camps and features associated with them are frequently adversely affected by subsequent logging operations and non-related construction and land use. Impact resources, particularly those of the water powered mill era have a higher priority than those related to the steam mill period. All extant resources should be documented, site number(s) assigned and their historical significance assessed.</td>
<td></td>
</tr>
</tbody>
</table>

** Maps: Chittenden Co. - Walling (1857), Beers (1869), Child (1882), State (no date); Washington Co. - Walling (1858), Beers (1873), Child (1889); USGS (Lincoln Mtn. Quad, 1921; Camel's Hump Quad, 1924)
Table 3 (continued). Historic resources within or in close proximity of the Camel's Hump Management Unit.

<table>
<thead>
<tr>
<th>County</th>
<th>Town, ANR Block &amp; Drainage</th>
<th>Known or Expected Historic Resources</th>
<th>Preservation Theme</th>
<th>Historic Context</th>
<th>Maps*</th>
<th>Property Types</th>
<th>Comments</th>
<th>Significance/Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chitt. Co.</td>
<td>Buel's Gore, Appalachian Gap Block, Bakers Brook</td>
<td>E Upland farm</td>
<td>Agriculture</td>
<td>Diversified and Specialty farm (ca. 1850-1900)</td>
<td>Walling Beers</td>
<td>Portions of 19th century farmstead(s) may be within boundaries of CHMU, including features associated with fields, orchards, maple sugar processing, fences, roads and dump sites</td>
<td>H. Sprague (Beers); E. Doty (Walling); Note: E. Doty in Huntington on Walling map</td>
<td>None currently known. High priority resources that may contribute to State's Preservation Plan and National Register's Multiple Property Listing (MPDF) on Vermont Agriculture. Protect all identified resources; with a buffer of 100m to safeguard known and other archaeological resources potentially present.</td>
</tr>
<tr>
<td>Wash. Co.</td>
<td>Fayston, Phoen Basin Block, Mill Brook</td>
<td>E Upland farms</td>
<td>Agriculture</td>
<td>Diversified and Specialty farm (ca. 1840-1900)</td>
<td>Walling Beers</td>
<td>Portions of 19th century farmstead(s) may be within boundaries of CHMU, including features associated with fields, orchards, maple sugar processing, fences, roads and dump sites</td>
<td>Wm. Phe (ca. 1847); also possible farms of J. McBurney, S. McCough, A. Blair (Walling), J. Baird 7th (Beers)</td>
<td>Priority should be given to agricultural resources on Preston Brook and Ridgely brookes, also on the Huntington Gap and Stagecoach roads where agricultural resources are located on regionally significant overland routes. Identification and documentation of potential resources relating to the Wm. Phe and other farms, however should receive high priority in this section of the CHMU, with a buffer zone established around farmstead sites.</td>
</tr>
<tr>
<td>K Upland farm</td>
<td>Agriculture</td>
<td>Diversified and Specialty farm (ca. 1850-1900) possibly earlier</td>
<td>Walling Beers State</td>
<td>Stone foundation (Barn)</td>
<td>Possibly associated w/ Donohue farm (Walling), J. Little (Beers), Located on Stagecoach Road</td>
<td>A. Hail (Walling), J. Baird 5th &quot;Baird in-the-Bush&quot; (Beers)</td>
<td>High priority resource given its location on the Stagecoach Road. Assign site number and conduct additional background research and field documentation. Buffer established 100m around resource.</td>
<td></td>
</tr>
<tr>
<td>Fayston, Phoen Basin Block, Mad River (formerly trib)</td>
<td>K Upland farm</td>
<td>Agriculture</td>
<td>Diversified and Specialty farm (ca. 1850-1900) possibly earlier</td>
<td>Walling Beers State</td>
<td>Stone-lined cellar hole (20' x 30'), 2 barn foundations, sugar arch, well, outbuilding remains, stone walls &amp; piles, old field forests</td>
<td>A. Hail, J. Baird 5th &quot;Baird in-the-Bush&quot; (Beers)</td>
<td>High priority resource given its location on the Stagecoach Road and potential contribution to the State's Preservation Plan and the National Register's MPDF on Vermont Agriculture. Documentation and additional background research should be a priority. A site number should be assigned and a buffer zone that encompasses all known resources associated with this site should be put in place following positive field identification.</td>
<td></td>
</tr>
</tbody>
</table>

** Maps: Chittenden Co. - Walling (1857), Beers (1869), Child (1882), State (no date); Washington Co. - Walling (1858), Beers (1873), Child (1889); USGS (Lincoln Mtn. Quad, 1921; Camel's Hump Quad, 1924)
Table 3 (continued). Historic resources within or in close proximity of the Camel's Hump Management Unit.

<table>
<thead>
<tr>
<th>County Town, ANR Block &amp; Drainage</th>
<th>Known or Expected Historic Resources</th>
<th>Preservation Theme</th>
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<th>Property Types</th>
<th>Comments</th>
<th>Significance/Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>Historic Road</td>
<td>Transportation</td>
<td>Overland Transportation (ca. 1840-1870) possibly earlier</td>
<td>Walling Beers Child</td>
<td>Stagecoach Road - road segment, road bed, abutments, culvert, corduroy, landing areas w/ timber work, stone work, markers</td>
<td>Links Irasville to North Fayston and connected with the Huntington Gap Road in North Fayston. Abandoned as long-distance route before 1973</td>
<td>Early roads are given high priority in the State’s Preservation Plan. All road-related features should be documented and additional background research should be conducted. As a segment of the regional road system, the Stagecoach Road should be mapped and the corridor assessed for additional resources.</td>
</tr>
<tr>
<td>E</td>
<td>Logging camp(s)</td>
<td>Industry and Commerce</td>
<td>Logging and Lumbering (ca. 1850-1900) possibly earlier</td>
<td>Logging camp(s)-structural remains, roads (skidways, sled roads, bunters, snubbing tree), cribbed log landings, sled bridges, hovel/barn, dumbs and other timber-related constructions</td>
<td>Logging camps attached to mills on Mill Brook, French Brook and Shepard Brook. After 1890 woodland consolidated by H.O. &amp; Burton Ward Lumber Co.</td>
<td>None currently identified. Logging camps and features associated with them are frequently adversely affected by subsequent logging operations and non-related construction and land use. Intact resources, particularly those of the water powered mill era have a higher priority than those related to the steam mill period. All extant resources should be documented and site number(s) assigned.</td>
<td></td>
</tr>
</tbody>
</table>

** Maps: Chittenden Co. - Walling (1857), Beers (1869), Child (1882), State (no date); Washington Co. - Walling (1858), Beers (1873), Child (1889); USGS (Lincoln Mtn. Quad, 1921; Camel’s Hump Quad, 1924)
CONCLUSION

Little historical archaeology has been done in Vermont. Historic sites are therefore under represented in the state site files and they are increasingly less visible due to the adverse effect of modern construction practices, environmental policy and cultural attitudes that challenge the practicality and even desirability of granting significance to a wide range of historic resources. Determining a site’s significance relative to other examples of the same resource is problematic when too few examples exist.

This study has resulted in the development of a set of historic contexts relating to known and expected historic resources, or property types within, or in close proximity of the CHMU. The study indicates that there is a high potential for the future identification of Native American sites in various sections of the management unit based upon the distribution of known sites in the general area and environmental settings within the CHMU favorable to human occupation. The lack of archaeological evidence of Native American occupation in the CHMU precludes an informed discussion of known and expected resources within the management unit attributable to them. However, the CHMU’s geographical setting on an important regional travel corridor, the Winooski River, together with anecdotal accounts of artifact finds in the park and its vicinity and the identification of the Camel’s Hump Rock Shelter, VT-CH-296, lead to the conclusion that additional sites will be identified during future survey work. In terms of historic resources related to the Euroamerican cultural context this study resulted in the identification of: historic farming/saw mill communities on Ridley and Preston brooks; a small number of individual nineteenth century farmsteads and mill sites; the Forest City Lumber Company mill complex, a late nineteenth century steam powered mill hamlet; abandoned segments of two early regional roads, the Huntington Gap Road and the Stagecoach Road; and numerous historic sites and features related to nineteenth and early twentieth century tourism, the development of outdoor recreation and the historic formation of the Camel's Hump Management Unit. Among the most significant of these resources are the carriage road and former summit house site, Vermont's first fire lookout, the Long Trail and its system of side trails, lodges and shelters, and a New Deal era CCC camp. The study provides a context for documenting historic regional trends relating to early settlement in the towns of Duxbury, Bolton, Huntington and Fayston, the evolution of the logging and lumbering industry, the rise and fall of agriculture in upland settings, in forest conservation and in the recreational development of public land.

UMF ARC recommends that this document be used as a framework for future cultural resource studies conducted within the CHMU. Additional research and field investigation is recommended in terms of evaluating each historic resource as it relates to the surrounding landscape, and as it represents some aspect of the historical process. Field inspection was not within the scope-of-work of this study and an archaeological resource assessment/phase IA survey of CHMUs cultural resources has not been conducted. The CHMU contains a range of important historic resources associated with a long and interesting history. This history begins with Native American occupation of the region thousands of years ago and continues into the present day with ongoing human use of the land. Recognition of this complex history and the physical remnants of past human activity in the area should be an important factor in the long-term management of the Camel’s Hump Management Unit.
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Child, Hamilton

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Walling, H.F.

APPENDIX C

Archeological Precontact Site Sensitivity Analysis
For the Vermont Department of Forests, Parks and Recreation

Camel’s Hump Management Area

Submitted to:
Vermont Dept. of Forests, Parks and Recreation
103 So. Main St.
Waterbury, VT 05671-0601

Submitted by:
CONSULTING ARCHEOLOGY PROGRAM
UNIVERSITY OF VERMONT
112 University Heights
Burlington, VT 05405

November 20, 2003
Archeological Precontact Site Sensitivity Analysis for the Camel’s Hump Management Area

Introduction

State-owned lands within Vermont represent extremely valuable conservation areas with respect to cultural resources, particularly precontact period archeological sites, or those sites attributable to indigenous Native Americans that date to before Europeans arrived in the early 1600’s. While hundreds of these sites already are known within these publicly held parcels, thousands more Native American archeological sites remain undiscovered. The known sites and the as-yet-undiscovered sites located in forests, parks and recreation areas represent a priceless endowment, the protection of which meets the long range goals of cultural resource management that are shared by the Vermont Division for Historic Preservation and the scientific community. Over the long-term, as development of Vermont’s privately held lands continues, state-owned archeological sites and state-owned lands that have the high potential to contain such sites will become increasingly valuable repositories of archeological information. One of the main goals of the present project is to help ensure the continued preservation of these resources by increasing awareness among land managers about the contexts in which buried archeological sites are most likely to exist and to help provide broad based assessments of archeological sensitivity that can be used to guide land use practices.

In most cases, precontact period archeological sites lie buried in the ground, unless they have been exposed through disturbance such as erosion or historic cultivation, or they are represented by quarries or other above ground features. Precontact archeological sites in Vermont are generally found within two basic natural contexts: depositional, as in floodplains or at the base of slopes where sites can be deeply buried by natural processes; and non-depositional as in lakesides or upland locations where very little sediment accumulates over time and archeological deposits thousands of years old can be found very close to the ground surface. Whether buried deeply or only by several centimeters of sediment, precontact archeological sites are extremely difficult to identify through visual inspection of the landscape. This is in contrast to other cultural resources such as historic archeological sites whose stone foundations or other above ground features often make them more obvious. Due to their ‘invisibility’, the identification of precontact archeological sites often requires surveying techniques that include sub-surface excavation.

Archeological surveying through excavation is labor intensive, time consuming and expensive. As a result, when assessing whether or not a given parcel contains sites or simply has the potential to contain sites, archeologists do as much as possible beforehand to focus their investigation and try to predict which natural areas that have the highest potential to contain sites. Using sets of predictive criteria derived mainly from knowledge where known sites occur, archeologists can evaluate the landscape, whether the goal of a given study is to actually identify sites or to predict where they are most likely to occur. Based on decades of archeological research in Vermont and the environmental setting of thousands of precontact sites, the Vermont Division for Historic Preservation (VDHP) established an Environmental Predictive model for Locating Archeological Sites to guide archeological research in the state.
The VDHP’s predictive model has been applied to hundreds of areas across the state and found to be a reliable way of predicting which locations are most likely to contain significant archeological resources. To date, the application of the VDHP predictive model has been almost entirely field based. That is, it has been used almost exclusively by archeologists assessing landscapes in person, in the field as opposed to remotely using paper maps or digital data.

The geographic analysis presented here represents the first ever attempt to graphically depict areas of archeological sensitivity on a state-wide scale. This geographical Information System (GIS) developed jointly by the University of Vermont Consulting Archeology Program (UVM CAP), and its consultant Earth Analytic, Inc., using the VDHP’s predictive model for identifying precontact archeological sites. The present analysis applies the VDHP’s sensitivity criteria to all lands under the jurisdiction of the State of Vermont’s Agency of Natural Resources (ANR). The main goal of this analysis was to identify and rank areas of archeological sensitivity within each ANR management district, in order to improve the ANR’s understanding and management of potentially significant precontact archeological resources within these lands.

The predictive model used by the VDHP was approved by the Vermont Advisory Council on Historic Preservation on May 23, 2002. Following the VDHP’s Guidelines for Conducting Archeology for Vermont, the goal of the predictive model is to ‘identify areas with a high potential for containing significant precontact Native American residential sites’ (Peebles 2002). Significant prehistoric sites contain multiple categories of data that can address several research topics important in understanding Vermont’s prehistory. This GIS, as it has been developed, does this by placing a numeric value on the nearness of any given land parcel or project area to numerous natural features that are known, through experience, to be likely locations for prehistoric Native American sites. The bulk of the natural features used to differentiate the landscape in terms of archeological sensitivity are water related and include, nearness to a river or permanent stream, nearness to falls or rapids, a lake, pond, or wetland, etc. Another major category of archeological sensitivity is related to dominant landforms, such as, presence of an elevated, level landform, nearness to a rockshelter, prehistoric quarry or source of workable stone, or natural travel corridor. Finally the presence of a high density of known sites in a particular area also contributes to the overall sensitivity score. The closer a given area is to natural features that would have attracted Native Americans, the higher the sensitivity score. Presently, the VDHP uses an overall score of 32 or over, to indicate an area of archeological sensitivity. It is acknowledged in the Guidelines that the predictive model is only a coarse guide highlighting potential site areas.

Using the VDHP predictive model, the GIS presented here ranks areas of archeological sensitivity based on sensitivity scores. In doing so it confidently identifies areas of very high sensitivity that likely would require additional work if endangered by modern usages, as well as those of very low sensitivity that would not likely require a site visit before being discounted in terms of archeological potential. However, those areas that score in between these two extremes fall within a ‘grey zone’. Given the inherent difficulty in fully assessing areas remotely, these areas would likely require additional investigation, whether in the form of a site visit or consultation with a district manager who may be familiar with the area or a combination of the two.
For this GIS, we consider areas of high archeological sensitivity to be those areas that score above 32 points. These areas will require Phase I site identification surveys unless specific circumstances dictate otherwise (e.g. ground trothing contradicts sensitivity map). Areas of medium sensitive score between 20-32 points, low sensitivity score between 10-20 points, whereas areas of very low sensitivity score between 0-10 points. Medium and low sensitivity areas are questionable, and will require a site visit to identify minor sensitive features and to determine whether or not a Phase I site visit identification survey is needed. Areas with very low sensitivity are unlikely to be sensitive, and in most cases will not require further work.

In constructing this GIS using the VDHP sensitivity criteria and scoring system, the most up to date geographic information was used. As more accurate information becomes available for any and all parcels, the sensitivity model will be updated. One limiting factor in terms of available data relates to topographic elevations. For this study, 30m grids were used, given that statewide this represents the best resolution available. To more accurately determine an area’s archeological sensitivity remotely, however, digital elevation data of a higher resolution is necessary. Problems of interpreting sensitivity on paper occur, for instance, with elevation changes smaller than 30m (98ft), with archeologically sensitive areas such as minor tributaries of brooks, streams, rivers, seasonal drainages, and low-level variations in landform, since they are not indicated on the currently available data layers. These minor details are very important in developing a sensitivity model that better reflects the reality of the distribution of archeological sites in Vermont, since we have observed in archeological studies throughout the state, that these minor variables are positively correlated to prehistoric Native American occupation.

Following the VDHP’s predictive model, areas throughout the state with slopes greater than 15° receive a negative sensitivity score of -35. Although we recognize that the current resolution of slope data masks subtle differences in slope, such as where small terraces and other habitable areas may be located, we have kept slope in the overall sensitivity equation as a negative factor, since without it everything would appear to be sensitive. When higher resolution data becomes available we may be able to customize the slope data for each parcel, identifying the small terraces within these sloped areas, which may be significant. In addition, better resolution data will allow us to incorporate significant sites with steep slopes, such as quarry sites.

As a result of likely improvements in technology and available data, this GIS is a draft, and will be updated as higher resolution data become available, and when the state’s site location database is complete. The site location database will produce a GIS layer of all known sites, which can be weighed and added to the overall sensitivity equation. While this database has not been completed for this initial Phase of the ANR Site Sensitivity Analysis, it should be completed by the deadline of the Phase II and could be incorporated into the model for that Phase, and for any Phase I updates.

Camel’s Hump Management Area

An area’s sensitivity in this GIS is heavily influenced by its proximity to water. As such, the largest area of archeological sensitivity in the Camel’s Hump Management Unit is located in
the north along the banks of the Winooski River. Additional high sensitive areas include those around the small mountain lakes, and their tributaries, like that at the head of Cobb Brook in the south, those near the headwater of Gleason Brook, just north of Camel’s Hump, and around Gillette Pond in the northwest. As mentioned above, the steep mountain slopes throughout the area have minimized the amount of overall archeological sensitivity, and has circumscribed sensitivity to those areas immediately bordering bodies of water and their associated tributaries. Therefore, those areas that score medium and low sensitivity in the model may require a site inspection to determine the true nature of these areas, since it is possible that archeologically sensitive areas are not brought into focus by the resolution of the data.

One shortcoming of ecologically based predictive models is the inability to incorporate an ideological basis for human behavior. Early historic accounts in Vermont, and elsewhere, often describe the veneration for natural landforms by Native Americans. In Vermont, for instance, Abenaki creation stories are intimately tied to descriptions of the natural surroundings, and account for the existence of Rock Dunder, Split Rock, and the lower falls of Otter Creek, to name a few (Haviland and Power 1994). As a result, it is likely that prominent mountain peaks, such as Camel’s Hump itself, and other geological features within the Camel’s Hump Management Area were of ideological importance to Native Americans. However, it is very difficult to quantify the ideological motivations in human behavior, and therefore these variables are left out of this, and most, predictive models. Nonetheless, background research may be able to shed light on the significance of such geological features, and should be taken into consideration, even though such landforms may not score high in this predictive model.

**Historic Cultural Resources**

There are no historic properties located within the Camel’s Hump Management Unit on either the National or State Registers. [Update: after the writing of this report, the Preston/Lafreniere 1820 home at the base of Honey Hollow was added to the Historic register].
Archaeological Precontact Site Sensitivity Analysis and GIS Mapping for the Vermont Agency of Natural Resources

ESSEX DISTRICT

Camels Hump State Forest

Submitted to:

Linda Henzel
Vermont Department of Forests
Parks and Recreation
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Waterbury, VT 05671-0601

Submitted by:

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January 2009

Archaeological Precontact Site Sensitivity Analysis and GIS Mapping for the Camels Hump State Forest, Buels Gore, Chittenden County, Vermont

Introduction

The archaeological analysis presented here ranks areas within Camels Hump State Forest based on their potential to contain precontact period archaeological sites. Precontact period sites are locations with evidence of Native American settlement and/or resource exploitation that dates to before the arrival of Europeans, or between roughly 9,000 B.C. and A.D. 1600. While it is impossible to predict exactly where these sites are on the landscape and, where present, which of these sites are the most significant, this analysis attempts to characterize the areas that have the highest potential to contain such sites. The ultimate goal of this analysis is to provide land managers with generalized sensitivity information that will help lead to the continued preservation of non-renewable cultural resources on state-owned lands.

This analysis is preliminary because of the limitations imposed by the available datasets used in the Geographic Information System (GIS) model (e.g., the low resolution digital elevation data), the inability of this or any computer model to account for all variables that may have influenced the way humans used the landscape, and because the accuracy of the sensitivity maps have not been evaluated in the field through visual inspection or subsurface testing. These maps can and should be revised whenever new data becomes available, whether that new information comes in the form of more accurate base maps, addition of new sensitivity criteria to the computer model, or first hand inspection of specific parcels. As a result of the preliminary nature of the maps that are included, the boundaries of sensitive areas should be viewed as rough estimates that can be used to guide land use practices in broad terms.

In these maps, archaeological sensitivity is depicted by the presence of one or more overlapping factors, or types of archaeological sensitivity (i.e. proximity to water, etc.). The more overlapping factors within a given area result in a larger area of archaeological sensitivity. However, the presence of a single sensitivity factor is enough to warrant an archaeological review. In this way, the model should be used as a guide to identify areas that would require a more detailed analysis, which may include a site inspection. The sensitivity factors used here are based on the Vermont Division for Historic Preservation’s paper-based “Environmental Predictive Model for Locating Precontact Archaeological Sites”. Please refer to the background sections and their appendices (on file with District Managers) for a more detailed discussion of the overall sensitivity project and specific details of the GIS analysis.
Table 1. Key to the scoring of areas with precontact archaeological sensitivity within Camels Hump State Forest.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Sensitivity Type</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Drainage</td>
<td>areas within 180 m of all streams = value of 1, beyond 180 m = value of 0</td>
<td></td>
</tr>
<tr>
<td>2 Waterbody</td>
<td>areas within 180 m of waterbody = value of 1, beyond 180 m = value of 0</td>
<td></td>
</tr>
<tr>
<td>3 Wetland</td>
<td>areas within 180 m of wetland = value of 1, beyond 180 m = value of 0</td>
<td></td>
</tr>
<tr>
<td>4 Stream-Waterbody Confluence</td>
<td>areas within 180 m of confluence = value of 1, beyond 180 m = value of 0</td>
<td></td>
</tr>
<tr>
<td>5 Head of Draw</td>
<td>areas within 180 m of head of draw = value of 1, beyond 180 m = value of 0</td>
<td></td>
</tr>
<tr>
<td>6 Stream-Stream Confluence</td>
<td>areas within 180 m of confluence = value of 1, beyond 180 m = value of 0</td>
<td></td>
</tr>
<tr>
<td>7 Waterfalls</td>
<td>areas within 180 m of waterfalls = value of 1, beyond 180 m = value of 0</td>
<td></td>
</tr>
<tr>
<td>8 Paleo Lake Soils</td>
<td>areas within 180 m of these soils = value of 1, beyond 180 m = value of 0</td>
<td></td>
</tr>
<tr>
<td>9 Kame Terrace or Glacial Outwash Soils</td>
<td>presence of soils = value of 1, all other areas = value of 0</td>
<td></td>
</tr>
<tr>
<td>10 Floodplain Soils</td>
<td>presence of soils = value of 1, all other areas = value of 0</td>
<td></td>
</tr>
<tr>
<td>11 Level Terrance</td>
<td>slopes ≤ 8% = value of 32, slopes &gt; 8% = value of 0</td>
<td></td>
</tr>
</tbody>
</table>

Camels Hump State Forest

In the current GIS study, an area’s archaeological sensitivity is heavily influenced by its proximity to water. The Camels Hump State Forest encompasses 2,250 acres, which encompass most of the southern slopes of Molly Stark Mountain, the northern slopes of Stark Mountain, and the saddle connecting the two (Figure 1). Stave Brook bisects the state forest before joining the Huntington River, which forms some of the western boundary of the forest. No precontact Native American or historic period Euroamerican sites are known from within the state forest. The archaeological sensitivity within Camels Hump State Forest is associated with seven overlapping sensitivity factors, which include drainage, waterbody, wetland, stream-waterbody confluence, head-of-draw, Paleosols, and floodplain (see Figure 1). Limited level terrain occurs along the extreme western margin of the forest, parallel to the Huntington River.

One shortcoming of this ecologically based predictive model is its inability to incorporate ideologically based stimuli for human behavior. Although waterfalls and natural springs are incorporated into the model, which are known to have been aspects of the landscape that were imbued with ideological importance, these are relatively rare in Vermont. Early historic accounts in Vermont, and elsewhere, often describe the veneration for natural landforms by Native Americans. In Vermont, for instance, Abenaki creation stories are intimately tied to descriptions of the natural surroundings, and account for the existence of Rock Dunder, Split Rock, and the lower falls of Otter Creek, to name a few (Haviland and Power 1994). However, it is very difficult to quantify the ideological motivations in human behavior, and therefore these variables are left out of this, and most, predictive models. Nonetheless, background research may be able to shed light on the significance of such geological features, and should be taken into consideration, even though such landforms may not score high in this predictive model.
Figure 1. Map showing the archaeological sensitive areas within the Camels Hump State Forest, Chittenden County, Vermont.
Potential Indicators of Archaeological Sensitivity

A list of expected site types in Vermont, their characteristics and typical locations was created by Peter Thomas for the Vermont Historic Preservation Plan. The site type list is used here as a guide, for district managers to better understand the types of precontact archaeological resources that they may encounter within their districts. The site type list is summarized below in Table 2. Camels Hump State Forest is mostly comprised of slope from two mountains. Such steep slope is typically not sensitive for precontact Native American sites. Level terraces along the Huntington River in the western extreme of the state forest is the most likely location for precontact Native American sites. Considering the upland environment of the state forest, any sites existing within it, along the Huntington River, likely will be small camp sites or specialized activity sites. The GIS model does not factor in areas with outcrops of high quality quartzite or rhyolite, which may have been visited by precontact era Native Americans for tool stone. It is possible that exposures of knappable stone exist within the limits of the state forest. As a result, district managers should consider all level, dry landforms, especially those adjacent to the Huntington River, as well as any exposures of quartzite that might have been quarried, as containing areas of precontact Native American occupation.

Table 2. List of expected site types in Vermont, their characteristics, and expected locations.

<table>
<thead>
<tr>
<th>Site Type</th>
<th>Characteristics</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Base Camp</td>
<td>May contain numerous areas of artifact concentrations 5-10 m in diameter, evidence of more permanent habitation: remains of hearths, thousands of stone tools, and cover areas of several acres or more.</td>
<td>Large river valleys with high densities of food resources and productive soils for horticulture/agriculture.</td>
</tr>
<tr>
<td>Small Residential Camps</td>
<td>One or more areas of artifact concentrations 5-10 m in diameter, with low to moderate densities of stone tools. Evidence of more short-term seasonal habitation</td>
<td>Open air sites on level terraces adjacent to rivers, streams, and wetlands. Some may occur in rock shelters.</td>
</tr>
<tr>
<td>Bedrock Quarries</td>
<td>Modified outcrops of high quality (fine grained) quartzite or chert. Large quantity of flaking debris and stone tools in various stages of production on talus.</td>
<td>Where outcrops of high quality quartzite and chert are exposed, on both vertical faces and level exposures.</td>
</tr>
<tr>
<td>Quarry Workshops</td>
<td>Large quantities of early stage lithic reduction debris, little long term occupation debris.</td>
<td>On level areas near bedrock quarries.</td>
</tr>
<tr>
<td>Kill Sites</td>
<td>Specific tools associated with the killing and preparation of game.</td>
<td>Anywhere.</td>
</tr>
<tr>
<td>Burial Sites</td>
<td>Where cremations and inhumations are found, unique religious, nonutilitarian goods found.</td>
<td>Extremely rare, probably associated with large base camps or in specific environments (e.g. gravel knolls near wetlands).</td>
</tr>
<tr>
<td>Find Spots</td>
<td>Isolated tools and debitage</td>
<td>Anywhere.</td>
</tr>
</tbody>
</table>
Historic Cultural Resources

There are no properties within the Camels Hump State Forest listed on the National or State Registers of Historic Places. Historic occupation of the town of Buel’s Gore, which contains Camels Hump State Forest, was never large, and a formal town has never existed within Buel’s Gore. The houses associated with the principal farms of the township are listed on the State Register, but they are not located within the limits of the state forest. Both the 1869 Beers Atlas (Figure 2) and the historic USGS map (Figure 3) indicated no structures within the limits of the state forest. Nonetheless, ANR personnel should record all stone foundations, cellar holes, wells, etc, that they encountered within the state forest.

Figure 2. Historic 1869 Beers Atlas of the Camels Hump State Forest area, Chittenden County, Vermont.
Figure 3. Historic 1921 USGS map of the Camels Hump State Forest area, Chittenden County, Vermont.
Conclusions and Recommendations

Precontact era Native American archaeological sensitivity was identified within the Camels Hump State Forest, primarily clustered along its western boundary along the Huntington River. Considering that most of the state forest is slope, any level and dry, elevated landform along the Huntington River is archaeologically sensitive. Good stone sources of quartzite may exist within the state forest, and may have been exploited by precontact Native Americans. Therefore, quartzite exposures in areas of steep slope also are archaeologically sensitive. Although little historic period occupation is known from the township, it is always possible that historic remains exist within the state forest. For these reasons, ANR personnel should take into account all historic features, such as stone foundations, cellar holes, fence lines, etc., that they encountered within the state forest. If these structures can be mapped and described, determining their significance may not require a site visit. However, sites visits are preferable in situation of identified historic period resources of unknown vintage.
APPENDIX D- PUBLIC INVOLVEMENT, SCOPING PHASE

CHMU LRMP- On-Line Survey Results & Comments

Question 1:

Additional Comments:

1. Vegetation Mgmt. and Wildlife Habitat are resource Protection.
2. Wildlife management.
3. Early successional wildlife habitat.
4. Prioritize Wildlife management w/NO motorized vehicles!!
5. Access for all members of the public is important including handicapped.
7. "Vegetation Mngmt" = hiking and x-c ski trail management are OK (but no added snowmobile or mountain bike trails) -- and please leave the forest alone!
8. Protect property rights.
9. Snowmobiling and 4-wheeling.
10. ATV recreational access.
11. Keep snowmobile trails open: Very important.
12- Include motorized recreation, especially snowmobiling.
13- XC Ski Access - high importance.
14- The aesthetics are naturally there and require little management other than vi management as the key to abundant and healthy wildlife. Vermont Traditions Coalition does not support restricted "wilderness" or set asides by another name. Revenue generation from timber sales, etc. is important but secondary to recreational opportunity for the taxpayers who paid for the land and the personnel to manage it.

**Question 2:**

**At present there are just under 80 miles of officially designated trails and improved forest roads available for recreation on the CHMU. Of this total there are approximately 31 miles of hiking trails, 18 miles of x-c ski trails, 15 miles of snowmobile trails, and 3.5 miles of mountain bike trails. ATVs are not allowed on this land unit for recreation. Do you think this amount of trails is:**

![Bar chart showing trail preferences.]

**What changes or improvements would you suggest to the trail network?**

**Hiking:**

1- The trails are fabulous and the volunteers are great. It would be nice to create an additional trail to take some of the burden off of Burrows and Monroe; they take a beating.
2- Drainage and bridge work.
3- More hiking trails would be fine too, but that's the 3rd priority since there are so many that are already well established.
4- Brushing out the hiking trails a little more routinely would be good.
5- A trail on the other side of Gleason Brook from the LT, tying into the old LT, would add an interesting perspective and views.
6- As this is such a heavily hiked area, investigate more hiking trails, highlighting a few great spots other than the summit - not every trail has to go up a mountain.

**Cross Country Ski:**

1- Make the Camel's Hump challenge ski route a permanent trail that folks can ski all winter long - not just on the day of the annual event. (x17)
2- It would be nice to get more of the Catamount Trail onto State land (off private land) to the extent terrain and other resource considerations permit.
3- Consider developing an area with officially sanctioned gladed backcountry ski trails, possibly on Bald Hill. I've love to see a classic ski glade cut and maintained as opposed to skiers constantly hacking their way back into prime backcountry spots. At this point some of the better spots that support backcountry alpine skiing are worthy of an "official" trail to get to them.
4- More Cross Country Skiing trails. (x8)
5- As a user of the camel's hump skiers association trails and a participant in the annual camel's hump challenge, I strongly support the following: I'm a xc skier and an enthusiastic supporter of the long-term efforts of Camel's Hump Nordic Ski Area (CHNSA), the Catamount Trail Association (CTA), and the Camel's Hump Challenge (CHC) organizers to coordinate the introduction of new xc ski trail routes in the Camel's Hump Mgt Unit. CHNSA provides a network of groomed and ungroomed xc ski trails on the western aspect of Camel's Hump. The Catamount Trail Association maintains a xc ski trail that runs the length of Vermont and the Camel's Hump Challenge trail provides a wilderness experience circumnavigating Camel's Hump. The proposed new trail routes would all connect to and be accessed by the existing xc ski trail network of the non-profit CHNSA or from Catamount Trail access points in the area. They are being identified by GPS mapping which will illustrate their interconnectedness and locations. The proposals include: 1. Mapping and marking the CHC "around-the-Hump" backcountry trail. 2. Re-routing the Catamount Trail in the Camel's Hump area to a higher elevation (around 2500'), 3. Developing a backcountry ski trail from CHNSA that would lead to the Bald Hill ridgeline and Little Baldy and afford skiers access to telemark skiing off the slopes of Bald Hill; 4. Establishing a backcountry loop departing from the north end of the existing Lion's Ridge Trail on the west rim of the Honey Hollow drainage basin and accessing the Robbins Mountain ridgeline and additional telemarking terrain. 5. Establishing a groomed trail rising gently east from the CHNSA "Stagecoach Road" trail on private land, to a Bald Hill saddle loop in CHSP, at about 2200', 6. Continuing a groomed route in CHSP descending gently south and west from the Bald Hill saddle loop (#5) that returns skiers to the existing CHNSA trail system. Thanks for listening. (x7)
6- x/c ski trail networks could be conservatively expanded, including making the Camel's Hump Challenge trail available for public access through the ski season. Moderate expansion of wilderness experience trails (minimal and ungroomed), if limited to winter xc ski use, would be beneficial with the least environmental impact of any other incursion.
7- I would like to see additional cross country skiing trails marked. These have the lowest environmental impact, being used in the winter months, and little effect on habitat. Establishing a backcountry loop departing from the north end of the existing Lion's Ridge Trail on the west rim of the Honey Hollow drainage basin and accessing the Robbins Mountain ridgeline would be another.
8- As a Waterbury resident and the author of a guidebook on backcountry skiing in the Northeast (which includes a chapter on Camel's Hump), I support the proposal by the Catamount Trl Ass. to relocate and consolidate the backcountry ski trails on Camel's Hump. This would be helpful in making it more clear to skiers where to go and would merging a confusing ski trail network into one shared path. A great idea that has minimum impact on the forest.

9- • easier parking/access to the trail from the Burrow's Trail parking lot • use of a portion of the existing Camels Hump Circuit trail as part of the CT • relocation of over 5 miles of the CT off private parcels and onto conserved State Park land • location of CT at higher elevations, providing more consistent snow coverage for a longer season • continued connectivity to the CHNSA trail network.

10- Formalize the Bald Mountain ski trails. Connect trail network to the adjacent WMAs.

11- Allow more cross country and back country ski trails because they have little if any environmental impact. Make sure they are not obvious to hikers so they don't get used by hikers. Light winter use will not cause erosion, unduly disturb wildlife or in any way change the environment.

Snowmobile

1- Limit snowmobile use based on degradation that results.
2- Make sure snowmobile trails are kept open and if one gets closed another one gets opened. VAST pays for trails. Snowmobilers do not ask the State to build or maintain the trail system. Other recreations expect the State of Vermont to build and maintain trails for their sport.
3- Currently, only snowmobilers have to pay VAST trail use fees to use the trails on this system, and those members help maintain these trails. Folks who use these trails for other purposes including hiking and cross-country skiing should also have to pay to use this trail system.
4- More Open areas for snowmobiling.
5- Need to maintain current level of snowmobile access, as these trails are an important link in the Statewide Snowmobile Trail System (SSTS) developed with the cooperation of VAST and State Agencies. Snowmobile access also offers emergency and rescue capabilities in remote areas of Camels Hump.

Mountain Bike:

1- Limit mountain biking use based on degradation that results.
2- Appropriate development of low elevation biking trails would serve a growing group. Erosion control and education about inappropriate riding conditions including denning and nesting seasons will be important. Expand, connect and preserve more permanent trail networks for mtn. biking and x-c/backcountry skiing with signage and maps.
3- I'd love to see more mountain bike trails first and foremost.
4- Work with local mountain bike community to develop and maintain trails in sustainable locations.
5- More mountain bike trails.
6- There are opportunities to connect existing mountain bike networks together and integrate CHSP into a much larger whole. Mountain bikers are sadly underserved by the state park system and trails, particularly at lower elevations are badly needed.
7- Allow mountain biking on the WMA's.
Motorized:

1- Allow ATV's to have a trail system there. (x35)
2- Please keep ATV's off state lands. NO ATV trails!!! Ever. (x5)

Other:

1- More trails available year-round.
2- Even out the trail systems so users have an equal trail system, some trails could be used by more
   than one user group, which would make maintenance of these trails a project of more people
   instead of a handful from a singular group.
3- Allow for a more balanced multi use. In general the unit is dominated by hiking trails with little
   else. More trail for other users is recommended.
4- I do not suggest cutting a trail over from Wind Gap to the Burrows trial.
5- Do allow for increases in the trail network.
6- Encourage more multiple use trails.
7- The most important thing for me is having each designated trail marked clearly.
8- More forest management and use, less "wilderness" considerations. More active management
   for game species.
9- This is not filled in because these decisions depend on the need of local clubs. Many portions of
   this sprawling network of state lands are ideal for snowmobiling and the snowmobile trails that
   are already there are some of the most scenic in the state. Similar consultations need to be had
   with other trail groups. VTC opposes attempts by trail groups such as the Green Mt. Club to
   establish trail buffers banning nearby motorized recreation or timber management so that they
   can have the woods all to themselves. There's room for everyone and the so-called
   overcrowding issue is way exaggerated. I base this on my own experience hiking in these woods
   nearby to my home and a long history of quiet recreation as well as motorized recreation
   throughout much of Vermont.
10- Improve existing trails for future sustainability; improve environmental education efforts along
    the trails to promote allowable and appropriate use, encourage stewardship and volunteerism
    to help protect resources from environmental impact from heavy or misuse/use.
Question 3:

From what you have observed, how would you rate the job the State does with management of the CHMU?

- **Very good**: 27.3% (48)
- **Good**: 42.6% (75)
- **Okay**: 21.6% (38)
- **Poor**: 7.4% (13)
- **Very poor**: 1.1% (2)

Comments:

**Recreation:**

1. Better trail maintenance.
2. The trails can always use work. I'm not sure how volunteers are organized, but they (we) could do more.
3. Like always hiking seems to be all the state cares about with recreation.
4. Many thanks to GMC for their help!
5. I would not mind paying a small daily-use fee into a box at the various CHMU trailheads (as at Mt Mansfield State Park ranger station/parking lot there's a $3 daily use fee, which is entirely good & justified. $3 is modest and realistic.) Free use of CHMU is unnecessary, especially given all these new hopeful improvements and additions to the hiking and ski trail network around Camel's Hump. Hikers and x-c skiers shouldn't expect that only the universal VT state income tax system can generate enough management funds to maintain a hopefully expanded trail network in CHMU. But remember, I'm only advocating a very modest $3 daily use fee into a trailhead box........(or would vandalism/theft of the box then be an issue? !!! --- but they do this at hiking trailheads in NH White Mountains National Forest -- and have been for years without problems,
as far as I know -- I think it's a $5 daily use fee for the hiking trailhead thick metal boxes on cemented in metal pipe stands).
6- Antipathy towards biking in past.
7- Nice job, folks! Now let's improve and expand the network of back-country x-c ski trails.
8- I don't have any experience with the state's management - they don't do the outreach the CTA and CHSA groups do to alert members and users of their activities, so I don't know who to credit with work and oversight of the trails and area in general.
9- I think more effort needs to be made to educate the public about the importance of LNT, keeping off of the trails in the wet season, walking on roots and rocks, and keeping on the trail instead of detouring around wet and muddy spots.
10- I think the GMC caretakers on Camels Hump are a valuable tool in education the public.
11- My favorite Mountain to hike!!!
12- Since I am a hiker and skier, I do not see the state maintaining any of it. it is done by volunteers.
13- I have observed only what private entities have accomplished (such as the Camels Hump Skiers Association and Catamount Trail Association). Both of these organizations have been stellar in their care and maintenance.

**Motorized Trail Use:**

1- Keep good relations between VAST and the State. The State needs to recognize the dollar value snowmobilers bring into the State and Business. Mom & Pop Business rely on Snowmobilers for their winter revenue.
2- Allowance for off-road vehicles, other than snowmobiles must be part of the program. It’s time to start discriminating based on old biases.
3- Concerned that ATV's will eventually be allowed access. Feel strongly that ATV represent a significant degradation to the landscape - and although there's a place for all forms of recreation - CHMU is NOT the place for such invasive recreation. Snowmobiles are a close second, but do not cause the same lasting impact on the ground.

**Vegetation Management:**

1- More funding to support disease and insect, wind and ice damage of mid-elevation paper birch glades and park-like stands of birch. Keep a handle on bootleg trails work w/ backcountry skiers to minimize impact on understory.
2- From what I understand timber management should be a higher priority.
3- More timber management and public access would be appropriate.
4- Design of additional timber harvesting sales, either selective or clear cut (where feasible). There currently are acres of downed, dying and diseased timber stands that provide little if any wildlife habitat or benefits. Active land management includes timber harvesting, not just preservation. There are no wilderness areas in this management unit.
5- Expand timber management with wildlife food regeneration in mind, avoiding winter cover. There is too much mature maple & ash up there.
6- We should be logging and creating more wildlife habitat. Our economy is in dire straits and we need to create jobs and stop the political (bull). Vermont already has too much forever wilderness in our state so please don't add anymore dead property for us to pay for.
7- Make sure that timber management is done and all access remains open to all users.
8- I would like to see more vegetative management in the form of commercial timber sales with revenues used to assist in the maintenance of these state lands.
9- Recent wildlife clearcuts on Robbins Mtn are a great improvement. Would like to see more selective cuts and possibly soft mast introductions (apple trees, etc).
10- I'd like to see more active management of forests to provide wildlife habitat--too much of the forests are mature timber.
11- Need to manage the logging of the forest to create revenue and provide habitat for wildlife.
12- With proper management the state should allow all recreation and timber harvest and make money. The state of Vermont has failed at most of these and is missing opportunity to pacify a few.
13- More active habitat management is needed. It can be a source of revenue for other projects as well.
14- I see some barberry left uncontrolled. Would like to see plantations cut in a way that they will re-grow into a more natural forest. Recreational use is too high, year round.
15- NO ACTIVE FORESTRY PRACTICES.

Other:

1- Given the amount of pressure on and use of CHMU, I think that the State is doing a very good job.
2- Have not enough info.
3- The State manages in the same way the Forest Service does, whatever the Federal policy is the State seems to follow suit, and only certain special interest groups get what they want, sometimes in exchange for actively working against other user groups.
4- I'm sorry I don't have sufficient info to make this decision right now.
5- State staff have always been responsive to my questions and requests for assistance with trail construction and maintenance.
6- I don't have sufficient information.
7- I'm not sure what the State's job responsibilities include.
8- I am grateful to the CHMU for all of its hard work managing a truly wonderful place.
9- Not familiar with State management.
10- I do not have information that would help me make a decision on this subject.
11- I've always been impressed.
12- I do not have sufficient information to rate the states management performance of these lands.
13- Better erosion control on the forest roads
14- Unknown, no information given as to how the land is being managed now?
15- Not familiar enough at this point in time to comment.
16- Don't really have enough info to make a strong opinion.
Question 4:

What do you use the CHMU for?

Other (please specify)

1- Camel's Hump Challenge Cross country skiing.
2- I would like to see some atv trails also, there is more than enough room for everyone.
3- Again, I would like ATV access.
4- Would like to use for atv riding.
5- Any ATV use of state land should be decided on the basis of the law at the time of the proposed use and the individual merits of each proposal.
6- my parents are both 70 years old. they have been riding atv's for 15 years. my mom is handicap so i got a side by side. so she could still go riding with us and enjoy the woods and mountains.
7- I would also use my ATV if permitted.
8- Stream swimming.
9- Would like to use my av there.
10- Mtn biking.
11- Trail running.
12- I would like some ATV access.
13- Logging is way over due to help with creating proper wildlife areas.
14- Allow ATV's and I'll show up more...some people still enjoy this, and they should be allowed to.
15- ATV RECREATIONAL RIDING.
16- We need atv connector trails thru it.
17- Need ATV trails.
18- Nothing presently as I am an ATV rider and do not really know what this area has to offer.
19- Again, while I like to hike I also like to ride my ATV and I feel that Vermont should not totally restrict motorized use on State land.
20- Snowmobiling is the only motorized activity I would deem appropriate.
21- while up to the present time I have not used the CHMU area I believe that allowing atv use of some of the trails would open this area up many people who otherwise would never be able to see how truly majestic the green mountains are. If it could be opened to some atv use through a daily permit process I believe you could control what goes on.
22- Solitude and escape into nature.
23- State of VT wood lot program - Honey Hollow in previous years.
24- Just looking at it and living so closely to it!
25- Contiguous land, buffer.
26- Trail Running.
27- Peace and quiet.
28- To reboot my soul!!!
29- Swimming.
30- I would bike if I knew about any biking trails. I would ski more if there were more trails.
31- I'm responding for The Nature Conservancy who has helped ANR acquire lands in this mgmt unit. We are interested in resource protection and how the resource is managed.
32- Roadside firewood permit.
33- Birding.
34- Cross country skiing.
Question 5:

What are the most important values and/or benefits of the CHMU?

Other:

1- Skiing.
2- ATV access.
3- Note: these benefits are primarily benefits to humans.
4- I have here championed my own values but I very much respect the various uses to which the Mountain is put.
5- Use of surface waters for Micro Hydro facilities. Consider development of mid-elevation hut system like in Maine and Europe to help boost the local economy.
6- No atv's.
7- Restrict or eliminate snowmobile trails in CHMU -- they make too much air pollution (you smell the lousy 2-stroke engine oil/gas even hundreds of yards away), and the irritating intrusive loud noise pollution is unacceptable (you hear them a mile away) -- IF THEY'D JUST PUT NOISE MUFFLERS ON THEM AND IF THEY EMMITTED NO SMELLY, HARMFUL GASES INTO THE AIR, I WOULD NOT HAVE ANY PROBLEM WITH SNOWMOBILES!
8- You need good wildlife habitats to see wildlife.
9- Only snowmobiling as motorized use.
10- Forest management.
11- What are traditional uses???
12- What do you mean by "traditional uses?"
13- Mountain biking.
14- What do you mean by "traditional uses??"
15- Habitat linkage.
16- Traditional uses should be defined.

Question 6:

What conflicts do you foresee and how would you resolve these conflicts?

Motorized vs. non-motorized:

1- Motorized and non-motorized users. No place for motorized transportation in CHMU - except perhaps quieter snowmobiles (4 cylinder).
2- Many people will oppose the use of OHV on state lands because of their lack of knowledge of responsible use. With me living very close to the CHMU, most of the land does not get used at all for any recreation with the exception of hunting.
3- People on motorized transport want to get out into quiet, unspoiled areas, not really seeing the irony. I don't believe in taking anything away from people, but I do believe in non-impactive interactions with the woods and with each other. Smoke-spewing vehicles work great for those on them, not so great for those who have to listen to them or breathe in the exhaust. I can't see a way to resolve these conflicts happily because ATV and snow machine owners don't view woods or relationships in the same fashion.
4- ATV's can do damage and interfere aesthetically VASA can repair any damage, restrictions of time could allow for sharing without interference.
5- Allow future use of atvs.
6- Non-motorized users are always against any other uses, I know, I have had confrontations with hikers on the National Forest while using my ATV on my access to my land, these people have even told me that I have no right to own land where I do.
7- Conflicts are avoidable as long as people are willing to share a little bit. Many VASA clubs allow other forms of recreation to share our trails.
8- Conflict between motorized and non-motorized use; Allow ATV use similar to snowmobile and mountain bike uses.
9- Motorized use and logging vs. human powered and preservation. Preserve Preserve Preserve. 
10- The use of atvs. Allow limited use of trails for atvs.
11- Any lobby effort for motorized ATVs will conflict with wildlife habitat preservation and advocates thereof. Keeping ATVs out is important to limiting damage.
12- Increased accessibility for snowmobiles is putting more and more pressure on the trail system, the habitat and the wilderness ski experience. Only resolution is to ban them. There are too few places to ski in unsullied wilderness (even in VT) and too many for snowmobiles already.
13- Motorized versus non-motorized use.
14- From the perspective of a devoted cross country skier, traditionally my own intrapsychic conflict has been with snowmobiles. A beautiful ski track laid down by skiers in the snow serves to route one's skis: snowmobiles and even snowshoes obliterate that parallel 'inverse rail'. But conflicts may be resolved by increased awareness. The only bobcat I have ever seen in my life was standing in the middle of a snowmobile trail: I zoomed around a blind corner and almost ran into it. It took a fantastic leap into the woods and was gone. I studied its tracks and soon
realized that the bobcat(s) had made hundreds of sorties off the snowmobile trail. I realized that a snowmobile trail serves as a super highway for bobcats—and my attitude toward snowmobiles has been much improved. Conflicts are resolved by fostering mutual respect and appreciation.

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17- Motorized vs. non-motorized users and the latter should have greater and more extensive access as the impact is far less than a motorized vehicle.

18- Hippies won't want motorized anything. The state will allow snowmobiles. Lots of people will get screwed out of recreation opportunities, not to mention logging opportunities. The woods are big enough so everyone should be able to do what they enjoy.

19- ATVs - Don't ever let them of access.

20- Pedestrians vs. ATVs: Keep ATV tracks from crossing hiking trails.

21- Motors vs. non. Keep motors out.

22- I can foresee unmanaged access to OHV being a conflict. Involving organization similar to VAST which are managed outside of the state to relieved the burden on the state. This additional access option to a resource we "all own" will generate economic benefits through additional visits to the area for use. Lodging, meals, taxes and jobs.

23- Motorized vs. non-motorized recreation; Motorized Rec. participants are willing to compromise and are willing to accept restrictions; other parties should also.

24- Motorized vehicles in the backcountry -- eliminate or reduce.

25- ATV's trying to push into this area prized by quiet users.

26- No ATV access. I think some ATV trails would help me access the management units as I get older. I pay taxes on this property and would like to use it the way I use to.

27- Motorized vehicles (4 wheelers, etc.) have done a lot of trail damage in areas. They should not be allowed.

28- Allow ATV access!!!

29- not having land for all types of recreational vehicles including ATVS.

30- Illegal atv use, fix by legal atv use(vasa).

31- Conflicts between motorized recreation groups and non-motorized groups. However, there is room for all and everyone should have the opportunity to recreate on any state land.

32- "Motorized recreation" Is biased. There are only 3- major possibilities- snowmobiles, trucks, and 4-wheelers. As you know the trucks and 4-wheelers can only be used for management, not recreation. Many people have issue with 4-wheelers, significantly fewer with snowmobiles. Presented as a group your data will be unreliable on your real question, snowmobiling.

33- I see a greater request for more motorized recreation in the CMHU. Since these lands are for all Vermonters perhaps some section no known for its solitude could be developed to satisfy these requests.

34- Separate non- and motorized recreation. If not possible, need education @ shared use.

35- Snowmobile use on designated trails is fine, but ATV use is not, except in VERY limited lower areas and unlike snowmobiles I don't believe they are easily controlled.
36- ATV use-- If it must be allowed somewhere, maybe only on small portions of the VAST trail away from more sensitive wildlife areas.
37- Motorized and extractive uses versus protection, preservation, and providing a stretch of land where we can find peace and solitude.
38- I see ATVs trying to impede on the tradition of quiet pursuits on this land. It should be kept special first for the hunters who pay for it and also for the foot-borne other users of the forest. I also see the need to continue to cut mature non-mast (maple, etc.) hardwood stands that are prominent in this area.
39- Will always have conflict with people who love the noise of motorized vehicles just have to keep reminding them of the intent of the original plan of "forever wild".
40- The on-going conflict of non-motorized and motorized use of state lands. Designation of certain areas as non-motorized, allowing current motorized areas to remain and be maintained in a way that would preserve and enhance their use. Limited access of ATVs to certain areas needs to be investigated as this is a growing sector of recreation in the state.
41- Motorized vehicle sports have lots of money for lobbying.
42- ATV's cause man problems.
43- Motor vehicle use, traffic, speeding, parking.
44- Any motorized use conflicts with non-motorized use, and the latter should be the focus of park efforts. Snowmobile trails should be kept separate from any ski or hiking trails.
45- Do not allow motorized recreation in the CHMU.
46- Motorized users are much more tolerant of other uses than "quiet" users. There needs to be as much public access and multiple use that accommodates the needs of all users.
47- Motorized vehicle access should be very closely monitored to keep the mountain's environment healthy. I would offer those who'd rather ride through the woods the benefits of using your two feet to gain access to the back country. You can see more and gain the rewards the mountain has to offer for your efforts!
48- The usual motorized vs. non-motorized conflicts. But I'm not aware of a current conflict. So looks like these trails are away from each other.
49- I'm sure ATV riders would like access to some roads/trails; the ban should continue. Some folks may think that there are too many people on the Hump, I don't like limiting the number of hikers but it may come to that.
50- I would continue the ban on ATV use (better policing of this policy may be needed). I would oppose any consideration of commercial wind energy development.
51- Educate trail users on the importance of all forms of recreations. Our state lands should continue to allow and heighten managed motorized recreation opportunities.
52- Keep ATVs out of the CHMU.
53- I have hiked and hunted Robbins Mt WMA for 40 yrs., kids, grandkids, etc., it's a nice, nearby, fairly remote resource and I would hate to see a lot of traffic of any sort, certainly not motorized.
54- Hikers wanting more wilderness and restricting power sports use as a taxpayer of the State I would like to see traditional uses with increased logging and only use comment from individuals not special interest groups.
Recreation/wildlife vs. vegetation management:

1- There is a desire to extend skiing (and other trails?) into the Robbins Mtn. WMA. This should only be allowed if compatible with wildlife management, which should have priority here.
2- Activity conflicting with each other, reroute, relocate trails to move like interests together and separate conflicting interests.
3- Illegal ski trail cutting is a problem. This might be mitigated by permanent recognition of more trails or ski corridors.
4- Logging below 2500' and Moose. Moose browse currently prevents regeneration of shade tolerant species within 1800' and higher. This promotes hobblebush thickets and other shrubs and/or stunted sugar maple. Either no cutting or large patch cuts (20+ acres) with site preparation would be able to resolve these conflicts.
5- Although traditional, hunting and logging can cause conflicts; with good management these can be minimized.
6- Illegal cutting of trails for skiing, mtn biking, etc.
7- Logging and recreation. Perhaps limiting logging to the times of year with less recreational demand.
8- Could be a conflict with wildlife and some logging and water quality. Keep an eye on loggers making sure they follow standard procedures with water bars and other erosion control methods. Keep ski trails and snowmobile trails well separated from each other.
9- Pedestrian recreation can come into conflict with areas that are being actively logged. Resolution would be by providing trail buffers that exclude logging where possible. For places where this is not possible or practical, provide careful signage and control, and provide maintained crossings for trails to cross logging roads. Do the logging work in these multi-use areas as quickly as possible, then restore/cleanup and return to usefulness for pedestrian recreation as quickly as possible. Do LOTS of coordination and shared management of these conflict areas, involving CTA - CHNSA - GMC, and the loggers.
10- Extractive activities vs. preservation. Sensitivity to what it takes to maintain a delicate ecological balance vs. the concept of having a "right" to do whatever you want on the land. Awareness of a larger picture vis-a-vis watershed issues, wildlife corridors, etc. vs. the desire to extract resources or recreate in a manner inappropriate in a delicate ecosystem.
11- Too many people view active habitat management as bad--educating people on the value of early successional habitat and having a variety of age-classes, different forest types, etc. would go a very long way towards changing people’s opinions.
12- Efforts by some groups to restrict other groups' forms of recreation, timber management, etc.

User experiences:

1- By letting everyone enjoy their sport everyone can work together to keep the trails and woods clean and patrol the bad groups.
2- All Vermont taxpayers deserve equal rights and access to State lands.
3- Competing interests can lead to conflict - balancing interests and avoiding overlaps (i.e. locate differing uses in different areas or in differing seasons) is key. When human use is in conflict with the wellbeing of natural communities, natural communities should be given special consideration by the State. In this area, I believe the State has a responsibility to advocate for the sustained wellbeing of flora and fauna.
4- Access v. solitude.
5- Too much over population
6- Property rights.
7- Population is the big problem. I do not know how to solve that problem. I do not want to see a limit on the number of people per day sort of rule.
8- Recreation is the only chance for Vt. It should be promoted.
9- This should be self-managed. There's enough room for everyone to have a place to use.
10- Sharing with different recreations.
11- I would imagine the only conflicts would be from the folks who do not want to share. It has been my experience that those that have what they want could care less about any one else’s wants or needs. To resolve these issues you have to ask yourself honestly where do you personally come down on the issue and are you willing to compromise.
12- There is plenty of room to avoid most conflicts.
13- CONFLICTS BETWEEN THE PASSIVE FOLKS AND THOSE OF US WHO ARE NOT.
14- Folks who want solitude will have to go elsewhere or use the area at inhospitable times. There is just a lot of demand for use of the area. Use and protection conflict, but wise use can be balanced with protection.

Trail types/uses:
1- Some conflicts between hikers and mtn. bikers but minor. Bootleg ski trails can get out of control.
2- All the various groups disagreeing and getting nowhere. Have people understand we must share and work together for the common good.
3- I do not see any conflicts that could not be resolved between the parties involved. The area is large enough for everyone to use and not bother each other.
4- There would be a conflict if some users, that helped pay for the land, were excluded from using their land.
5- Most conflicts originate at the trail heads or access areas. More assess areas or improve the existing ones would be a solution.
6- Overuse and erosion would be primary culprits of any new trail development, but these can be overcome.
7- Overuse if the popular hiking trails.
8- Hiker/biker conflicts can be avoided by providing designated mountain biking trails within the park. Bikers don't want to ride hiking trails when good mountain bike trails are available.
9- Do not cater to only one group. open the land to all recreation.
10- Watch out for rogue back country skiers cutting private trails and glades!
11- Too many day hikers and skiers. Don't advertise the trails. Encourage GMC not to promote them.
12- I'm sure there is a concern that additional ski trails may invite non-winter use of trails that should be minimized or avoided to support wildlife habitat and sensitive areas. Perhaps very clear signs at applicable trail heads that promote winter-use only, with the acknowledgement that the trails will be discontinued if non-winter use occurs.

Other:
1- I see no conflicts. Current management is fine. There is enough land for everyone to enjoy.
2- Not sure.
3- No comment.
4- None. Any that arise should be resolved through education and understanding.
5- Environmentalists who won't listen and always think they know everything.
6- Unwillingness of some advocacy and user groups to share our resources responsibly.
7- Vermont is letting organizations from outside VT dictate with their lawyers what we do with our land. We need to manage and use our land to benefit Vermonters first not organizations from other states.

8- Conflict= True North Wilderness Program.

9- Conflicts may arise with increased group interests using this area for recreational use. One way to resolve conflicts is to work closely and consistently with all user groups to help manage and promote appropriate use in concert with FPR's mission & values. Be sure to identify what kinds of use that would diminish the value of this parcel, that people have enjoyed and valued for many years and to wrap these messages into conversations with individuals and groups while accentuating why Camel's Hump State Park is so amazing because of the people who take personal responsibility to keep this area special. Promote leave no trace; respect for the land, water, and people who make the efforts to maintain this area this generation and the next to come to enjoy. Set up a system where friends and others can make donations for future preservation and management.

Question 7:

How can the managers of the CHMU better accommodate your interests or needs on the CHMU?

Recreation:

1- I would like to see the Camel's Hump Challenge one-time-per-year trail become a regular winter use only trail similar to the Bolton to Trapps trail. This provides an opportunity for individuals wanting a long distance backcountry ski experience. I would suggest signage that this is a long and backcountry trail and should not be done alone. (x4)

2- Significantly expand options for backcountry cross-country skiing trails (ungroomed).

3- Work w/ backcountry skiers, NGOs and individuals cutting wild trails.

4- More x-c ski trails. (x7)

5- Volunteer crews to cut more cross country ski trails.

6- More cross country ski trails that connect to Huntington trail system so as to encourage their use and a tourist economy.

7- The State should continue to work with the Catamount trail and Camels Hump Ski association to improve and maintain ski trails. Existing hiking trails should be allowed to continue.

8- Camel's Hump Nordic Ski Area (CHNSA), the Catamount Trail Association (CTA), and the Camel's Hump Challenge (CHC) organizers to coordinate the introduction of new xc ski trail routes in the Camel's Hump Mgt Unit.

9- The Catamount Trail Association would like to make improvements to the route of the Catamount Trail. These reroutes seem reasonable and will improve this important state-long trail. Please give their plan careful consideration.

10- Increased opportunities to ski for "average" skiers.

11- Logging roads could be open to mountain biking on Duxbury side. Get staff comfortable with biking.

12- More organized non-motorized opportunities. Mt Bike trails can be properly cut to minimize impact and can make great hiking trails too. Backcountry ski equipment has come a long way and it is time for the state that has a great history of skiing to embrace the new BC skiing movement and provide opportunities for all levels of Backcountry skiers. If the state provides places to glade ski, perhaps the illegal cutting will slow down!?

13- More mountain bike trails. (x3)
14- More transparent management, with more inclusion of recreational uses.
15- Permit people to recreate anyway possible.
16- More back-country pedestrian trails (summer and winter).
17- Allow existing trail systems to be maintained and managed so activities can co-exist.
18- Rock climbing.
19- Increased snowmobile trails. (x2)
20- Help with rebuilding snowmobile trails should they get damaged.
21- Open the land to all recreation.

Motorized Use:

1- Allow ATV ridding. (x12)
2- Any ATV use of state land should be decided on the basis of the law at the time of the proposed use and the individual merits of each proposal.
3- Allowing ATV's and VASA to organize a trail system so everyone can see the beauty this land has to offer. Not everyone can hike or bike to see this wonder.
4- Allow other established OHV organizations to manage the use of the trails and infrastructure relieving the burden on the state. It is possible to manage trail systems keeping the environment safe.
5- Coordinate an MOU to allow motorized recreation on appropriate and environmentally compatible trail systems.
6- Keep ATVs out. (x3)
7- Allow motorized uses, year-around, through-out the entire CHMU. Why do the "enviro's" get their form of recreation allowed on EVERY WMA and those of us who need to use "motorized recreation" get little or nothing. Read our State constitution> no people or group of people shall benefit more than any other person or group of people. That is what you are doing by making these "Non-motorized" areas!

Public input/information:

1- Please make available on the web maps showing existing trails and potential trail changes.
2- The public needs to be better educated on "Carry In / Carry Out". Perhaps fines and more enforcement could be added.
3- I am generally happy with the management of CHMU. Some better posting at key intersections within the trail network would be useful.
4- Keep the public adequately informed of projects in the CHMU.
5- Communicate how they are achieving a balance of the need/demand for recreation use vs. wilderness preservation.
6- Protect land owner property rights.
7- Public literature that defines the current use of the area with maps.
8- More education of colleges and other organizations which seem to sponsor inappropriately large groups on the trails. I've encountered college groups, Middlebury and maybe others, with numbers way over 10, on the summit cone of Camel's Hump. They should know better.
9- Keep asking the questions.
10- Post signage to say what's allowed and what isn't--if it doesn't exist.
11- Well announced fundraisers for the Mountains health for like-minded individuals.
12- LISTEN TO AND BE OPEN TO SUGGESTIONS.
General Management:

1. Always make someone unhappy. Seriously.
2. Listen to suggestions and comments of the residents of the area. (Not that they do not now).
3. I think a great job is being done now.
5. Open up equal uses for all interest.
6. Provide technical support and small funding to existing interest groups in establishing moderate expansion of routes, and assisting with coordination.
8. Return it closer to a natural resource, less open capabilities for general public.
9. Accommodate more user groups and permit more access points in order to spread users out across the property.
10. Keep logging wildlife cuts.
11. Start managing with the idea of helping VTs not worrying about being sued by enviro not for profit organizations.
12. By being fair and balanced in decisions. Remember the wildlife are not afraid of a motor. They run when they see a human walking. Wildlife are used to the sound of a motor. If you shut the motor off and step off the snowmobile that's when they run.
13. Listen to and work with groups that are willing to work together to be all inclusive and good stewards of the land, instead of being exclusive.
14. Preserve the status quo.
15. More timber management to let the forest and wildlife flourish.
16. I believe that all parties can be accommodated if folks are willing to compromise.
17. Try not to change much.
18. Make your management decisions based on what is best for the ecosystem.
19. Cut mature maple stands; prioritize hunters interests above those of non-hunters. (We have done more to pay our way).
20. Doing a good job now.
21. Continue wildlife habit improvement (logging), otherwise, leave it alone.
22. Put ecological preservation at the top of the priority list. If extractive and recreation activities can fit in as secondary priorities, then I'm all for those that are the least destructive.
23. Increased logging.
24. No wilderness or sensitive area designations the park is already protected by being a park.
25. Do NOT set aside restricted wilderness areas - do not surreptitiously "post" portions of this area, making it off-limits to any part of the public.
26. There needs to be more active management of State lands in general. State lands are to be used by the people of VT. Multiple use and access need to be stressed over resource protection which should only be considered in isolated instances. Our state needs to limit additions of wilderness as many of our State lands may be needed for other purposes in the future.
27. Focus on recreation and active vegetation management. It looks like there has been very little logging on these lands despite the fact that the vast majority of the trees are at harvestable age. Game species and virtually all non-game species suffer as a result.
28. They are doing a good job. More and more people are looking to get out in the woods in the winter. CHMU managers need to accommodate them to control their use and balance protection of sensitive areas.
29. We would support the creation of a new or expanded Natural Area designation.
30. More firewood lots if possible. Back to first come-first served, not lottery.
Question 8: (Additional comments):

Motorized Trails-ATV's:

1- How about ATV Mondays for a starter.
2- Being from CT where no public ATV riding is allowed, we often ride in VT where we spend hundreds of dollars on registration, club membership, food, hotel accommodations, fuel, etc. We sometimes head over to NH or NY for additional trail access-it would be more economical for us to stay in VT and continue to ride extended trails. It is foolish for CT to forego motorized rec. vehicle income...be smarter.
3- I am pro ATV, there is very limited ATV access but the forest is big enough for everybody to enjoy.
4- This is a resource we all own and it is not fair to limit it to specific areas of unique interest. All other surrounding states allow access to OHV groups. Vermont is losing to the revenue in many different areas due this.
5- I am an ATV user and I enjoy getting out to see many of the remote areas in our states forest. I am 59 years old with bad knees and now not as able to get back to many of the areas of the forest where it might be better hunting or fishing or even many of the scenic areas of the woods. I would like for the state to give the atv'ers a chance to prove that we are not out to ruin our state lands but just want a chance to enjoy them along with all the other groups. We pay our taxes like everyone else and would like the same privileges.
6- Our state is 80% forest and we have no legal place to ride ATVs or off-road motorcycles. Something is wrong with this picture. If states like MA, NH, ME, NY, NJ, and WV can all have revenue generated from legal riding, why can't we??? We live in the woods!
7- Responsible motorized recreation on public lands is allowed in every state except Vermont, Rhode Island and Hawaii. It can and has been be done successfully and in a responsible and sustainable manner. Just saying "no: is not a management plan.
8- All state and federal management units should have access to tax paying registered ATV users.
9- My bias is that I despise motorized recreation and support efforts to implement ski trails as I consider winter activities to in large part be a lesser impact.
10- We need legal ATV use.
11- Fair is fair, (except in Vermont) so open some State land to motorized use, especially ATVs.
12- ATVing and other forms of OHV should be determined based on the circumstances of each proposal and the applicable state regulations in place at the time of the proposal. There should be no statement banning ATVs because laws and regulations change over time. Are there any easements on this land restricting ATVs? Other uses? What uses?

Recreation-Non-Motorized:

1- Please open winter use of the camels hump challenge trail.
2- I recently backpacked through this area as was very impressed with the level of trail maintenance compared to adjacent areas, specifically the Long Trail south of App Gap.
3- I was first put on skis when I was 4. I was taught skiing in the Ford Sayer's Program in Hanover. I am now 56. My father, Dr. Warren Beeken, and I shared many hours with topo maps situating trails, trimming them, and skiing. It was my father and his friends who established the Camel's Hump Challenge. I would like to have the opportunity to remember him up there more often. I am now 56 and I intend to ski for the rest of my life.
4- I'm an xc skier and member of the Catamount Trail Association. I am an enthusiastic supporter of the coordinated, long-term efforts of the Catamount Trail Association (CTA), Camel's Hump Nordic Ski Area (CHNSA), and the Camel's Hump Challenge (CHC) organizers to establish the following new xc ski trail projects in the Camel's Hump Mgt Unit. As I understand it, these proposed trail routes would all connect to and be accessed by the existing xc ski trail network of the non-profit CHNSA or from Catamount Trail access points in the area, and they are being identified by GPS mapping to illustrate their low-impact locations--primarily at lower elevations to the west of Camel's Hump--and interconnectedness for consideration by the Vermont Dept of FPR.

5- Please limit logging except in a small mountain area to encourage back country skiing. This would clean up the area (bushes, downed trees, low branches) so as to allow skiing between the trees.

6- Mtn. Bike trails on private land are being lost, we need more recreation trails on public land.

7- There is no reason mountain biking should not be allowed on the WMA’s; they were there once and didn't bother anything.

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General Management:

1- Perspective of science based, natural communities expertise is very valued and I suggest making this input known to the public to create better understanding of the public's appropriate use of this irreplaceable resource.

2- It's in need of some logging.

3- Thanks for being open to allowing more Recreational Uses on our State Lands, as it should be!

4- Do not restrict any ongoing uses.

5- I'm an xc skier and member of the Catamount Trail Association. I am an enthusiastic supporter of the coordinated, long-term efforts of Camel's Hump Nordic Ski Area (CHNSA), the Catamount Trail Association (CTA), and the Camel's Hump Challenge (CHC) organizers to coordinate the introduction of new xc ski trail routes in the Camel's Hump Mgt Unit. CHNSA provides a network of groomed and ungroomed xc ski trails on the western aspect of Camel's Hump. The Catamount Trail Association maintains a xc ski trail that runs the length of Vermont and the Camel’s Hump Challenge trail provides a wilderness experience circumnavigating Camel’s Hump. The proposed new trail routes would all connect to and be accessed by the existing xc ski trail network of the non-profit CHNSA or from Catamount Trail access points in the area. They are being identified by GPS mapping which will illustrate their interconnectedness and locations. The proposals include: 1. Mapping and marking the CHC "around-the-Hump" backcountry trail. 2. Re-routing the Catamount Trail in the Camel's Hump area to a higher elevation (around 2500’). 3. Developing a backcountry ski trail from CHNSA that would lead to the Bald Hill ridgeline and Little Baldy and afford skiers access to telemarking skiiing off the slopes of Bald Hill; 4. Establishing a backcountry loop departing from the north end of the existing Lion's Ridge Trail on the west rim of the Honey Hollow drainage basin and accessing the Robbins Mountain ridgeline and additional telemarking terrain. 5. Establishing a groomed trail rising gently east from the CHNSA "Stagecoach Road" trail on private land, to a Bald Hill saddle loop in CHSP, at about 2200', 6. Continuing a groomed route in CHSP descending gently south and west from the Bald Hill saddle loop (#5) that returns skiers to the existing CHNSA trail system. Thanks for listening.

6- I think you and the Green Mountain Club do a great job of maintaining trails and letting us use the forest for recreation and logging.
Other:

1- Off-leash dog walking should be discouraged in November.
2- Thanks for listening.
3- Thank you!
4- Thanks for our input.
5- Thank you for listening to my comments.
6- If we need to create Vt. laws to protect you from being sued by the environmental groups so you can do your job then let’s do it. Thanks.
7- Thanks for this survey. Good job and effort.
8- I don't think it’s necessary for the State to incorporate "wilderness lands" or "core areas" we have to many of these areas on the National Forests within Vermont.
9- Continue to include extractive forest resource management as an important component of CHMU, and pro-actively manage the unavoidable conflicts between those extraction activities and back-country pedestrian trail users.
10- How can individuals help you?
11- Support healthy, green exercise opportunities on state land.
12- Maine, NH, NY, Canada Provinces co-exist with all recreation why can’t Vermont?
13- I would be interested in learning more on how I can contribute and be a better steward of the woods.
14- Thank you!
15- I BELIEVE THE TAXPAYERS OF VERMONT PAID FOR THESE LANDS SO EVRYONES WISHES AS FAR AS USE SHOULD BE LOOKED AT AND IMPLEMENTED IF FEASIBLE.
1- What changes, if any, would you like to see to the Camel’s Hump Management Unit over the next 20 years?

TRAILS:
- Mountain bike trails where appropriate.
- Where are mountain biking trails?
- More trails on western side of mountain.
- Expand CH ski touring center and CH challenge trail.
- Ski trail additions (CHNSA, CTA, trail around Camel’s Hump).
- More back-country ski trails.
- More back-country ski trails/glade thinning.
- Snowmobile trail mileage inadequate for acreage.
- Hiking and ski trails - added and maintained at Robbins Mt. and Stevens Blk.
- More integrated trails covering all of the unit, e.g. Robbins Mt.
- Lower elevation [x-c ski] trails on western side of park which can be groomed.

VEGETATION MANAGEMENT:
- Effective timber management to get money out of land.
- Good work on current harvesting.
- Continue sustainable timber harvest.
- Increase sustainable timber harvest.
- Continued active management for Earth Successional Habitat (x2).
- More frequent harvesting.
- Question about extent of areas not harvested (maybe review this).
- How many acres are actually available for timber management?
- Make land available for maple sugaring. (x2)
- What early successional wildlife habitat work has been done?
- More Early Successional Habitat management (wildlife).
- More timber and firewood harvesting in appropriate areas.
- Stop all logging and allow the forest to age and transition, following its natural evolution.
- More timber harvest, more snowmobile trails, additional road system to allow better access for people, create more wildlife habitat.
- The only changes I would like to see are more forest management implemented. As we know wildlife can only flourish with active forest management. From what I gathered from the meeting it happens but not enough and I do understand that a lot of the land is owned by forest companies, but I think you folks should encourage those folks to do more.
- Acquire timber rights from A. Johnson for Huntington Gap (WMA). (x2)

ACCESS:
- Parking access/ developed for multiple vehicles (snowmobiles, trailers, Charlie Smith Road).
- Snowplowing at designated parking areas (Robbins Mt. WMA).
- Parking for Beane Trail and Trapp Road?
- Improved access through gates and expand time of year.
- Better Parking at Forest City.

OTHER:
- Maintain unique identities.
- More funding – land acquisition (x2).
- If you don’t have resources to manage then don’t own it.
- New development account for Bicknell’s Thrush in all season and other species (bob cats, bears etc.).
- “Resource Based” Leases (availability, applications, etc. i.e. sugaring and/or AG).
- Maintain “wilderness” (remoteness) keep undeveloped.
- Increased focus on multiple use (x2).
- More education on the full extent of public resource/ more outreach to public schools/ engage next generation in all the uses.
- Public education about all the parcels.

2- How could the CHMU be managed better or differently?

TRAILS:
- Buffer trails from harvesting.
- Add managed glades to ski trail system to discourage bootleg cutting.
- Education program for winter uses to discourage unauthorized [‘trail’] cutting.
- Recognize demand for glades and more trails.
- Develop firm policy against unauthorized trail clearing.
- Locate back country ski routes in a thoughtful way.
- Consider a remote downhill trail (similar to tear drop) in conjunction with back country system.
- Improve trailhead signage/ signs about dogs.
- More cross-country ski trails.

VEGETATION MANAGEMENT:
- Increased timber management ( > 200 ac/yr to promote local economics, reduce fuels (FIRE), and improve wildlife habitat).
- More timber harvest. Based on 200 acre per year harvest it would take 125 years for 1 timber cycle or 50 years for 10,000 acres.

ACCESS:
- Label roads/ features as part of emergency response plan.
- Do not increase the number of open roads and motor vehicle use.
- So far it seems to be managed quite nicely. Good balance. Keep the same access, especially on the Huntington side.

OTHER:
- Minimal management.
- No new activities at high elevations.
- More public input on use or non-use.
- Identify critical management area and protect and depict “wilderness” areas and research areas.
- Improved continuity between departments and agency i.e. maps showing ownerships to be combined as “State Lands”.
- No set-asides/ wilderness.
- Need more permanent land managers i.e. staff, partner organizations.
- Increased funding.
- Partnerships with user groups.

3- What do you think the critical resources or sites on the CHMU are?

TRAILS:
- Trails (the variety of topography and forest scenery on trails).
- Recreation access.
- Bald Hill area (back-country skiing, illegal trail est., and motoring?).
- Honey Hollow - Nordic Center.
- Bald hill area: connectivity separate from Camel’s Hump.
- Recreational resources include natural communities and wildlife.
- Additional mountain bike and ski trails (with thoughtful planning).
- Permanently mark Camel’s Hump Challenge Trail.
- Trail network.
- Snowmobile trails some of the best in the state.
- Phen Basin mountain bike trails are unique and have a back-country feel.
- Cross-country trails the traffic is increasing.
- Recreational trails.
- Long Trail.
- Snow resource – backcountry and x-c skiing.
- Hiking trails.

VEGETATION MANAGEMENT/WILDLIFE/HABITATS:
- Wildlife floral/farms.
- Wildlife Resources (habitat diversity, upland wetland).
- Water resources.
- Timer resources/ harvest opportunities.
- Wildlife habitat (include large area for spp. such as catamount, bear).
- Rare ecological sites.
- Research plots, upland wetlands, and spruce-fir swamps.
- Alpine meadows/vegetation.
- Open grown birch stands manage for health and vigor.
- Ridgelines, forests, obviously Camel’s Hump, hardwood glades for skiing.

OTHER:
- Scenery.
- Fragile nature of summit.
- Summit/ alpine zone (concerns about dogs).
- Summit of Camel’s Hump(x2).
Historic sites. The historical sites are the most important. These sites should be protected and maintained at any expense.

- APP Gap (signage).
- Access and parking areas.
- Sometimes town road closed too early on Camel’s Hump Road in Huntington.
- Advocate continuance of camp culture.
- “Views” and view shed.
- Hiking trails, native wildlife, trees, water.

4- Would you support additional:
    A- Mountain bike trails?
    B- Cross country ski trails?
    C- Other trails? (specify)

MOUNTAIN BIKE TRAILS:
- Yes (7)
- No (2)
- More single track; no large group events.
- I think this is one of the fastest growing recreational activities; trails need to be well designed and maintained.

CROSS COUNTRY SKI TRAILS
- Yes (5)
- No (1)
- Catamount trail to be moved onto public land.
- Need for trails to be maintained (“Around the Hump” trail).
- Move Catamount Trail around Bert White Road/ Salvas Road on to State land.
- Designated backcountry ski area?

OTHER TRAILS:
- Some support for new trials.
- Additional Trails...
- Snowmobile
- Keep snowmobile trails open during winter harvests.
- Additional snowmobiling trails, i.e. interior loops.
- More (2)
- No more (1)
- Foot trails to all high points.
- Hiking trail up Bald Hill.

MOTORIZED:
Carefully consider before adding any additional motorized trails.
- Opportunities for motorized recreation – on logging roads?
- Absolutely no 4-wheelers.
- Need motorized trails.
- Consistency with SCORP, establish ATV and other ORV trails.

OTHER:
- Careful planning because can’t go back after adding new trails or difficult to do.
- Need for formal signage/ design of trails.
- Recreational Trails to be maintained (long trails/vast trial access routes are N to S).
- Trails have diminishing return if too many.
- Concerns about illegal trails.
- Trails should conserve landmark status and review how many trails fit in.
- Question about over use.
- There are locations where connector trails and loop trails could be established.
- More trails as long as those folks start chipping in.

5a- How should we communicate with the public?
- Internet survey/social media good.
- Front porch forum (x3) – good source to announce newspaper.
- No out of state influence on planning.
- Small representation here tonight – got to do better.
- Free press, press releases, and town papers.
- Sportsman groups, recreation groups.
- Good to keep track of history.
- Websites (F&W and FPR).
- Public meetings (town library and sites).
- Facebook page for CHMU (individuals who sign-up get automatic notification of news).
- Share link with important stakeholders.
- Catamount and LT/GRN Mt.
- Fellowship of the Wheel.
- Meeting announcements, bulletin boards, etc.
- Continue/ increase use of technology to stakeholders list for various concerns.
- Ex. Notice to spread word about illegal cutting - outreach to school students.
- ANR/ FPR school liaison officer, especially in surrounding communities.
- Continue stakeholder outreach, get wide diversity, entice people to show up/ participate.
- Keep politics out of management.
- Outreach to town meetings/ to select boards/ conservation commissions.
- Community extends beyond state lands boundary (economy, neighbors, etc.).
- Email and website.
- Availability of existing plan – where is it?
- Ample time to review and comment on plan.
- Better keywords on your webpage so that if one Google’s ‘Camel’s Hump’, your page is the first search page picked up.
- Your session tonight is helpful.
- More newspaper press.
- Much better than you previously have. At the Huntington meeting there was only around 20 folks there and I have to believe more would have shown if they had known. Lots of folks I have since talked to about this were totally unaware this was happening.

5b- What should we communicate?

- State should communicate need for funding.
- What is here in management unit and why is it available.
- New land purchases.
- Changes in management, or planning, not post-planning.
- What we do already (logging, etc.) and why it is important to listen.
- What updates/ drafts/ public input opportunities.
- Explain benefits of active management.
- Be specific, but also relate to larger ecosystem (wildlife).
- Trails as safety resource.
- Sharing the forest (multiple uses).
- Updates: status of planning process.
- Significant changes to current LRMP.
- What’s new?
- Refer readers to major changes in document.
- Better signage at trailheads.
- Meetings, major events (logging, recreation, etc.), trail conditions.
- That the entire area be designated as wilderness area.
- What exactly is the plan?
- Who oversees the Stevens Block restoration?
- You should communicate what Camel’s Hump is all about and what it has to offer. I feel it is the gem of Vermont and we should be selling it as such. This should be communicated through the media, i.e.: TV, radio, newspapers, outdoor publications, internet, etc.

6- Additional comments, suggestions, questions:

RECREATION:
- Concerns about focused impacts on trails.
- Activities in remote areas should be limited to human powered operation and increase with elevation.
- Simply put I would encourage traditional uses of State managed lands e.g. hunting, fishing, hiking, (including handicapped access), forest management, wood harvesting, snowmobiling, and ATVing, and generally few rules, limitations, and regulations as possible.
- I am not a large fan of heavy recreation uses, especially ATV use and mud bogging. They have a place but not up high. Keep the activities down low and controlled by limited access.
- Developing more backcountry ski trails on all VT state forest land is a golden opportunity to increase winter use and increase tourism. I see nothing wrong with carefully executed thinning of glades for skiing by crews that know their tree species.
- On a final note, in our breakout groups one person voiced her opinion loudly; she would like to see a much larger trail system on Camel’s Hump. Our presenter said that could happen but financial restraints hamper this happening. I suggested it is high time that the folks who hike, bike, snowshoe, and ski start to ante up to support these activities. She replied ‘that is what I
pay taxes for’. I showed her my Vermont State hunting license, where I pay well over $100 a year to trap, hunt, fish, and to buy and sell fur. I also pay a lot to register my trailer, boat, and pay a tax on every firearm, or hunting and trapping related equipment via the Pittman-Robinson Act whose funds go directly to such areas where she recreates for free. I have to pay this money yearly, and in multiple states I hunt in where she gets to do it all for free. Somehow you folks have to get this very message out and I think your financial crisis would dwindle. A simple $50 a year access permit would fill the coffers. Thanks you for the invite and the opportunity to express my viewpoint on the critical issues.

- We urge the Dept. of FP&R allow VAST snowmobile trails be built and maintained in all areas possible.

**VEGETATION:**
- Concern about ever expanding wilderness.
- More commercial sugaring leases?
- Continue to harvest at least 200 acres/ year (more if possible).
- Major changes to landscape.
- Timber harvest information.
- Keep scale of operations small/sustainable.
- Do what is right and scientifically makes sense and biologically sound.

**OTHER:**
- Manage property based on Vermont values.
- Accommodating multiple passive and active uses.
- Others value wilderness for wilderness.
- Better advertising of public involvement in meetings.
- Visitor oriented signage or kiosk at crest of Route 17. Lot of tourist traffic up there; they should have some information available.
- I believe you should manage property based on Vermont values (those values of the 50’s and 60’s), not out of state influence.
- In summary, I was happy with your plan objectives. I was most happy to see that trapping, hunting, fishing were not going to be affected by this plan. That fact is rare in most new management plans. I would like to see more active forest management as I stated before.
# Appendix E - Public Responsiveness Summary

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Introduction

The purpose of this document is to provide readers with a summary of the public comments that were received during the Public Comment Period for the Camel’s Hump Management Unit (CHMU) Long Range Management Plan. The draft plan was released on October 25, 2017 and the comment period was open through January 15, 2018. The comment period was reopened and extended from March 2, 2018 to April 13, 2018. More than 700 comments were received via mail, email, and in comment boxes at the four public meetings held in November and December of 2017.

Public Comments were received, reviewed, and summarized by the Essex District Stewardship Team (DST). The DST is an inter-disciplinary group of natural resource professionals from the Department of Forests, Parks & Recreation, Fish and Wildlife Department, and Department of Environmental Conservation. The DST is responsible for planning and management of ANR lands in the District. When necessary, this group seeks input from other ANR professionals. The DST summarized these comments to capture the sentiment of respondents, though most commenters will not see their exact words below. This document organizes comments by theme and includes a response from the Agency of Natural Resources (ANR). Where edits were made to the plan in response to comments, this is clearly stated.

Recreation Management

Mountain Biking

Public Comment theme: Consider additional mountain bike trail opportunities, including trails in Honey Hollow, Stevens Block, a connection from the Mad River Valley to the Huntington River Valley, and the newly planned Velomont Trail.

Response to comments: The plan has been edited to allow consideration of the Velomont trail to traverse the CHMU in the vicinity of the existing Vermont Association of Snow Travelers (VAST) trail in Duxbury using portions of Land Management Classification (LMC) 2.5J and 3.0A (see map 16). The presence of a new hut or new trail would not alter other plans for these areas, including timber harvesting. The trail will not be sited on the northeast “arm” that lies east of Camel’s Hump Road and west of Crossett Hill Road.

Mountain biking is allowed on all gravel-surfaced roads on the Department of Forests, Parks and Recreation (FPR) land, in accordance with FPR Policy #4 Mountain Bicycles, Horseback Riding, and Pack Animals. This includes gravel roads within Stevens Block of Camel’s Hump State Forest, and Honey Hollow in Camel’s Hump State Park.

ANR is not supportive of the other suggested expansion opportunities.

- The lower elevations of Stevens Block are managed specifically with wildlife in mind, and the area above this would be severely limited by terrain and size.
• ANR considers the availability of recreation resources in the local community when considering new trail networks on state land. There are mountain biking opportunities near to Honey Hollow in Richmond and Waterbury, on both public and private land.

• A mountain bike trail linking the Mad River Valley and Huntington River valleys on state land would likely need to cross the Huntington Gap WMA. Such a trail would not be in line with the primary goals of the WMA.

**Public Comment theme:** Additional mountain bike trails are not necessary. These trails will lead to the development of dense networks and pose a serious risk to wildlife. Trails may also lead to erosion.

**Response to comments:** Additional mountain bike trails are proposed in the plan and focus on connectivity between, and enhancements to, existing trail networks, not the establishment of new trail networks. The plan has been edited to consider locating the Velomont Trail in LMC 2.5J and 3.0A (see map 16). The Velomont trail would be in the vicinity of an existing VAST trail and thus the area of new impact would be limited. The possibility of mountain bike trail expansion in Phen Basin remains in the plan.

The DST recognizes improper trail location, design, or use can impact wildlife or create erosion. The DST thoroughly reviews the routes of new trails and considers the impact to important habitat features, water, and forest health. Mountain bike trails on state land are installed and maintained by experienced volunteers, professional trail crews, and FPR staff using International Mountain Bicycling Association sustainable trail standards designed to minimize erosion.

**Public Comment theme:** Mountain bikers have a deservedly bad reputation. They ignore signage on state land, cut illegal trails on private land, and disrupt hunting seasons.

**Response to comments:** ANR works closely with the Vermont Mountain Bike Association (VMBA) and local chapter volunteers to educate riders about the importance of observing signage and working with landowners to enhance riding opportunities. A cooperative agreement between VMBA and ANR specifies that all mountain bike trails on state land are closed for use from November 1 to Memorial Day weekend each year, unless unusually dry conditions allow the DST to open trails earlier in the spring. This closure spans popular hunting seasons and spring mud season. Winter fat bikes are allowed on VAST trails during the VAST operating season.

**Cross-Country and Backcountry Skiing**

**Public Comment Theme:** We strongly support many of the recreation proposals in the existing draft LRMP including the official designation of the Camel’s Hump Challenge Trail, the Catamount Trail Relocation, expansion of Nordic trails associated with the Camel’s Hump Nordic Ski Association, and glade management in backcountry zones.
Response to comments: These proposals remain in the updated plan.

Public Comment theme: Designating the Camel’s Hump Challenge cross-country ski trail may have unintended consequences on the Montclair Glen Shelter and privy, and potential for new and unmanaged ski glades.

Response to comments: Because of the length and nature of the Challenge Trail, the DST does not anticipate a high degree of use. However, the DST will monitor the use of the Montclair Glen Shelter and privy and work with partnering organizations to address any overuse issues should they emerge. ANR will also work with the Catamount Trail Association (CTA) and local ski groups to make sure that any illegal cutting of vegetation is addressed. Unauthorized cutting of vegetation on state land, including trimming vegetation and cutting, in whole or in part, any size vegetation, is prohibited by law1.

Public Comment theme: Consider additional backcountry ski management including in the vicinity of the old Callahan Trail in Duxbury as well as numerous other areas accessible to the Mad River Valley community. Craft a plan with flexibility that would allow cooperation on projects that have yet to be identified.

Response to comments: While managing backcountry skiing in the vicinity of the old Callahan Trail was discussed at public meetings in fall of 2017, this management action was mistakenly left out of the draft plan. The updated plan has been edited to include the potential to manage backcountry skiing in the vicinity of the old Callahan trail (see LMC 1.8F, 1.8G, 2.5J, and 3.0A).

The DST reviewed comments that advocated for managing backcountry ski zones throughout the CHMU. Many of these suggestions were in areas where this type of management would be prohibited by easement, or where encouraging higher visitation would be problematic due to lack of parking capacity, or they included areas that the DST specifically identified to be left not managed for recreation where other management objectives are prioritized. The updated LRMP includes the possibility of managing backcountry ski zones in two locations: in the vicinity of Bald Hill and near the old Callahan Trail.

1 Any person who cuts, trims, or damages any vegetation on State land without permission may be subject to civil and criminal violations and fines. This prohibition applies to unauthorized cutting associated with backcountry skiing. The so-called “Timber Trespass Law,” Chapter 77 of Title 13 of the Vermont Statutes Annotated, also applies, and defines “timber” as including “sprouts from which trees may grow, seedlings, saplings, bushes, or shrubs that have been planted or cultivated by a person who owns or controls the property where they are located.” Other criminal and civil statutory provisions may also apply to unauthorized cutting or trimming of vegetation on State lands, and the Agency has and will pursue such violations, on a case-by-case basis.
Skiers should be aware that skiing is allowed anywhere on state land unless otherwise explicitly prohibited. It is the cutting of vegetation that is not allowed. While the DST understands the desire to write a plan that remains flexible and open to additional backcountry skiing opportunities, the nature of ANR plans is that new uses must be approved in a LRMP to allow for appropriate public input and consideration of the impacts on other natural resources. Consideration of further opportunities would require an amendment to this plan and an appropriate degree of public involvement, which are indeed possible.

**Public Comment theme:** ANR should consider the concept of “post logging skiing glades” as a dual purpose forest management technique. This would provide the opportunity for backcountry skiers to be able to utilize recently logged areas for skiing.

**Public Comment theme:** We do not support the idea proposed by other groups of removing tops and down woody material (coarse and/or fine) from timber harvest areas in order to create better conditions for backcountry skiing. This material plays a variety of important ecological functions for wildlife, soil health, and carbon sequestration, and should not be removed without careful consideration.

**Response to comments:** Timber management and backcountry skiing have been and can be compatible uses. The LRMP has been edited to allow for the management and use of ephemeral backcountry skiing zones in recently completed harvest areas. Implementation will occur in close collaboration with a local partner. The appropriate areas will be near an already existing winter trail and within LMC 3.0. State of Vermont licensed foresters will consider impacts of removing coarse and fine woody material and prescribe this only on sites with appropriate soil conditions. Such management will be limited in scope and encompass only portions of recently harvested stands and will depend on and vary with many site and access conditions.

**Public Comment theme:** The road through the Stevens Block should be left unplowed for cross country skiers.

**Response to comments:** The road through Stevens Block is plowed during some winters to facilitate the habitat improvement work that is conducted in accordance with the goals for the Stevens Block Wildlife and Forestry Demonstration Area (LMC 2.4H). Cross country skiing is an allowed use; however, FPR will continue to allow plowing on this road by those involved in management. There are other skid roads and trails that emanate from the main road in the Stevens Block which could be used by cross-country skiers.

**Public Comment theme:** Backcountry skiing is popular because it is unmanaged. Let people find the naturally occurring lines. ANR should not spend time or money developing glades. There is little evidence of damage to forests from unauthorized cutting.
Response to comments: Vermonters have demonstrated that backcountry skiing terrain is in high demand. Backcountry skiing is considered a form of dispersed recreation and is allowed anywhere on the CHMU and anyone who would like to ski un-managed, naturally occurring lines will still be able to find areas in which to do that.

Unauthorized cutting of vegetation on state land, including trimming vegetation and cutting, in whole or in part, any size vegetation, is prohibited by law for many reasons, including that it can indeed be damaging.

Due to an increase in backcountry ski use on public land in recent years, ANR will be proactive in addressing unauthorized cutting and pursue education and collaboration with partner organizations to prevent unauthorized cutting and any resulting damage through managing backcountry ski use in appropriate areas on all ANR lands. The plan would authorize FPR to manage backcountry ski zones in the vicinity of Bald Hill and the old Callahan Trail.

Public Comment theme: Additional high elevation ski zones pose a risk to wildlife.

Response to comments: Pro-actively managing growing uses like backcountry skiing can help steer use away from those wildlife habitats that are most susceptible to impact, and managing use and concentrating it in certain areas can provide a level of predictability for wildlife.

Public Comment theme: The maintenance and creation of glades, the relocation of the Catamount Trail, and the official designation of the Camel’s Hump Challenge Trail is inconsistent with the enabling legislation that created the Ecological Area, the Camel’s Hump Natural Area, and the purpose of the Hub Vogelmann Research Area. These uses will lead to a degradation of the “wilderness feel” of this area, as well as the ecological function of the forest.

Response to comments: The LRMP authorizes ANR to consider options for management of backcountry skiing, designate the Camel’s Hump Challenge Cross-Country Ski Trail, and relocate the Catamount Trail into areas of the CHMU that are part of the Ecological Area, Natural Area, and Hub Vogelmann Research Area. There seem to be two main considerations for these activities: 1) whether the activity is allowed by statute that created the Natural Area and Ecological Area, or the Hub Vogelmann Research Area, and 2) whether the activity would have an unacceptable adverse impact on forest health and wildlife.

Recreation management is compatible with the purposes established for the Ecological Area and Research Area. Both statutes permit the establishment of compatible uses, including recreational uses, and recreation use is common in many state Natural Areas. Chapter 77 of Title 10 of the Vermont Statutes Annotated, which established the Camel’s Hump State Park and Forest Reserve and the Ecological Area, was amended in 1975 to add 10.V.S.A. § 2353(a) which specifically authorizes the Department of Forests, Parks and Recreation to establish other permitted uses within the three Use Districts through the adoption of a comprehensive management plan for Camel’s
Hump State Park. Many of the trails on Camel’s Hump pre-date the designation of the Ecological Area and the Natural Area, and the existence of these trails were specifically recognized in the legislative history of Chapter 77 of Title 10 and in the Natural Area Designation.

While the statute that defines the use districts (10 V.S.A. §2353) emphasizes the “wilderness aspect” of the Ecological Area, and Natural Areas (10 V.S.A. §2607) are defined as those areas which “have retained their wilderness character, although not necessarily completely natural and undisturbed,” both statutes permit the establishment of compatible uses, including recreational uses. Wilderness qualities in these designations are not to be equated with those of the U.S.D.A. Forest Service’s Wilderness Areas, nor shall USFS criteria be applied to Agency designations.

The draft plan released in October 2017 included a map of the Hub Vogelmann Research Area as part of the Land Management Classification Map. The Research area corresponds to LMC 2.6K and 1.9l. ANR further investigated the origins of the Research Area and determined that the actual research area is much smaller than that which had been mapped in the draft plan of October 2017. The LMC map (map 18) has been updated with the actual boundaries.

Correspondence between Hub Vogelmann and FPR personnel suggest that the Research Area was meant to be free of the influence of timber management. The original long-term vegetation monitoring plots were set up on either side of the already existing Burrows Trail, so the original intent of the Research Area inherently recognizes recreation as a compatible use, and in this case, one that pre-dates the establishment of the Research Area. Much of the backcountry ski use today is outside of the Research Area and uses the Burrows Trail for access.

While the use on the Burrows trail has increased, there is no commensurate impact on the vegetation monitoring plots from hiking. Backcountry skiing, which is not confined to the Burrows trail has a much greater potential to impact the vegetation monitoring plots and the integrity of the Research Area as a whole. Given the present level of un-managed use, there may already be impact.

Relocation of the Catamount Trail, re-routes associated with the Challenge Trail, and the details of implementation of backcountry ski zone management will require further DST review to minimize impact on wildlife habitat, water quality, and forest health, and ensure compliance with all relevant ANR policies and procedures.

**Public Comment theme:** Illegally cut ski glades have become a problem on state land. Enforcement actions are in order rather than cooperation with the offending parties.

**Response to comments:** Unauthorized cutting of vegetation on state land, including trimming vegetation and cutting, in whole or in part, any size vegetation, is prohibited by law. In those places where illegal cutting of trees and shrubs continues, ANR works with enforcement officials and local partners to address cutting. ANR is proactive in addressing unauthorized cutting and pursue education and collaboration with partner organizations to prevent unauthorized cutting and any resulting damage.
Vermonters have demonstrated that backcountry skiing terrain is in high demand. The most effective way for ANR to prevent damage associated with unauthorized cutting may be to identify and manage backcountry ski zones in appropriate locations and with a high level and quality of user cooperation and involvement. The plan would authorize FPR to manage backcountry ski zones in the vicinity of Bald Hill and the old Callahan Trail.

**Public Comment theme:** Maintenance of illegally cut ski glades and the creation of new glades should be contingent upon a commitment by partnering organizations to address, monitor and curtail illegal use in sensitive areas, particularly the Hub Vogelmann Research Natural Area. Furthermore, this is an opportunity for ANR to invest in glade restoration in highly impacted areas, as well as conduct research into the impacts of winter recreation on wildlife and forest dynamics.

**Response to comments:** The plan has been edited to reflect that ANR may act to manage backcountry ski use with or without a partner. Management actions may range in scope and include simple signage directing people to avoid a certain area, designating a “skin” trail for skiing to the top of the Bald Hill ridge, and even establishing and managing skiable lines through cutting of vegetation. For the DST to look favorably on a proposal to create new backcountry ski zones, ANR would need a strong cooperative agreement with a qualified partner to help monitor and curtail illegal cutting of vegetation in non-designated areas.

ANR recognizes the importance of researching the impacts of winter recreation on forest health and wildlife. ANR regularly partners with academic institutions on research and would willingly partner on a project within the Bald Hill area. At the same time, backcountry skiing may already be having an impact and ANR will be proactive in addressing the impacts.

**Public Comment theme:** Encourage recreational partners to develop proposals for new glades in areas where such use is ecologically appropriate and avoid areas designated as Natural Areas or Ecological Areas. Do not allow glade management in the Gleason Brook drainage and other parts of the Ecological Area.

**Response to comments:** The DST will work with groups to identify those places that are less sensitive and more appropriate for proactive backcountry ski management, with the understanding that the terrain is the driving factor in where people want to ski. Portions of the Natural Area and Research Area are popular skiing destinations because of their elevation, forest type, slope, and aspect, and this use is compatible with these designations provided there is no illegal cutting of vegetation. The plan does not propose the creation, maintenance, or expansion of backcountry ski zones in the Gleason Brook drainage.
**Hiking**

**Public Comment theme:** To alleviate pressure on the existing summit approach trails and parking areas, ANR should build a new and more sustainable trail to the summit from Honey Hollow.

**Response to comments:** There are four main approaches to the summit including short day hikes from the Burrows and Monroe trailheads, and longer approaches from the north and south on the Long Trail. A new trail to the summit of Camel’s Hump could potentially alleviate some overcrowding issues on other trails and at other parking areas, however it is likely to spawn a new set of challenges in terms of road and trail maintenance.

**Public Comment theme:** The proposal in the draft LRMP to re-open the Callahan Trail is sound in theory but will not lead to any reduction in the impact on the other summit trails, only add more trail mileage to maintain. Funding for trail maintenance is already limited and this project would further stretch budgets.

**Response to comments:** After further discussion and review of public comments, the DST has removed rebuilding and reopening the Callahan Trail for summer use from the plan. The plan has been edited to reflect this decision (see LMC 1.8F, 1.8G, 2.5J). Reopening this trail for hiking use would have been very costly while the existing trails to the summit are already in great need of maintenance. Furthermore, trail use, and trail impact do not have a linear relationship and cutting down traffic on the Monroe trail would not likely have a commensurate decrease in impact or maintenance cost.

The plan has been edited to allow management of backcountry ski use on the Callahan Trail (see LMC 1.8F, 1.8G, 2.5J, 3.0A). This area is already popular. At present, users ski up the Monroe trail and descend through the woods near the old Callahan Trail. The plan would allow FPR to manage this growing use to enhance recreational opportunities and to minimize impact to forest health and wildlife from un-regulated cutting of vegetation, without the same costs associated with maintaining a year-round hiking trail.

**Snowmobiling**

**Public Comment theme:** The existing VAST trail system is an important resource. ANR should maintain and possibly expand snowmobile trails in the CHMU.

**Response to comments:** The VAST trails in the CHMU are an important resource. There is no proposal in the plan to change the extent of the VAST trail system.
Multi-Use Recreation Resources

**Public Comment theme:** ANR should consider accommodating new huts proposed by the Vermont Huts Association in Honey Hollow, the Lions Ridge Area, Phen Basin, and adapting use of the Caretaker Cabin at the Monroe Trailhead.

**Response to comments:** The plan has been edited to allow consideration of a hut in the Honey Hollow Area (LMC 3.0A) or the Lion’s Ridge Area (LMC 2.5J) but not both. The plan has also been edited to allow consideration of a hut in LMC 3.0A in association with the potential Velomont Trail. The presence of a new hut or new trail would not alter other plans for these areas, including timber harvesting. ANR was not supportive of a hut in Phen Basin or adopting the Caretaker Cabin for use by the Vermont Huts Association.

Motorized Access

**Public Comment theme:** ANR should restrict motorized recreation on the property.

**Public Comment theme:** ANR should allow regulated ATV access in the forest.

**Public Comment theme:** Although at this time, ATV use is prohibited on state land, there may be a time in which connector trails may be allowed. We encourage language that will consider a request for a connector ATV trail at such time as it becomes legal.

**Response to comments:** The plan does not propose any changes to motorized access on the CHMU. At present, ATVs are by rule not allowed on any ANR lands unless they are being used for management or emergency response purposes or by visitors with a mobility disability who have obtained the necessary permissions. If in the future ATVs are allowed on state land through changes in rule, they will be accommodated in the CHMU in the context of a statewide policy governing their use on ANR lands. No language was added to the plan that would complicate implementation of such a policy.

Recreation, Large Forest Blocks and Maintaining Areas Free of Trail Networks

**Public Comment theme:** Construction of new trails on the CHMU should be limited to strategic connections between existing trail networks, with a priority given to connections between trail networks that are already protected. Additional trail systems are not necessary on, around, or near the summit of Camel’s Hump.

**Response to comments:** The plan would allow for the construction of new trails, most of which in the vicinity of other trail networks (adjacent to the Camel’s Hump Nordic ski area, for instance), or provide strategic connections between existing trail networks (Velomont Trail, for instance). These strategic connections are very important for user groups to ensure permanent access to trails, as placing these connections on private land leaves them subject to closure with property transfer. The
plan would authorize the use of the Camel’s Hump Challenge Trail and the potential for backcountry ski management near Bald Hill, but these are the only proposals for trail or recreation development around or near the summit, and these are still well below the alpine area.

**Public Comment theme:** Any large proposals for trail construction that have the potential to result in adverse impacts to wildlife, water quality, or sensitive ecological features should go through proper environmental review, and should involve some kind of plan amendment and opportunity for public input.

**Response to comments:** The specific recreation proposals in the plan were reviewed by the DST and impacts to forest health, wildlife habitat, water resources, and more were considered when evaluating suitability of the proposal. Furthermore, each proposal in the plan will receive additional review from the DST in the process of identifying the actual trail corridor, including a robust field review and consideration of site conditions and features.

Permanent creation of new recreation corridors not identified in the current plan would require ANR approval and an amendment to the plan prior to implementation, a process which involves public comment.

**Public Comment Theme:** There seem to be no checks and balances on recreational development schemes on the large forest blocks. Recreational Trails Program grant funding has been spread around the state to construct recreational infrastructure in large forest blocks with only internal review.

**Response to comments:** Proposals for recreational development on state land are evaluated by the managing DST. This group considers a wide variety of factors prior to implementing or denying a specific request.

FPR administers the Federal Highway Administration’s Recreation Trail (grant) Program which is an important funding source for trail management on the CHMU and other ANR properties as well as private land. Disbursement of these funds and associated review is beyond the scope of this plan.

**Public Comment theme:** Finding suitable hunting spots is more difficult as time goes on. Trails seem to be plenty and growing. Trail networks should be closed during the months of October, November, December, and May for the small game, big-game and turkey hunting seasons. Trail closure would minimize conflicts between traditional users and other user groups, allow wildlife time to re-occupy these areas, and improve the overall hunting experience.

**Response to comments:** The entire CHMU is open to hunting, in accordance with state laws. It is true that the CHMU is home to very popular trails, however there are still large portions of the property that are not adjacent to popular hiking or biking trails. FPR collaborates with recreation
groups to raise awareness about hunting seasons and encourages other recreationists to wear high-
visibility orange. During deer Regular Season FPR and recreation partners encourage visitors to seek outdoor opportunities that don’t conflict with popular hunting areas. Mountain bike trails are officially closed from November 1 through Memorial Day, which span which spans several popular hunting seasons. Hiking trails are not officially “closed” except during spring mud season.

**Public Comment theme:** Large blocks of forest with minimal or no trail networks are extremely important for wildlife and for those looking to explore the woods by foot, without trails. Areas like this are growing less common. ANR should adopt a 5th land-use classification that designates significant areas on the CHMU and all other appropriate public lands for dispersed, non-motorized, non-mechanized recreation with minimal or no trail networks, representing habitats and elevations throughout the CHMU and other ANR lands.

**Response to comments:** We agree with the importance of areas available for dispersed backcountry enjoyment. Balancing the requests of recreation groups with the importance of maintaining portions of the property that are not impacted by trails is one of the greatest challenges in the CHMU and many other ANR properties. The default recreation management strategy for land in the CHMU is to manage for dispersed backcountry recreation. ANR requires any deviation from this management strategy to occur through existing designated trail corridors, or proposals for new uses and trail corridors. Permanent creation of new recreation corridors or changes in use of existing corridors not identified in the current plan would require ANR approval and an amendment to the plan prior to implementation. Furthermore, the plan identifies certain areas where the DST feels that future trail development should be prohibited, for instance LMC 1.8H.

### Increasing Recreational Demand, Parking, and Access

**Public Comment theme:** Camel’s Hump is an enormously popular hiking destination. The plan minimizes the impact that hikers are having on the summit trails. ANR needs to evaluate the carrying capacity of Camel’s Hump and its summit trails with regard to the impact that visitors are having on the mountain itself and on the visitor experience.

**Response to comments:** The trails do experience an enormous amount of use and the impact on the tread is apparent. These trails are maintained by volunteers, summit caretakers, and by paid trail crews. FPR is considering ways to improve and harden the existing tread, potentially re-route unsustainable portions of the trail to more appropriate grades, and better manage visitor use.

**Public Comment theme:** The hiking trails are severely degraded and overcrowded, yet the plan suggests that in the future, ANR might expand the parking areas. Instead, ANR should explore options to limit
visitation through implementation of a permit system, charging a fee, hiring a trail-head attendant, or enforcing parking restrictions.

**Response to comments:** Parking is very limited at both the Burrows Trailhead in Huntington and the Monroe Trailhead in Duxbury. ANR is aware of the issue and is dedicated to finding a solution. The goal of expanding parking areas would be to better accommodate the existing level of use. ANR is actively exploring the expansion of existing parking capacity. There are no immediate plans to hire a park attendant, limit use through a permit system, close trails, or impose fees, but these options may be utilized in the future. Any significant change to the management structure of existing parking areas would be presented to the public prior to implementation.

**Public Comment theme:** The speed limit signs on Camel’s Hump Road in Huntington are not effective. The speed limit should be lowered to 20 mph. The “No Parking” signs are ignored, and regulations are not enforced.

**Response to comments:** ANR has no legal authority to establish or enforce speed limits or parking restrictions on town roads, nor can ANR change the posted speed limit on a town road. ANR has installed signs over the years encouraging hikers to drive slowly and be respectful of neighbors.

**Public Comment theme:** Please consider methods to control dogs. There are too many off-leash dogs, and too much dog waste.

**Response to comments:** Signs are posted at trailheads and trails discussing expected dog etiquette. Dogs should be under voice control at all times, stay on the trail, and be leashed when in proximity to large groups, and when in the alpine zone or other sensitive areas. Green Mountain Club (GMC) Summit Caretakers are also proactive about asking visitors to leash their dogs. Opportunities to enhance education and outreach will continue.

**Public Comment theme:** ANR should increase road improvement and maintenance budgets for state owned forested properties. Road closures due to lack of maintenance threaten recreational access.

**Response to comments:** Additional funding would help ANR maintain and improve roads and trails and staff has been exploring funding opportunities. FPR’s forest and park road appropriation has been level funded for over a decade. ANR maintains public access to roads and trails to the best of our ability with current resources and creativity.
The Recreation Assessment

Public Comment theme: Appendix G (Recreation Use Data) should be removed as it is inaccurate and incomplete. Instead, the plan should include a thorough analysis of the value of recreation on the CHMU and its importance to state coffers.

Response to comments: Appendix G does not purport to represent the absolute number of hikers, and only captures the number of hikers that have signed in at trailhead registers. It does reflect an accurate trend-line showing an increase in use at the most popular trailheads and a valuable reference for planning.

The DST has not conducted a thorough analysis of the value of recreation on the CHMU, however the economic impact of recreation use on the CHMU is of great importance to surrounding communities. Several economic impact analyses related to recreation have been conducted in Vermont in recent years.

Public Comment theme: The Recreation Opportunity Spectrum map categorizes the summit of Camel’s Hump as “semi-primitive, non-motorized.” One criterion of this category is that “interactions between users are low.” On many days, this is not an accurate description of the summit and its approach trails.

Response to comments: The USDA Forest Service Recreation Opportunity Spectrum (ROS) is a framework that uses three main components to delineate ROS class: physical setting, social setting, and managerial setting. The user density falls under the social setting component and is one of seven mapping criteria, the others are: remoteness, size, evidence of humans, managerial regimentation, and managerial noticeability. When combined, these criteria and components are intended to capture the characterization of an area. The summit and the approaching trails meet nearly all criteria for the semi-primitive non-motorized ROS Class, however, the social setting criteria for this ROS category is defined as “low to moderate contact frequency.” Guidance in the Forest Service ROS guide explains that contact frequency can vary with location, day, season and conditions and that users can expect a higher number of parties at designated concentration points (e.g. a summit, trails leading to that summit). When taken as a whole, the summit and its approach trails are more representative of the semi-primitive non-motorized ROS class than any of the other categories.

Timber Management

Extent of Timber Management

Public Comment theme: The draft plan does not include enough active woodland/timber management. More lands within the CHMU should be managed for timber, and more acreage should be scheduled in the upcoming management cycle. This management is important for wildlife habitat and the rural economy.
Response to comments: The total area of the CHMU that is suitable for timber harvesting has been updated in the new plan and consists of approximately 7,483 acres. This represents the area in which timber harvesting is not restricted through deed, easement, or legislation, or limited by terrain or access. A third party owns the timber rights on approximately 1,467 acres and approximately 122 acres are not forested. The remaining area of approximately 16,837 acres will not be harvested. ANR considers many objectives when making management decisions. Map 11 depicts those areas that are and are not available for potential timber management.

The areas proposed for harvest in the next 15 years (3,749 acres) were identified based on their current condition using existing forest inventory data and a reasonable expectation for how much could be accomplished on an annual basis, given professional staff capacity.

Public Comment Theme: The area to be logged is too large and lacks provisions for sustainability. There are no plans for restoration, reforestation, or preservation of habitat. With the plan purporting that 8,500 acres are suitable for logging, ANR intends to harvest 44% in the next 15 years, approximately 3% per year. Northeastern forests grow at about 1% per year. The harvest schedule is unsustainable and should be scaled back.

Response to Comments: The plan has been edited to reflect that the area suitable for timber harvests is approximately 7,483 acres. The plan proposes to conduct harvests on approximately 3,749 acres in the next 15 years (50% of the total operable area). The area scheduled to be harvested is based on science and silvicultural guides and is consistent with the approach that many landowners use in managing forests in New England. Northern hardwood stands are typically managed on a 20-30 year cycle which puts ANR on track to manage most of the operable area in the next 30 years. This does not mean every tree will be harvested. Most of this area will be harvested using uneven-aged techniques. This means that individual trees, small groups of trees, and occasionally, larger patches will be removed with intention of regenerating new trees and improving growth and vigor on retained trees. Most of the area will be managed with single tree and group selections harvests and less than 1/3 of the timber volume is typically removed in a single entry. Only 2-5% of the managed area will be harvested in patches of 2-10 acres in size, which will comprise only portions of stands.

Even-aged methods including intermediate thinnings and shelterwood practices may also be appropriate.

Unlike in many other regions, silviculture in the northeast rarely requires “reforestation” by planting. The goal of the harvest is to take advantage of natural regeneration and allow trees to grow back naturally. Harvesting alters the availability of light to the forest floor, thereby stimulating a response from tree seedlings and seeds that are already present. Replanting trees is a method more typical of industrial forestry in other regions of the country.

All areas that are scheduled for timber harvests have been harvested before, sometimes repeatedly. Historically, some stands have been harvested in ways that reduce the structural complexity of the
forest and limit its ecological function and utility as habitat for certain wildlife species. In many ways, scheduled harvests are a method of restoration meant to diversify forest structure and increase the forest’s complexity and resilience to disturbances.

**Silvicultural Methods**

**Public Comment theme:** ANR should only practice single tree selection. Do not create gaps that are greater than one tree length in diameter.

**Public Comment theme:** ANR should not practice single tree and group selection. These silvicultural methods do not create enough light to regenerate pioneer and intermediate species and favor only climax and shade tolerant species.

**Response to comments:** The size of canopy gaps created during timber harvests is an important factor in determining the response of existing vegetation and regeneration or the likelihood of recruiting new tree regeneration or a growth response in retained trees. The plan does not propose any restrictions on the size of gaps in uneven-aged silviculture regimes. These decisions are best made after field visits. Foresters are always concerned with recruiting adequate tree regeneration, and in turn they vary the size of openings based on soil type, aspect, slope, herbivore density, height of surrounding trees, and presence and composition of existing vegetation. In some places, a canopy gap that is only one tree length in diameter would not be adequate to recruit desired regeneration. In other places, it might be just right.

**Public Comment theme:** ANR should increase its goal for early successional (young forest) habitat to 5%-20%. These young forests are more valuable for wildlife than older forests. Minimum size threshold for early successional habitat should be changed from 2 acres to 5 acres.

**Response to comments:** Early successional habitat is an important habitat feature in Vermont and one that is under-represented in the Northern Green Mountain Biophysical Region. Fifty-four *Species of Greatest Conservation Need* are supported by young forest. The plan has been edited to target a goal of 2-5% young forest habitat on the actively managed forest lands of the CHMU, raising the goal from 1-2% in the draft released in October 2017. [Vermont Conservation Design](https://www.fw.state.vt.us/), a scientific effort led by F&W and FPR, with guidance from partner organizations, identified 5% young forest as a goal for the Northern Green Mountain Biophysical Region. It may not be possible to reach this goal on the CHMU, but 2-5% is within the realm of natural variation for the region.

**Public Comment theme:** It is not necessary for ANR to create young forest habitat. Even-aged forest stands will naturally diversify on their own. The plan should focus more on growing stands into older age classes through passive means and uneven aged management.
Response to comments: The plan would employ both uneven-aged and even-aged silvicultural treatments. While the plan identifies an early successional habitat goal of 2-5% of actively managed timberland, most management will utilize uneven-aged techniques. These most closely approximate the natural disturbance regimes that dominate northern forest types and are more adept at creating structural complexity in the forest for the benefit of wildlife and in pursuit of resilience to future forest health threats.

Public Comment theme: There are a variety of silvicultural treatments that create young forest conditions for breeding birds. The plan should recognize that any treatment that reduces canopy cover to less than 30% effectively creates young forest conditions. If the plan only recognizes patch cuts and clearcuts as methods for creating these conditions, other silvicultural treatments like shelterwood harvests may push the landscape percentage higher than necessary.

Response to comments: Certain shelterwood practices may create areas of low canopy cover and dense regeneration, but these conditions are typically short-lived compared to the young forest created through patch cuts. The presence of residual mature trees also affects which wildlife species use these areas. The plan recognizes patch cuts as methods for young forest creation but identifies a target range of young forest abundance (2-5%) in the CHMU, allowing foresters and biologists flexibility to consider the larger landscape context and surrounding forest conditions when planning patch cuts.

Public Comment theme: ANR should utilize whole tree chipping to hasten the transition from over-mature pioneer regeneration to a more normal mixed species stand.

Response to comments: Whole-tree harvesting will be considered on portions of certain timber harvests. Decisions to use whole-tree harvesting will be made on a stand-by-stand basis during the process of writing the silvicultural prescription, and relate to soil type and quality, merchantability, silvicultural goals, terrain, and other factors.

Public Comment theme: The plan includes forward-thinking language about sustainable forest management, but the key to sustainability is the practices themselves: the stand-level prescriptions, road layout, performance requirements of operators, and the monitoring of results. Past treatments, for example in the Cobb Brook area, were simply business-as-usual logging: stand-wide "diameter cuts" of all mature or maturing timber, significant residual stand damage, and the harvest of trees inside a perennial stream course (contrary to the spirit and intent of VT AMPs).

Response to comments: Silvicultural prescriptions are created by State of Vermont licensed foresters and reviewed by the DST, including wildlife biologists and the state land ecologist. Harvests are inspected on a regular basis by FPR foresters and corrective action is taken if
foresters observe excessive residual damage, the removal of unmarked trees, or a failure to implement appropriate AMPs on roads, landings, and skid trails.

The most recent harvest in the Cobb Brook area was completed in 2013. The existing stand was two-aged and the harvest objective was to transition the stand towards uneven-aged conditions using single tree and group selection. Trees were marked for removal in all diameter classes.

Carbon Sequestration

Public Comment theme: Vermont should halt all commercial logging on state land to maximize carbon sequestration in the forest. Unmanaged woodlands sequester more carbon than managed woodlands.

Response to comments: ANR considers many objectives when making management decisions and manages forests for a variety of benefits, including wildlife habitat, sustainable production of forest products, species diversity, resilience to disturbance, carbon sequestration and storage, and more. ANR will continue to manage for timber production on approximately 7,483 acres of the CHMU. A third party owns the timber rights on approximately 1,467 acres and approximately 122 acres are not forested. The remaining area of approximately 16,837 acres will not be harvested.

Public Comment theme: Silvicultural decisions should consider the role of forest management on carbon sequestration.

Response to comments: Silvicultural decisions do and will consider the role of forest management on forest carbon stocks, in addition to a variety of other considerations, including wildlife habitat, species diversity, resilience to disturbance, and more. Silvicultural decisions often have co-benefits, for instance, the total amount of carbon storage can be increased by managing on longer rotations, growing trees to a larger size, and enhancing structural complexity within a forest stand. These actions can also improve habitat for certain interior bird species. Silvicultural decisions are based on meeting multiple objectives, including forest carbon dynamics.

Public Comment theme: ANR should market CHSP’s forests to green investors, local companies and national companies interested in carbon offset investments.

Response to comments: In 2019, the Vermont General Assembly passed Act 83 that established the Vermont Forest Carbon Sequestration Working Group to study how to create a statewide program to facilitate the enrollment of Vermont forestlands in carbon sequestration markets. The Working Group was charged with evaluating several aspects of forest carbon sequestration, including the feasibility of enrolling state-owned land in carbon offset markets. The report
includes a recommendation that ANR analyze the feasibility of developing a forest carbon offset project for at least one parcel of state land; this work is currently in progress.

Economics

Public Comment theme: Timber sales on state land are conducted at below market rates, which amounts to a handout from state lands to loggers. The revenue does not cover the cost of the employees who plan the timber sales or the infrastructure necessary to access the timber sales. The plan fails to make a business case for logging and does not reflect best practices in accounting for social and economic values.

Response to comments: ANR does not conduct timber harvests at below market rates. Timber sales are marked by FPR’s State of Vermont licensed foresters, based on a detailed prescription written in consultation with ANR biologists and an ecologist. The rights to cut and harvest only the wood that has been marked is then purchased by a third-party through a comprehensive legal contract. The sale of the timber is conducted through a competitive bidding process following procedures and closed-envelope bidding. In most cases, the timber is sold to the highest qualified, eligible bidder.

An analysis of revenue and timesheet coding shows that between 2002 and 2015, FPR netted $925,548 from timber sales within Camel’s Hump State Park and Camel’s Hump State Forest. This amounts to $868 net revenue per acre that is harvested.

The plan does include a proposal to spend significant funds on road and bridge infrastructure in the next 15 years. These improvements enhance access for forest management and public recreation for skiers, hikers, equestrians, snowmobilers, hunters, bird watchers, and many more.

Forest management decisions are not made based on revenue expectations. Sustainable forest management helps create important wildlife habitat, enhances the resilience of forest ecosystems, and supports local jobs in the wood harvesting and manufacturing sectors, while remaining compatible with other management goals.

Public Comment theme: Where do timber sale receipts go?

Response to comments: Timber sale receipts are used for different purposes depending on whether the harvest occurs on State Park, State Forest, or Wildlife Management Area (WMA) land.

Receipts from harvests on Camel’s Hump State Park (2786 acres or 74% of the total prescribed area) contribute to the Forest Parks Revolving Fund, more typically referred to as the State Parks Special Fund. These funds are used for the planning, design, development, operation, and
maintenance of Vermont’s State Parks. Further details about the purpose and establishment of the *Forest Parks Revolving Fund* can be found in the enabling legislation (**10 V.S.A. § 2609**).

Receipts from harvests on Camel’s Hump State Forest (447 acres or 12% of the total prescribed area) contribute to the *Lands and Facilities Trust Fund*. Expenditures from this fund are meant to support management activities on all ANR lands including the maintenance of roads, trails, facilities, forest, and habitat improvement, and more. In recent years, this fund has been used to support management of invasive plants at Alburgh Dunes State Park and Round Pond State Park, restoration of historic barns in Camel’s Hump State Park, riparian buffer planting at Lake Carmi State Park, roadside mowing in Mt. Mansfield State Forest, and many other valuable projects. Further details about the purpose and establishment of the *Lands and Facilities Trust Fund* can be found in the enabling legislation (**3 V.S.A. § 2807**).

Receipts from harvests on Huntington Gap WMA and Robbins Mountain WMA (516 acres or 14% of the total prescribed area) contribute to the *Fish and Wildlife Conservation Fund*. Timber sale receipts are specifically tracked so that all income is spent on management and improvements to WMAs. Because these funds are not considered “federal funds” F&W is able to use them as 25% match to federal Pittman-Robertson federal funds. For every dollar received from timber harvests on WMAs, F&W can achieve $4 worth of Pittman-Robertson funds to improve WMAs. Examples of how timber sale revenues are invested include invasive plant control to improve or restore wildlife habitat, restoration of wetlands, improvements to parking facilities, kiosks or boardwalks, or inventories for rare natural communities to ensure those areas are protected in long range management plans.

**Public Comment theme:** Timber is being sold to out of state loggers and processed at out of state facilities. The profits leave the state while the impacts remain in the local community.

**Response to comments:** ANR sells marked or designated timber on a competitive bid basis to a purchaser who pays for the standing timber in advance. By contract, ownership of the timber is transferred to the purchaser when the timber is cut. ANR cannot legally dictate where the wood is processed. This is at the sole discretion of the timber purchaser.

Many forest product markets are regional in nature due to economies of scale. For example, no pulp mills (used in the manufacture of paper) exist in Vermont or New Hampshire, so those products must travel to markets in Maine or New York to be processed. Likewise, the closest markets to Vermont for spruce and fir logs, destined for use as framing lumber, are found in Quebec, New Hampshire, and Maine. However, much of the hardwood sawtimber harvested in Vermont is processed in the state. Roughly 60% of all the hardwood sawtimber harvested in Vermont is processed in Vermont. Many of the timber sales on the CHMU are purchased by companies that supply Vermont sawmills or by mills themselves that process the wood in-state.
There is also a robust local market for firewood, nearly all of which is processed and consumed locally. Vermonters use an estimated 410,000 cords of wood annually to heat their homes—over 80,000 of that is estimated to be used in Chittenden and Washington Counties alone².

**Public Comment theme:** Logging will put increased pressure on local roads which receive no maintenance funding from the state.

**Response to comments:** Management actions, as well as recreational visitors to the CHMU can increase pressure on local roads in much the same way that management actions on private land can. ANR does not give towns funding specifically for the maintenance of state roads. ANR does make Payments In Lieu of Taxes (PILOT) which towns determine how to best use.

### Ecological Concerns

**Public Comment theme:** Timber harvesting will have a negative impact on wildlife. ANR should consult wildlife experts to determine the detrimental impacts of timber harvesting activities on wildlife habitat, wildlife corridors, and forest fragmentation.

**Response to comments:** Wildlife biologists are indeed an integral part of the DST and are involved with every decision made on the CHMU. They play a prominent role in writing and reviewing silvicultural prescriptions to ensure that forest management activities have the desired impact on wildlife habitat.

Forest management including harvesting is not a form of forest fragmentation because it does not convert forest to another land use, like agriculture or residential areas. Managed forests remain forests. The main contributor to forest fragmentation in Vermont and in the periphery of CHMU is the result of subdivision and development areas.

**Public Comment theme:** The draft plan does not provide adequate protection for old growth forests slated for logging. ANR only advocates for “young forests” and ignores the habitat benefits of old growth forests.

**Response to comments:** There are no “old-growth” forests scheduled for timber management in this plan. All areas that are scheduled for timber management have been harvested before, sometimes repeatedly. The plan identifies approximately 7,483 acres of the CHMU as available for commercial timber harvesting, with approximately 3,749 acres scheduled for management in the next 15 years. The timber rights on an additional 1,467 acres are owned by the Eaton family and managed by the A. Johnson Company. An additional 122 acres are non-forested. The remaining 16,837 acres (65% of the total area of the CHMU) will be able to develop naturally.

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into older forests. ANR advocates strongly for the importance of old forests. Vermont Conservation Design sets a target of allowing 10% of Vermont’s forest to develop and maintain old forest structure and function. On the CHMU 65% of the total area will be allowed to develop into older forests, which significantly advances the VCD goal.

Public Comment theme: The existing draft plan has a very strong bias toward control and forest management. Consider placing much more emphasis on forest ecosystem conservation and enhancing the forest's capacity for self-renewal. Logging will diminish one of Vermont’s most important wilderness areas.

Response to comments: Forest ecosystem conservation and forest management are not mutually exclusive. Still, 65% of the total acreage of the CHMU is unavailable for the purpose of timber harvesting. It is true that timber harvesting can temporarily change the feel of an area and remind visitors that they are in a landscape that has been shaped by humans for hundreds of years. While Camel’s Hump is not a federally designated Wilderness Area, there remain large portions of the CHMU where one can find solitude and little obvious physical evidence of humans.

Public Comment theme: While some of the parcels to be logged have been heavily cut in the past, other parcels are hemlock-northern hardwood stands of statewide significance.

Response to comments: Hemlock-northern hardwood natural communities are a “matrix” community that is distributed broadly across the landscape and occurs at large scales. There are hemlock-northern hardwood stands of statewide significance that are scheduled to be managed. 93% of the entire CHMU comprises “state-significant” natural communities, a fact that is largely driven by the sheer size of the forest block. Timber harvesting is compatible with maintaining or even improving the quality rank of significant matrix-type natural communities, when it is done in a way that emulates patterns and impacts of natural disturbance. Therefore, State of Vermont licensed foresters, biologists, and ecologists review silvicultural prescriptions and harvest plans prior to implementation.

Public Comment theme: Much of the park is on ledge, with thin, acidic soils prone to erosion; constant harvesting on poorly designed logging roads only increases erosion, soil compaction and loss of critical mycorrhizal fungi, leading to poorer timber production in the future, and more flooding events.

Response to comments: Much of the CHMU does have thin, acidic, and shallow soils. Soil condition was included in the analysis to determine the extent of the area that could be managed. Additionally, the DST considers soil characteristics when developing silvicultural prescriptions and harvest plans. FPR’s State of Vermont licensed foresters implement the appropriate practices to mitigate erosion and soil compaction, including limiting the season of
operation and equipment type, when necessary. Most forest management is conducted in the winter to allow travel over snow and minimize soil disturbance.

While changes in vegetation within a watershed could lead to short-term changes in yield and streamflow, the size of the harvests in the CHMU in comparison to the watersheds is small. Proper implementation of The Acceptable Management Practices (AMPs) for Maintaining Water Quality on Logging Jobs in Vermont and the Agency of Natural Resources Riparian Management Guidelines will protect the soil and tributaries from adverse impacts related to harvesting.

**Public Comment Theme:** Logging will lead to the introduction of invasive plants and pests including emerald ash borer, hemlock woolly adelgid and the crazy snake worm. All logging should be halted upon the discovery of emerald ash borer or hemlock woolly adelgid.

**Response to comments:** Timber harvesting can lead to the introduction of non-native invasive plants. ANR requires all logging and earth-moving equipment is cleaned of visible soil and plant material prior to entry onto the CHMU. Additionally, forest access roads and landings are the starting point for our annual efforts to “monitor for early detection and removal of invasive plant species” (section IV.B).

It is unlikely that timber harvesting would lead to the introduction of emerald ash borer (EAB), as these pests travel in untreated ash logs and there is no reason that logs would be brought onto the CHMU. Timber sale operators on state land are required to enact practices meant to “Slow the Spread” of EAB.

At present, there is no evidence that crazy snake worms are introduced through timber harvesting or road-building activities, however it is not impossible. ANR land managers are attuned to the signs of crazy snake worm presence and annually monitor for their presence.

**Public Comment theme:** Past logging operations have failed to build proper stream crossings and left behind lots of garbage. Some have even led to water quality violations, most recently in 2013-2014.

**Response to comments:** There is a long history of timber harvesting on the CHMU by ANR and previous landowners. Undoubtedly there have been operations that did not implement the appropriate water quality protection measures. The standards are a lot stricter now than they were decades ago when violations occurred. FPR staff regularly visit and oversee active timber sales to ensure compliance with Acceptable Management Practices for Maintaining Water Quality on Logging Jobs and other best practices to protect water quality. No water quality violation on the CHMU was reported to FPR staff or DEC Enforcement officials related to harvesting on the CHMU.
Compatibility with Park Goals, Existing Deed Restrictions, and Historic Trends

Public Comment theme: The new plan entails a drastic increase in the amount of timber harvesting over the past 30 years. Is this the result of a new timber management philosophy on state land? Is this new approach sustainable?

Response to comments: The proposed harvesting is not the result of a new timber management philosophy. Harvest areas were identified based on forest inventory data and local knowledge of the land base. The previous plan for Camel’s Hump State Park was more ambitious than this plan in proposing areas for harvesting. Many of those areas were found to be inoperable or non-commercial, and others appear as holdovers in this plan.

Sustainable management allows forests to “maintain their health, productivity, diversity, and overall integrity in the long-run, in the context of human activity and use” (Vermont Forest Action Plan, 2017). The timber management approach will ensure the continued health, productivity, and diversity of the forests of the CHMU.

Public Comment Theme: The increase in logging is a radical departure from the past 30 years and is not consistent with the overall objectives of the park. The plan represents a downgrade in the protected status of Camel’s Hump and sets a dangerous precedent.

Response to comments: The timber harvesting schedule is consistent with the overall objectives of the park, including 10 V.S.A. §2353 that defines the uses of each “district.” While the timber harvesting schedule represents an increase from that which was harvested in the last 30 years, it is less than that which was approved for harvest in the last iteration of the plan. The 1991 plan proposed harvesting on a total of 4,740 acres out of what was then a smaller unit- 19,636 acres. Many of the proposed harvests in the current plan were originally proposed in the 1991 plan and not implemented because the harvest areas were not yet ready for harvest or due to lack of staffing capacity.

Public Comment Theme: Joseph Battell, who gifted the summit of Camel's Hump and the surrounding forests to the State of Vermont in 1910, requested that the lands be "preserved in a primeval state."

Response to comments: Battell’s Gift consists of approximately 1,147 acres. The deed states: “Trees growing on the land herein conveyed are not to be cut except those which it is necessary to remove in building paths or roads, and the whole forest is to be preserved in a primeval state by planting or natural growth.” There are no timber harvests planned for this land, nor will there ever be. The conditions of Battell’s gift do not extend beyond the parcels which he gave to the state.
Public Comment Theme: The draft plan treats Camel’s Hump like a commodity. Timber harvesting has nothing to do with “helping” the forest. It is greedy, aggressive, and serves the interests of a few over those of the many. Logging should not be allowed.

Response to comments: ANR will continue to manage forests within the CHMU for multiple uses in accordance with legislation that establishes the purpose of the park (10 V.S.A § 2353), as well as the mission of the Department of Forests, Parks & Recreation. Sustainable forest management creates important wildlife habitat, enhances the resilience of forest ecosystems, helps create and maintain recreational access, and supports local jobs while remaining compatible with other management goals.

Human Health and Safety Concerns

Public Comment Theme: Cutting trees will increase the prevalence of Lyme Disease.

Response to comments: Lyme disease and tick populations have expanded in recent years. The causes of this include a changing climate, growing deer populations, loss of farmland, and changing land use patterns. It is possible that timber harvesting that leads to thick understory vegetation could lead to increased tick prevalence, but this impact would be difficult to disentangle from the other causes of increased tick populations. All visitors to the CHMU are encouraged to take precautions to reduce their exposure to ticks.

Public Comment Theme: Timber management at the end of Mountainview Road in Duxbury is unsafe and inappropriate. This area is designated as a suburb by the federal government. Its roads are too steep and crowded to safely accommodate the proposed amount of logging and truck traffic.

Response to comments: The US Census Bureau designates Urban Areas, Urban Clusters, and Rural Areas. The town of Duxbury is defined as “rural” by the US Census Bureau. The town of Duxbury Zoning Map places Mountainview Road within the “Forest Recreation” and “Timber Management and Wildlife” Districts.

While Mountainview Road is steep and narrow, it can be safely navigated by appropriately sized log trucks. FPR regularly imposes restrictions in timber sale contracts that limit the hours of trucking to reduce conflicts with school bus traffic.

Unintended Impacts

Public Comment theme: Timber harvesting will have negative impacts on recreation by closing trails and causing understory plant growth in areas that are popular for skiing.

Response to comments: Recreation and forest management are compatible uses and have been so on the CHMU for decades. Trails and roads are not closed during harvesting operations.
However, signs are posted warning visitors that an operation is occurring, and users are asked to exercise caution when traversing harvest areas. Logging contractors are notified that roads and trails are frequented by visitors. There are no timber sales scheduled in the vicinity of the Long Trail or side trails to the Long Trail. There are several places where snowmobile trails and cross-country ski trails will be utilized for transporting wood, which means the trail or road will be plowed. The DST works with skiers and snowmobilers to find alternate routes, or users continue to travel the road with caution. FPR will also apply weekend restrictions on trucking on popular trails. For instance, the most recent harvest completed in the CHMU had a condition that prohibited trucking wood on weekends to allow skiers to use the road.

Open woodlands that are free of undergrowth may be aesthetically pleasing and easier for skiers to maintain. However, this forest condition is less desirable ecologically. The very purpose of certain kinds of timber management is to regenerate a dense understory of seedlings and saplings that will develop into mature trees, thus diversifying forest structure and enhancing wildlife habitat, especially for forest songbird breeding.

**Public Comment Theme:** Timber harvesting will have a negative impact on the view from Camel’s Hump Summit, and from nearby homes and roads.

**Response to comments:** The plan allows the creation of forest openings up to 15 acres. In the last 28 years, the largest opening created on the CHMU was approximately 6 acres and to most an opening of that size would be difficult to locate on an aerial map. Most of the timber harvesting will utilize single tree and group selection and these areas are unlikely to be noticed from the summit, private residences, or roads.

**Public Comment Theme:** Timber harvesting could have negative impacts on neighboring properties.

**Response to comments:** ANR does not have a specific policy for buffering inholdings or adjacent properties during layout of timber harvests on state lands. However, foresters communicate with neighbors prior to harvests, are keenly aware of the proximity of neighboring structures and property boundaries, and balance safety with silvicultural objectives when marking trees and laying out skid roads near property boundaries.

**Accountability**

**Public Comment Theme:** ANR should only contract with local logging companies certified to carry out ecologically sensitive harvesting operations adhering to the standards of the Forest Stewardship Council or any other credible, independent forest certification entity.

**Response to comments:** ANR is obligated to contract for services adhering to guidelines set forth in State of Vermont *Administrative Bulletin 3.5- Procurement and Contracting Procedures.*
Reasonable restrictions may be placed on logging contractors, but these must be defensible, and typically consist of specifying equipment types that are suitable on a given site. A requirement that loggers be certified by a third party in order to operate on the CHMU would require a change to state-wide practice that applies to all ANR lands and would not be considered in association with the LRMP process. Timber sale contracts for logging on ANR lands include strict standards and conditions, and operations are monitored closely by FPR State of Vermont licensed foresters.

**Public Comment theme:** Loggers should be held to as high a standard as trail construction projects. ANR should inspect all logging operations post-harvest to ensure adherence to best management practices. Loggers should not be allowed to use “legacy skid roads.” These roads should be discontinued and re-designed.

**Response to comments:** Logging operations are held to strict standards. FPR State of Vermont licensed foresters make frequent visits to active harvests and work with operators to implement the appropriate measures to protect water and site quality and inspect harvests to make sure that operators are abiding by the marking and contractual guidelines.

Legacy skid roads are present throughout the CHMU. Many are well constructed and useful. On any given harvest, the forester evaluates which existing roads should be used and which should be avoided and repaired or decommissioned. All active skid roads are maintained throughout the harvest with appropriate drainage structures and “closed-out” at the end of the harvest through the installation of appropriate water diversion structures. When a legacy skid road is found on a timber sale but is not used, foresters are opportunistic in decommissioning these. The plan has been edited to reflect the importance of pro-actively decommissioning legacy skid roads (Section IV.B.)

**Public Comment Theme:** ANR should provide citizens with the opportunity to participate in monitoring Acceptable Management Practices (AMP) compliance and ecosystem health including water quality. To increase credibility, ANR should not monitor itself.

**Response to comment:** The way in which ANR monitors AMP compliance on timber harvests on state land is beyond the scope of the LRMP. However, if any individuals suspect an AMP violation, they should contact FPR to investigate.

**Public Comment Theme:** How do staff identify sensitive ecological features and critical wildlife habitats within harvest areas for special treatment? How are silvicultural prescriptions created for treatment areas?
**Response to comments:** The timber management schedule in the plan provides a guide for the timing and type of management that will occur in each treatment area and are subject to change. Detailed prescriptions are written after a State of Vermont licensed forester conducts a thorough forest inventory, and biologists and ecologists identify special habitat features through field visits to the harvest area. The silvicultural prescription is then written and reviewed by members of the District Stewardship Team and headquarters staff.

**Public Comment Theme:** The plan includes a variety of designations, both formal and informal related to the Land Management Classification, Legislative Districts, and whether land can be managed for timber. It is not obvious which acreage is eligible for timber management.

**Response to comments:** The plan has been edited to reflect that a total of 7,483 acres are available for timber management. This includes areas that are classified both as General Management Areas and Special Management Areas in ANR’s Land Management Classification system (LMC), and lands that correspond to the Multiple Use Area and Timber Management and Wildlife Area as defined by the legislature in 10 V.S.A.§235. ANR recognizes that these overlapping designations can be confusing. Map 11 clearly depicts those areas that are and are not available for timber management.

The area that is eligible for timber management includes those areas that are not otherwise restricted from this use by deed, easement, or legislation, or characteristics of the land itself such as slope, soil type, and distance from existing infrastructure. Table 5 lists acreage figures for areas based on whether they are available for timber management, or for what reason they are not available. Map 11 indicates which areas are eligible for timber management, while maps 20 and 21 depict those areas scheduled for management in the next 15 years.

**Public Comment Theme:** I am concerned that many of the planned timber harvests will not get done in a timely fashion without ANR dedicating more personnel to the state lands timber cutting effort.

**Response to comments:** ANR believes that the timber harvest schedule is an achievable one given current staffing levels.

**Wildlife and Habitat Management**

**Unique Habitat Features and Forest Conditions**

**Public Comment Theme:** The plan does not identify existing areas of old growth forest, nor does it set aside any lands for the restoration of old-growth conditions. The plan should set aside 30% of the timberland for old-growth restoration.
Response to comments: Approximately 65% of the total CHMU area is not available for timber management. The area of the CHMU where timber harvesting could occur is approximately 7,483 acres (with a total of 3,749 acres scheduled for management in the next 15 years). A third party owns the timber rights on approximately 1,473 acres of Huntington Gap WMA and ANR has limited input on the management of this area. Still other areas are not forested. However, the vast majority of the CHMU is not available for timber harvesting, either due to ground conditions, legal restrictions (deed restrictions, easements), or born of the legislative use districts. This includes 91% of spruce-fir-Northern Hardwood forest types and 50% of northern hardwood forest types, including those at lower and mid-elevations.

The area that is not available to timber harvesting does not just include land that is inoperable, inaccessible, and non-merchantable. It also includes good growing sites at lower elevations, including portions of the Gleason Brook watershed, and the Ecological Protection Zone in Phen Basin. Map 11 depicts those areas that are and are not available for timber management, while Table 5 lists acreage figures for areas based on whether they are available for timber management, or for what reason they are not available.

In the area that is not available for timber harvesting, natural disturbance regimes will be the dominant force in forest development and these areas are expected to develop the more complex structural characteristic of old forests. The area that is not available to timber harvesting is consistent with the regional old forest targets established by Vermont Conservation Design.

Public Comment Theme: The Special Wildlife Habitat map (map 10) fails to identify major corridors used by moose and bear and critical habitats such as bobcat denning sites on the Bolton cliffs. Furthermore, the map indicates a bias toward game animals. There are no designations on the map, for instance, of the “special” habitat for Bicknell’s Thrush.

Response to comments: Because of its size and unfragmented character, the main portion of the CHMU acts as a north-south wildlife corridor sandwiched between the more developed Huntington River and Mad River Valleys. Within the CHMU, ridgelines and riparian areas would be the predominant corridors, but would be difficult and confusing to map at a finer scale in map 10. The finer scale features that enhance the value of a certain area for wildlife movement are identified through field observation during timber inventory or during other assessments related to new trail development.

The Selected Wildlife Habitat map is meant to depict certain habitat features, not all habitat features of interest to all readers. The map does include old field, young forest, aspen/white birch, bear feeding areas, deer wintering areas, soft mast production areas, wetlands, alder swamps, forest openings, agricultural lands, and red oak stands. Some of these features are related to game animals, others are not, yet all are important for a variety of wildlife that use these habitats and food sources. Certain habitat features are omitted to protect the habitat
itself. For instance, there are two *confirmed* bobcat dens on the CHMU, but the location of the dens will remain undisclosed for protection of this wildlife species.

The *Selected Wildlife Habitat* map focuses on discrete habitats that may not be discerned at the scale of the natural community maps (maps 6-9). For some species, Natural Community mapping is a suitable framework to guide management decisions. For example, Bicknell’s Thrush may nest throughout the Montane Spruce-Fir Forest natural community, an area greater than 4000 acres.

**Public Comment Theme:** What is ANR doing to improve connectivity between Camel’s Hump State Park and other protected areas in Vermont? How does ANR plan to improve safe passage for animals crossing the Winooski River/Rt. 2/I-89 corridor?

**Response to comments:** ANR attaches great value to parcels that enhance connectivity between forest blocks and across elevation gradients and considers this when targeting new acquisitions or reviewing land donations.

Outside of acquisition priorities, improving the safe passage of wildlife across the Winooski River Valley is beyond the scope of this plan. However, ANR is actively engaged in improving wildlife connectivity in this area and surrounding lands. Within road rights-of-way, ANR works closely with the Vermont Agency of Transportation to enhance existing highway underpasses and plan for more functional replacements in coordination with long-term transportation plans. Two nearby riparian corridors- Pineo Brook and Sharkeyville Brook- are critical for wildlife connectivity between Camel’s Hump State Park and conserved lands to the north.

Outside of road rights-of-way, ANR is engaged with a host of partners through the *Staying Connected Initiative*. This group supports landscape connectivity through identification of key wildlife road crossings, targeted land conservation, outreach to towns to encourage compatible zoning regulations, and educating landowners on appropriate land management strategies.

**Suggestions for Improving Wildlife Habitat and Ensuring Best Practices**

**Public Comment Theme:** The plan should minimize timber harvesting between May and mid-July as this will minimize disturbance during the bird breeding season.

**Response to comments:** It is uncommon that harvesting would occur between May and Mid-July. Most harvesting occurs during winter on frozen or snow-covered ground. Summer harvesting occurs on dry sites and in cases where soil scarification is desired to regenerate specific tree species that respond favorably to such ground disturbance. Summer harvesting has grown more common on state land with the shortened winter harvesting season. There will be occasions when the DST will need to balance the considerations related to soil scarification,
taking advantage of dry summers, and bird breeding. Still, harvesting before mid-July will be uncommon.

Public Comment Theme: The plan should specify that old fields should not be mowed until after Sept 15 to allow pollinator habitat to exist longer and allow post-breeding birds to utilize seed and fruit sources prior to migration.

Response to comments: The plan has been edited to reflect that Old Fields/Maintained Openings (LMC 2.2C) should be mowed on a 2-5 year cycle, not a 1-5 year cycle (see section IV.B). The earliest mowing date of August 15 will remain in effect, but impacts should be minimal given that fields are not mowed every year and most mowing will occur later in the fall due to schedule and availability of mowing contractors.

Public Comment Theme: While the plan offers detail on standing snags, there is no metric for coarse woody material on the forest floor, which has been demonstrated as having significant value to wildlife, soils, and carbon sequestration (and as such should be addressed). We recommend using the metrics found in FPR’s Voluntary Harvesting Guidelines (i.e. leave 3-5 stems at least 18” in diameter and 10 stems at least 14” in diameter per acre, all at least 16’ long).

Response to comments: The plan has been edited to reflect the target for downed woody material that is described in the *Voluntary Harvesting Guidelines for Landowners in Vermont* (see section IV.B).

Miscellaneous Comments Relating to Wildlife and Habitat Management

Public Comment Theme: The CHMU is one of the most important forest blocks in the Atlantic flyway and provides habitat to many priority species. The draft plan is consistent overall with maintaining and/or enhancing high-quality breeding habitat for a diverse suite of bird species. To better reflect these species, we recommend that the list of critical bird species should be changed to use the birds on the State Wildlife Action Plan list of Species of Greatest Conservation Need. Likewise, the write-up on birds on page 34 should instead focus on Canada Warbler, Peregrine Falcon, Bicknell’s Thrush, Black-throated Blue Warbler and Chestnut-sided Warbler as these species are mostly likely to breed in the habitats covered by the plan.

Response to comments: Table 3 has been edited to include all rare and uncommon animal species that are also listed in the *State Wildlife Action Plan* as *Species of Greatest Conservation Need*.

Public Comment Theme: The wildlife and cultural sections are short on actionable objectives and timelines for completion.
Response to comments: Many of the Wildlife Habitat Management Strategies identified in section IV.B will be achieved by managing stands through timber harvests. These harvests do have an implementation schedule.

Section IV.B also identifies strategies concerning the protection of historic resources and public outreach and education. These strategies tend to get implemented in concert with other management activities or are the result of preventing certain actions. It is difficult to attach a timeline to strategies of this nature.

Public Comment Theme: With these two priorities in mind—recreation and wildlife habitat, we respectfully submit that the ANR should suspend trapping and hunting of rodent predator species, such as fox, coyote, weasel, mink, bobcat, fisher, etc. and of beaver on the two Wildlife Management Areas (WMAs)—Huntington Gap and Robbins Mountain—where trapping is currently allowed.

Public Comment Theme: The Recreational Assessment makes no mention of hunting, trapping, or fishing. The plan should affirmatively recognize these as allowed uses.

Response to comments: Trapping and hunting are allowed uses on the CHMU, including all Camel’s Hump State Park, Camel’s Hump State Forest, Robbins Mountain Wildlife Management Area, and Huntington Gap Wildlife Management Area, as long as state laws that pertain to these activities are followed. ANR does not typically suspend hunting or trapping of specific species in association with the implementation of an LRMP. The Recreation Assessment has been edited to reflect that hunting, fishing, and trapping are allowed on the property.

Public Comment Theme: The plan does not identify how the volunteer conservation efforts in the Stevens Block of Camel’s Hump SF are handled. It feels as if this volunteer group is closed to other members. It is not appropriate that some members of the public may cut firewood cheaply and others cannot.

Response to comments: Volunteer work on the Stevens Block of Camel’s Hump SF is coordinated by a District Forester and directed by an annual work plan to accomplish desired outcomes. These outcomes are described in Section IV.C, LMC 2.4H. The Orvis Volunteer Group is not closed and has welcomed new members in the past. Only a very small part of their work involves cutting firewood and volunteers must be willing to engage in the other aspects of this habitat work (releasing softwood trees, brush-hogging fields, pruning trees, etc.) Little firewood is removed each year, especially in relation to the cost and effort involved with the other habitat work on the parcel. If members of the public are interested in assisting with this or other habitat management work, they should contact a district office.
Suggestions for Improving Cultural Resource Protection

Public Comment Theme: Three reports dated 2003, 2007, and 2009 deal with cultural and archaeological resources within the park. Each recommends that ANR send out survey teams to identify, map, and protect Native American and early European settler sites. The draft plan contains no action plans or time table to deliver on these recommendations.

Response to comment: Documenting, interpreting, and protecting historic resources is identified as a strategy in the existing plan (Section IV.B). This work is done on an as needed basis in accordance with state and federal requirements to protect historic resources. Projects that involve subsurface disturbance are reviewed by the Division of Historic Preservation (DHP).

Public Comment Theme: ANR should install informational signage about historical resources along trails and roads and incorporate environmental education and ecology into programming to encourage more people to learn the inherent value of CHMU.

Response to comments: The plan has been edited to include the importance of interpretive signage documenting historic resources (Section IV.B).

Suggestions for Improving Natural Resource Protection

Public Comment Theme: The plan should include restoration activities with workable time-bound strategies to restore critical habitats for imperiled flora and fauna within CHSP. The plan should also include strategies for the control and eradication of invasive plant species.

Response to comments: Because the CHMU comprises such a large area of intact forest habitat, there are few areas in need of restoration. There are several rare, threatened, and endangered plant species that are monitored by ANR staff and volunteers from the Native Plant Trust.

The summit area is one such location. Years ago, the north summit was becoming degraded from visitors trampling alpine plants. This area was closed to the public and monitoring has shown a marked improvement in the condition of the alpine plant community. The north summit and main summit are visited periodically, and the condition of rare plants are recorded. GMC summit caretakers continue to educate visitors about how to lower their impact in the alpine zone, and encourage visitors to keep off the north summit.

The most important restoration that occurs on the CHMU involves the treatment of emerging invasive plant populations. Staff conduct annual surveys of roads, landings, and other known areas of invasive plant infestations. Infestations are evaluated in accordance with the State...
Policy on *Use of Pesticides on State Lands*. Most infestations within the CHMU are addressed through mechanical or chemical treatment in accordance with a *Pesticide Use Impact Assessment for Invasive Plant Control on State Lands*.

**Public Comment Theme:** ANR should designate more low and mid-elevation areas with the highest level of protection as part of the current planning process. Designating these areas will safeguard critical wildlife habitats, protect remote, backcountry experiences for recreation and hunting, and maintain the near-wild character that many visitors cherish about Camel’s Hump.

**Response to comments:** Overall, the most heavily managed areas of the CHMU are at lower elevations. However, there are low and mid-elevation areas that are not available for commercial timber and wildlife management and host to a lower density of trails because of legislative mandates and conservation easements. There are approximately 1,300 acres of the Ecological Area (LMC 1.8H) that extend below 2,500 feet in the Gleason Brook drainage. An additional 1,800 acres of the Phen Basin Ecological Protection Zone (LMC 1.10I) also extends below 2,500 feet in elevation. Uphill of these areas are extensive portions of the Ecological Area, and other lands which are not managed for timber and difficult to access by visitors. These comprise some of the most remote portions of the CHMU.

**Public Comment Theme:** Future land acquisitions should prioritize creating more elevational linkages that provides connectivity from the river valley up to the ridgeline.

**Response to comments:** ANR will continue to identify priority parcels for conservation near and adjacent to the CHMU. Properties that provide elevational linkage and those that include known wildlife corridors, and high-quality streams are a priority for ANR and will become increasingly critical in the face of climate change impacts and shifting ranges.

**Public Comment Theme:** The public has overwhelmingly pointed to the high value of this management unit for non-damaging recreation and habitat conservation and that should be the overarching management goal. While it is true that this forest can produce very high-quality timber products, among other potential extractive uses, that does not mean such uses should be “balanced” in equal proportion.

**Response to comments:** The LRMP seeks to manage public lands for multiple uses that are reflective of public interest and responsibly protect natural resources within the land base. Some management objectives result in multiple benefits. For instance, improvements to a woods road may facilitate access to a future timber harvest, enhance the road for recreational use, enable aquatic organism passage through larger culverts, and make the road more resilient to future storms. Timber management can be an important part of habitat management, conservation, restoration, and maintaining forest health. ANR’s land management approach recognizes the complementary uses and goals of the property and state land in general.
**Public Comment Theme:** The natural resource mapping fails to identify certain water features that seem exceptional. The plan only classifies 213 acres as LMC 1.7 *Exceptional Water Features*. What about all the small headwater streams?

**Response to comments:** The areas identified as *LMC 1.7 Exceptional Water Features* are discrete features and easily mapped. The LRMP does not treat these areas as the *only* important water resources. The many small rivers and streams within the unit are not easily mapped because they are not part of existing spatial data sets. Instead, they are identified on field visits. These are embedded in other LMC categories and will be managed accordingly. These features are protected from impacts of vegetation management and recreational use by the proper implementation of *Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont*, trail and bridge construction standards, and adherence to the ANR’s *Riparian Management Guidelines*.

**Public Comment Theme:** ANR should maximize the value of the Ecological Protection Zone in Phen Basin by (1) creating a consortium for conducting research and (2) establish it as a natural heritage site.

**Response to comments:** ANR does not intend to create a new consortium focused on research in the Ecological Protection Zone. The *Forest Ecosystem Monitoring Cooperative* (FEMC) is an already existing partnership of Northeastern state agencies, The University of Vermont, and the USDA Forest Service, and promotes the coordination of multi-disciplinary environmental monitoring and research activities in forest ecosystems in the Northeast. Research is an allowed activity on state land with the appropriate license or special use permit and ANR is supportive of interested parties conducting research in this area.

**Public Comment Theme:** The plan should include a “threats analysis” section that discusses how climate change, atmospheric pollution, logging, and non-native flora and fauna will impact forest health. The plan should propose management strategies and contingency plans to address and ameliorate identified threats.

**Response to comments:** A “threats analysis“ is not presently part of the LRMP format. However, table 10 and 11 detail potential changes to the climate of New England and New York, and potential impacts to the forest because of climate change. Management strategies to address these factors can be found throughout section IV.B.
Plan Format, Existing or Inadequate Assessments, and Public Involvement Process

**Public Comment Theme:** Section III.K states that aesthetics will be taken into consideration when making future management decisions. This statement needs elaboration. How, exactly, will aesthetics be considered? Will the USFS Scenery Management system be employed? Some other approach?

**Response to comments:** ANR does not have a comprehensive way of considering aesthetics in management decisions. However, the visual impact is a consideration when developing silvicultural prescriptions, laying out trails, and during other activities that require vegetation management.

**Public Comment Theme:** The plan should include a section disclosing the annual budget for CHSP as well as a discussion section revealing how the budget is allocated toward the four management goals. The plan should also include an economic analysis of the real economic value of Camel’s Hump state Park, in reference to its environmental services (nutrient cycling, climate regulation, watershed protection, genetic resources, recreation opportunities, and aesthetics).

**Response to comments:** There is no “annual budget” for Camel’s Hump State Park. The DST and other ANR staff spends time managing this and many other properties but do not track their time to a specific property or management goal. Funding for specific projects on ANR lands are proposed and funding is allocated based on an evaluation of their priority and available resources.

An economic analysis of the value of the ecosystem services afforded by the CHMU would be an informative exercise. ANR does not currently include an economic valuation analysis as part of the planning process.

**Public Comment theme:** There was an insufficient amount of time to provide public comment. The public involvement process reflects a very outdated model of public engagement and consultation.

**Response to comments:** The DST conducted four widely advertised public meetings in November and December of 2017. Meeting notices were sent to town officials, conservation organizations, and individuals known to ANR as having an interest in the management unit. Notices also appeared in local newspapers and several stories appeared in local press during the open comment period. The initial comment period ran for approximately eleven weeks. A second comment period ran for an additional five weeks. The DST received over 700 comments by email and letter.
The public involvement process was consistent with Agency guidelines and norms for the creation of Long-Range Management Plans.

**Public Comment Theme:** Further public input needs to be taken when significant changes are made to public lands, which these proposed trail systems certainly constitute. It was indicated at the public meetings that there would be no such public input process for any new cross country or mountain bike trails in the unbounded, vaguely designated areas.

**Response to comments:** The public meetings and comment period constitute the extent of formal public involvement for activities - such as new trails - that are proposed in the plan. While certain trail proposals are still in the planning phase and a specific route has not yet been identified, the DST will work with local corridor managers to finalize the exact route according to ANR guidelines for reviewing trail proposals. New trail proposals that are not included in the LRMP would trigger an amendment to the LRMP and a level of public involvement commensurate with the proposed change.

**Public Comment theme:** Expand the planning team, assessment, and conservation plan to provide a more holistic and comprehensive assessment of forest conditions.

**Comment theme:** Camel’s Hump would best be protected under a new state wilderness designation and managed under a separate Camels Hump Park Authority

**Response to comments:** The DST is an inter-disciplinary group of natural resource professionals from the Departments of Forests, Parks & Recreation, Fish and Wildlife, and Environmental Conservation. The DST includes wildlife and fisheries biologists, foresters, recreation managers, the state land ecologist, and a watershed planner. When necessary, this group seeks input from other ANR professionals. The DST has broad expertise and considers a wide array of factors when writing and implementing Long-Range Management Plans. The DST model is consistent across districts/regions and is responsible for the management of all ANR lands. A portion of the property is already designated a State Natural Area which exists, in part, to protect the “wilderness character” of the property.

**Public Comment theme:** Section IV.C. Land Classification Management is difficult to follow; structural and formatting revision are recommended.

**Response to comments:** The structure of Section IV is in conformance with the current, existing LRMP format for all state land parcels.

**Public Comment Theme:** The plan should have a compelling Vision Statement. The Executive Summary should contain more detail about the actual management activities prescribed in the plan.
Response to comments: A “Vision Statement” is not presently a part of the standard template for Long-Range Management Plans. However, the Executive Summary has been edited to reflect some of the management decisions described in the plan.

Public Comment Theme: If sugaring is going to be an allowed use on a portion of the CHMU, or may become one, the plan should provide some discussion of standards by which operations should be managed.

Response to comment: Act No.21 of the 2009 Vermont State Legislative session (S.94 - An Act Relating to Licensing State Forest Land for Maple Sugar Production) established as state policy the limited use of state lands under the jurisdiction of the Department of Forests, Parks and Recreation for maple sugar production. The legislation directs the Department to work with the Vermont Maple Sugar Makers Association to develop responsible tapping guidelines and to issue licenses for tapping maple trees at appropriate sites on state forest and park land in accordance with the standards and guidelines. Currently, there is one license for maple sugaring in CHMU.

Public Comment Theme: The plan is inconsistent in its reference to the use districts and areas as defined by the enabling legislation.

Response to comments: The plan has been edited with an eye towards consistency and honoring the wording of the legislation. Each “Use District” is now referenced correctly as either the “Ecological Area,” “Timber Management and Wildlife Area,” or “Multiple-use Area.”

Public Comment Theme: The table of invasive plants needs careful editing.

Response to comments: Table 9 has been edited.

Public Comment Theme: The plan should provide more detail about how the big picture goals, such as enhancing wildlife habitat, climate adaptation, and timber production, will translate down to silvicultural prescriptions and how conflicts between objectives will be resolved at the stand scale. To this end, we recommend using Silviculture with Birds in Mind management since these practices also help create a more climate resilient forest.

Response to comments: The way in which broad goals are incorporated into stand-level prescriptions is based on detailed inventories of the stand and the surrounding landscape context. Silvicultural prescriptions are written by an FPR State of Vermont licensed forester with input from wildlife biologists, the state lands ecologist, and are subject to review by the entire DST. Silviculture with Birds in Mind is a creation of FPR and Audubon Vermont and it is among the silvicultural guides that will be used when implementing forest management practices.
**Public Comment Theme:** We support the approach to combine the management plans of the state park, state forest, and wildlife management area into one comprehensive management unit. However, the scale, diversity, and quality of the natural resources in the Camel’s Hump area demand a more robust landscape scale perspective than is reflected in the current draft plan.

**Response to comments:** Long-Range Management Plans are written for specific ANR properties, not for the landscape scale or biophysical regions. The CHMU LRMP incorporates guidelines and targets from larger scale plans such as regional conservation plans or the work of [Vermont Conservation Design](#).

**Public Comment Theme:** The table of *Expected Climate Change Effects* incorporates some intriguing thinking and wording as it relates to the likeliness of certain impacts or the timeframe of those impacts.

**Response to comments:** Section 3.G has been edited to better convey the already observed and projected changes to climate in the northeast, and the potential impacts on forests resulting from these changes.
APPENDIX F – Natural Communities Information

The topography, soils, vegetation, and wildlife associations of each natural community in the CHMU 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.

1. Alpine Meadow

The open summit of Camel’s Hump is an extreme environment, where high winds, cold temperatures, frequent fog, intense sun, and a short growing season all shape the vegetation. Overall, the climate is reminiscent of the arctic tundra found at much higher latitude. As a result, many of the plant species found in this community at Camel’s Hump are very rare in Vermont and New England. Fourteen species of rare or very rare vascular plants, and one very rare liverwort, are known to occur around the summit of Camel’s Hump. Three of the rare species are dominant: Bigelow's Sedge (*Carex bigelowii*), Bog Billberry (*Vaccinium uliginosum*) and Three-forked Rush (*Juncus trifidus*). Also abundant in this community (but not rare in Vermont) are Labrador Tea (*Ledum groenlandicum*), and Common Hairgrass (*Deschampsia flexuosa*). Other species occasionally found include Bunchberry (*Cornus canadensis*), Starflower (*Trientalis borealis*), Acuminate Aster (*Aster acuminatus*), Cinnamon Fern (*Osmunda cinnamomea*), and Woodlily (*Clintonia borealis*), along with a few very short and twisted Balsam Firs (*Abies balsamea*). In many places vascular plants are only found growing in protected crevices in the bedrock; exposed bedrock and moss-covered rock are common here. What little soil can be found is thin and mostly peaty, with a pH measured at 4.0-4.2.

The exposed mountaintop is a challenging habitat for animals, but northern juncos and evidence of snowshoe hare were observed around the summit. Ravens fly near the summit but may make only limited use of the Alpine Meadow community. The rare rock shrew has been found at high elevations on Camel’s Hump, but not specifically in this community. Deer mice, red-backed voles, and meadow voles have also been found on the summit. Finally, there may be uncommon invertebrates associated with the alpine zone, though these have not been thoroughly studied. Several insect species endemic to the alpine zone have been found on Mount Washington in New Hampshire, while in Vermont there is a beetle that is restricted to a small area of the alpine zone on Mount Mansfield (Johnson 1998).

Although the plants found in this community are well-adapted to the harsh mountaintop climate, they are easily damaged by hiker trampling. It is likely that the extent of vegetation in this community has been affected by many decades of visitors to the mountain. Ongoing monitoring and management, as well as continued public outreach and education, are all necessary to maintain the viability of these plant populations. The Green Mountain Club’s Summit Caretaker program is likely largely responsible for the continued presence of the alpine tundra vegetation on the summit.

The 5-acre occurrence of Alpine Meadow in the CHMU is C-ranked, and considered to be an example of statewide significance.
2. Beaver Wetland

These wetlands are constantly changing in response to the presence or absence of beavers. As a result, they are not mapped as a natural community type; instead they are separately identified to indicate their dynamic nature. Thirteen beaver wetland patches have been mapped in the CHMU, and several of these are part of the large beaver wetland complexes found in the Phen Basin and along the northeast ridge of Camel’s Hump. Because of their dynamic nature, the beaver wetlands mapped in this report are not assessed for statewide significance in the same way that specific natural community types are. Nevertheless, these wetlands are highly important for their ecological functions and habitat values.

Vegetation in these patches can be quite diverse, and the processes of flooding and draining that characterize beaver wetlands influences vegetative composition. Soils vary from deep, saturated organics to drier alluvial soils. Areas recently drained are dominated by herbaceous growth, including species such as tussock sedge (Carex stricta), stipitate sedge (Carex stipata), retrorse sedge (Carex retrorsa), Carex leptalea, Carex interior, three-way sedge (Dulichium arundinaceum), interrupted fern (Osmunda claytoniana), bluejoint (Calamagrostis canadensis), hairy panic grass (Panicum lanuginosum), soft rush (Juncus effusus), and grass-leaved goldenrod (Solidago graminifolia). Alluvial deposits near the margins of beaver ponds and the streams that feed them can be dominated by Speckled Alder (Alnus incana). Other species noted in beaver wetlands include Meadow-sweet (Spiraea alba), Hobblebush (Viburnum lantanooides), Evergreen Woodfern (Dryopteris intermedia), Ostrich Fern (Matteuccia struthiopteris), Sensitive Fern (Onoclea sensibilis), Long-hair Sedge (Carex crinita), and White Hellebore (Veratrum viride). At higher elevations the shrubby areas can include Mountain Maple (Acer spicatum), Yellow Birch (Betula alleghaniensis), Evergreen Woodfern (Dryopteris intermedia), and White Snakeroot (Eupatorium rugosum). Beaver wetlands can be local “hotspots” for wildlife diversity in forested landscapes, and can host many animal species including birds, bats, small mammals, moose, amphibians, and many species of invertebrates.

Some portions of the Phen Basin wetland complex were mapped as Sedge Meadow and Alder Swamp in an earlier ecological assessment. Aerial photos show that these patches have changed over the past decade, and can be expected to continue to change, and thus are better mapped as Beaver Wetlands rather than any particular natural community type.

3. Boreal Acidic Cliff

Two examples of a Boreal Acidic Cliff have been mapped within the CHMU, and both are considered examples of statewide significance. One is the large cliff on the south face of the Camel’s Hump summit; the other is a cliff above the “Beaver Meadow” saddle southeast of the summit. Both cliffs are exposures of the underlying schist bedrock, and are generally sparsely vegetated. Little ecological data was collected on species present, however several rare and uncommon species have been observed on these cliffs. Ten rare or very rare species are reported for the south face of the Camel’s Hump summit: Bigelow’s Sedge (Carex bigelowii), Fragrant Fern (Dryopteris fragrans), Mountain Firmoss (Huperzia
Three-forke Rush (*Juncus trifidus*), A liverwort (*Mylia taylorii*), Boot’s Rattlesnake Root (*Nabalus bottii*), Bearberry Willow (*Salix uva-ursi*), Rand’s Mountain Goldenrod (*Solidago simplex* spp. *randii var. monticola*), Bog Billberry (*Vaccinium uliginosum*), and Smooth Woodsia (*Woodsia glabella*). Of these the Boot’s Rattlesnake Root and Bearberry Willow are legally listed as “endangered” by Vermont statute. Additionally, the uncommon Steller’s Cliffbrake (*Cryptogramma stelleri*) was located at the cliff above Beaver Meadows. This species can sometimes be indicative of mineral enrichment, and suggests that the rock may have thin calcareous veins, or that groundwater seepage through cracks in the cliff may be a source of minerals. These cliffs might provide habitat for nesting ravens, but overall few animals can use this community.

4. **Boreal Outcrop**

These high-elevation outcrops are found scattered throughout the CHMU. Many are relatively small and isolated, but the northeast ridge of Camel’s Hump has a very extensive complex of Boreal Outcrops that may be one of the largest in the state. This community is found where there are exposures of the underlying schist bedrock, generally on moderately sloping rock. In the large outcrop complexes there can be a mix of flat shelves, steep slopes, sheer faces, and even overhangs. The varied topography does not seem to influence species composition, but it does affect the overall vegetative cover. The “canopy” on these outcrops is typically a 20-30% cover of very short (3-8’ tall) Red Spruce (*Picea rubens*). Heart-leaved Paper Birch (*Betula papyrifera var. cordifolia*), Balsam Fir (*Abies balsamea*), Red Maple (*Acer rubrum*), American Mountain Ash (*Sorbus americana*), Striped Maple (*Acer pensylvanicum*), and Mountain Maple (*Acer spicatum*) can also be present. Low shrubs include Mountain Holly (*Ilex mucronata*), Velvet-leaf Blueberry (*Vaccinium myrtilloides*), Lower Lowbush Blueberry (*Vaccinium angustifolium*), and an *Amelanchier* species. Herbs are sparse, and include Bracken Fern (*Pteridium aquilinum*), Hay-scented Fern (*Dennstaedtia punctilobula*), Common Hairgrass (*Deschampsia flexuosa*), and Bristly Sarsaparilla (*Aralia hispida*). Mosses and lichens are abundant. Wildlife species that might use these outcrops include birds such as common raven and northern junco, and small mammals, including possibly the rare rock shrew which has been found at high elevations on Camel’s Hump. Five occurrences of this community have been mapped in the CHMU (though they may be others that were too small to detect during inventories); the largest covers 55 acres and is an A-ranked example of statewide significance.

5. **Boreal Talus Woodland**

A small (1-acre) patch of Boreal Talus Woodland is found below a large complex of rock outcrops that are northeast of the Camel’s Hump summit. Below a small 15’-tall cliff, large boulders ranging from 2-4’ on the longest side are resting on a 40-45 degree east-facing slope. It is likely that these are boulders of the local schist bedrock that were broken off and deposited by the plucking action and southeast advance of the continental glacier. With little space for soil development, only a few plant species find room to establish. There is open canopy (65-70% cover) of Yellow Birch (*Betula alleghaniensis*), and a tall shrub layer with Striped Maple (*Acer pensylvanicum*) and Mountain Maple (*Acer spicatum*). Only two
herbs were noted in this patch: Rock Polypody (Polypodium virginianum) and Evergreen Woodfern (Dryopteris intermedia). Though small in acreage, this talus community provides habitat in the crevices between boulders that may be used by some small mammals. A rare species, rock shrew, which uses mossy talus as habitat has been found nearby in the Gleason Brook drainage.

Because of its small size, this occurrence is C-ranked and not considered an example of statewide significance. However, this patch is certainly locally important as part of the large association of cliffs, outcrops, talus and forest on the ridge.

6. Hemlock-Balsam Fir-Black Ash Seepage Swamp

A patch of this community type was mapped on Robbins Mountain WMA, along the trail that enters behind the neighboring shooting range. Though the mapping was based on field observations, no ecological data was collected in this patch. These swamps can be found on both mineral and organic soils, though in both cases groundwater flow provides some mineral enrichment. Expected species would include Hemlock (Tsuga canadensis), Balsam Fir (Abies balsamea), and Black Ash (Fraxinus nigra) in the canopy, Winterberry Holly (Ilex verticillata) in the shrub layer, and Cinnamon Fern (Osmunda cinnamomea) in the herb layer. This occurrence is preliminarily C-ranked based on knowledge of size and landscape context. Additional data is needed for this occurrence to confirm if it is properly typed and to confidently assign a quality rank.

7. Hemlock-Northern Hardwood Forest

Found on shallow-to-bedrock till soils and sandy glacio-fluvial soils, this community is found scattered around the lower elevations of the CHMU. In most patches, Hemlock (Tsuga canadensis) shares the canopy with the typical northern hardwood species Sugar Maple (Acer saccharum), Yellow Birch (Betula alleghaniensis), and American Beech (Fagus grandifolia). Red Maple (Acer rubrum) and Big-toothed Aspen (Populus grandidentata) are present in some younger patches of this type. The canopy is usually closed (70-90% closure) and averages 60’ tall. Understory species include a shadbush (Amelanchier sp.) and Hobblebush (Viburnum lantanoides); herbs can be sparse. Evergreen Woodfern (Dryopteris intermedia) and Wild Sarsaparilla (Aralia nudicaulis) were two species noted. One patch of Hemlock-Northern Hardwood Forest (near Robbins Mountain) had evidence of mineral enrichment. Basswood (Tilia americana), Wild Leeks (Allium tricoccum), Broad-leaved Sedge (Carex platyphylla), Sharp-lobed Hepatica (Hepatica acutiloba), Squirrel-corn (Dicentra canadensis) and Rattlesnake Fern (Botrychium virginianum) were all noted in this patch. Wildlife in this community is likely similar to Northern Hardwood Forest, though patches of dense hemlock may provide winter cover for species like white-tailed deer and ruffed grouse. Overall five occurrences of Hemlock-Northern Hardwood Forest have been identified in the CHMU, and all are considered to be examples of statewide-significance.
8. Hemlock Forest

Hemlock Forest is found in steep, shady ravines and on dry, exposed low-elevation ridges. Most of the examples of this community are the Hemlock-Red Spruce Forest variant. These occur as small patches within the surrounding Northern Hardwood Forest and Montane Yellow Birch-Red Spruce Forest, usually on south and southwest-facing rocky ridgelines between 1800 and 2600’ elevation. This is a stressful environment for plants and animals—soils are extremely thin, winter weather is severe, and conditions are frequently very dry, due to exposure to direct sun and wind. Thirty to 45’ Red Spruce (*Picea rubens*) and Eastern Hemlock (*Tsuga canadensis*) dominate the open (55-80%) canopy, and Red Maple (*Acer rubrum*) and Yellow Birch (*Betula allegheniensis*) are sometimes present. In canopy gaps, dense stands of regenerating spruce and hemlock are found. Scattered shrubs present are Hobblebush (*Viburnum lantanoides*) and Canada Honeysuckle (*Lonicera canadensis*). Herbs present include Intermediate Wood Fern (*Dryopteris intermedia*), Sarsaparilla (*Aralia nudicaulis*), Canada Mayflower (*Maianthemum canadense*), Shining Clubmoss (*Lycopodium lucidulum*), Woodlily (*Clintonia borealis*), and Wild Cucumber (*Medeola virginiana*). Windthrow is common in these patches. Two patches of Hemlock Forest were mapped on the northern edge of the CHMU along River Road, but detailed ecological data was not collected from these patches. They would be expected to have a dense canopy of hemlock, with very sparse shrub and herb layers.

Large patches of Hemlock Forest can serve as excellent deer wintering habitat, but none of the small patches in the CHMU have been identified as such. The largest occurrence of this community in the CHMU totals 81 acres. It and another occurrence are both examples of statewide significance.

9. Lowland Spruce-Fir Forest

Lowland Spruce-Fir Forest is a matrix forming community in some regions of Vermont, but in the CHMU it is found only in small patches around beaver-influenced wetland complexes. Since these wetlands are in small basins, cold air sinks down into them from higher elevations, and favors the establishment of Lowland Spruce-Fir Forest on these shores. Preferential feeding by beavers on hardwood species probably also helps maintain the softwood dominance. This community typically occurs on moderately deep, poorly to moderately well drained stony silt loams. Some of the wettest sites have peaty soil. The low (25-30’) canopy is 85 to 98% closed, and is dominated by Red Spruce (*Picea rubens*); Balsam Fir (*Abies balsamea*), Red Maple (*Acer rubrum*) and Eastern Hemlock (*Tsuga canadensis*) are also present. Hobblebush (*Viburnum lantanoides*) and Striped Maple (*Acer pensylvanicum*) have 10% canopy cover in the tall shrub layer. The uncommon species Showy Mountain Ash (*Sorbus decora*) is present in one patch, and may be overlooked in others because of its similarity to the more common American Mountain Ash (*Sorbus americana*). The sparse herb layer includes Sarsaparilla (*Aralia nudicaulis*), Bunchberry (*Cornus canadensis*), Intermediate Woodfern (*Dryopteris intermedia*), Common Wood-Sorrel (*Oxalis acetosella*), Canada Mayflower (*Maianthemum canadense*), Painted Trillium (*Trillium undulatum*), and Pink Ladieslipper (*Cypripedium acaule*). Disturbance events in this community include windthrow of shallowly rooted trees and felling of trees by beavers.
The patches of Lowland Spruce-Fir Forest in the CHMU are grouped into five different occurrences. One of these, found about two miles north of the Camel’s Hump summit, is considered to be an example of statewide significance.

10. Mesic Red Oak-Northern Hardwood Forest

Northern Red Oak (*Quercus rubra*) is generally only a minor component in forests of the CHMU, but the species does characterize one 55-acre patch above Honey Hollow Road. Found on a southwest-facing slope, this patch is on shallow, very well drained to excessively well drained, rocky silt-loam soils. Though this area was affected by the large forest fire of 1903, tree ring data in this community indicated that some trees were approximately 200 years old. With the large trees (up to 22” dbh), many scattered snags, and a large amount of coarse woody debris (downed logs), this community may approach old-growth conditions. While relatively small for an example of Mesic Red Oak-Northern Hardwood Forest, this is A-ranked for current condition, and is an example of statewide significance.

Red Oak and Sugar Maple (*Acer saccharum*) form a sparse emergent canopy 65’ tall with 10% cover. Underneath is a 55’ tall main canopy with Red Oak, Sugar Maple, White Ash (*Fraxinus americana*), Paper Birch (*Betula papyrifera*), and a few Big-toothed Aspen (*Populus grandidentata*). A tertiary canopy includes Sugar Maple, White Ash, American Beech (*Fagus grandifolia*), Hop Hornbeam (*Ostrya virginiana*), and Black Cherry (*Prunus serotina*). Interestingly, no evidence of oak regeneration was noted during inventories; it is likely that this patch will require disturbance if the oak is to persist. Tall shrubs (60% cover) include Beech and Hop Hornbeam, and low shrubs (10% cover) include Red Elderberry (*Sambucus racemosa*), Striped Maple (*Acer pensylvanicum*), Maple-leaved Viburnum (*Viburnum acerifolium*), and a Ribes sp. Herb cover is 50% and abundant species include Large Bellwort (*Uvularia grandiflora*), Rough-leaved Ricegrass (*Oryzopsis asperifolia*), Zig-zag Goldenrod (*Solidago flexicaulis*), and Marginal Wood Fern (*Dryopteris marginalis*). Bryophytes are infrequent.

The large trees, snags, and coarse woody debris likely make this forest good habitat for a number of wildlife species, including northern flying squirrel, pileated woodpecker, and barred owl. It also probably hosts common species such as turkey, black bear, and white-tailed deer.

11. Montane Spruce-Fir Forest

Just over 4,000 acres of Montane Spruce-Fir Forest have been mapped in the CHMU. These are split into two occurrences separated by Route 17 at the Appalachian Gap. The northern occurrence covers approximately 3,600 acres, though the community probably extends onto private land in places. The southern occurrence includes approximately 400 acres within the CHMU, but is part of a much larger occurrence that extends south to the Lincoln Gap Road on both private land and Green Mountain National Forest land (Sorenson 2010). Both are of very high ecological quality and are considered examples of statewide significance.
Montane Spruce-Fir Forest is found at high elevations where the climate is cold, cloudy, windy and damp. Soils are typically thin. The canopy is composed of Red Spruce (*Picea rubens*), Heart-leaved Paper Birch (*Betula papyrifera* var. *cordifolia*), Balsam Fir (*Abies balsamea*). In most places the canopy is 70-80% closed, and less than 40’ tall. American Mountain Ash (*Sorbus americana*) is a common understory tree, and the uncommon Showy Mountain Ash (*Sorbus decorata*) is probably an often overlooked component of this forest. Hobblebush (*Viburnum lantanoides*), Mountain Holly (*Ilex mucronata*), and Mountain Maple (*Acer spicatum*) are frequent shrubs. Herbs include Starflower (*Trientalis borealis*), Woodlily (*Clintonia borealis*), Common Wood-Sorrel (*Oxalis acetosella*), Mountain Wood Fern (*Dryopteris campyloptera*), Acuminate Aster (*Aster acuminatus*), Shining Clubmoss (*Lycopodium lucidulum*), and Canada Mayflower (*Maianthemum canadense*). Montane Spruce-Fir Forest can provide habitat for many migratory songbirds, including blackpoll warbler and yellow-rumped warbler. The uncommon Bicknell’s thrush nests in this community in the CHMU.

An extensive area around the Camel’s Hump summit burned in a 1903 forest fire, including portions of Montane Spruce-Fir Forest. Today, it still possible to see evidence of this in the stands of Paper Birch (*Betula papyrifera*) that established after the fire, and in some remaining non-native Norway Spruce (*Picea abies*) trees that were planted high on the mountain. More recently, this community was impacted by red spruce decline and acid deposition; however, improved air quality has given this community a chance to recover.

### 12. Montane Yellow Birch-Red Spruce Forest

This community is found at middle elevations on Camels Hump, typically between 2000 and 3000’. It is typically above Northern Hardwood Forests but below the very cold and exposed ridges that favor Montane Spruce-Fir Forest. Soils are generally shallow silt or sandy loams. The canopy can contain a mix of Yellow Birch (*Betula alleghaniensis*), Heart-leaved Paper Birch (*Betula papyrifera* var. *cordifolia*), Red Spruce (*Picea rubens*) and Balsam Fir (*Abies balsamea*), though often a single species will dominate within a stand. At the most exposed ridgetop sites the canopy can be stunted and sparse (20-25’ tall, 50-60% cover), but at more protected sites the trees grow taller. Shrubs noted in this community include Striped Maple (*Acer pensylvanicum*), Mountain Maple (*Acer spicatum*), American Mountain Ash (*Sorbus americana*), and Hobblebush (*Viburnum lantanoides*), and herbs include Goldthread (*Coptis trifolia*), Large-leaved goldenrod (*Solidago macrophylla*), Shining Clubmoss (*Lycopodium lucidulum*), Woodlily (*Clintonia borealis*), Mountain Wood Fern (*Dryopteris campyloptera*), Common Wood-Sorrel (*Oxalis acetosella*), Acuminate Aster (*Aster acuminatus*), and Bladder Sedge (*Carex intumescens*). Moss and lichen cover can be abundant.

Some areas of this community have an abundance of Sugar Maple (*Acer saccharum*) in the canopy, and have been mapped as the Montane Yellow Birch-Sugar Maple-Red Spruce Forest variant. A least some of these sites show evidence of soil enrichment, which may allow the sugar maple to compete in an otherwise unfavorable landscape position. Some species indicating moderate enrichment that are found in this variant include Braun’s Holly Fern (*Polystichum braunii*), Drooping woodreed (*Cinna latifolia*), Zigzag Goldenrod (*Solidago flexicaulis*) and Yellow Jewelweed (*Impatiens pallida*).
Portions of the Montane Yellow Birch-Red Spruce Forest near Robbins Mountain and Camel’s Hump summit burned in large forest fires that occurred in 1903 and 1908. These fires are probably in part responsible for many of the stands of paper birch that are still present in this community. After these fires there was extensive tree planting, and some non-native Norway Spruce (Picea abies) can still be found in the high-elevation forest.

While the majority of this community is remote and largely undisturbed, a few areas receive intensive use by backcountry skiers. In these places there is extensive illegal cutting of small trees and brush to create open glades for skiing. The cumulative effect of repeated clearing will likely have lasting impacts on forest structure and composition. The impact is especially acute in the Montane Yellow Birch-Red Spruce Forest, where heavy moose browse combined with the tendency for New York Fern (Thelypteris noveboracensis) and Hay-scented Fern (Dennstaedtia punctilobula) to densely carpet the forest floor, hinders or excludes the establishment of new shrubs or trees.

All examples of Montane Yellow Birch-Red Spruce Forest in the CHMU are examples of statewide significant.

13. Northern Hardwood Forest

Northern Hardwood Forest is the matrix-forming natural community at lower elevations (below 2000’), and in the CHMU it covers over 14,000 acres. As a result, this is a variable community, with species and structure determined by landscape position and disturbance history. While some of the Northern Hardwood Forest is fairly young, the CHMU also has some excellent examples of mature forest patches that have seen relatively little human disturbance. Of particular note, these mature patches have complex structure with large trees, tip-up mounds, coarse woody debris, and large-diameter snags. All of these features create important micro-habitats for both plants and wildlife, and are uncommon in Vermont’s mostly mid-successional forests.

The most common species in the canopy include Sugar Maple (Acer saccharum), Yellow Birch (Betula alleghaniensis), and American Beech (Fagus grandifolia), though younger stands often have Paper Birch (Betula papyrifera), Red Maple (Acer rubrum), and aspens (Populus spp.). Areas with slight soil enrichment tend to favor White Ash (Fraxinus americana) and Basswood (Tilia americana). This canopy averages 60-70’ tall and 70-80% closure. Tall shrubs and understory trees often includes canopy regeneration along with Hop Hornbeam (Ostrya virginiana), Striped Maple (Acer pensylvanicum), Red Elderberry (Sambucus racemosa), and shadbushes (Amelanchier spp). Low shrubs include Hobblebush (Viburnum lantanoides), which can sometimes form a dense, almost impenetrable layer. Herbs (average 50% cover) are diverse, with over 40 different species noted in Northern Hardwood Forest within the CHMU. Some of the most frequently observed species include: Evergreen Woodfern (Dryopteris intermedia), Canada Mayflower (Maianthemum canadense), Common Miterwort (Mitella diphyllos), Hay-scented Fern (Dennstaedtia punctilobula), New York Fern (Thelypteris noveboracensis), and Christmas Fern (Polystichum acrostichoides). Areas with moderate enrichment can have Silvery Spleenwort
(Deparia acrostichoides) and Blue Cohosh (Caulophyllum thalictroides). This community is found primarily on loamy and rocky till soils.

Many wildlife species make use of Northern Hardwood Forest, including mammals such as white-tailed deer, black bear, moose, chipmunk, porcupine, and northern flying squirrel; birds such as hermit thrush, black-throated blue warbler, red-eyed vireo; and reptiles and amphibians such as red-backed salamander, eastern newt, and wood frog.

There are two occurrences of Northern Hardwood Forest in the CHMU, with Route 17 as the separating feature. The northern occurrence encompasses over 13,000 acres and is of very high ecological quality; it is of statewide significance.

14. Northern Hardwood Talus Woodland

Four patches of this community are found in the northern portion of the CHMU. Three of these sites are characterized by an accumulation of large rocks on steep slopes, either as the result of weathering cliffs above or glacial deposits. The boulders average 2-4 cubic feet in size, and are on 40-45 degree slopes. Deep crevices are sometimes formed between rocks. Soil is often absent, but where it does accumulate it can be deep and rich as a consequence of colluvial movement. Tree cover varies from relatively open to near 80% cover, and canopy height can reach 40’. Species include Sugar Maple (Acer saccharum), Yellow Birch (Betula alleghaniensis), and Paper Birch (Betula papyrifera). Red Spruce (Picea rubens) is sometimes present but generally a minor component. Mountain Maple (Acer spicatum) and Red Elderberry (Sambucus racemosa) are characteristic shrubs. Herb cover can be quite high in places, with Evergreen Woodfern (Dryopteris intermedia), Appalachian Polypody (Polypodium appalachianum), and Shining Clubmoss (Lycopodium lucidulum) as abundant species. Talus can provide important habitat for some species of small mammals, including the rare rock shrew (Sorex dispar), for which there are historical records on Camel’s Hump.

A fourth patch mapped as this community type is an unusual example of a rocky talus community found on low-angle ground. It has a similar vegetation composition to Northern Hardwood Talus Woodlands, but needs further study to determine if it is properly classified as this type. No examples of this community found in the CHMU are considered to be of statewide significance.

15. Red Maple-Black Ash Seepage Swamp

This wetland community was mapped within Robbins Mountain WMA along Wes White Hill Road. No ecological data was collected at this site. These swamps are often found on organic soils up to 20” in depth, and the ground usually has well-developed hummocks and hollows. Groundwater seepage typically provides a source of mineral enrichment. Species expected in this community include Red Maple (Acer rubrum), Black Ash (Fraxinus nigra), Winterberry Holly (Ilex verticillata), Speckled Alder (Alnus incana), Cinnamon Fern (Osmunda cinnamomea), and Sensitive Fern (Onoclea sensibilis). This
occurrence is preliminarily C-ranked based on knowledge of size and landscape context. Additional data is needed for this occurrence to confirm if it is properly typed and to confidently assign a quality rank.

16. Red Spruce-Cinnamon Fern Swamp

Red Spruce-Cinnamon Fern Swamps are small, seepage influenced wetlands that in the CHMU are typically found in small, bedrock-controlled basins on the high elevation ridges. Sampled sites have moderately deep (20-50”) peat with a pH measured between 4.0-4.8. These swamps lack a pronounced hummock and hollow topography, and instead have a mostly flat surface with few pools of standing water. Some examples had mineral soil between peat and bedrock.

The tree canopy is composed of a mix of Red Spruce (Picea rubens), Balsam Fir (Abies balsamea), Paper Birch (Betula papyrifera), Red Maple (Acer rubrum), and American Mountain Ash (Sorbus americana). Canopy height averages 20-30’, and most examples have a relatively closed canopy, though some had as little as 25% tree cover. Coarse woody debris was abundant in some patches. Tall shrubs include Hobblebush (Viburnum lantanoides), Mountain Holly (Ilex mucronata), and Northern Wild Raisin (Viburnum cassinoides). Herb cover varies, and species noted include Cinnamon Fern (Osmunda cinnamomea), Three-seeded Sedge (Carex trisperma), Mountain Wood Fern (Dryopteris campyloptera) and Goldthread (Coptis trifolia). Sphagnum moss species are abundant. These small swamps may provide habitat for songbirds such as winter wrens, which will nest in roots of tipped up trees. They may also provide suitable habitat for the rare rock shrew (Sorex dispar), for which there are historical records on Camel’s Hump.

All the examples of Red Spruce-Cinnamon Fern Swamp in the CHMU are small (<5 acres). Because of the high-quality surrounding landscape and good current condition, all are considered examples of statewide significance.

17. Red Spruce-Heath Rocky Ridge Forest

Dry rocky ridges, with little soil and exposure to wind, can favor red spruce (Picea rubens) in sites that lack the cold and damp conditions characteristic of Lowland Spruce-Fir Forest and Montane Spruce-Fir Forest. These sites, which are mapped as Red Spruce-Heath Rocky Ridge Forest, are found on mid-elevation ridges above the Winooski Valley. In particular the Bamforth Ridge has a very extensive example of this community type, which is readily visible to vehicle passengers on I-89 westbound, and to Long Trail hikers who traverse through portions of the community. Since the occurrences in the CHMU are relatively large, within an excellent landscape context, and generally in good current condition, they are considered to be of statewide significance. The occurrence on the Bamforth Ridge may be the best example of Red Spruce-Heath Rocky Ridge Forest in the state.
Because this community is primarily characterized by shallow dry bedrock and the presence of red spruce, it is quite variable. Both open canopy woodlands and dense stands of red spruce have been mapped as Red Spruce-Heath Rocky Ridge Forest in the CHMU.

Open sites have a low (10-15’ tall) canopy with around 20% cover of Red Spruce (Picea rubens) and Balsam Fir (Abies balsamea). A 3-8’ tall secondary canopy with 70% cover is comprised of Red Spruce (Picea rubens), Balsam Fir (Abies balsamea), and American Mountain Ash (Sorbus americana). Black Spruce (Picea mariana) may be also present in places but was not observed during field inventories. Tall shrubs include stunted and prostrate Red Spruce (Picea rubens), and a few Paper Birch (Betula papyrifera). Low shrubs include Lower Lowbush Blueberry (Vaccinium angustifolium) and Creeping Snowberry (Gaultheria hispidula). Herbs are very sparse, with Bunchberry (Cornus canadensis) and Bracken Fern (Pteridium aquilinum). Bare rock is common, and where soil is present it is typically very shallow over the bedrock. In some places, this community intergrades with Temperate Acidic Outcrop and Boreal Outcrop communities.

The closed canopy sites are typified by a taller canopy (up to 30’) of Red Spruce (Picea rubens), Red Maple (Acer rubrum), Paper Birch (Betula papyrifera), and Balsam Fir (Abies balsamea). Understory trees and tall shrubs include American Mountain Ash (Sorbus americana), Striped Maple (Acer pensylvanicum), shadbushes (Amalanchier spp.) and Lower Lowbush Blueberry (Vaccinium angustifolium). Herbs observed include Painted Trillium (Trillium undulatum), Bracken Fern (Pteridium aquilinum), and Pink Ladyslipper (Cypripedium acaule). These sites also had very shallow soils (usually <6”) over bedrock.

The abundant American Mountain Ash (Sorbus americana) in this community may be an important source of food for black bears and many species of songbirds. Other bird species, such as white-throated sparrow and northern junco, might nest in this high-elevation habitat. Finally, this community may host interesting associations of invertebrates, but these have not been studied.

18. Red Spruce-Northern Hardwood Forest

While Red Spruce-Northern Hardwood Forest can be a matrix-forming community, in the CHMU it is found in smaller patches where local microclimate and soil conditions are slightly cooler and favor the cold-tolerant Red Spruce (Picea rubens) and some boreal herb species. It is also possible that historically this community was more widespread on Camel’s Hump, but that the history of timber harvests and forest fires has altered the species composition, limiting the role of spruce in the present forests.

The present-day Red Spruce-Northern Hardwood Forest in the CHMU has a canopy that is 60-70’ tall and ranges from 50-80% cover, and is composed of Red Spruce (Picea rubens), Sugar Maple (Acer saccharum), Yellow Birch (Betula alleghaniensis), Red Maple (Acer rubrum), and American Beech (Fagus grandifolia). Some examples have a secondary canopy with a similar species composition. Tall shrubs (averaging 30% cover) include Striped Maple (Acer pensylvanicum) and Hobblebush (Viburnum
lantanoides). Herb cover varies from sparse to abundant; in places ferns can form a dense carpet. Species include New York Fern (Thelypteris noveboracensis), Evergreen Woodfern (Dryopteris intermedia), Woodlily (Clintonia borealis), Wild Cucumber (Medeola virginiana), Starflower (Trientalis borealis), Wild Sarsaparilla (Aralia nudicaulis), and Pink Ladieslipper (Cypripedium acaule). Typical for the CHMU, the soil is shallow with one site having 4-6" of organic soil over 8-10" of mineral soil above bedrock. Moose, black bear, and many bird species make use of this forest community. Though it may have dense conifer cover in places, it probably does not serve as suitable deer wintering habitat because of the cold and snowy weather of high elevations.

Some examples of this community within the CHMU are considered to be of very high ecological quality, and all are of statewide significance.

19. Rich Northern Hardwood Forest

These are forest patches that show signs of mineral enrichment and host a more diverse suite of plants than those found in typical Northern Hardwood Forests. Sources of enrichment include weathering of mineral-rich bedrock, delivery of minerals to plant rooting zones by upwelling of water (e.g., in seepy areas), or downhill movement of soils on steep slopes (colluvial soil movement). Soils vary accordingly, and can be shallow, seepy, or—especially on colluvial slopes—very deep.

Sugar maple (Acer saccharum) dominates the canopy in this community, and is usually accompanied by a significant component of white ash (Fraxinus americana) and American basswood (Tilia americana). Butternut (Juglans cinerea) is also present in some locations. The shrub layer is not well-developed in this community, but hobblebush (Viburnum lantanoides) and red-berried elder (Sambucus racemosa) are occasionally encountered. The diverse herb layer includes blue cohosh (Caulophyllum thalictroides), plantain-leaved sedge (Carex plantaginea), wild leek (Allium tricoccum), rattlesnake fern (Botrychium virginianum), Virginia waterleaf (Hydrophyllum virginianum), Solomon’s seal (Polygonatum pubescens), silvery spleenwort (Athyrium thelypteroides), wood nettle (Laporta canadensis), sweet cicely (Osmorhiza claytonii), Braun’s holly fern (Polystichum braunii), maidenhair fern (Adiantum pedatum), jack-in-the-pulpit (Arisaema triphyllum), Goldie's Wood Fern (Dryopteris goldiana), and Yellow Jewelweed (Impatiens pallida). These sites likely host many of the same mammals, and birds found in Northern Hardwood Forests. The mineral-rich soils may also provide habitat for specific invertebrates, such as species of snails.

There are six occurrences of Rich Northern Hardwood Forest in the CHMU, and all but one are of statewide significance.

20. Seep

Seeps are abundant within the CHMU. Fifty-nine different Seep patches, forming more than 20 different occurrences, have been mapped in the unit. Because seeps are nearly impossible to identify remotely, it
is likely that the mapped Seeps represent just a small fraction of those in the CHMU. (As additional Seeps are found during subsequent inventories they will be incorporated into the natural community map.) Many of the seeps found in the CHMU are examples of statewide significance.

These small patch communities are characterized by a continuous discharge of groundwater at the soil surface. The water flow can provide nutrient input, and also help moderate temperatures within the seep. In particular, seeps are often the first places to thaw and grow vegetation in the spring, and wildlife such as deer and black bear will forage on the early vegetation when little other food is available.

Seeps are primarily characterized by hydrology and the dominance of herbaceous vegetation. The species composition of particular patches is variable and reflects nutrient levels and microclimate. Species commonly associated with seeps in the CHMU include: Orange Jewelweed (*Impatiens capensis*), Wood Nettle (*Laportea canadensis*), Golden Saxifrage (*Chrysosplenium americanum*), Jack-in-the-pulpit (*Arisaema triphyllum*), Rough-stemmed Sedge (*Carex scabra*), Macloskey’s Violet (*Viola macloskeyi*), Dwarf Blackberry (*Rubus pubescens*), Turtlehead (*Chelone glabra*), Water Avens (*Geum rivale*), Narrow beach Fern (*Phegopteris connectilis*), Gynandrous Sedge (*Carex gynandra*), Bog-candles (*Platanthera dilatata*), and Slender Mannagrass (*Glycera melicaria*). Soils are also variable. Some have peat accumulations and *Sphagnum* moss species, others are primarily mineral soil. Higher elevation seeps in particular seem to have more organic soil, likely the result of increased precipitation and cooler temperatures.

**21. Silver Maple-Ostrich Fern Riverine Floodplain Forest**

Along its northern boundary, Camel’s Hump SP borders the Winooski River, and a few portions of the river floodplain are found within the park. Some of the floodplain has been converted to agricultural field, but some areas are Silver Maple-Ostrich Fern Riverine Floodplain Forest. These are generally fairly disturbed patches. Soils are alluvial and generally fine silts and clays, the result of depositions during flooding. Canopy trees include Box Elder (*Acer negundo*), Black Willow (*Salix nigra*), Butternut (*Juglans cinerea*), Basswood (*Tilia americana*), Gray Birch (*Betula populifolia*), Northern Red Oak (*Quercus rubra*), and American Elm (*Ulmus americana*). Alternate-leaved Dogwood (*Cornus alternifolia*), Choke Cherry (*Prunus virginiana*), and a sumac (*Rhus* sp.) are tall shrubs/understory trees present. Vines include Poison Ivy (*Toxicodendron radicans*), Common Woodbine (*Parthenocissus quinquefolia*), and Purple-flowering Raspberry (*Rubus odoratus*). Herbs are diverse, with a number of weedy species. The non-native species Goutweed (*Aegopodium podagraria* is present and likely poses a threat to native plant species. Other herbs include Ostrich Fern (*Matteuccia struthiopteris*), Moneywort (*Lysimachia nummularia*), Golden Alexanders (*Zizia aurea*), and a wild rye (*Elymus* sp.). The patches of this community in the CHMU form one C-ranked occurrence.
22. Subalpine Krummholz

Just below the open summit of Camel’s Hump is a dense ring of densely-growing stunted trees. The combined effects of wind, ice, fog and cold temperatures stress even the hardiest of tree species, forcing them grow in tight clumps that are low to the ground. Balsam Fir (Abies balsamea), Black Spruce (Picea mariana), and Heart-leaved Paper Birch (Betula papyrifera var. cordifolia) reach 4-8’ in height in this community on Camel’s Hump. Though not noted during inventories, American Mountain Ash (Sorbus americana) and Showy Mountain Ash (Sorbus decora) are characteristic of this community type and are both probably present as well. Shrubs (< 3% cover) include Mountain Holly (Ilex mucronata), Labrador Tea (Ledum groenlandicum), and blueberries (Vaccinium spp.), including the rare Bog Billberry (Vaccinium uliginosum). Herbs are sparse beneath the dense tree growth, but Goldthread (Coptis trifolia), Starflower (Trientalis borealis), and Bunchberry (Cornus canadensis) were all noted in this community. Moss and lichens cover was relatively abundant, but individual species were not identified during inventories.

Subalpine Krummholz can provide habitat for some birds and small mammals, including the uncommon Bicknell’s Thrush, which will nest in this community. Other species likely to be found in this patch of Subalpine Krummholz include blackpoll warbler, white-throated sparrow, and red-backed vole. The rare rock shrew has been found at high elevations on Camel’s Hump, and could possibly use this community.

Just less than 14 acres of this community type have been mapped in the CHMU. It is C-ranked and considered an example of statewide significance.

23. Temperate Acidic Cliff

A 15’ high Temperate Acidic Cliff was mapped among the large complex of rock outcrops that is on the northern ridge of Camel’s Hump, east of Gleason Brook. It is likely that other small cliffs are interspersed with these outcrops (and possibly in other parts of the CHMU) but were not detected during inventories. The mapped cliff is partially overhanging, and is above a Boreal Talus Woodland. Only limited ecological data was collected here; the cliff is an exposure of the underlying schist bedrock and species found around the edges include Red Spruce (Picea rubens), Yellow Birch (Betula alleghaniensis), American Mountain Ash (Sorbus americana), Mountain Wood Fern (Dryopteris campyloptera), Lower Lowbush Blueberry (Vaccinium angustifolium), and many mosses and lichens. A Woodsia sp. was found on the overhanging section of cliff. This occurrence is tentatively C-ranked, but more information is needed to confidently assign an overall quality rank.

24. Temperate Acidic Outcrop

Characterized by a mix of open rock and areas short stunted tree and shrub cover, this community is found where shallow bedrock creates a warm and dry microclimate. Nearly two dozen Temperate Acidic
Outcrops have been mapped in the CHMU, primarily on the northern portion of Camel’s Hump State Park, but there are likely additional small outcrops that were not detected during inventories.

Tree cover is sparse (approximately 30-50%) and stunted, with trees only growing 10-15’ tall. Species include Red Spruce (*Picea rubens*), Red Maple (*Acer rubrum*), Paper Birch (*Betula papyrifera*), Northern Red Oak (*Quercus rubra*), American Mountain Ash (*Sorbus americana*), shadbushes (*Amelanchier* spp.) and the tall shrub Black Chokecherry (*Aronia melanocarpa*). The only low shrubs observed were blueberries (*Vaccinium* spp.). Herb species in this community include Common Oatgrass (*Danthonia spicata*), Mountain Wood Fern (*Dryopteris campyloptera*), a sedge (*Carex brunescens*), Wild Sarsaparilla (*Aralia nudicaulis*), Bracken Fern (*Pteridium aquilinum*), Hay-scented Fern (*Dennstaedtia punctilobula*), and Fringed Bindweed (*Polygonum cilinode*). In some places the non-native Sheep Sorrel (*Rumex acetosella*) is abundant. Non-vascular plants can be common on these outcrops, with occasional extensive cover of mosses and lichens. The blueberries and mountain ash berries may attract songbirds and other wildlife to these outcrops, and species such as bobcats might be found where outcrops intergrade with cliffs and talus communities.

Six occurrences of this community type have been mapped in the CHMU; most cover less than 5 acres and all but one are considered examples of statewide significance.

### 25. Temperate Calcareous Cliff

Two occurrences of Temperate Calcareous Cliff are found northwest of the Camel’s Hump summit. Though the underlying bedrock is broadly mapped as acidic schist, it seems to contain lens of calcareous rock that contribute to mineral enrichment. The one cliff that was studied in detail is 400’ long and varies in height from 10-35’. Species observed on the cliff include Common Miterwort (*Mitella diphyllya*), Mountain Maple (*Acer spicatum*), Bulblet Fern (*Cystopteris bulbifera*), Fragile Fern (*Cystopteris fragilis*), Dwarf Blackberry (*Rubus pubescens*), and a *Ribes* species and an *Impatiens* species. The uncommon fern Steller’s Cliffbrake (*Cryptogramma stelleri*) is also present on this cliff. Because of their small size, these occurrences are both C-ranked.

### 26. Vernal Pool

Vernal pools form in small basins that are often dry, but fill with water in the spring (and occasionally in other seasons) due to heavy rain and snowmelt. In the CHMU, these pools vary in size from 20’x30’ to 80’x30’; they were usually found with less than 12” of water. Because they lack fish, these pools are excellent breeding habitat for amphibians—frogs and salamanders—that migrate to the pools to reproduce and lay eggs. Unlike other natural communities, which are typically defined and assessed based on vegetation, vernal pools are better characterized by the amphibian and invertebrate species present, such as wood frogs, spotted salamanders, fingernail clams, caddis flies, and fairy shrimp. Vegetation found around the edges of these pools in the CHMU includes Wood Nettle (*Laportea canadensis*), Lady Fern (*Athyrium filix-femina*), Sensitive Fern (*Onoclea sensibilis*), Meadow-sweet
(Spiraea alba), Orange Jewelweed (Impatiens capensis), Cinnamon Fern (Osmunda cinnamomea), and sedges (Carex sp.).

Detailed information on amphibian breeding populations is needed to assign quality ranks to Vernal Pools; none could be ranked based on information collected during these inventories. There are six occurrences of this community type in the CHMU, one of which is a cluster of six individual pools.
## APPENDIX G - RECREATION USE DATA

### Trailhead Sign ins*:

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***The summit count is recorded daily by the full-time Green Mountain Club caretakers when they are on summit duty. The number of visitors each day is recorded using a hand held clicker counter. Caretakers are present in the summer months only.
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Camel's Hump State Park
DUXBURY BLOCK

Camel's Hump Management Unit LRMP - Appendices

Page 338
## CAMEL'S HUMP MANAGEMENT UNIT LONG RANGE MANAGEMENT PLAN - STAND INFORMATION

### Camel's Hump State Park

#### DUXBURY BLOCK

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Camel's Hump Management Unit LRMP - Appendices

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## Camel's Hump Management Unit LRMP - Appendices

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# Camel's Hump Management Unit Long Range Management Plan - Stand Information

**Camel's Hump State Park**

**Forest City Block**

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**Camel's Hump Management Unit LRMP - Appendices**

Page 350
# Camel's Hump Management Unit Long Range Management Plan - Stand Information

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Camel's Hump Management Unit LRMP - Appendices
### Camel's Hump Management Unit Long Range Management Plan - Stand Information

**Appalachian Gap Block**

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APPENDIX I

Assessment of the Native Bee Diversity of Camel’s Hump Management Unit
Leif Richardson, Consulting Ecologist
Leifr7@gmail.com

December 3, 2013
INTRODUCTION

The 25,000 acres of state lands that comprise the Camel’s Hump Management Unit (CHMU) provide many environmental, recreational and aesthetic values to Vermonters. As part of the development of a Long Range Management Plan (LRMP) for these lands, staff from the Department of Forests, Parks and Recreation and their partners have prepared assessments of the resources found here. Similar to previous state lands LRMPs, these include assessments of environmentally and economically important natural resources, including natural communities, wildlife and timber. But due to a lack of funding or staff, LRMPs usually do not include assessments of some ecologically significant groups such as invertebrate animals and fungi. This document describes an inventory of one such group, native species of bees. The purpose of this assessment is to provide a preliminary picture of the diversity of this group at the CHMU, as well as some management recommendations for maintaining habitat for these animals.

Roughly 90% of the plants native to the northeast are dependent on animals for pollination, the transfer of pollen between flowers necessary for plant reproduction. This figure includes most of our forest and wetland herbs, forest trees such as sugar maple and black cherry, and key wildlife foods including raspberries, apple and blueberry. It also includes most of the rare, threatened and endangered plants found at CHMU, including alpine tundra species such as Boot’s rattlesnake root (*Prenanthes bootti*) and northern bilberry (*Vaccinium uliginosum*). The vast majority of the animal-mediated pollination in this region is performed by bees, animals for which plant pollen is the only protein source. Most plant species compete for pollination services of multiple species of bees and other insects, but some benefit from visits by specialist pollen foragers (‘oligoleges’), bees that provision their offspring with single source pollens. As pollinators, bees are keystone animals in the natural communities found at CHMU. Wild bees also perform the majority of the pollination of agricultural crops, meaning that pollination, like water filtration, is an ‘ecosystem service’ that people in the area around CHMU receive from these conserved lands.

Vermont has an estimated 275 native as well as 5-10 introduced species of bees, (of which the managed European honey bee is the most familiar). This figure is derived from historical collections, however, and overall the state’s bees are poorly known.
Additionally, we know the status of only a few of these insects in Vermont, and in most cases would not be able to detect changes in their abundance and distribution. This is worrying because for the few bee groups we do know well (e.g., bumble bees), there is evidence of widespread species declines (Cameron et al. 2011, Colla et al. 2012, Bartomeus et al. 2013), including in Vermont (Richardson and McFarland unpublished). These declines are probably due to a combination of threats that include climate change, pesticides, introduction of new pathogens and changes in habitat. Given their functional significance to natural and human systems and the threats they face, the inventory of native bees, particularly on conserved lands, should be a priority. While the current effort is cursory, it should serve as a baseline of information on the bees of the Camel’s Hump area.

METHODS

Bees were collected and identified from sites around Camel’s Hump Management Unit in summer, 2013. Collection methods differed slightly from the initially proposed sampling scheme for practical reasons, and the inventory consequently included more sites, but fewer visits to each site. Bee specimens were collected on four dates from June to August 2013. A total of 15 sites were chosen to represent a broad cross-section of the habitats and elevations present at CHMU (Figure 1; Table 1). These habitats included rivershore grassland, weedy roadsides, an active sand and gravel pit, managed old fields, northern hardwood forests, outcrops, montane forests dominated by spruce and fir, and alpine tundra. Collections took place on sunny days when flowers attractive to bees were in bloom, and a day spent on the summit was timed to coincide with peak flowering of tundra plants.

Two collection methods were used, netting and pan trapping. During netting, a standard insect net was swept over flowers and bees caught were killed with hydrogen cyanide and later mounted on insect pins. Individual bees were netted regardless of their identity, except for bumble bees, which at some sites were not collected after each species had already been collected once. Pan trapping methods follow those of Droege (2012). Traps were 3.5oz white plastic Solo brand food cups, some of which were painted with blue or yellow fluorescent spray paint (Krylon brand), which is attractive to bees.
and other insects. At each site, equal numbers of blue, yellow and white traps were placed on the ground >3 meters apart, filled with soapy water, and left for 4-12 hours, during which time insects landed on the water and become trapped. Pan traps were picked up at the end of each sampling day and collections were rinsed and stored in 70% ethanol. Insects were later strained, dried with a hair dryer and pinned. All specimens were databased and labeled. Most bees were identified to species, but for two difficult groups—the genera *Andrena* and *Lasioglossum*—specimens were typed only to morphospecies, and will be definitively identified at a later date. A variety of spiders, flies, wasps and other invertebrates collected in pan traps were retained, particularly when they came from specialized habitats (e.g., alpine areas).

For purposes of comparison, pan trap data were standardized to bees*trap⁻¹*day⁻¹, assuming a 12 hour diurnal period of bee activity.

RESULTS

A total of 221 insects were collected, 169 of them bees. An estimated 57 species of bees from five families were collected (Table 2). Bees of the family Apidae, which includes the bumble bees, were most numerous. As in previous studies, netting and pan trapping produced complimentary assemblages of specimens, with larger species being less common in traps (likely because they can climb out of them) and smaller species sometimes eluding capture by net.

Pans were used on four days at 9 sites. A total of 253 pans were deployed for 1,747 pan-hours. Capture rate averaged 0.66 (+0.51) bees*trap⁻¹*day⁻¹ (range 0-1.44). Bees were captured in all three trap colors, and no obvious patterns of attraction among them were evident.

Insects of other types were collected as by-catch at several sites and will be retained for identification. Noteworthy collections include wasps, spiders, sawflies and spiders from the alpine tundra of the summit of Camel’s Hump.

DISCUSSION

This inventory presents a preliminary view of the bee diversity and distribution of Camel’s Hump Management Unit. Despite a relatively small collecting effort on a limited
number of days, the effort identified >20% of the state’s known bee diversity within the confines of the management unit. While pan trapping may appear to have been an inefficient method for bee capture, the catch rate for traps in this inventory was within the range of other studies in the eastern U.S. (Droege et al. 2010b). Bees were generally abundant during netting, except on the Camel’s Hump summit, where abundance was extremely low, despite fine weather and peak flowering of very attractive plants such as blueberry and bilberry (*Vaccinium* spp.).

Three rare or uncommon bee species were collected. *Bombus terricola* (pictured at Appalachian Gap in lower right inset photo, p. 1) is a bumble bee that was once one of the most commonly collected species in the northeast, but has disappeared from much of its former range (Colla et al. 2012). This species accounts for <2% of the 10,000 collections made during a two year citizen science inventory of Vermont’s bumble bees by the Vermont Center for Ecostudies (Richardson and McFarland, *unpublished data*) and was recently recommended for listing as Endangered by the state’s Endangered Species Committee. *B. terricola* is also being recommended for federal protection under Canada’s endangered species program, the Committee on the Status of Endangered Wildlife in Canada (Colla and Richardson 2013). *B. terricola* was collected at Appalachian Gap and on the summit of Camel’s Hump during this survey. A second bumble bee of conservation concern, *B. sandersoni*, was collected along Route 17 near Appalachian Gap. This bee is broadly distributed across Canada and was formerly found as far south as the highlands of the southern Appalachians, but is now uncommon in collections from the northeastern U.S. Finally, *Nomada bethunei*, a kleptoparasitic species collected at the summit, is an uncommon northern species (Droege et al. 2010a) that may have a limited distribution in Vermont.

There are several notable absences from this collection that warrant mention. *Bombus affinis* was one of the most common bee species in the northeast until the late 1990s, when it abruptly disappeared from almost all of its former range. Formerly found in a variety of habitats, the most recent specimens from Vermont were collected in Underhill and Huntington in 1999 within a few miles of the CHMU. This bee was likely one of the most common at CHMU before its decline. Indeed, UVM’s Zadock Thompson Zoological collections include a 1972 *B. affinis* specimen labeled “Bolton, Camel’s...
Hump”. *B. ashtoni* (=*B. bohemicus*), another regionally rare bumble bee, was also absent from this inventory, but would most likely have been common at CHMU 20 years ago. A third bumble bee previously collected at Camel’s Hump but not found in this inventory is *B. citrinus*, a social parasite of other bumble bee species. While still found in other parts of the state, this species appears to have declined over the last decade.

This inventory could be strengthened by additional surveys. In general, it would be good to do more extensive pan trapping and netting in a greater variety of habitats and sites around the CHMU. More work in the alpine zone is necessary to fully characterize the bees that live there, some of which are likely to be habitat specialists (e.g. pollen feeders on rare plants or arctic/ alpine in distribution). And, this effort is incomplete without a thorough collection of the bees that collect nectar and pollen from spring ephemeral wildflowers. (These collections were not made in 2013 due to logistical constraints.)

**Management Recommendations**

Management activities typically used on state lands can both harm and help bees. The following specific recommendations will help to support the diversity of bees found at CHMU:

1) Alpine zone management: Continue to manage the summit of Camel’s Hump to conserve the alpine tundra natural community and the plants that grow there. Some of the fragile vegetation present on the summit—in particular the rare plants *Diapensia lapponica* and *Prenanthes boottii*—have noticeably declined in recent years due to trampling by hikers and their dogs (Countryman 1980; Richardson, personal observation). This loss of nectar and pollen sources may negatively affect bees as well as other flower foraging insects.

2) Deciduous forest management: Northern hardwood forests dominated by deciduous trees provide some of the most extensive bee habitat at CHMU, yet they are among the most intensively managed forest types there. Spring ephemeral wildflowers that emerge before the tree canopy has leafed out support a large diversity of bees that complete the active part of their life cycle in just a few weeks of spring. Current forest management practices generally promote other forest stand values (e.g. by retention of legacy trees), yet they tend to reduce
understory herb diversity and abundance by favoring the spread of ferns and shrubs. This incremental change probably results in a gradual loss of habitat quality for the bees that rely on spring wildflowers. Whenever possible, timber management practices should seek to maximize retention of these understory plants.

3) Anthropogenic habitats: Native bee species are abundant in some ‘unnatural’ habitats at CHMU, and these habitats should be retained if possible. Old fields with a variety of native and non-native flowering plants such as those in Bolton where the Catamount Trail enters the property should be maintained. For bees, many of which are ground nesters, mowing in alternate years and/or late in the growing season is probably best. Additionally, the open sand and gravel pit on Duxbury (River) Road in Bolton is excellent habitat for certain species that depend on areas of open sand for nesting. The current active management of the site for extraction of road materials supports this habitat.

4) Maintenance of plant hosts for specialists: The CHMU supports many types of plants that are the sole source of pollen for particular bee species, and land managers can encourage these species by managing with those plants in mind. These include willows (Salix spp.), spring beauty (Claytonia caroliniana), blueberries, cranberry and bilberry (Vaccinium spp.), dogwoods (Cornus spp.), asters (Symphyotrichum spp. and allies) and goldenrods (Solidago spp.).

5) Pesticides and herbicides: Minimize or eliminate the use of these chemicals if possible. Where pesticides must be used, avoid spraying flowering plants and do not use neonicotinoids (e.g. imidacloprid), which are very toxic to herbivorous insects including bees.

In summary, a preliminary assessment reveals that the Camel’s Hump Management Unit supports a diversity of Vermont’s native bee species, although some important species have declined in or disappeared from the area. More inventory is needed to fully characterize this functionally important group of invertebrates at CHMU. Most typical management activities undertaken by state lands managers probably have a neutral or positive effect on bees, but certain changes, in particular to timber harvest
practices in hardwood stands, would likely improve bee habitat. Recreational activities in alpine areas may have a negative effect on bees via trampling of flowering plants, and this effect could be avoided with increased management, especially in the alpine tundra on the summit of Camel’s Hump.
FIGURES AND TABLES

Table 1. Bees were collected at 15 sites around the CHMU on four days in 2013. Bees were collected by a combination of netting and pan trapping.

<table>
<thead>
<tr>
<th>Site</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Elevation (M)</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpine Trail terminus</td>
<td>44.322</td>
<td>-72.885</td>
<td>1,164</td>
<td>06/20/2013</td>
</tr>
<tr>
<td>Appalachian Gap</td>
<td>44.211</td>
<td>-72.931</td>
<td>686</td>
<td>08/1/2013, 08/20/2013</td>
</tr>
<tr>
<td>Banforth Ridge</td>
<td>44.348</td>
<td>-72.865</td>
<td>651</td>
<td>06/06/2013</td>
</tr>
<tr>
<td>Banforth Ridge outcrops</td>
<td>44.354</td>
<td>-72.867</td>
<td>527</td>
<td>06/06/2013</td>
</tr>
<tr>
<td>Camel's Hump Road</td>
<td>44.326</td>
<td>-72.838</td>
<td>313</td>
<td>08/01/2013</td>
</tr>
<tr>
<td>Camel's Hump Summit</td>
<td>44.320</td>
<td>-72.887</td>
<td>1,244</td>
<td>06/20/2013</td>
</tr>
<tr>
<td>Catamount Trailhead</td>
<td>44.371</td>
<td>-72.901</td>
<td>111</td>
<td>06/20/2013</td>
</tr>
<tr>
<td>Duxbury Road (sand pit)</td>
<td>44.366</td>
<td>-72.867</td>
<td>137</td>
<td>08/01/2013</td>
</tr>
<tr>
<td>Honey Hollow</td>
<td>44.346</td>
<td>-72.918</td>
<td>316</td>
<td>08/01/2013</td>
</tr>
<tr>
<td>Long Trail (Winooski River)</td>
<td>44.370</td>
<td>-72.879</td>
<td>110</td>
<td>06/06/2013</td>
</tr>
<tr>
<td>Long Trail (N of App Gap)</td>
<td>44.212</td>
<td>-72.930</td>
<td>780</td>
<td>08/01/2013</td>
</tr>
<tr>
<td>Monroe Trailhead</td>
<td>44.316</td>
<td>-72.850</td>
<td>439</td>
<td>08/01/2013</td>
</tr>
<tr>
<td>Rich NHF along LT</td>
<td>44.367</td>
<td>-72.882</td>
<td>152</td>
<td>06/06/2013</td>
</tr>
<tr>
<td>Robbin's Mtn WMA roadside</td>
<td>44.355</td>
<td>-72.964</td>
<td>221</td>
<td>08/01/2013</td>
</tr>
<tr>
<td>Route 17</td>
<td>44.218</td>
<td>-72.947</td>
<td>503</td>
<td>08/01/2013</td>
</tr>
</tbody>
</table>
Table 2. Approximately 57 species of bees were collected during four days of inventory at CHMU. Species of *Andrena* and *Lasioglossum* were sorted to morpho-species only, and will later be identified to species.

<table>
<thead>
<tr>
<th>Family</th>
<th>Species</th>
<th>No. Specimens</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andrenidae</td>
<td><em>Andrena</em> (~ 10 species)</td>
<td>13</td>
</tr>
<tr>
<td>Apidae</td>
<td><em>Apis mellifera</em></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td><em>Bombus bimaculatus</em></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td><em>B. borealis</em></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><em>B. impatiens</em></td>
<td>12</td>
</tr>
<tr>
<td></td>
<td><em>B. perplexus</em></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td><em>B. sandersoni</em></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><em>B. ternarius</em></td>
<td>29</td>
</tr>
<tr>
<td></td>
<td><em>B. terricola</em></td>
<td>13</td>
</tr>
<tr>
<td></td>
<td><em>B. vagans</em></td>
<td>26</td>
</tr>
<tr>
<td></td>
<td><em>Bombus sp.</em></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><em>Ceratina dupla</em></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><em>Nomada bethunei</em></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><em>N. cressoni</em></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><em>N. depressa</em></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><em>Nomada sp.</em></td>
<td>1</td>
</tr>
<tr>
<td>Colletidae</td>
<td><em>Hylaeus annulatus</em></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><em>Hylaeus sp.</em></td>
<td>1</td>
</tr>
<tr>
<td>Halictidae</td>
<td><em>Agapostemon texanus</em></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><em>Augochlorella aurata</em></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td><em>Halictus</em> (2 species)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><em>Lasioglossum</em> (~25 species)</td>
<td>41</td>
</tr>
<tr>
<td>Megachilidae</td>
<td><em>Hoplitis producta</em></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><em>M. relativa</em></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td><em>Megachile inermis</em></td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>169</td>
</tr>
</tbody>
</table>
Figure 1. Bees were collected in a variety of habitat types around the Management Unit. Refer to Table 1 for a list of locations.
APPENDIX 1

Insects collected during this survey were databased using Filemaker Pro 12 software. A Microsoft Excel table version of the database accompanies this document, and the original Filemaker Pro file is available upon request. Specimens collected during this assessment will be given to the Department of Forests, Parks and Recreation, or donated to a scientific collection of the Department’s choosing (e.g. UVM’s Zadock Thompson Zoological Collection).
LITERATURE CITED


APPENDIX J - Photos

Camel’s Hump summit observatory 1860

Sam Ridley hotel near Camel’s Hump summit 1865

Forest fire observatory on Camel’s hump summit 1911

Camel’s Hump from the east late 1800’s

Couching Lion Farm (Will Monroe)

Former Montclair Glen Lodge
Camel's Hump hut clearing 1908

Camel's Hump hut clearing early 1900’s

Old Birch Glen Camp

Mt. Ethan Allen from Camel's Hump

Old Theron Dean shelter

Old style camping
APPENDIX K- LITERATURE USED IN WRITING THE CHMU LRMP

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Chittenden County Regional Planning Commission. 2018. 2018 *Chittenden County ECOS Plan*.


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Greene-Swift, P.E. 2008. Research findings to support the addition of four new seep wetland communities, and five potential variant communities thereof, located in the central Vermont region of the northern Green Mountains. Unpublished Master’s Project. Antioch University, Keene, NH.


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